SEW EURODRIVE

Operating Instructions

User-friendly documentation
TÜV SÜD DocCert

DR.71 – 315 AC Motors

Edition 07/2013

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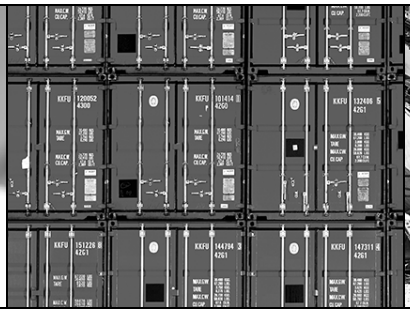

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1 General information

1.1 How to use this documentation

The documentation is an integral part of the product and contains important information on operation and service. The documentation is written for all employees who assemble, install, start up, and service this product.

The documentation must be accessible and legible. 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 documentation carefully and understood it. If you are unclear about any of the information in this documentation, or if you require further information, contact SEW-EURODRIVE.

1.2 Structure of the safety notes

1.2.1 Meaning of signal words

The following table shows the grading and meaning of the signal words for safety notes, warnings regarding potential risks of damage to property, and other notes.

Signal word	Meaning	Consequences if disregarded
⚠ **DANGER**	Imminent danger	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 the handling of the drive system.	

1.2.2 Structure of the section safety notes

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

This is the formal structure of a section safety note:

⚠ SIGNAL WORD

Type and source of danger.

Possible consequence(s) if disregarded.

- Measure(s) to prevent the danger.

1.2.3 Structure of the embedded safety notes

Embedded safety notes are directly integrated in 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 danger.

  Possible consequence(s) if disregarded.

  – Measure(s) to prevent the danger.

1.3 Rights to claim under warranty

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

1.4 Exclusion of liability

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

1.5 Product names and trademarks

All product names in this documentation are trademarks or registered trademarks of their respective titleholders.

1.6 Copyright

2 Safety notes

The following basic safety notes must be read carefully to prevent injury to persons and damage to property. The operator must ensure that the basic safety notes are read and adhered to. 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.. AC motors. If using gearmotors, also refer to the safety notes in the corresponding operating instructions for:

- Gear unit

Also observe the supplementary safety notes in the individual sections of this documentation.

2.2 General information

⚠ WARNING

Danger of fatal injury or risk of injury during the operation of motors or gearmotors caused by live, bare (in the event of open connectors/terminal boxes) and movable or rotating parts.

Risk of burns caused by hot surfaces

Severe or fatal injuries

- All work related to transport, storage, installation, assembly, connection, startup, maintenance and repair may only be carried out by qualified personnel.
- For transport, storage, installation, assembly, connection, startup, maintenance and repair it is important that you adhere to the information in the following documents:
  - 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 products.
- Never operate or energize the unit without the necessary protection covers or housing.
- Use the unit only for its intended purpose.
- Make sure the unit is installed and operated properly.

INFORMATION

Report any transport damage to the shipping company immediately.

This documentation provides additional information.

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 further areas of transportation, storage, operation and waste disposal must only be carried out by persons who are trained appropriately.

All qualified personnel must wear appropriate protective clothing.

2.4 Functional safety

SEW-EURODRIVE drives can be supplied with safety-rated components.

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

SEW-EURODRIVE indicates such an integration by the FS mark and a number on the nameplate of the motor.

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	Motor monitoring (e.g. motor protection)	Encoder	Brake	Brake monitoring (e.g. function)	Manual brake release
01	**x**					
02				x		
03		x				
04			x			
05	x			x		
06	x	x				
07	x		x			
08				x		x
09				x	x	
10		x		x		
11			x	x		
12		x	x			
13	x		x	x		
14	x	x	x			
15			x	x		x
16			x	x	x	
17		x	x	x		
18	x	x		x		x
19	x		x	x		x
20	x	x		x	x	
21	x		x	x	x	
22	x	x	x	x		
23	x	x	x	x		x
24	x	x	x	x	x	
25	x	x	x	x	x	x
26				x	x	x
27			x	x	x	x
28		x		x		x
29		x		x	x	
30		x		x	x	x
31		x	x	x		x
32		x	x	x	x	
33		x	x	x	x	x
34	x			x		x
35	x			x	x	
36	x			x	x	x
37	x		x	x	x	x
38	x	x		x		
39	x	x		x	x	x

If the FS logo on the nameplate contains the code "FS 11", for example, the motor is equipped with a combination of safety-rated brake and safety-rated encoder.

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

- "Safety-Rated Encoders – Functional Safety for AC Motors DR.71-225, 315" addendum to the operating instructions
- "Safety-Rated Brakes – Functional Safety for AC Motors DR.71-225" addendum to the operating instructions
- "Safety-Rated Brake System" system manual

To determine the safety level for systems and machines yourself, refer to the characteristic safety values of the following components in chapter "Technical data":

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

The characteristic safety values of SEW components are also available on the SEW homepage on the Internet and in the SEW library for the Sistema software of the Institute for Occupational Safety and Health of the German Social Accident Insurance (IFA, formerly BGIA).

2.5 Designated use

The DR.. 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 form the basis for this.

Use 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.

2.6 Other applicable documentation

2.6.1 DR.71 – 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, S..7, SPIROPLAN® W" operating instructions for gearmotors
- "DR Series AC Motors" catalog and/or
- "DR Gearmotors" catalog
- if required "Functional Safety for AC Motors DR.71-225, 315 – Brakes" addendum to the operating instructions
- if required "Functional Safety for AC Motors DR.71-225, 315 - Encoders" addendum to the operating instructions
- if required "MOVIMOT® MM..D Functional Safety" manual

2.7 Transport/storage

Inspect the shipment for any damage that may have occurred in transit as soon as you receive the delivery. Inform the shipping company immediately in the event of damage. It may be necessary to preclude startup.

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

The built-in lifting eyebolts comply with DIN 580. Always observe the loads and regulations listed in this standard. If the gearmotor is equipped with two eyebolts, then both should be used for transportation. In this case, the tension force vector of the slings must not exceed a 45° angle according to DIN 580.

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

Store the motor/gearmotor in a dry, dust-free environment if it is not to be installed straight away. You must not store the motor/gearmotor outdoors or on the fan guard. The motor/gearmotor can be stored for up to 9 months without requiring any special measures before startup.

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 network 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.

Install or remove belt pulleys and couplings using only 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 waste air, or air from adjacent units, cannot be drawn in again straight away.

Observe the notes in the "Mechanical Installation" section.

2.9 Electrical connection

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

Check that the motor is de-energized!

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

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

The connection should be a continuous secure electrical connection (no protruding wire ends); use the cable end equipment 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:

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

The terminal box must be free of foreign objects, dirt and humidity. Unused cable entry openings and the box itself must be closed so that they are dust and water proof. Secure keys for test mode without output elements. When operating low-voltage machines with brakes, check that the brake is functioning correctly before startup.

Observe the notes in the "Electrical Installation" chapter.

2.10 Startup/operation

Whenever changes to normal operation occur, such as increased temperatures, noise, vibrations, etc., try to determine the cause. Consult the manufacturer if required. Never deactivate protection devices, even in test mode. Switch off the motor in case of doubt.

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.

Danger of burns.

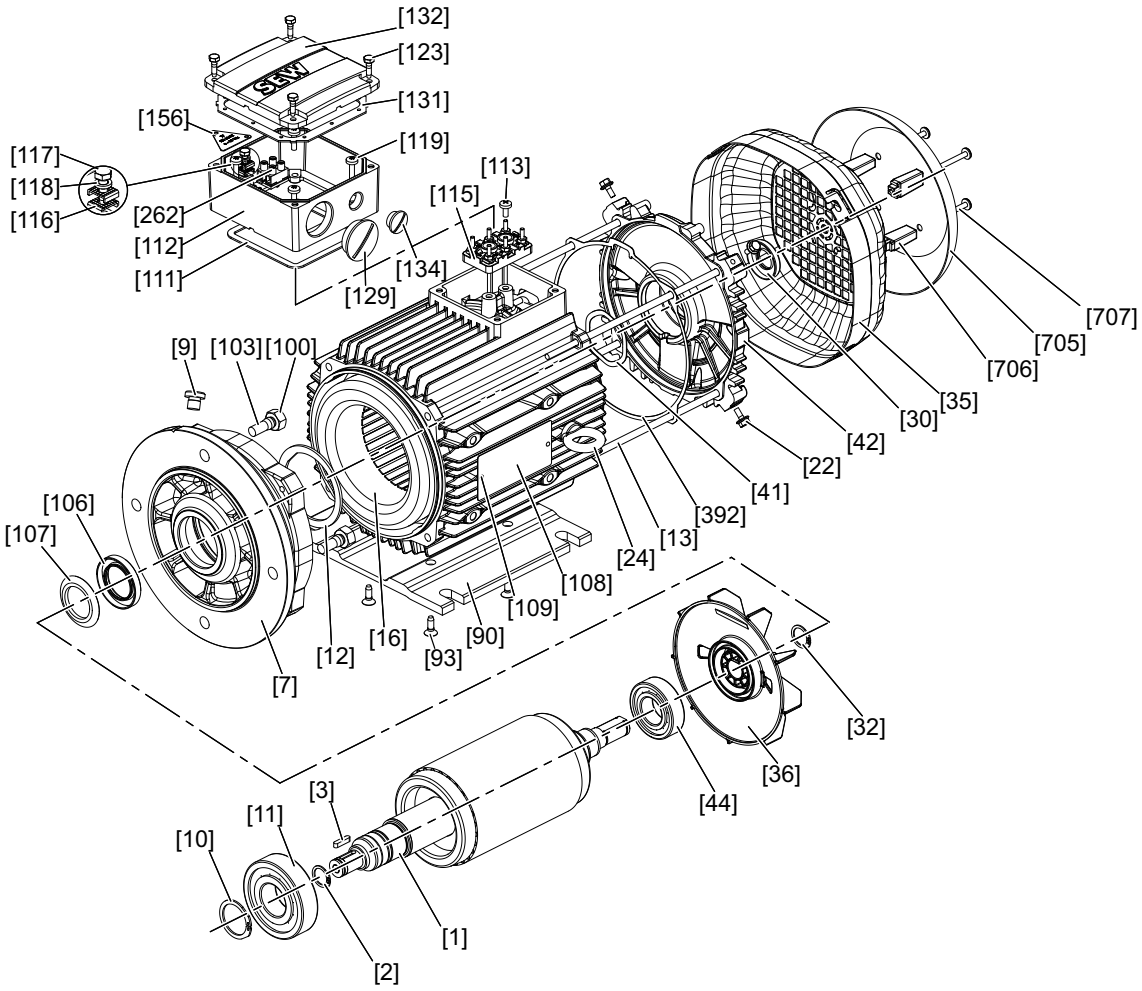
- Make sure that hot surfaces cannot be touched unintentionally or during normal operation. Install covers or warning signs according to regulations.
- Let the unit cool down before you start working on it.

3 Motor structure

INFORMATION

The following figures are block diagrams. They help you to assign components to the spare parts list. Deviations are possible depending on the motor size and version.

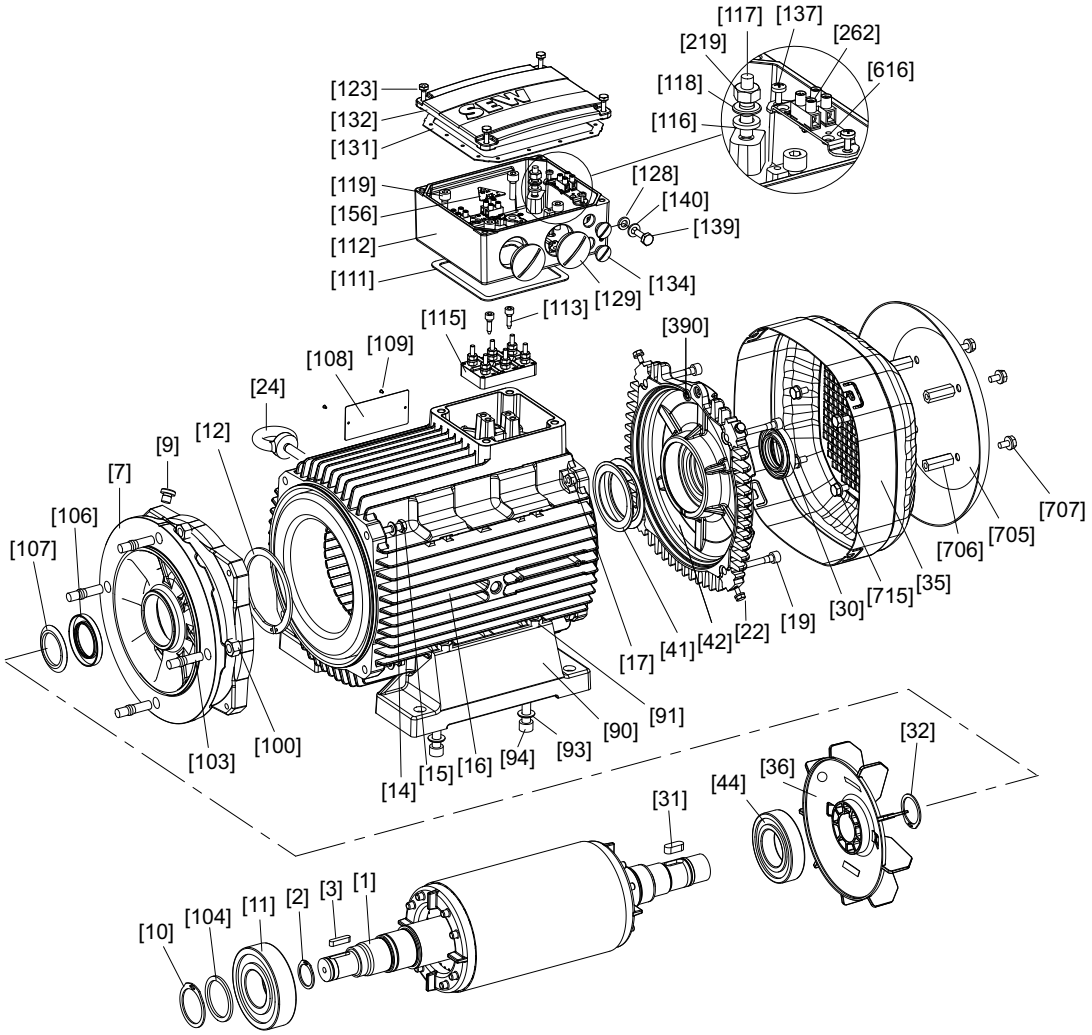
3.1 DR.71 – DR.132 – basic structure



173332747

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

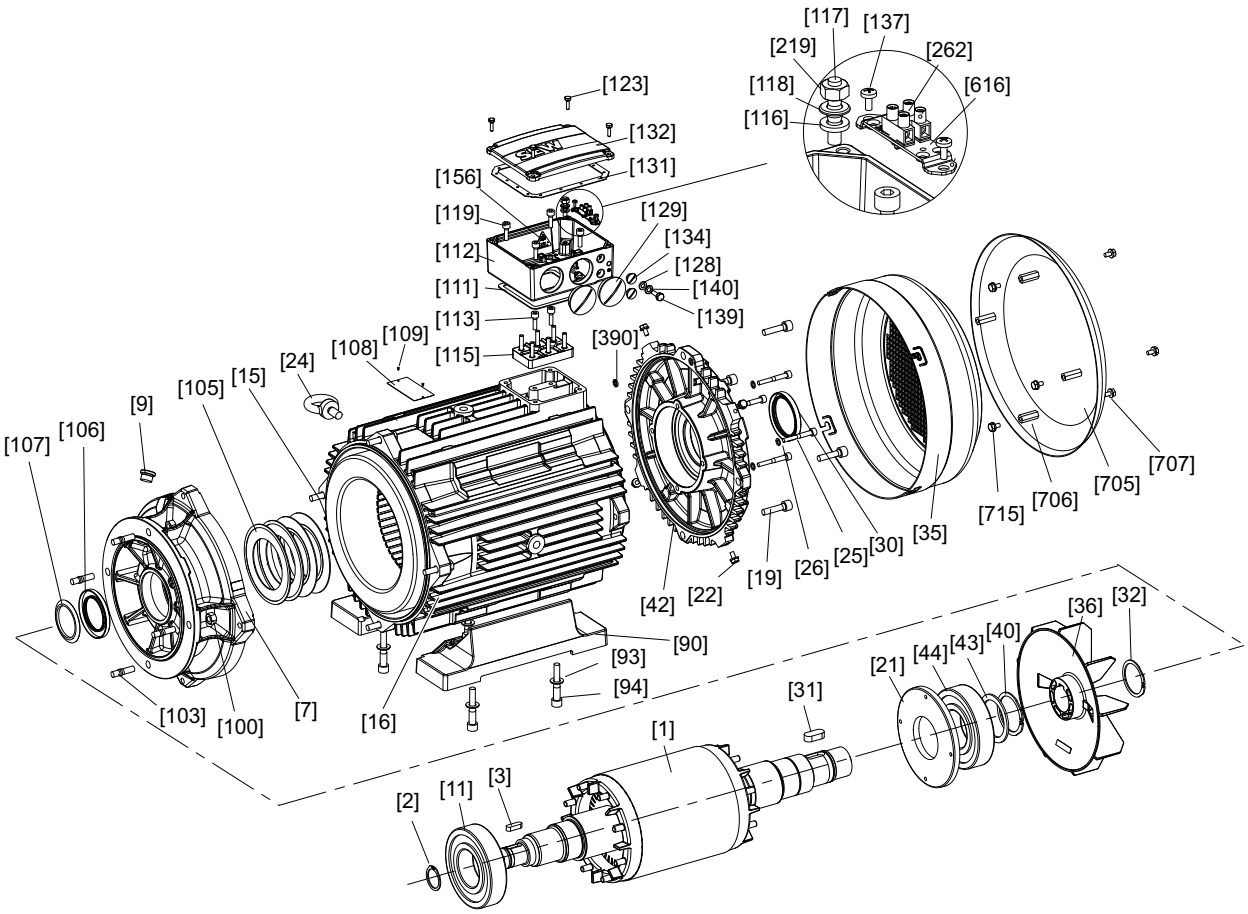
3.2 DR.160 – DR.180 – basic structure



527322635

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

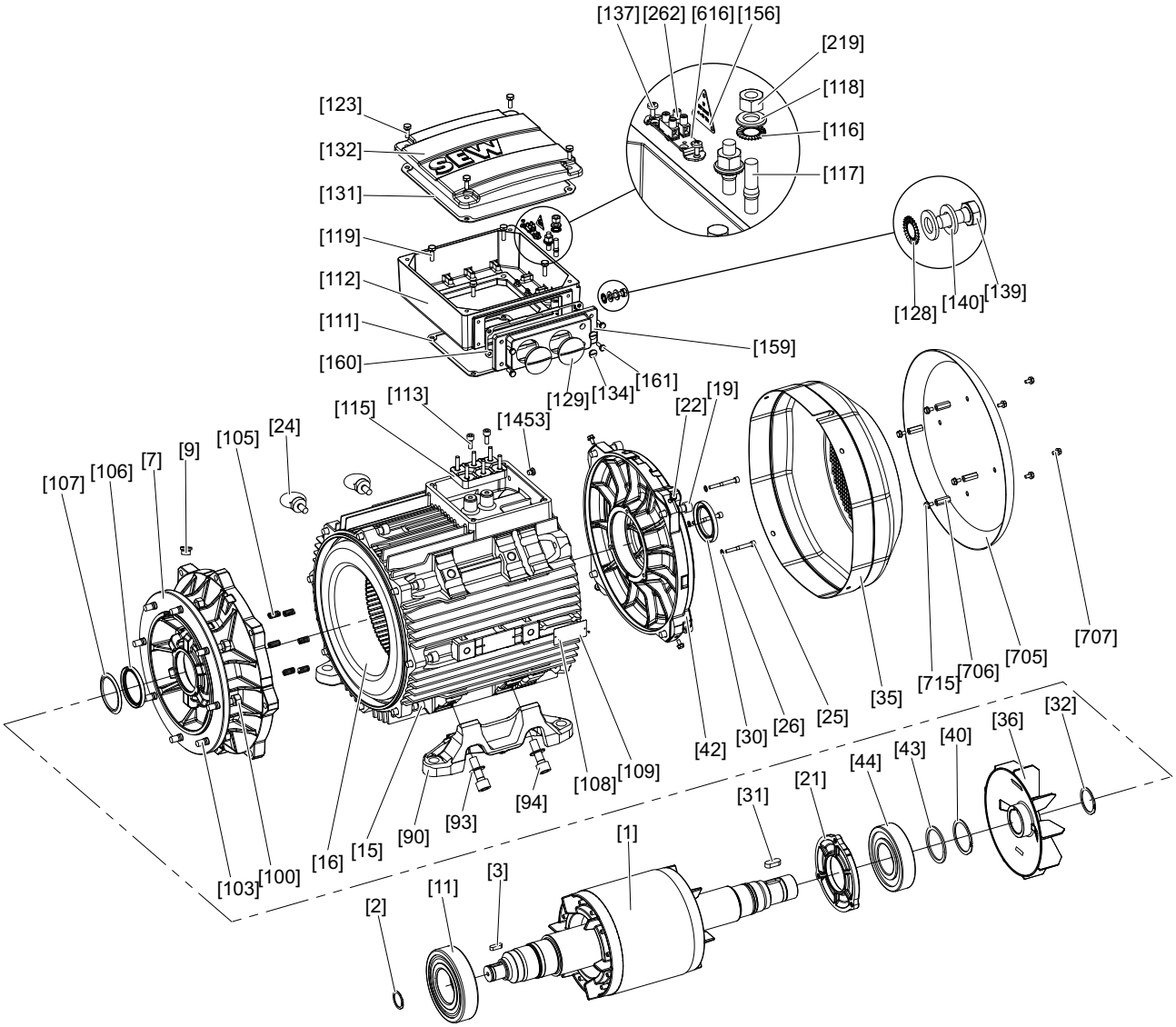
3.3 DR.200 – DR.225 – basic structure



1077856395

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

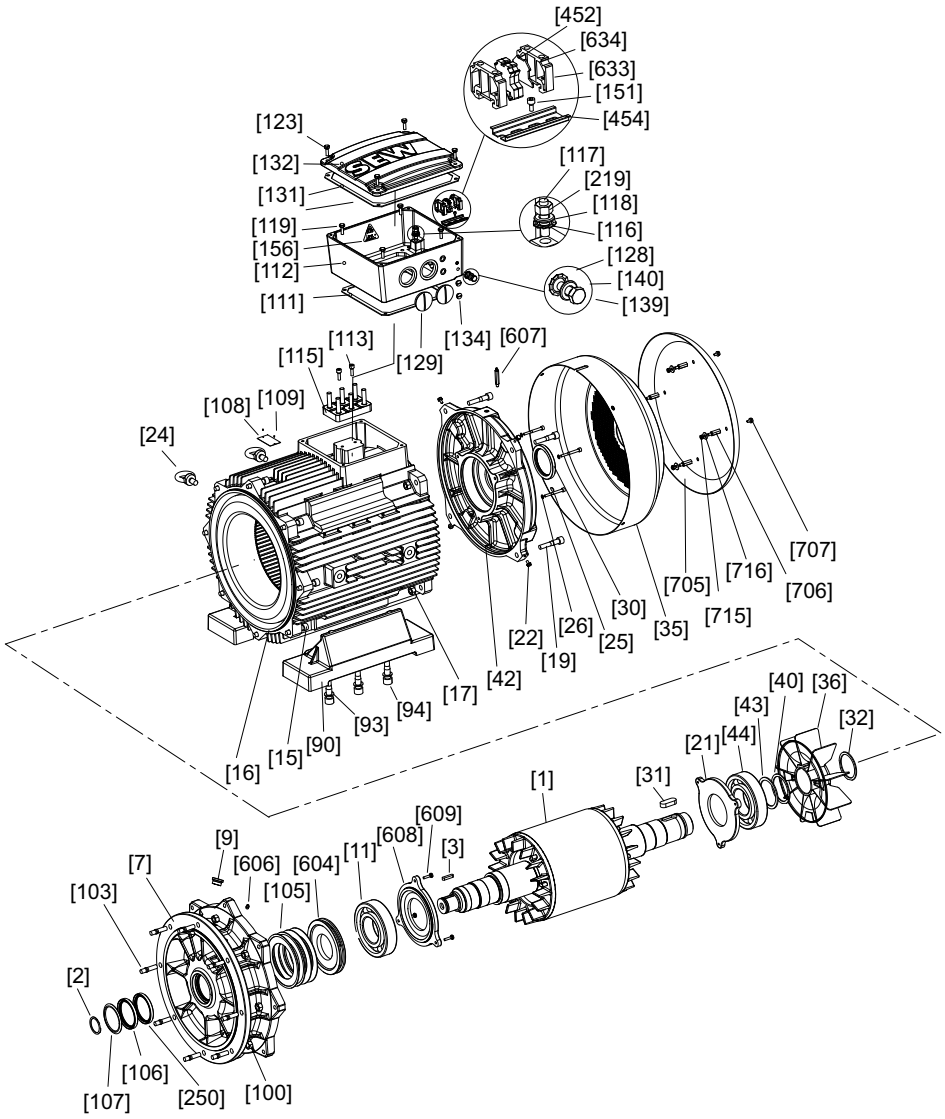
3.4 DR.250 – DR.280 – basic structure



7435669131

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

3.5 DR.315 – basic structure



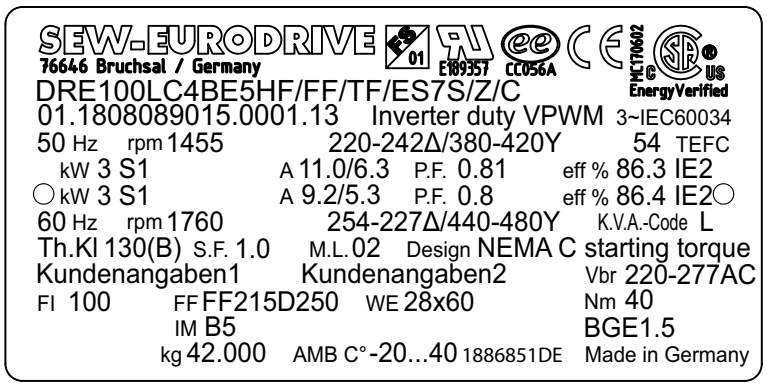
18014398861480587

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

3.6 Nameplate, type designation

3.6.1 Nameplate of a DRE gearmotor with brake

The following figure shows an example of a nameplate:



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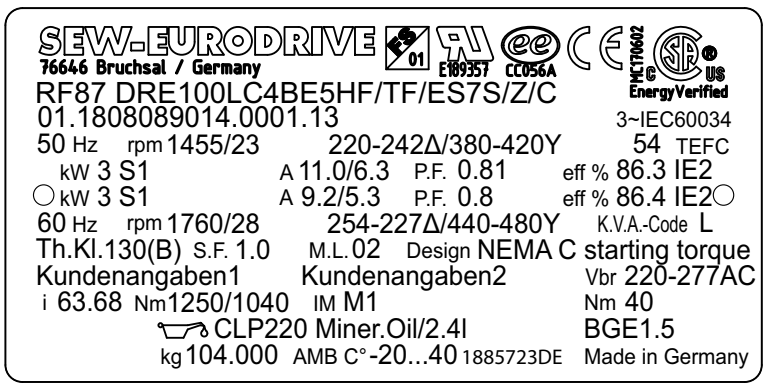

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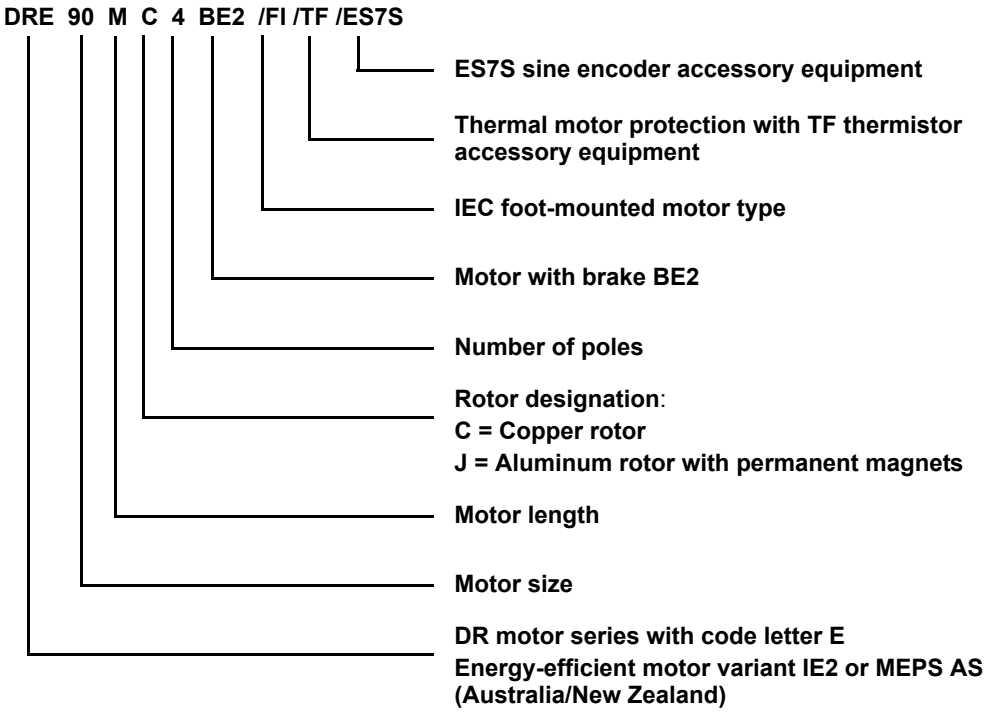
The marks on the upper edge of the nameplate are only present when the motor has been certified accordingly or when it includes the relevant components.

3.6.2 Type designation of an DR. series AC brakemotor

The following diagram shows a type designation example:



3.6.3 AC motor series

Designation	
DRS..	Motor, Standard efficiency IE1, 50 Hz
DRE..	Energy-efficient motor, High efficiency IE2, 50 Hz
DRP..	Energy-efficient motor, Premium efficiency IE3, 50 Hz
DRL..	Asynchronous servomotor
DRK..[1)]	Single-phase operation with running capacitor
DRM.	Torque motor: Torque motor for operation at speed n = 0
71 – 315	Sizes: 71 / 80 / 90 / 100 / 112 / 132 / 160 / 180 / 200 / 225 / 315
K – L, MC, LC	Lengths: K= very short / S = short / M = medium / L = long MC/LC = Rotors with copper cage
2, 4, 6, 8/2, 8/4, 4/2, 12	Number of poles

1) In preparation

3.7 Optional equipment

3.7.1 Output variants

Designation	Option
/FI	IEC foot-mounted motor with specification of shaft height
/F.A, /F.B	Universal foot-mounted variant, with specification of shaft height, only DR. 250/280
/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 gearmotor with IEC feet, with specification of shaft height if required
/FE	IEC flange-mounted motor with bore holes and IEC feet, with specification of shaft height
/FY	IEC flange-mounted motor with thread and IEC feet, with specification of shaft height if required
/FK	General flange-mounted motor (other than IEC) with feet, with specification of shaft height if required
/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 disengaging function
HF	Manual brake release, lockable
/RS	Backstop
/MSW	MOVI-SWITCH®
/MI	Motor identification module for MOVIMOT®
/MM03 – MM40	MOVIMOT®
/MO	MOVIMOT® option(s)

3.7.3 Temperature sensor / temperature detection

Designation	Option
/TF	Temperature sensor (PTC thermistor or PTC resistor)
/TH	Thermostat (bimetallic switch)
/KY	One KTY84 – 130 sensor
/PT	One/three PT100 sensor(s)

3.7.4 Encoder

Designation	Option
/ES7S /EG7S /EH7S /EV7S	Mounted speed sensor with sin/cos interface
/ES7R /EG7R /EH7R	Mounted speed sensor with TTL (RS-422) interface, V = 9 – 26 V
/EI7C	Built-in incremental encoder with HTL interface
/EI7C FS	Safety-rated incremental encoder (marked with FS logo on the motor nameplate) For detailed information, see "Safety-Rated Encoders – Functional Safety for AC Motors DR.71 – 315" addendum to the operating instructions
/EI76 /EI72 /EI71	Built-in incremental encoder with HTL interface and 6 / 2 / 1 period(s)
/AS7W /AG7W	Mounted absolute encoder, RS-485 interface (multi-turn)
/AS7Y /AG7Y /AH7Y	Mounted absolute encoder, SSI interface (multi-turn)
/ES7A /EG7A	Mounting adapter for encoders from the SEW portfolio
/XV.A	Mounting adapter for non-SEW encoders
/XV..	Mounted non-SEW encoders

3.7.5 Connection options

Designation	Option
/IS	Integrated plug connector
/ASE.	HAN 10ES plug connector on terminal box with single locking latch (cage clamp contacts on motor end)
/ASB.	HAN 10ES plug connector on terminal box with double locking latch (cage clamp contacts on motor end)
/ACE.	HAN 10E plug connector on terminal box with single locking latch (crimp contacts on motor end)
/ACB.	HAN 10E plug connector on terminal box with double locking latch (crimp contacts on motor end)
/AME. /ABE. /ADE. /AKE.	HAN Modular 10B plug connector on terminal box with single locking latch (crimp contacts on motor end)
/AMB. /ABB. /ADB. /AKB.	HAN Modular 10B plug connector on terminal box with double locking latch (crimp contacts on motor end)
/KCC	6- or 10-pole terminal strip with cage clamp contacts (for DR.71 – DR.132, depending on the variant)
/KC1	C1-profile-compliant connection of the electric monorail system drive (VDI guideline 3643) (for DR71, 80) Alternatively for DR.90 – 132 for a more compact connection range
/IV	Other industrial plug connectors according to customer specifications

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 the fan guard
/LF	Air filter
/LN	Low-noise fan guard (for DR.71 – 132)

3.7.7 Bearings

Designation	Option
/NS	Relubrication device (for DR.250 – DR.315 only)
/ERF	Reinforced bearing A-side with rolling bearing (for DR.250 – DR.315 only)
/NIB	Insulated bearing B-side (for DR.200 –DR.315 only)

3.7.8 Condition monitoring

Designation	Option
/DUB	Diagnostic unit brake = brake monitoring
/DUV	Diagnostic unit vibration = vibration sensor

3.7.9 Motors for hazardous locations

Designation	Option
/2GD	Motors according to 94/9/EC, category 2 (gas / dust)
/3GD	Motors according to 94/9/EC, category 3 (gas / dust)
/3D	Motors according to 94/9/EC, category 3 (dust)
/VE	Forced cooling fan for motors according to 94/9/EC, category 3 (gas / dust)

3.7.10 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

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 addendums 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 specifications on the nameplate of the drive correspond to the supply system or the output voltage of the frequency inverter
- The drive is undamaged (no damage caused by transportation or storage)
- All transport locks have 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. The ambient conditions must comply with all the specifications on the nameplate.
  - No oil, acid, gas, vapors, radiation, etc.
  - Installation altitude max. 1000 m above sea level

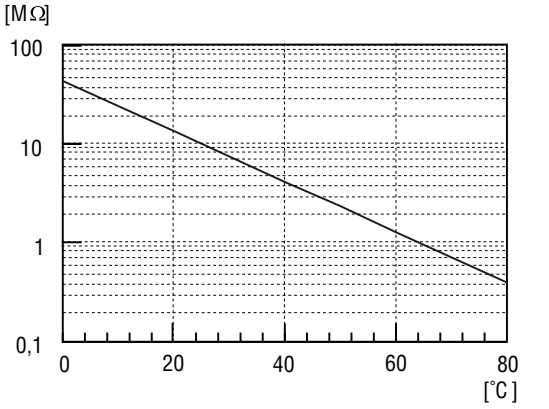
    Observe chapter "Electrical Installation" > "Ambient conditions during operation" > "Installation altitude".
  - Note the restrictions for encoders
  - Special design: Drive configured in accordance with the ambient conditions

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.

4.2 Long-term 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.
- Before startup, you should re-lubricate the lubrication devices on motors that have been in storage for longer than 5 years. 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 following figure) varies greatly depending on the temperature. The motor must be dried if the insulation resistance is not adequate.



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4.2.1 Drying the motor

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

- with warm air

  DR.. motors with rotor designation "J": dry with warm air only

⚠ WARNING

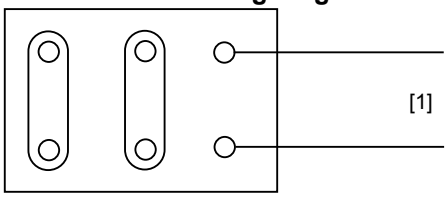
The motor shaft may be subject to torque when drying via isolation transformer.

Possible injury.

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

- Using isolation transformer
  - Connect the windings in series (see following figures)
  - Auxiliary AC voltage supply max. 10% of the rated voltage with max. 20% of the rated current

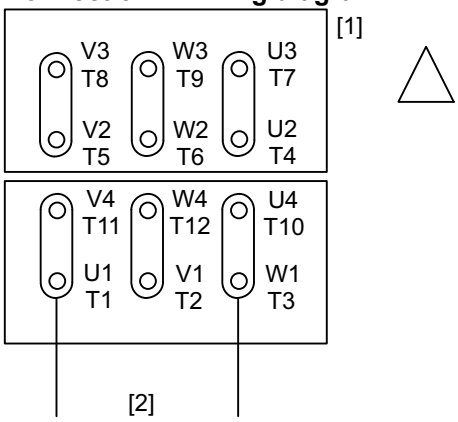
Connection in wiring diagram R13:



2336250251

[1] Transformer

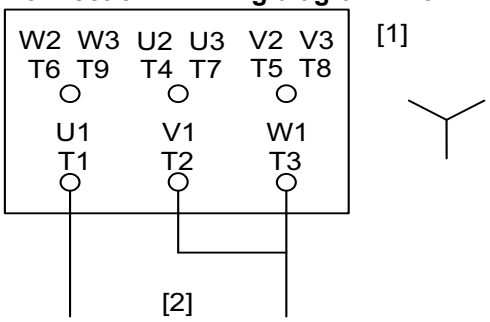
Connection in wiring diagram R72:



2343045259

[1] Motor terminal boards
[2] Transformer

Connection in wiring diagram R76:



2343047179

[1] Motor terminal board
[2] Transformer

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

In the terminal box check that:

- The inside is clean and dry
- The connections and fixing parts are free from corrosion
- The gasket and sealing surfaces are functioning
- The cable glands are tight, otherwise clean or replace them

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

- Note the following:

- 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 shaft seals – 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).
- Make sure that there is sufficient clearance around the motor to provide for adequate cooling, and that the motor does not draw in warm air from other units.
- 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 setscrew (with lockable manual brake release).
- Protect shaft again against corrosion, if necessary.

INFORMATION

To install 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.

4.3.1 Installation in damp locations or in the open

- Use suitable cable glands for the incoming cable (use reducing adapters if necessary) according to the installation instructions.
- If possible, arrange the terminal box so 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 with a suitable anti-corrosion agent.

4.4 Mounting tolerances

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

4.5 Installing drive components

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.

4.6 HR/HF manual brake release

4.6.1 manual brake release HF

You can use the optional lockable HF manual brake release to continuously mechanically release the BE.. brake with a setscrew and a release lever.

On delivery, the setscrew is inserted far enough to not fall out and to not affect the brake performance. The setscrew 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 setscrew until there is no more play at the release lever. Additionally, screw in the setscrew 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 setscrew at least until the floating clearance (see chapter "Retrofitting HR/HF manual brake release") of the manual brake release has completely returned.

⚠ WARNING

Lacking functionality of the manual brake release due to improper brake installation, e.g. setscrew 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.

4.6.2 Retrofitting the HR/HF manual brake release

⚠ WARNING

Risk of crushing if the drive starts up unintentionally.

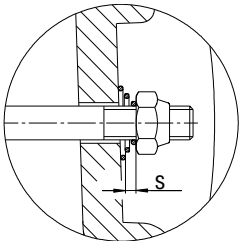
Severe or fatal injuries.

- 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" (page 90).
   - Flange cover or fan guard [35], circlip [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 release lever [53], conical coil springs [57] and setting nuts [58].
   - **For BE20 – BE122:**
     - Screw in studs [56].
     - Mount release lever [53], conical coil springs [57] and setting 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).

   This 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 [mm]
BE05, BE1, BE2, BE5	1.5
BE11, BE20, BE30, BE32BE 60, BE62BE120, BE122	2

4. Reinstall the removed parts.

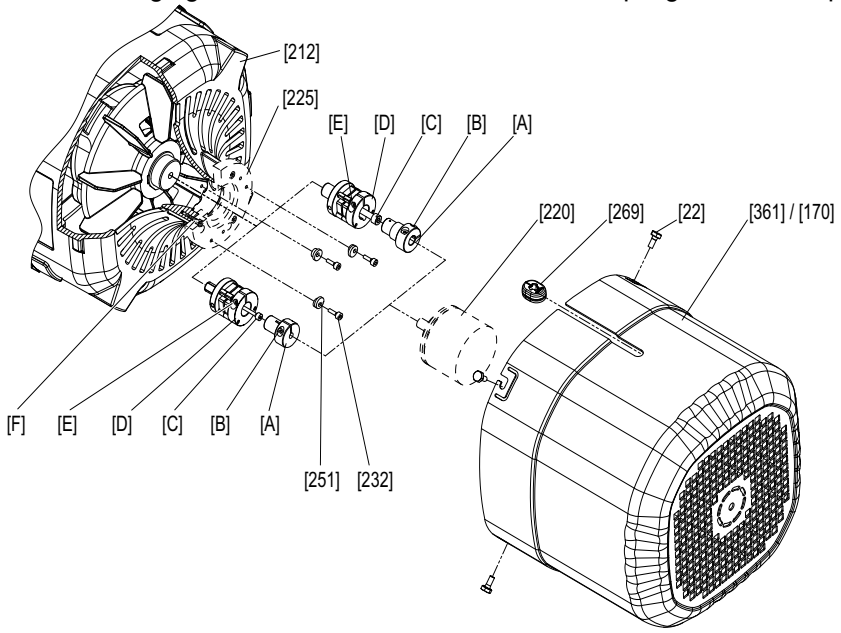
4.7 Non-SEW encoder mounting

If a drive was ordered with non-SEW encoder, SEW-EURODRIVE will deliver the drive with enclosed coupling. You must not connect the coupling for operation without non-SEW encoder.

4.8 Connecting XV.A encoder mounting adapter to DR.71 – 225 motors

If you have ordered the XV.A 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: Tighten the screw [C] with a tightening torque of 3 Nm [26.6 lb-in].

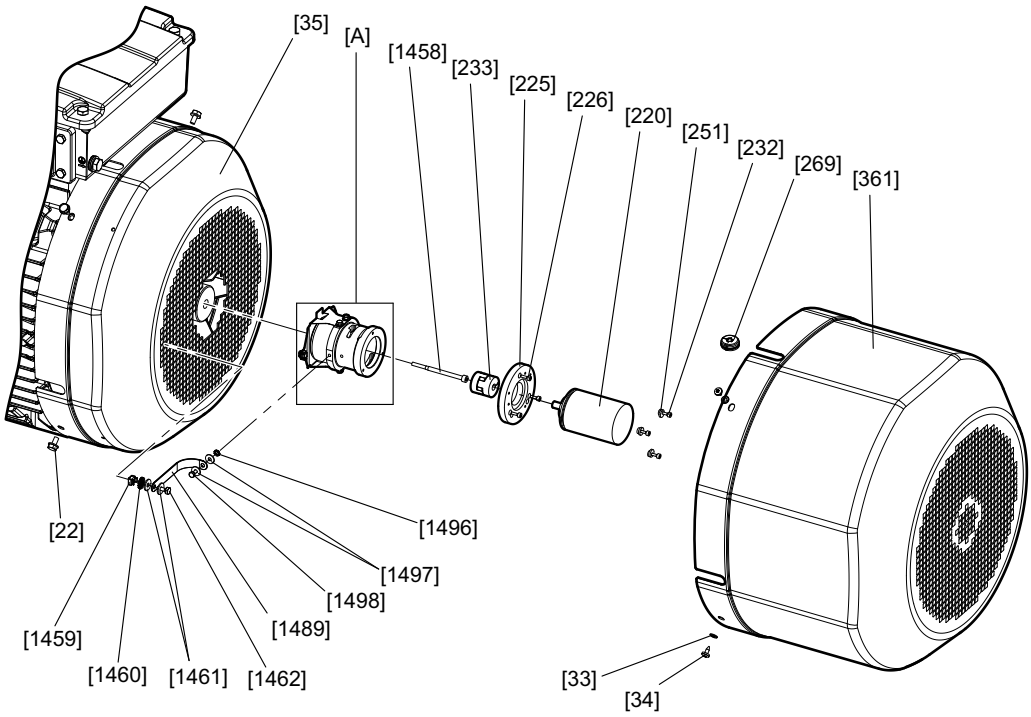
   DR.160 – 225: Tighten the screw [C] with a tightening torque of 8 Nm [70.8 lb-in].
4. Push the adapter [A] on the encoder [220] and tighten it with the retaining screw [B] with a tightening torque of 3 Nm [26.6 lb-in].

5. **For XV2A and XV4A:** Mount the intermediate flange [225] with the screw [F] with a tightening torque of 3 Nm [26.6 lb-in].
6. Push the encoder and the adapter on the coupling [D] and tighten the retaining screw [E] with a tightening torque of 3 Nm [26.6 lb-in].
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 (26.6 lb-in).
8. **For XV3A and XV4A:** Installation by the customer via the bores in the encoder plate.

4.9 Mounting an encoder with EV.A / AV.A mounting adapter to DR.250 – 280 motors

If you have ordered the EV.A / AV.A 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
[33] Washer
[34] Screw
[35] Fan guard
[220] Encoder
[225] Intermediate flange (optional)
[226] Screw
[232] Screws (enclosed with .V1A and .V2A)
[233] Coupling
[251] Conical spring washers (enclosed with .V1A and .V2A)
[269] Grommet
[361] Extended fan guard (normal/long)
[1458] Screw
[1459] Cage nut
[1460] Serrated lock washer
[1461] Washer
[1462] Screw
[1489] Ground strap
[1496] Serrated lock washer
[1497] Washer
[1498] Screw
[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 (26.6 lb-in) 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 (26.6 lb-in).
4. Mount the conical spring washers [251] to the encoder mounting adapter [A] with screws [232]. Do not tighten the screws [232] yet.

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 (26.6 lb-in). Tighten the screw of the coupling clamping hub [233] on the encoder end with 3 Nm (26.6 lb-in).
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 [361] to the fan guard [35] with screws [34] and washers [33].
   - **With /V forced cooling fan option:** Mount the forced cooling fan guard [170] with screws [22].

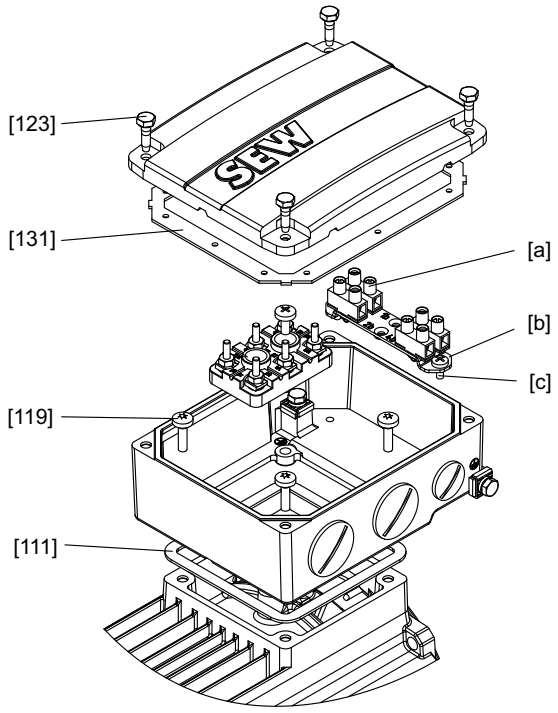
4.9.1 XH.A encoder mounting adapter

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" (page 90) to mount the encoder.

4.10 Turning the terminal box

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



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[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:

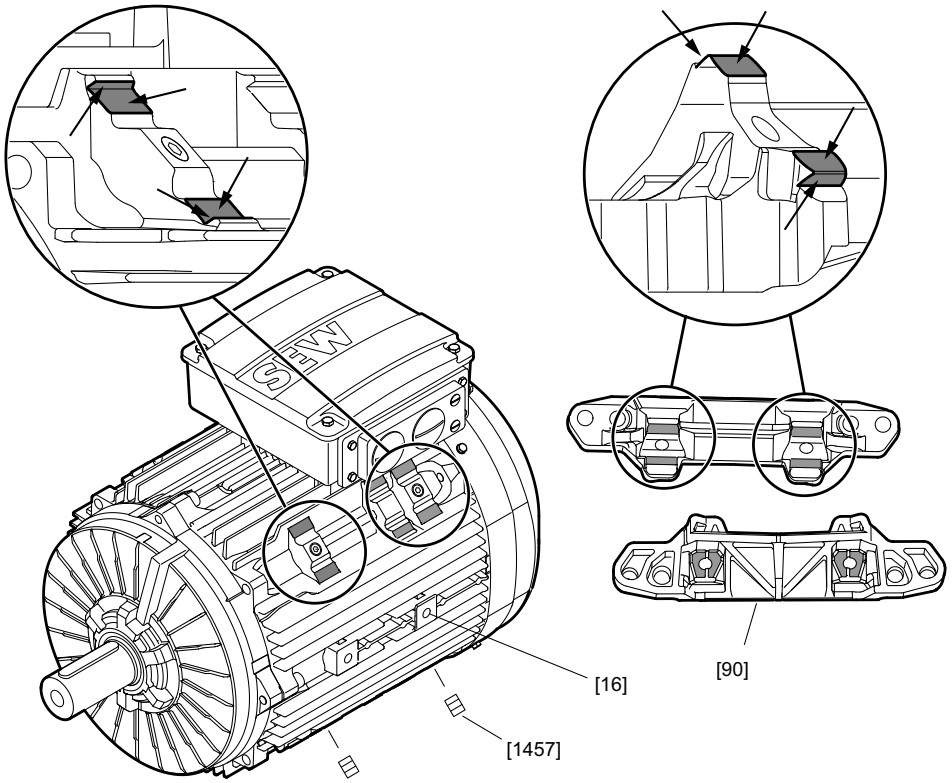
1. Loosen the screws [123] from the terminal box cover and remove the cover.
2. Remove the terminals [a], if available.
3. Remove the retaining screws [119] of the terminal box.
4. Clean the sealing surfaces at the stator shoulder as well as the bottom and the cover of the terminal box.
5. Check the 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:** 5 Nm [44.3 lb-in]
   - **DR.160 – 225:** 25.5 Nm [225.7 lb-in]

   Do not forget the retaining plate [c] if available.
8. Tighten the screws of the terminal box with the following tightening torques:
   - **DR.71 – 132:** 4 Nm [35.4 lb-in]
   - **DR.160:** 10.3 Nm [91.2 lb-in]
   - **DR.180 – 225 (aluminum variant):** 10.3 Nm [91.2 lb-in]
   - **DR.180 – 225 (gray-cast iron variant)** 25.5 Nm [225.7 lb-in]

   Make sure the gasket is seated properly.

4.11 Retrofitting (option /F.A) or modifying (option /F.B) DR.250/280 motor feet

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



8026940555

[16] Stator
[90] Foot
[1457] Setscrew

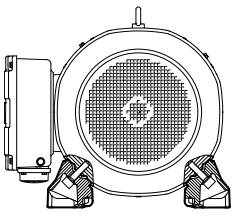
Remove the paint from the marked surfaces

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

1. Remove the set screws [1457]. You will no longer need them. Only remove the set screws from those threads into which you will screw in the foot screws [94].
2. Remove the paint from the contact surfaces of the stator [16] (see marking in the "Example illustration of DR.280" above). 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 corrosion protection agent can be applied to the contact surfaces once the paint has been removed.

The possible terminal box positions are shown below:

0°



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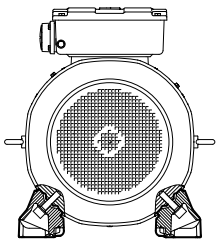
270°



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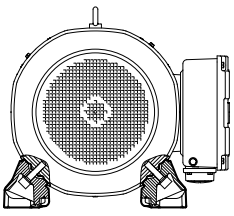
180°



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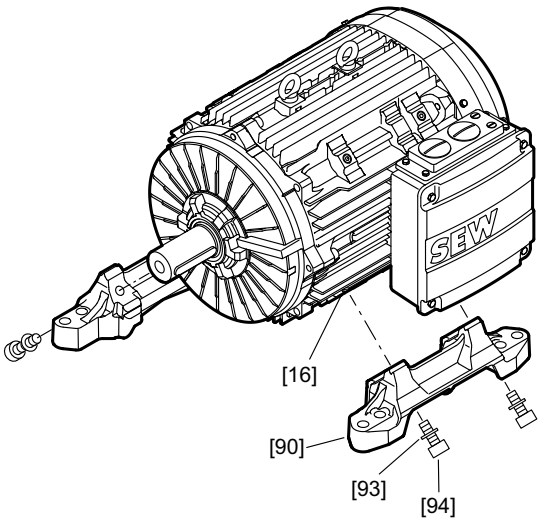
3. Remove the paint from the contact surfaces of the feet [90] (see marking in the "Example illustration of DR.280" above). SEW-EURODRIVE recommends to use a chisel or flat scraper for this purpose. A thin corrosion protection agent can be applied to the contact surfaces once the paint has been removed.
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 (3628 lb-in). 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].



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

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

1. After removing the screws [94], check them for damage, e.g. to the thread.
2. Remove the microencapsulation.
3. Clean the thread of the screws [94].
4. Apply a high-strength thread locker to the screw threads before inserting the screws again.

4.12 Accessory equipment

4.12.1 LF air filter

The air filter, a kind of fleece mat, is mounted in front of the fan guard. 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 – DR.132
Filter material	Viledon PSB290SG4 fleece

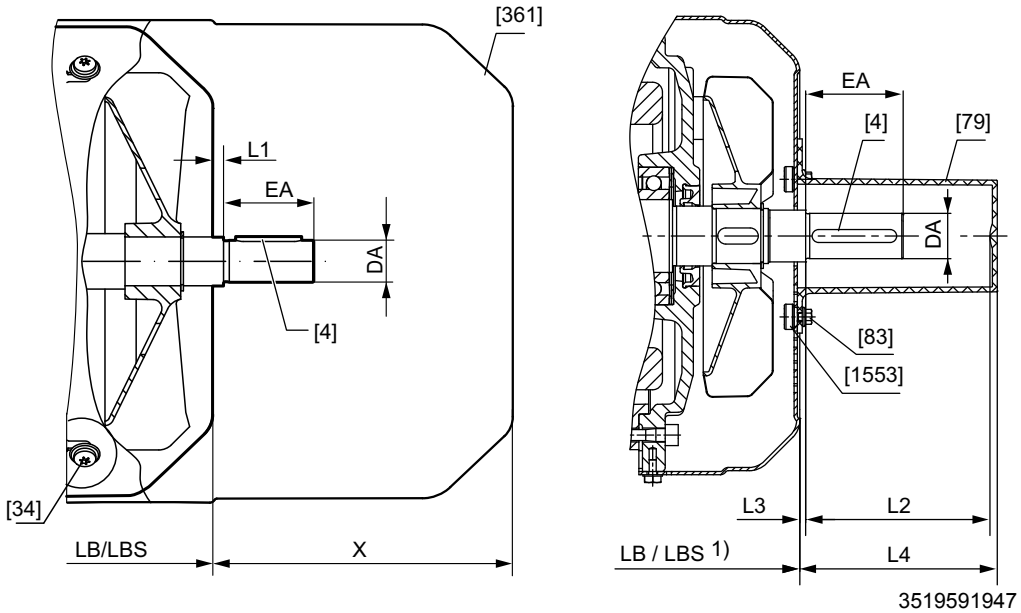
4.12.2 2. shaft end with optional cover

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

The following figure shows the dimensions of the covers:

Sizes DR.71 – 132, 250 – 280 **Sizes DR.160 – 225**

Sizes DR.160 – 225 (optional)



[4]	Keyway	[83]	Hex head screw	LB/LBS	Length of the motor/brake-motor
[34]	Tapping screw	[361]	Extended fan guard		
[79]	Cap	[1553]	Cage nut	1)	Refer to the catalog for dimensions

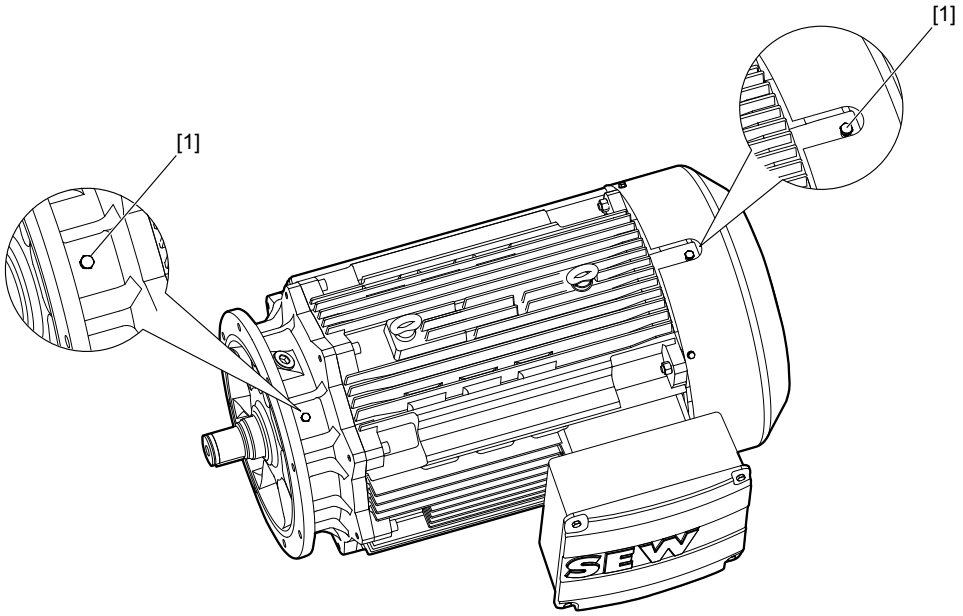
Motor size	DA	EA	L1	L2	L3	L4	X
DR.71	11	23	2	–	2	–	91.5
DR.71 /BE				–		–	88
DR.80	14	30	2	–	2	–	95.5
DR.80 /BE				–		–	94.5
DR.90	14	30	2	–	2	–	88.5
DR.90 /BE				–		–	81
DR.100	14	30	2	–	2	–	87.5
DR.100 /BE				–		–	81
DR.112/132	19	40	3.5	–	3.5	–	125
DR.112/132 /BE				–		–	120.5
DR.160	28	60	4	122	3.5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

4.12.3 Mounting adapter for measuring nipple

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

- with bore or
- with bore and enclosed measuring nipples

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



2706206475

[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 (133 lb-in).
- Plug the mounting adapter of the measuring unit into the measuring nipple.

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

Danger of 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. You can obtain the valid wiring diagrams free of charge from SEW-EURODRIVE.

5.3 Wiring notes

Comply with 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. Power cables with phased currents are in particular

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

5.3.2 Protecting the motor protection devices against interference

Adhere to the following points to protect SEW motor protection devices (TF temperature sensors) against interference:

- You may route separately shielded supply cables together with switched-mode power lines 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

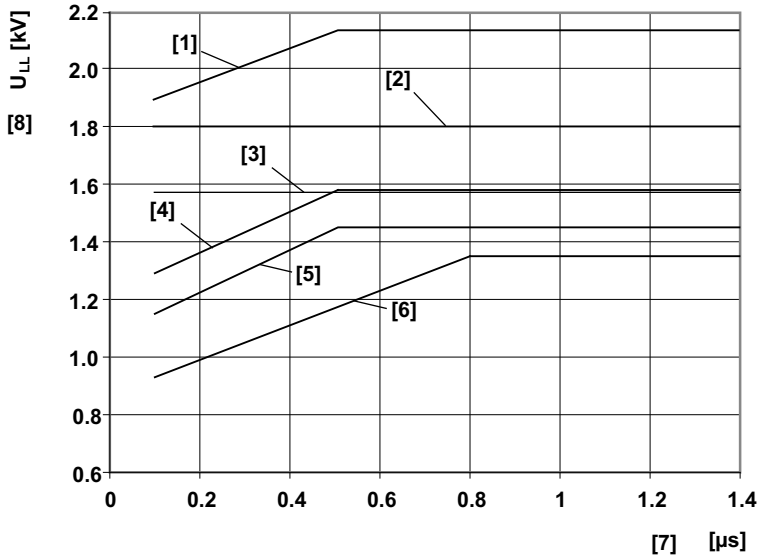
When motors are powered from inverters, you must adhere to the wiring instructions issued by the inverter manufacturer. You must also observe the operating instructions for the frequency inverter.

5.4.1 Motor on SEW inverter

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

5.4.2 Motor on a non-SEW inverter

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



3980591243

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

[2] Permitted pulse voltage for DR motors with reinforced insulation (/RI)

[3] Permitted pulse voltage according to NEMA MG1 part 31, $V_N \leq 500$ V

[4] Permitted pulse voltage according IEC 60034-25, limit value curve A for nominal voltage $V_N \leq 500$ V, star connection

[5] Permitted pulse voltage according IEC 60034-25, limit value curve A for nominal voltage $V_N \leq 500$ V, delta connection

[6] Permitted pulse voltage according to IEC 60034-17

[7] Voltage rise time

[8] Permitted pulse voltage

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 (motive/regenerative)

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

5.5 Exterior grounding at the terminal box, LF grounding

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

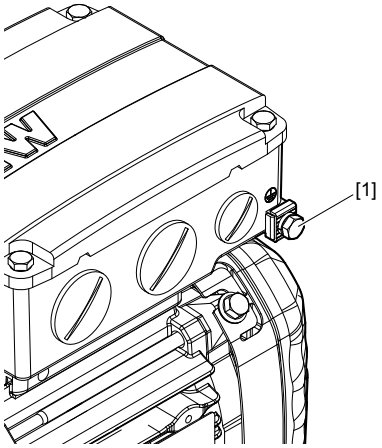
LF grounding can be ordered as completely pre-installed at the factory. For DR.71 – 132 motors, this requires a brake or gray-cast terminal box. For DR.160 – 225 motors, this option can be combined with all terminal box types.

The option can be combined with HF grounding (page 48).

INFORMATION

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

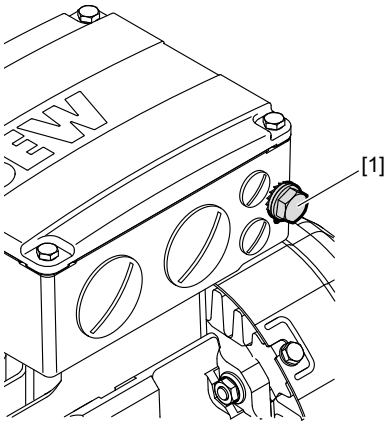
DR.71 – 132



8024328587

[1] LF grounding at the terminal box

DR.160 – 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 DR.80S / M	1363 3953
DR.90M / L	
DR.100M	
DR.100 L – DR.132 with aluminum terminal box	1363 3945
DR.160 – DR.225 with aluminum terminal box	

INFORMATION

All parts of the kit are made from stainless steel.

INFORMATION

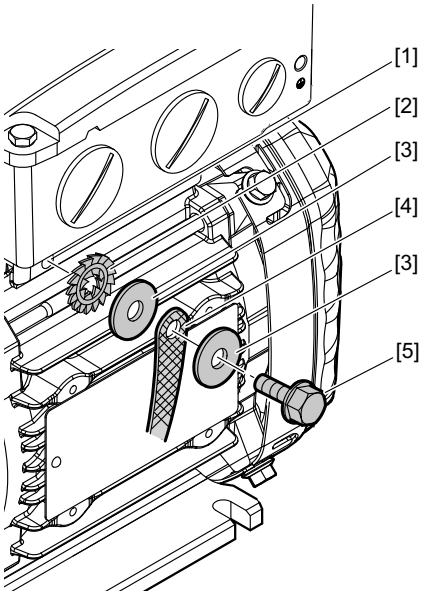
For further information regarding the grounding, refer to the SEW publication "Drive Engineering – Practical Implementation, EMC in Drive Engineering".

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.

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

The following figure shows how to install the grounding:

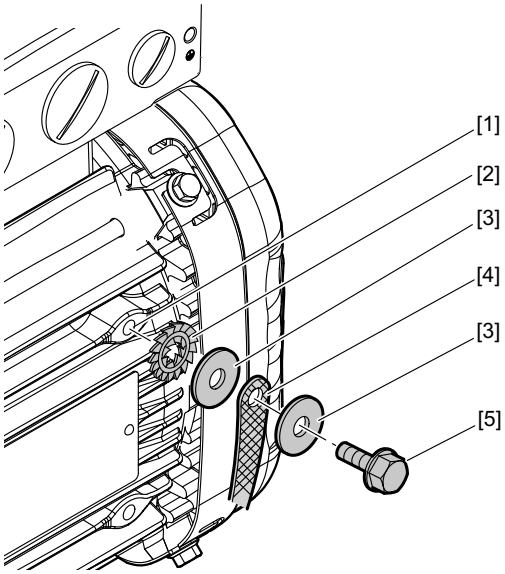


8026768011

[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 scope of delivery)
[5] Self-tapping screw DIN 7500 M6 x 16, tightening torque 10 Nm (88.5 lb-in)

5.6.2 Size DR.90M / L with HF(+LF) grounding

The following figure shows how to install the grounding:

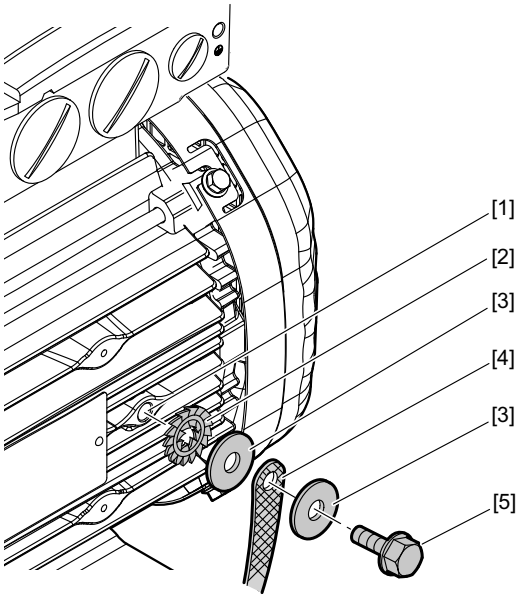


8026773131

[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 scope of delivery)
[5] Self-tapping screw DIN 7500 M6 x 16, tightening torque 10 Nm (88.5 lb-in)

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

The following figure shows how to install the grounding:

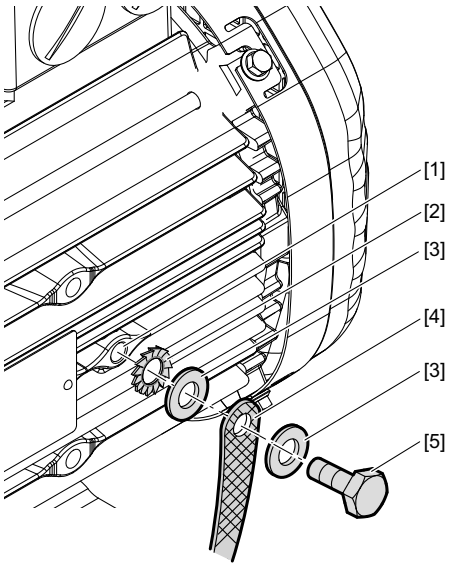


8026770443

[1]	Use of the pre-cast bore at the stator housing	[4]	Ground strap (not included in the scope of delivery)
[2]	Serrated lock washer	[5]	Self-tapping screw DIN 7500 M6 x 16, tightening torque 10 Nm (88.5 lb-in)
[3]	Washer 7093		

5.6.4 Sizes DR.100L – DR.132 with HF(+LF) grounding

The following figure shows how to install the grounding:

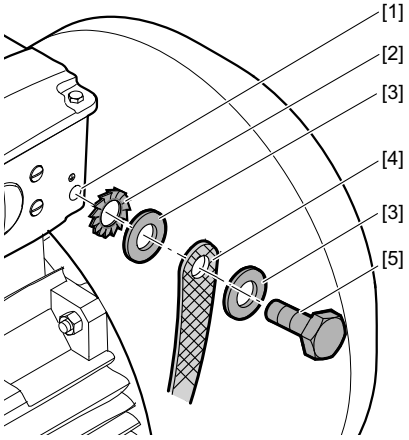


18014402064551947

[1]	Use of tapped hole for lifting eyes	[4]	Ground strap (not included in the scope of delivery)
[2]	Serrated lock washer DIN 6798	[5]	Hexagon screw ISO 4017 M8 x 18, tightening torque10 Nm (88.5 lb-in)
[3]	Washer 7089 / 7090		

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

The following figure shows how to install the 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 scope of delivery)

[5]
- Hex head screw ISO 4017 M8 x 18 (with aluminum terminal boxes of size DR.160 – 225), tightening torque 10 Nm (88.5 lb-in)
- Hex head screw ISO 4017 M10 x 25 (with gray cast iron terminal boxes size DR.160 – 225), tightening torque 10 Nm (88.5 lb-in)
- Hex head screw ISO 4017 M12 x 30 (terminal boxes of size DR.250 – 315), tightening torque 15.5 Nm (137.2 lb-in)

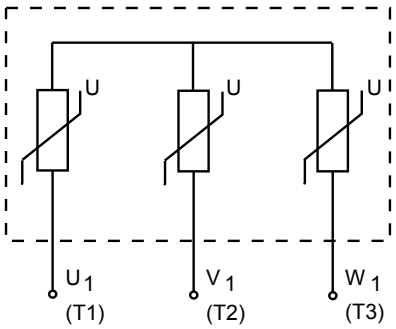
5.7 Specifics regarding switching operation

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 circuitry 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.



5.9 Ambient conditions during operation

5.9.1 Ambient temperature

Unless otherwise specified on the nameplate, you must observe the temperature range of -20 °C to +40 °C. Motors intended for use in higher or lower ambient temperatures have specific designations on the nameplate.

5.9.2 Installation altitude

The rated data on the nameplate apply to an installation altitude up to 1000 m asl. Installation altitudes above 1000 m asl require a different project planning for the motors and gear units.

5.9.3 Hazardous radiation

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

5.9.4 Harmful gas, vapor and dust

The DR. 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, DR motors can be equipped with high-quality gaskets. If you have doubts regarding the stability of the gaskets in connection with the respective environmental impacts, consult SEW-EURODRIVE.

5.10 Notes regarding motor connection

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.

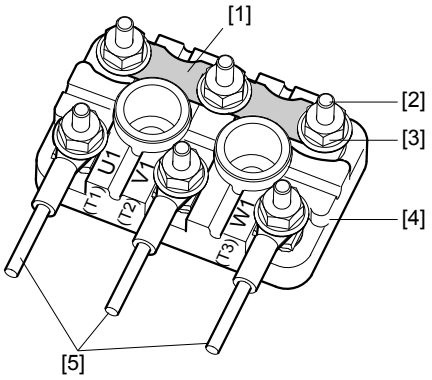
Observe the following points when connecting the motor:

- 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 clearances, 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
- Observe the specified direction of rotation

5.11 Connecting the motor via terminal block

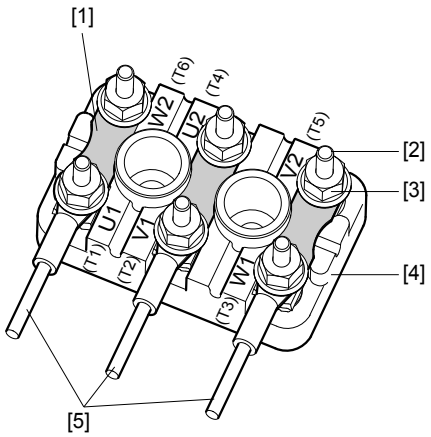
5.11.1 According to wiring diagram R13

Arrangement of terminal links for ⅄ connection

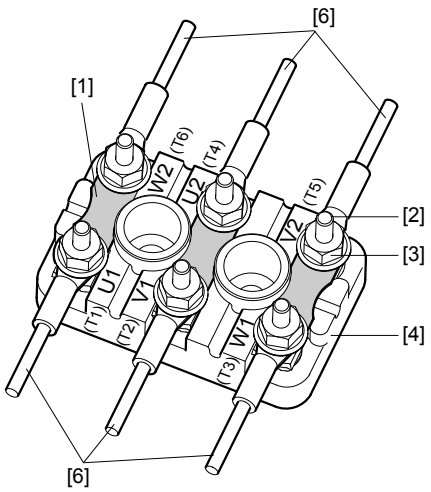


Arrangement of terminal links for △ connection

Motor sizes DR.71 – DR.280:



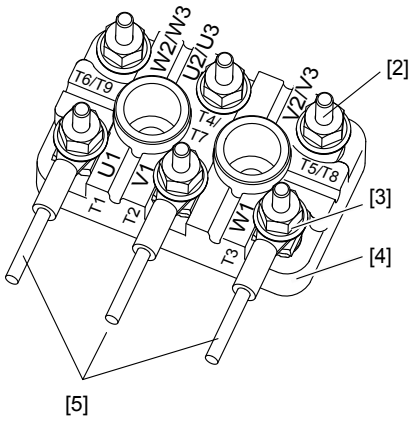
Motor sizes DR.250 – 315:



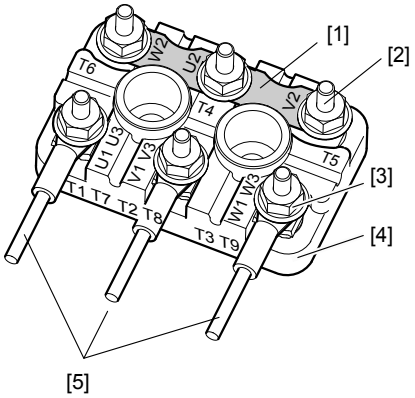
[1] Terminal link
[2] Terminal stud
[3] Flange nut
[4] Terminal board
[5] Customer connection
[6] Customer connection with split connection cable

5.11.2 According to wiring diagram R76

Arrangement of terminal links for ⅄ connection



Arrangement of terminal links for ⅄⅄ 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.

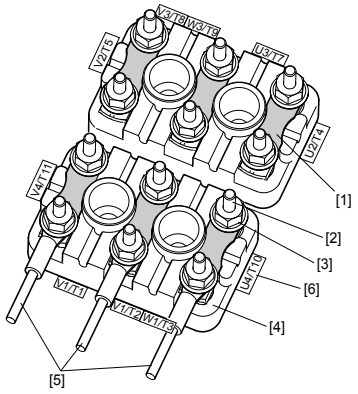
- U3 (T7) from U2 (T4) to U1 (T1)
- V3 (T8) from V2 (T5) to V1 (T2)
- W3 (T9) from W2 (T6) to W1 (T3)

Changing from low to high voltage is carried out in reverse order.

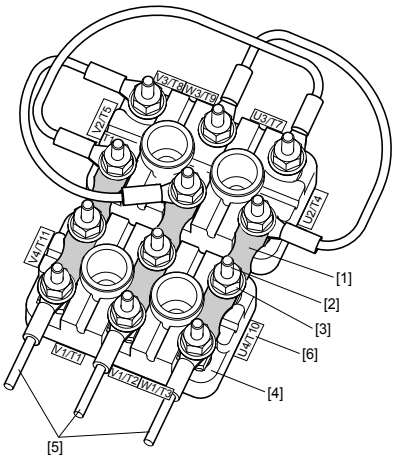
In both cases, the customer connection is made to U1 (T1), V1 (T2) and W1 (T3). You can change the direction of rotation by interchanging 2 supply cables.

5.11.3 According to wiring diagram R72

Arrangement of terminal links for △ connection



Arrangement of terminal links for △△ connection



[1] Terminal link
[2] Terminal stud
[3] Flange nut
[4] Terminal board
[5] Customer connection
[6] Wiring designation plate

5.11.4 Connection variants via terminal block

The motors are supplied and connected in different ways 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-DR.100							
Terminal bolt Ø	**Tightening torque of hex nut**	**Connection Customer Cross section**	**Variant**	**Connection type**	**Scope of delivery**	**PE Connecting screw Ø**	**PE design**
M4	**1.6 Nm** (14.2 lb-in)	**≤ 1.5 mm²** (AWG 16)	**1a**	**Solid wire Conductor end sleeve**	**Pre-assembled terminal links**	M5	4
		≤ 6 mm² (AWG 10)	**1b**	**Ring cable lug**	**Pre-assembled terminal links**		
		≤ 6 mm² (AWG 10)	2	Ring cable lug	Small connection accessories enclosed in bag		
M5	2.0 Nm (17.7 lb-in)	≤ 2.5 mm² (AWG 14)	1a	Solid wire Conductor end sleeve	Pre-assembled terminal links		
		≤ 16 mm² (AWG 6)	1b	Ring cable lug	Pre-assembled terminal links		
		≤ 16 mm² (AWG 6)	2	Ring cable lug	Small connection accessories enclosed in bag		
M6	3.0 Nm (26.5 lb-in)	≤ 35 mm² (AWG 2)	3	Ring cable lug	Small connection accessories enclosed in bag		

Motor size DR.112-DR.132							
Terminal stud Ø	**Tightening torque of hex nut**	**Customer connection Cross section**	**Variant**	**Connection type**	**Scope of delivery**	**PE Connecting screw Ø**	**PE design**
M5	**2.0 Nm** (17.7 lb-in)	**≤ 2.5 mm²** (AWG 14)	**1a**	**Solid wire Conductor end sleeve**	**Pre-assembled terminal links**	M5	4
		≤ 16 mm² (AWG 6)	**1b**	**Ring cable lug**	**Pre-assembled terminal links**		
		≤ 16 mm² (AWG 6)	2	Ring cable lug	Small connection accessories enclosed in bag		
M6	3.0 Nm (26.5 lb-in)	≤ 35 mm² (AWG 2)	3	Ring cable lug	Small connection accessories enclosed in bag		

Motor size DR.160							
Terminal stud Ø	**Tightening torque of hex nut**	**Customer connection Cross section**	**Variant**	**Connection type**	**Scope of delivery**	**PE Terminal stud Ø**	**PE design**
M6	**3.0 Nm** (26.5 lb-in)	**≤ 35 mm²** (AWG 2)	**3**	**Ring cable lug**	**Small connection accessories enclosed in bag**	M8	5
M8	6.0 Nm (53.1 lb-in)	≤ 70 mm² (AWG 2/0)	3	Ring cable lug	Small connection accessories enclosed in bag	M10	5

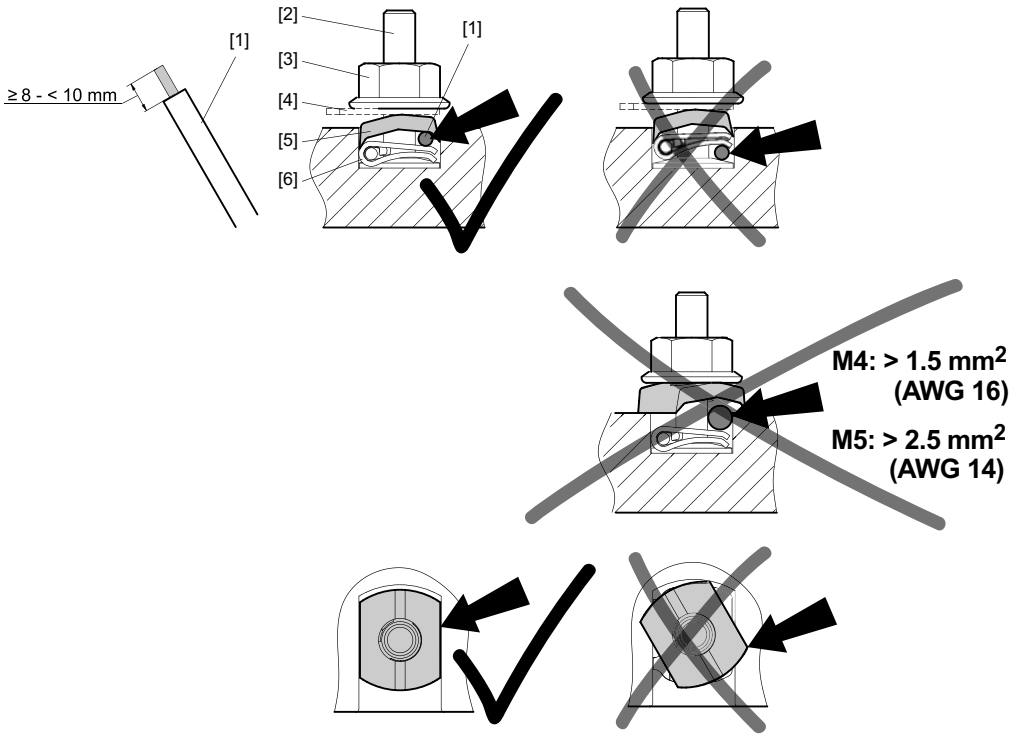
Motor size DR.180-DR.225							
Terminal stud Ø	**Tightening torque of hex nut**	**Customer connection Cross section**	**Variant**	**Connection type**	**Scope of delivery**	**PE Terminal stud Ø**	**PE design**
M8	**6.0 Nm** (88.5 lb-in)	**≤ 70_mm²** (AWG 3/0)	**3**	**Ring cable lug**	**Small connection accessories enclosed in bag**	M8	5
M10	10 Nm (88.5 lb-in)	≤ 95 mm² (AWG 3/0)	3	Ring cable lug	Small connection accessories enclosed in bag	M10	5
M12	15.5 Nm (137.2 lb-in)	≤ 95 mm² (AWG 3/0)	3	Ring cable lug	Small connection accessories enclosed in bag	M10	5

Motor sizes DR.250-DR.280							
Terminal stud Ø	**Tightening torque of hex nut**	**Customer connection Cross section**	**Variant**	**Connection type**	**Scope of delivery**	**PE Terminal stud Ø**	**PE design**
M10	**10 Nm** (88.5 lb-in)	**≤ 95 mm²** (AWG 3/0)	**3**	**Ring cable lug**	**Small connection accessories enclosed in bag**	M12	5
M12	**15.5 Nm** (137.2 lb-in)	**≤ 95 mm²** (AWG 3/0)	**3**	**Ring cable lug**	**Small connection accessories enclosed in bag**	M12	5

Motor size DR.315							
Terminal stud Ø	**Tightening torque of hex nut**	**Customer connection Cross section**	**Variant**	**Connection type**	**Scope of delivery**	**PE Terminal stud Ø**	**PE design**
M12	**15.5 Nm** (137.2 lb-in)	**≤ 95 mm²** (AWG 3/0)	**3**	**Ring cable lug**	**Premounted connection pieces**	M12	5
M16	**30 Nm** (265.5 lb-in)	**≤ 120 mm²** (AWG 4/0)					

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.

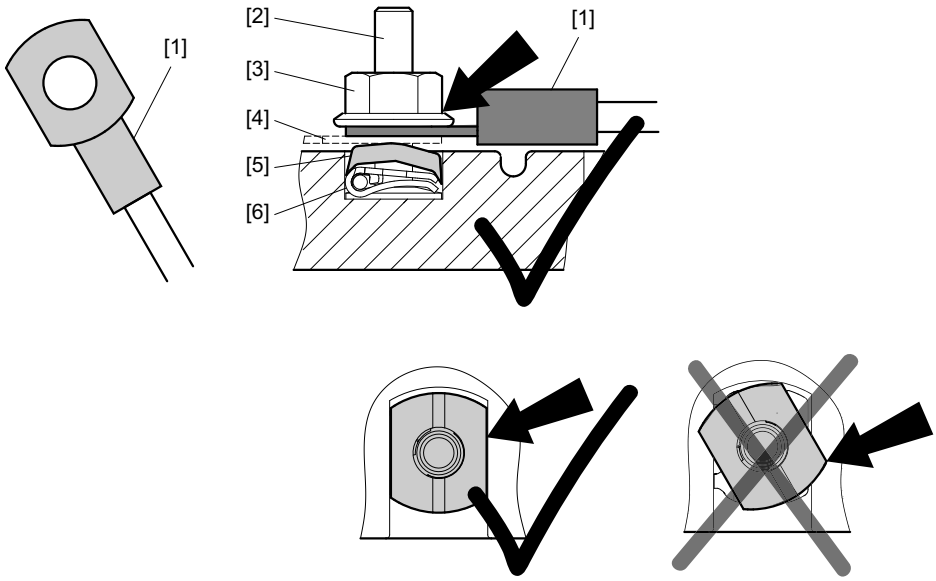
Variant 1a:



88866955

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

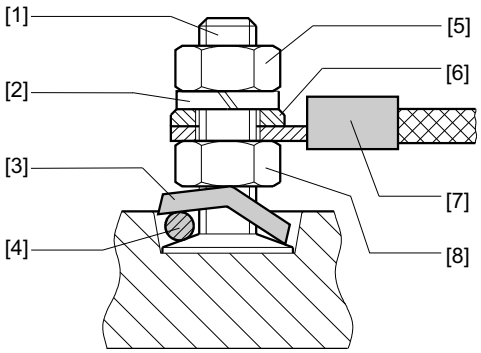
Variant 1b:



88864779

[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 connection terminal

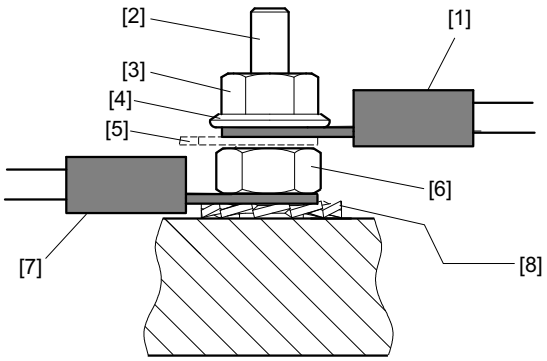
Variant 2



185439371

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

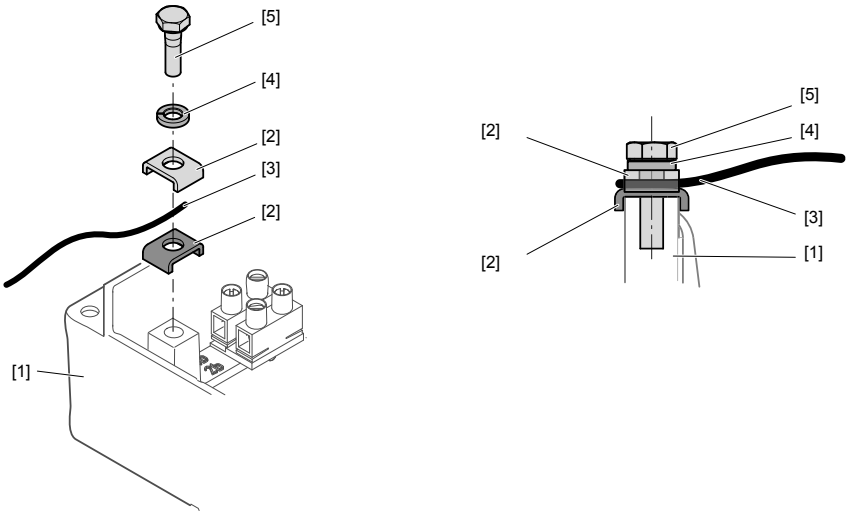
Variant 3



199641099

[1] External connection with ring cable lug, according to DIN 4637 or DIN 46234, for example.
[2] Terminal stud
[3] Upper nut
[4] Washer
[5] Terminal link
[6] Lower nut
[7] Winding connection with ring cable lug
[8] Serrated lock washer

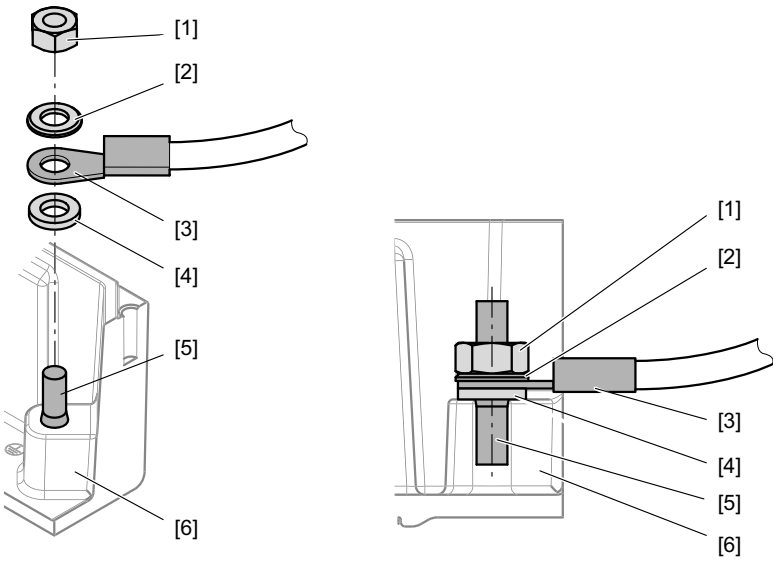
Variant 4



1139606667

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

Variant 5

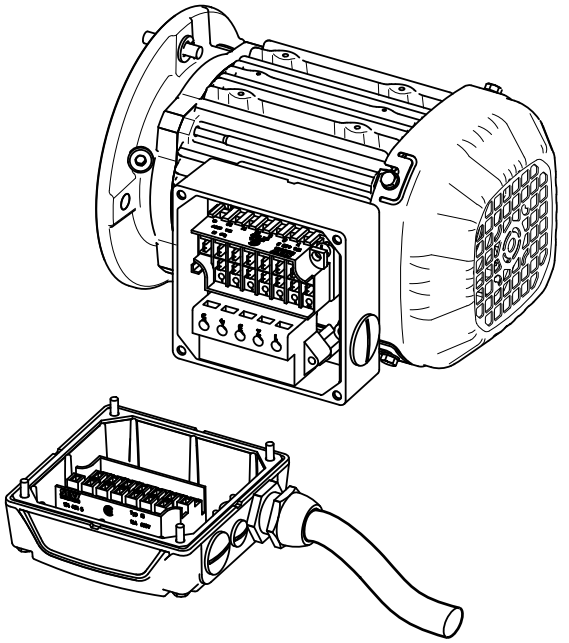


1139608587

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

5.12 Connecting the motor via plug connector

5.12.1 IS plug connector



1009070219

The IS plug connector is supplied from the factory with its base fully wired-up, including additional features such as a brake rectifier. The upper section of the IS connector is included in the scope of delivery and must be connected as shown 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 (17.7 lb-in) 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 terminal screws to a torque of 0.5 Nm (4.4 lb-in). 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 und 1 x 1.5 mm^2
AWG 24 - 12	AWG 24 - 14	max. AWG 16	max. 1 x AWG 14 und 1 x AWG 16

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 lead:
  - 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 circuit diagram:
  - Tighten the clamping screws carefully!
- Install the plug connector (→ section "Installing the plug connector")

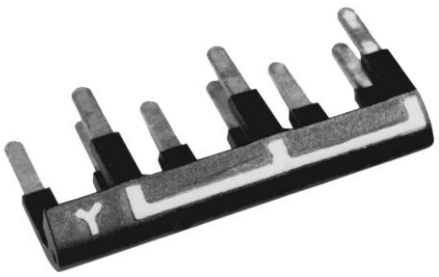
Wiring up as shown in wiring diagram R81

For ⅄/ △startup:

- Connect with 6 lines:
  - Tighten the clamping screws carefully!
  - Motor contactors in the control cabinet
- Install the plug connector (→ section "Installing the plug connector")

For ⅄ or △operation:

- Connect as shown in the wiring diagram
- According to the desired motor operation (⅄ or △) Install the variable terminal link as shown in the following figures.
- Install the plug connector (→ section "Installing the plug connector")



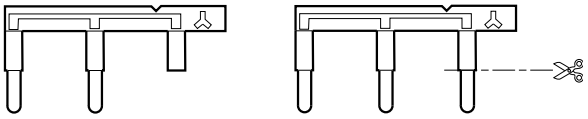
798606859

798608523

Brake control system BSR – preparing the variable terminal link

For ⅄ operation:

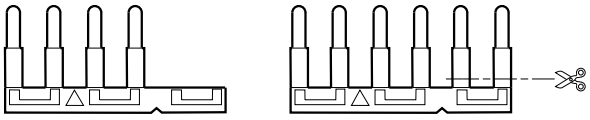
On the ⅄ side of the variable terminal link, remove only the bare metal pin of the marked prong horizontally as shown in the following figure – touch guard!



798779147

For △ operation:

On the △side of the variable terminal link, completely remove 2 prongs horizontally as shown in the following figure.



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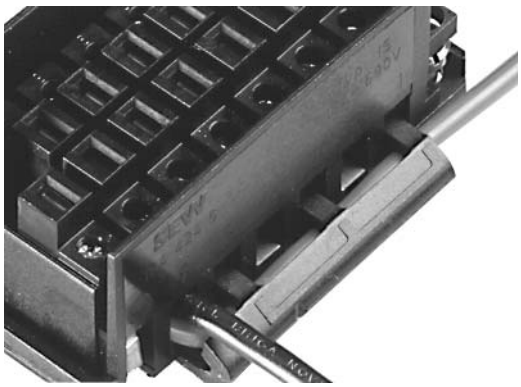
Wiring up as shown in wiring diagram R81 for ⅄ or △operation with double terminal assignment

- At terminal point 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 point 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 (→ section "Installing the plug connector")

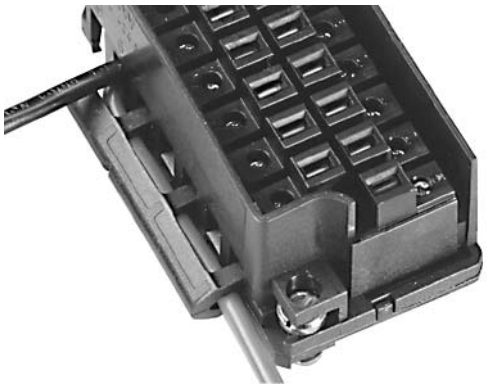


798780811

Installing the plug connector

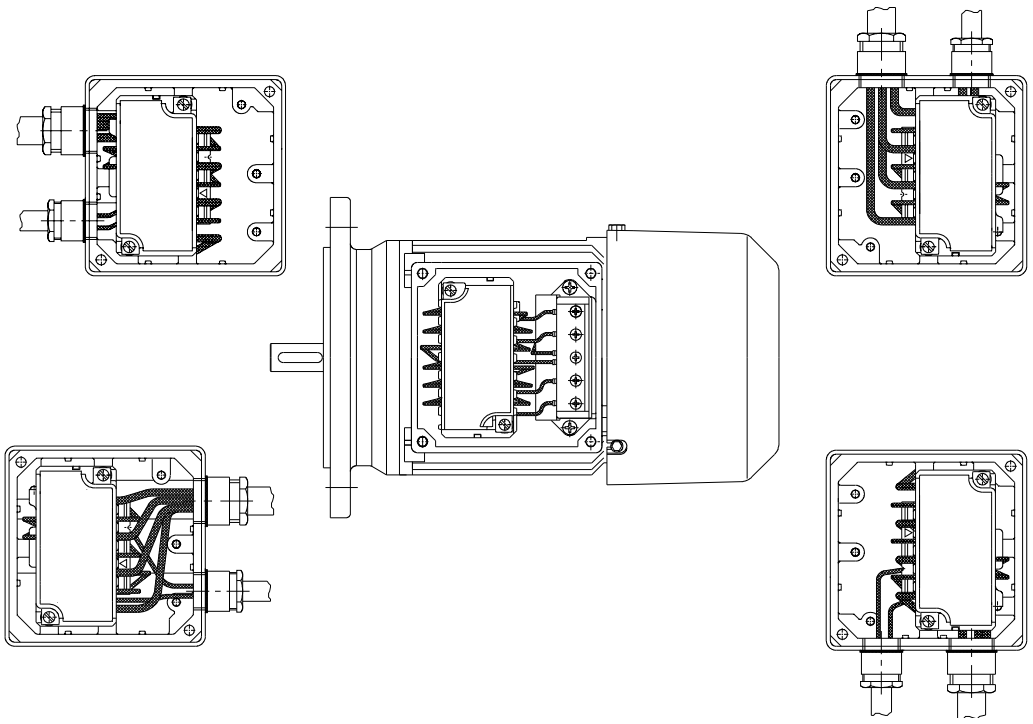
The housing cover of the IS plug connector can be screwed onto the lower section of the plug connector depending on the required position of the cable lead. The upper section of the plug connector shown in the following figure must first be installed in the housing cover so it will match the position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



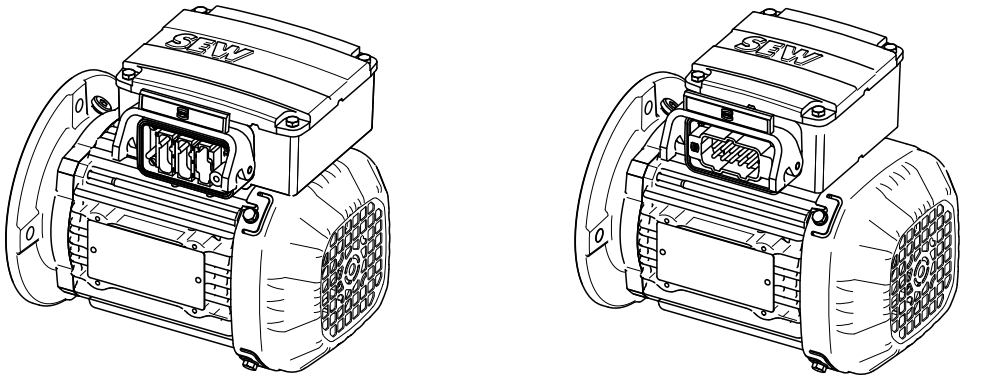
798978827

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



798785163

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



798984587

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

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

The plug 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 scope of delivery.

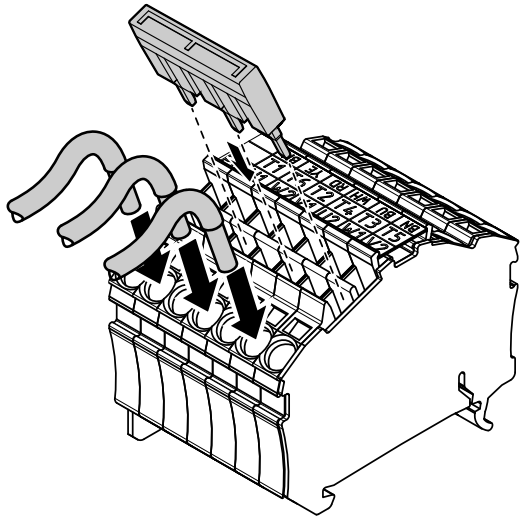
The enclosure is only applied when the mating connector is mounted and locked.

5.13 Connecting the motor via terminal strip

5.13.1 KCC terminal strip

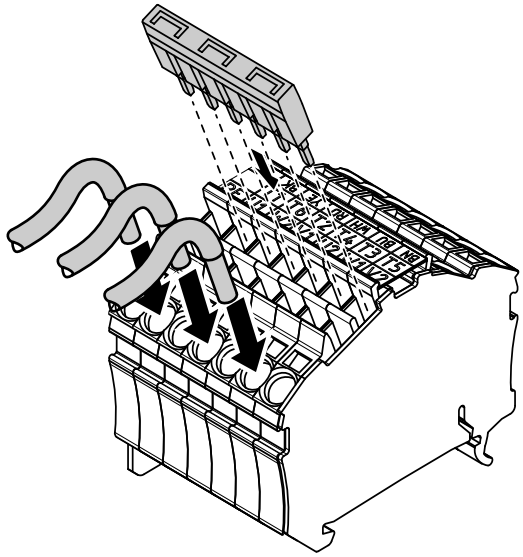
- Perform the connection in accordance with the enclosed wiring diagram
- Check the maximum cable cross section:
  - 4 mm^2 (AWG 12) rigid
  - 4 mm^2 (AWG 12) flexible
  - 2.5 mm^2 (AWG 14) flexible with conductor end sleeve
- In the terminal box: Check winding connections and tighten them if necessary
- Strip-off length 10-12 mm

Arrangement of terminal links for ⅄ connection



18014399506064139

Arrangement of terminal links for △ connection

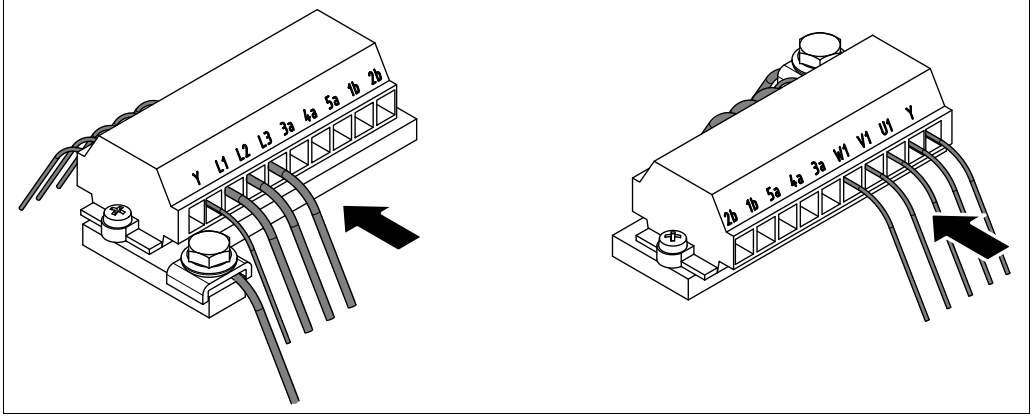


18014399506066059

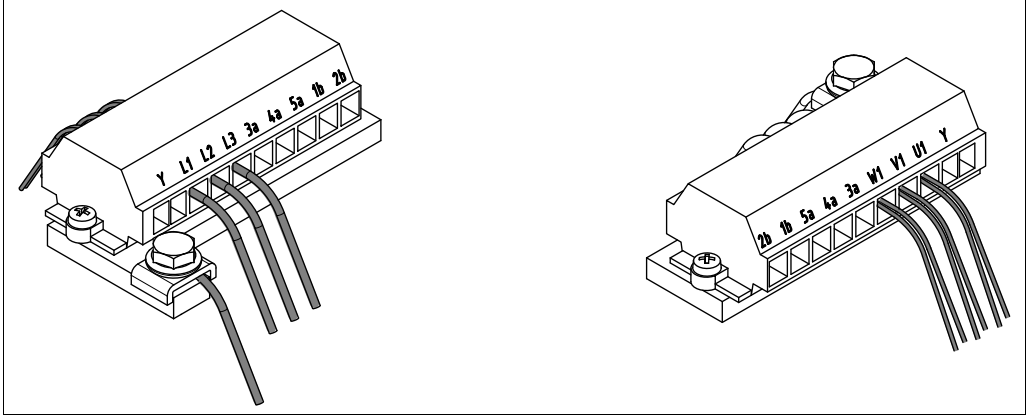
5.13.2 KC1 terminal strip

- Perform the connection in accordance with the enclosed wiring diagram
- Check the maximum cable cross section:
  - 2.5 mm^2 (AWG 14) rigid
  - 2.5 mm^2 (AWG 14) flexible
  - 1.5 mm^2 (AWG 16) flexible with conductor end sleeve
- Strip-off length 8-9 mm

Arrangement of terminal links for ⅄ connection



Arrangement of terminal links for △ connection



5.14 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.

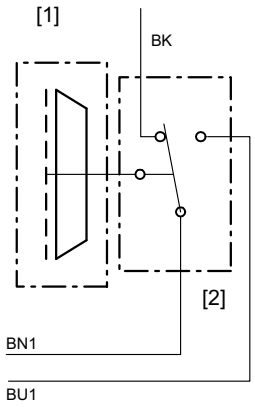
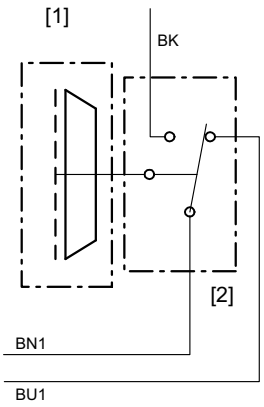
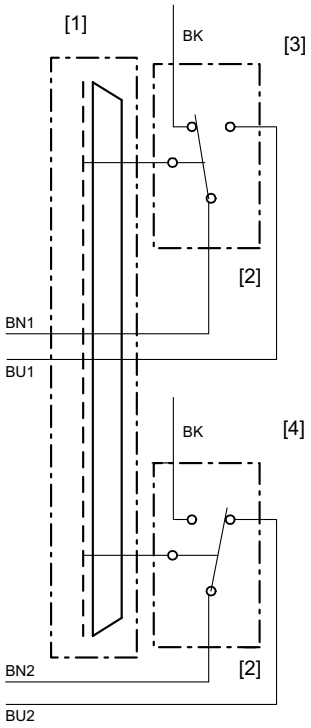
5.14.1 Connecting the brake control

The DC disk brake is powered from 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 section "Technical Data")**
- Connect the brake control system according to the wiring diagram supplied with the brake
- 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.

5.14.2 Connecting the DUB diagnostics unit

Connect the diagnostics unit as shown in the wiring connection diagram(s) 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. Subsequent change to low voltage is not permitted.

Function monitoring	Wear monitoring	Function and wear monitoring
		
[1] Brake [2] MP321-1MS microswitch	[1] Brake [2] MP321-1MS microswitch	[1] Brake [2] MP321-1MS microswitch [3] Function monitoring [4] Wear monitoring
1145889675	1145887755	1145885835

5.15 Accessory equipment

Connect accessory equipment as shown in the wiring connection diagram(s) provided with the motor. **Do not connect or start up the accessory equipment if the wiring diagram is missing.** You can obtain the valid wiring diagrams from SEW-EURODRIVE free of charge.

5.15.1 Temperature sensor /TF

NOTICE

Damage of the temperature sensor due to excessive heat.

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, thermal 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 second terminal box for the TF temperature sensor, you must connect the temperature sensor in that terminal box.

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.

5.15.2 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.

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

5.15.3 Temperature sensor /KY (KTY84-130)

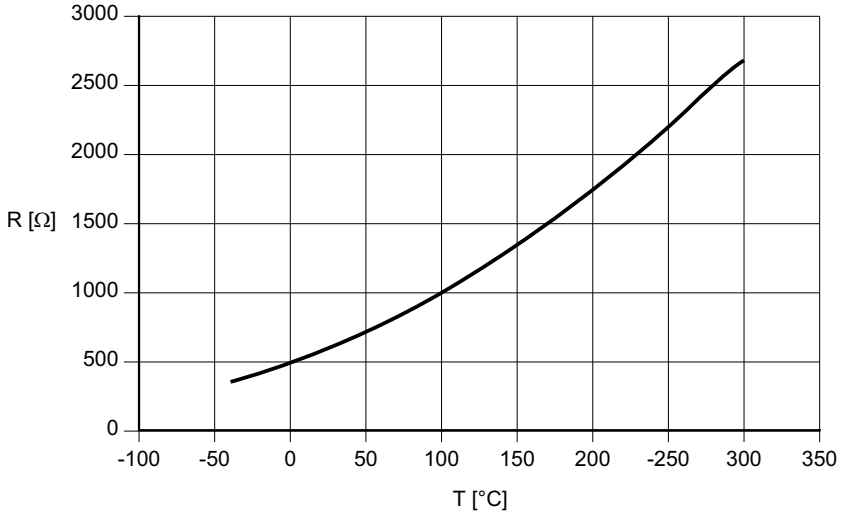
NOTICE

Excessive self-heating of the temperature sensor can damage the insulation of the temperature sensor.

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.



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

5.15.4 Temperature detection /PT (PT100)

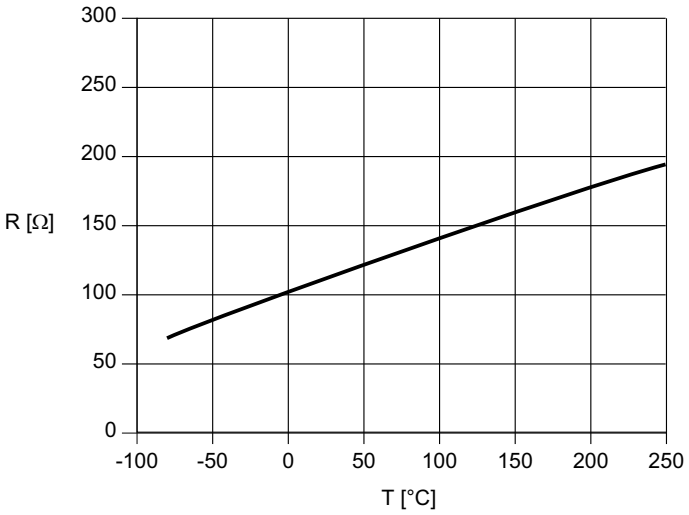
NOTICE

Excessive self-heating of the temperature sensor can damage the insulation of the temperature sensor.

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.



Technical data	PT100
Connection	Red/white
Resistance at 20 – 25 °C per PT100	107 Ω < R < 110 Ω
Test current	< 3 mA

5.15.5 V forced cooling fan

- Connection in separate terminal box
- Max. connection cross section 3 × 1.5 mm^2 (3 × AWG 15)
- Cable gland M16 × 1.5

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

1) Steinmetz circuit

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

1) Steinmetz circuit

Motor size	Operating mode/connection	Voltage V
DR.71 – DR.132	DC 24 V	24

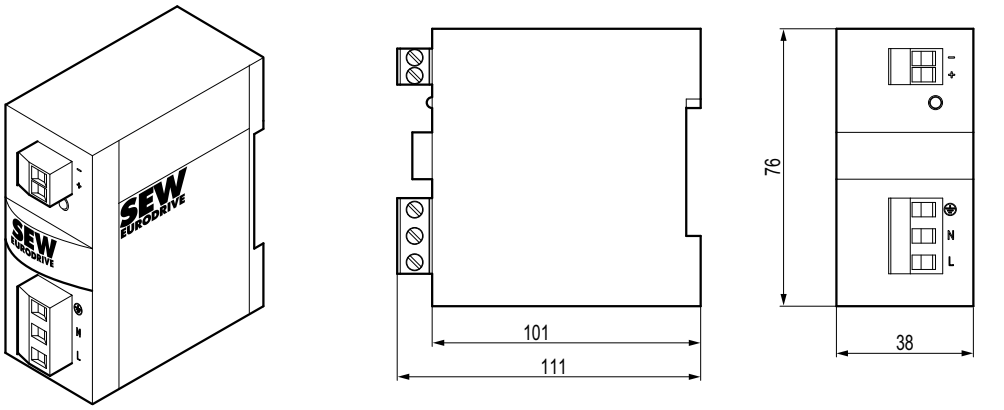
INFORMATION

For information on how to connect the V forced cooling fan, refer to the wiring diagram (page 188).

5.15.6 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. If you have not specifically ordered the switched-mode power supply, you can order it separately from SEW-EURODRIVE by quoting its part number.

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



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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:	Terminal screws 1.5 ... 2.5 mm^2, separable
Degree of protection:	IP20; attachment to EN 60715 TH35 support rail in the control cabinet
Part number:	0188 1817

5.15.7 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	Power supply	Signal	Wiring diagram
ES7S	DR.71-132	Incremental enc.	Shaft-centered	DC 7 – 30 V	1Vss sin/cos	68 180 xx 08
ES7R	DR.71-132	Incremental enc.	Shaft-centered	DC 7 – 30 V	TTL (RS 422)	68 179 xx 08
ES7C	DR.71-132	Incremental enc.	Shaft-centered	DC 4.5 – 30 V	HTL / TTL (RS 422)	68 179 xx 08
AS7W	DR.71-132	Absolute enc.	Shaft-centered	DC 7 – 30 V	1Vss sin/cos	68 181 xx 08
AS7Y	DR.71-132	Absolute enc.	Shaft-centered	DC 7 – 30 V	1Vss sin/cos + SSI	68 182 xx 07
EG7S	DR.160-280	Incremental enc.	Shaft-centered	DC 7 – 30 V	1Vss sin/cos	68 180 xx 08
EG7R	DR.160-280	Incremental enc.	Shaft-centered	DC 7 – 30 V	TTL (RS 422)	68 179 xx 08
EG7C	DR.160-280	Incremental enc.	Shaft-centered	DC 4.5 – 30 V	HTL / TTL (RS 422)	68 179 xx 08
AG7W	DR.160-280	Absolute enc.	Shaft-centered	DC 7 – 30 V	1Vss sin/cos	68 181 xx 08
AG7Y	DR.160-280	Absolute enc.	Shaft-centered	DC 7 – 30 V	1Vss sin/cos + SSI	68 182 xx 07
EH7S	DR.315	Incremental enc.	Shaft-centered	DC 10 – 30 V	1Vss sin/cos	08 511 xx 08
EH7C	DR.315	Incremental enc.	Shaft-centered	DC 10 – 30 V	HTL	08 511 xx 08
EH7R	DR.315	Incremental enc.	Shaft-centered	DC 10 – 30 V	TTL (RS 422)	08 511 xx 08
EH7T	DR.315	Incremental enc.	Shaft-centered	DC 5 V	TTL (RS 422)	08 511 xx 08
AH7Y	DR.315	Absolute enc.	Shaft-centered	DC 9 – 30 V	TTL+SSI (RS 422)	08 259 xx 07
AV1H	DR.160-280	Absolute enc.	Flange centered	DC 7 – 12 V	Hiperface® / 1Vss sin/cos	–
AV1Y	DR.160-280	Absolute enc.	Flange centered	DC 10 – 30 V	1Vss sin/cos + SSI	–
EV1C	DR.160-280	Incremental enc.	Flange centered	DC 10 – 30 V	HTL / TTL	–
EV1S	DR.160-280	Incremental enc.	Flange centered	DC 10 – 30 V	1Vss sin/cos	–
EV1R	DR.160-280	Incremental enc.	Flange centered	DC 10 – 30 V	TTL	–
EV1T	DR.160-280	Incremental enc.	Flange centered	DC 5 V	TTL	–

INFORMATION

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

5.15.8 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" (page 179) for connection via terminal strip.
- Observe the enclosed wiring diagram for connection via M12 connectors.

Encoder	Motor size	Power supply	Signals
EI71 A / EI71 B[1)]	DR.71 – 132	DC 9 – 30 V	HTL 1 period/revolution
EI72 A / EI72 B[1)]			HTL 2 periods/revolution
EI76 A / EI76 B[1)]			HTL 6 periods/revolution
EI7C A / EI7C B[1)]			HTL 24 periods/revolution

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

EI7. A – visual feedback

The LED display, if installed, (visible with the fan guard removed) gives visual feedback according to the following table:

LED color	Track A	Track B	Track $\overline{A}$	Track $\overline{B}$
Orange (red and green)	0	0	1	1
Red	0	1	1	0
Green	1	0	0	1
Off	1	1	0	0

EI7. B – visual feedback

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

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 error detects an error.

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

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

LED color	Track A	Track B	Track $\overline{A}$	Track $\overline{B}$
Orange (green and red)	0	0	1	1
Red	0	1	1	0
Green	1	0	0	1
Off	1	1	0	0

5.15.9 Encoder connection

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 cable length (inverter - encoder):
  - 100 m with a capacitance per unit length ≤ 120 nF/km
- Core cross section: 0.20 ... 0.5 mm^2 (AWG 24 ... 20); recommendation ≥ 0.25 mm^2
- Use shielded cable with twisted pair conductors and apply shield over large area on both ends:
  - To the connection cover of the encoder, in the cable gland, or in the encoder plug
  - To the inverter on the electronics shield clamp or 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.
- 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 a suitable other cable gland.
- The cable glands for the cable entry must meet the following conditions:
  - Cramping area is suitable for the respective cable
  - The IP level of the encoder connection is at least as high as the IP level of the actual encoder
  - The cable is suitable for the respective ambient temperature range.
- Check the flawless state and the proper seat of the connection cover gasket.
- Tighten the screws of the connection cover with a tightening torque of 2 Nm [17.7 lb-in].

5.15.10 Anti-condensation heater

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.

6 Startup

INFORMATION

- Observe the safety notes in chapter 2 during installation.
- In case of problems, refer to the "Malfunctions" (page 168) chapter.

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

Danger of 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 surface temperatures on the drive can be very high during operation.

Danger of burns.

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

NOTICE

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

NOTICE

The 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

When using the DR.250/280 motor with BE brake and EV.. / AV.. 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 rpm. For higher speeds, please contact SEW-EURODRIVE.
- Emergency stops from a higher motor speed are allowed.

6.1 Before startup

Before 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" (page 27) are performed after extended storage periods
- All connections have been made properly
- 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 have been properly installed
- 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

6.2 During startup

During startup, make sure that:

- The motor is running properly, which means
  - No overload,
  - No speed fluctuation,
  - No loud noises,
  - No unusual vibrations, etc.
- The braking torque corresponds to the respective application. Observe the "Technical Data" (page 145) chapter and the nameplate.

INFORMATION

On brakemotors with self-reengaging manual brake release, the lever must be removed after startup. A bracket is provided for storing the lever on the outside of the motor housing.

6.2.1 DR.. motors with rotor designation "J"

⚠ WARNING

Voltage at the motor exceeds the permitted level.

Serious injury.

- Equip the connection area of the motor with a touch guard.

Despite proper functioning of the drive the startup of DR.. motors with rotor designation "J" may cause noise and vibration.

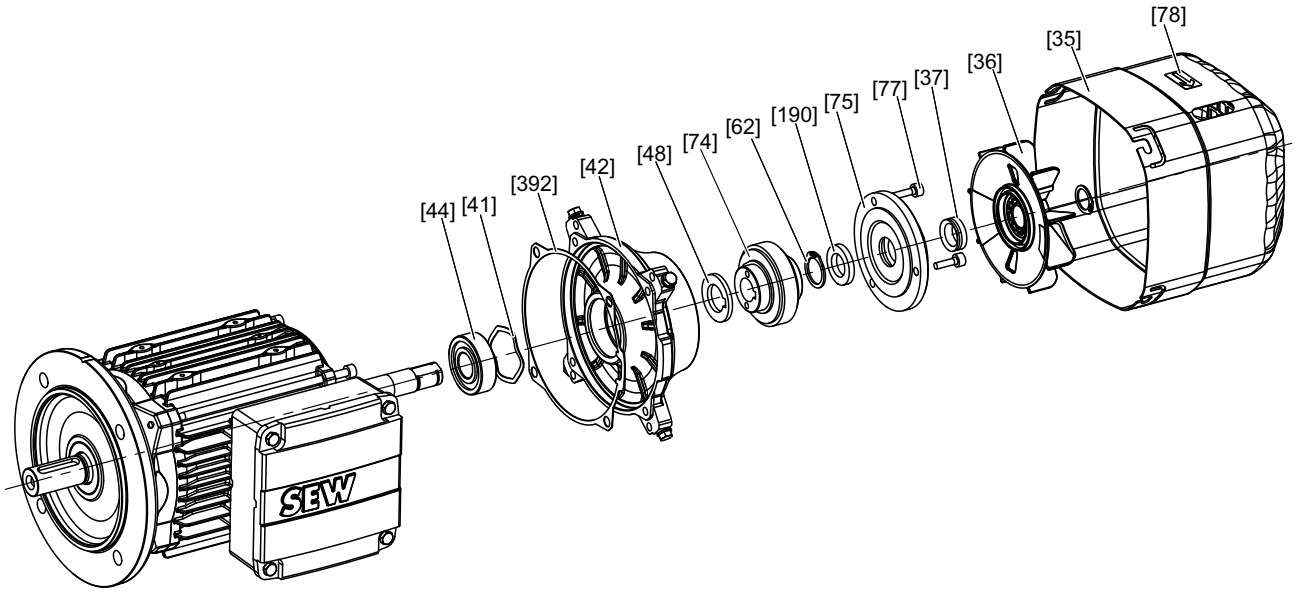
6.3 Motors with reinforced bearings

NOTICE

Motors with a reinforced bearing must not be operated without an overhung load. Otherwise you risk damaging the bearings.

6.4 Altering the blocking direction on motors with a backstop

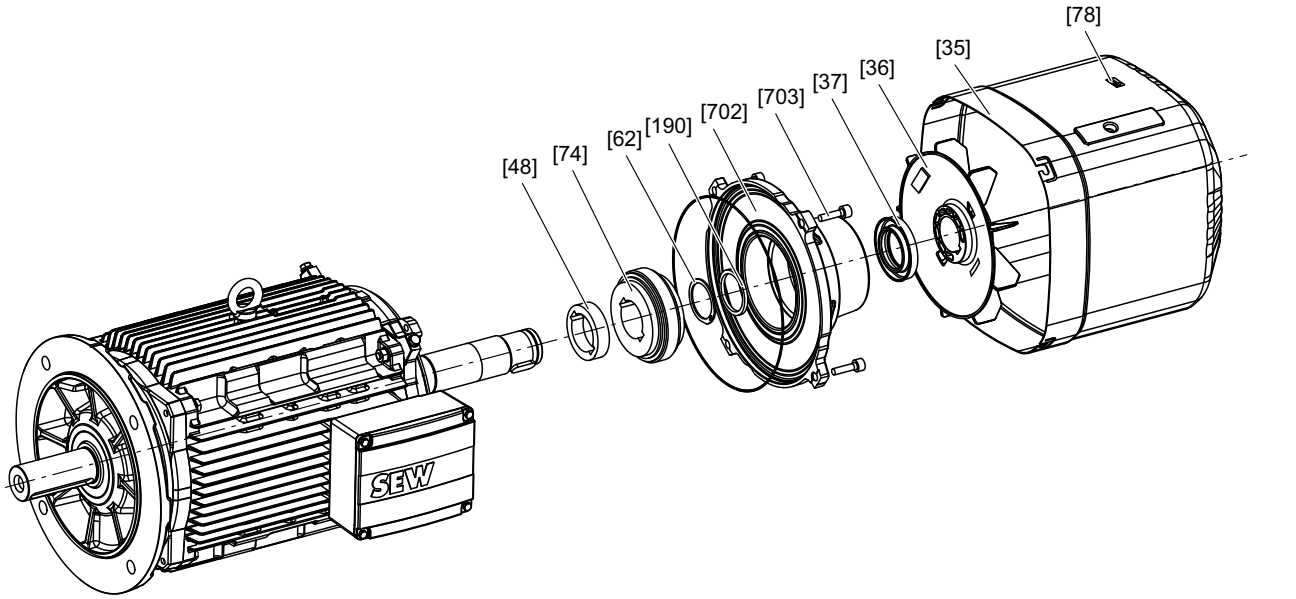
6.4.1 DR.71 – DR.80 with backstop – basic structure



1142858251

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

6.4.2 DR.90 – DR.315 with backstop – basic structure



1142856331

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

6.4.3 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 steps described below.

Proceed as follows to change the blocking direction:

1. Remove forced cooling fan and incremental encoder (if installed).

   See chapter "Motor and brake maintenance – preliminary work" (page 90).

2. Remove flange cover or fan guard [35]
3. **For the DR.71 – 80:** Remove the sealing flange [75].

   For the DR.90 – 315: Completely remove the backstop housing [702].

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

   For the DR.90 – 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.

Greasing the backstop

The backstop is supplied 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.

Motor type	71	80	90/100	112/132	160	180	200/225	250/280	315
Amount of grease [g]	9	11	15	20	30	45	80	80	120

The tolerance regarding the grease level is ± 30%.

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 controller 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 on the drive can be very hot during operation.

Danger of burns.

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

NOTICE

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

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.

Only SEW service staff, SEW 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 tests following all maintenance and repair work (thermal protection).

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:** At least every 3000 hours of operation[1)] • **If used as a holding brake:** Every 2 to 4 years, depending on operating conditions[1)]	Brake inspection • Measuring the brake disk thickness • Brake disk, lining • Measuring and adjusting working air gap • Pressure plate • Carrier/gearing • Pressure rings • Sucking off any abrasion • Inspect the switch contacts and replace them, if necessary (e.g. in case of burn-out)
Motor	• **Every 10000 operating hours**[2) 3)]	Motor inspection: • Check rolling bearing and change if necessary • Replacing the oil seal • Clean cooling air ducts
Drive	• Varies [3)]	• Touch up or renew the surface/anticorrosion coating • Check and clean the air filter. • if applicable, clean condensation drain hole at the bottom of the fan guard • 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.250 – 315 with relubrication device, please note the shortened relubrication periods in the "Bearing lubrication DR.250 – 315" section.

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.

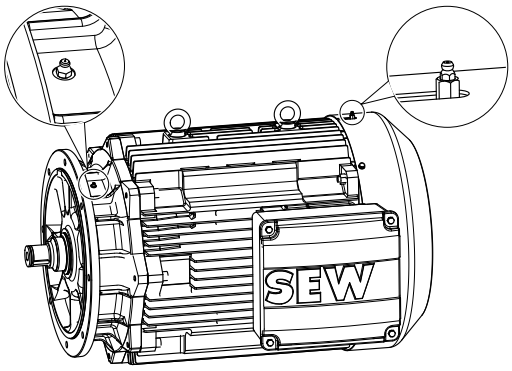
7.2 Bearing lubrication

7.2.1 Bearing lubrication for DR.71 – DR.225

In standard design, the bearings are lubricated for life.

7.2.2 Bearing lubrication for DR.250 – DR.315

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, which is also a polyurea-based mineral grease.

Relubrication

You can purchase the lubricants in 400 g cartridges from SEW-EURODRIVE. For order information, refer to the section "Lubricant tables for rolling bearings of SEW motors" .

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.

Relubrication interval

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

- –20 °C to +40 °C Ambient temperature
- 4-pole speed
- 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.250 – 315 /NS	5000 h	50 g	3000 h	70 g
DR.250 – 315 /ERF /NS	3000 h	50 g	2000 h	70 g

7.3 Reinforced bearings

In the /ERF (reinforced bearing) 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 bearing is only offered with the /NS (relubrication) option so as to facilitate optimal lubrication of the bearing. For bearing lubrication, refer to the notes in chapter "Inspection/maintenance" > "Bearing lubrication DR.250 – DR.315".

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.

7.5 Preliminary work for motor and brake maintenance

⚠ WARNING

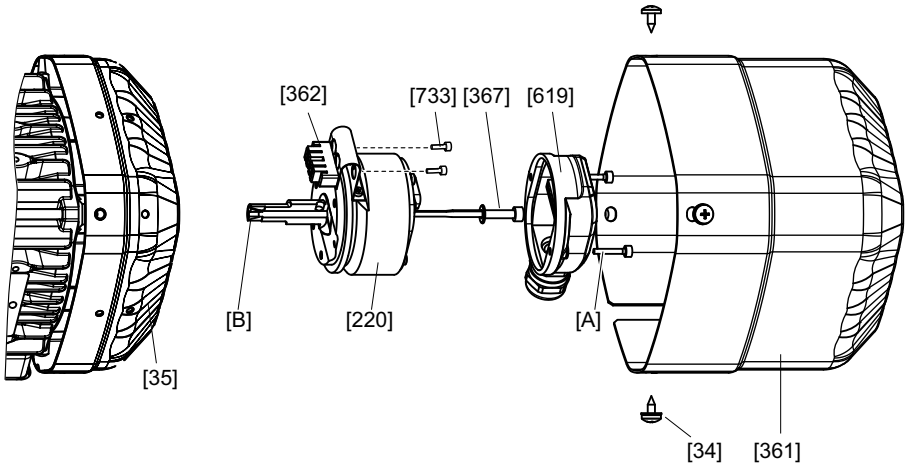
Risk of crushing if the drive starts up unintentionally.

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 Remove the incremental encoder from DR.71 – DR.132

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



3475618443

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

Disassembling 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 two to three turns and loosen the spread shaft by tapping lightly on the head of the screw.

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

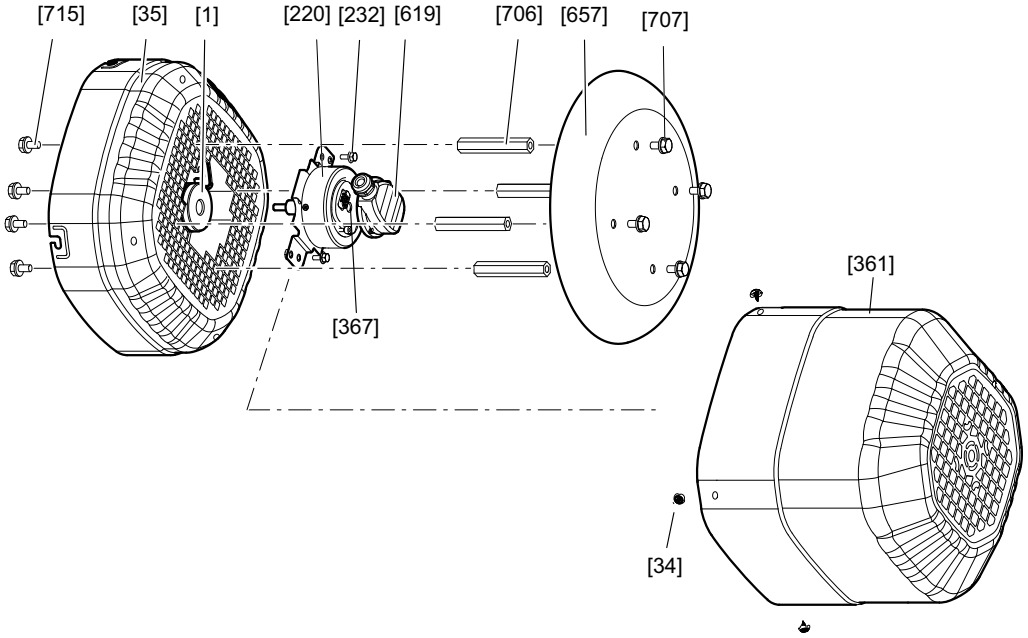
Re-assembly

Proceed as follows to re-assemble the encoder:

1. Apply NOCO® Fluid to the encoder spigot.
2. Tighten the central retaining screw [367] with a tightening torque of 2.9 Nm (25.7 lb-in).
3. Tighten the screw [733] in the expansion anchor with a maximum tightening torque of 2.0 Nm (17.7 lb-in).
4. Assemble the encoder cover [619] and tighten the screws [A] with a tightening torque of 2 Nm (17.7 lb-in).
5. Install the extended fan guard [361] with the screws [34].

7.5.2 Removing the incremental encoder from DR.160 – DR.280

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



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

Disassembling EG7.- and AG7. encoders

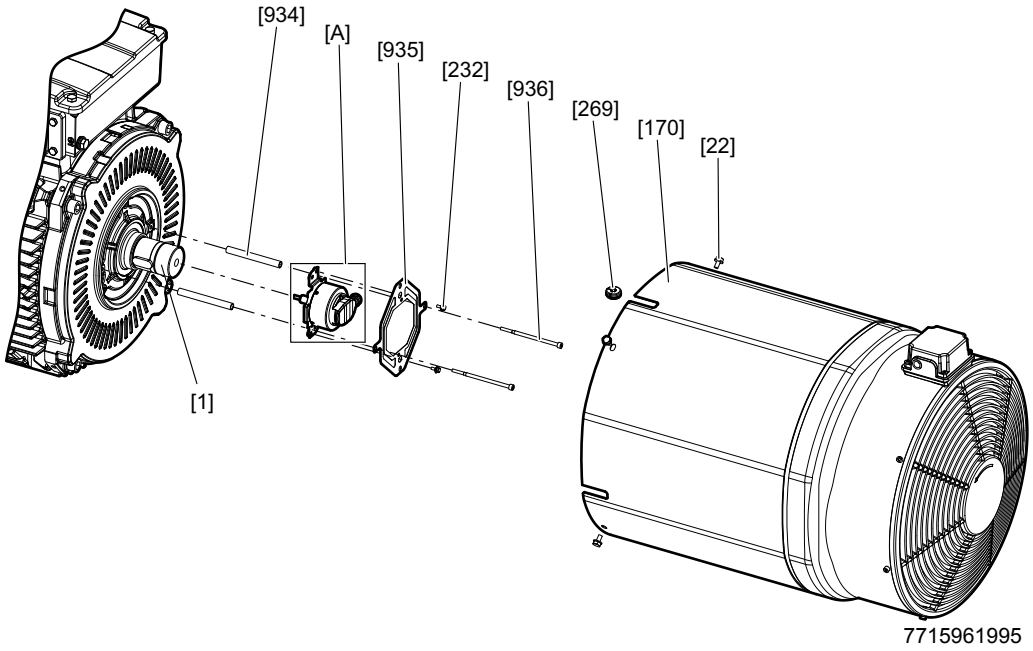
1. Loosen the screws [22] and remove the forced cooling fan guard [170].
2. Remove the cable grommet [269] with encoder cable from the forced cooling fan guard [170].
3. Loosen the screws [232] and [936] and remove the torque bracket [935].
4. Loosen the retaining screw [220] on the encoder and remove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

Re-assembly

1. Apply NOCO® Fluid to the encoder shaft.
2. 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 (70.8 lb-in).
3. Place the torque bracket [935] on the spacing bushings [934] and tighten the screws [936] with 11 Nm (97.4 lb-in).
4. Attach the torque arm of the encoder [A] to the torque bracket [935] using the screws [232]. The tightening torque must be 6 Nm (53.1 lb-in).
5. Pull the cable of the encoder [220] through the cable grommet [269]. Insert the cable grommet [269] into the forced cooling fan guard [170].
6. Mount the forced cooling fan guard [170] and tighten the screws [22] with 28 Nm (247.8 lb-in).

7.5.3 Removing the incremental encoder from a DR.160 – DR.315 motor with /V forced cooling fan option

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



[22]	Screw	[269]	Grommet	[936]	Screw
[170]	Forced cooling fan guard	[934]	Spacing bushing	[A]	Encoder
[232]	Screws	[935]	Torque bracket		

Disassembling EG7.- and AG7. encoders

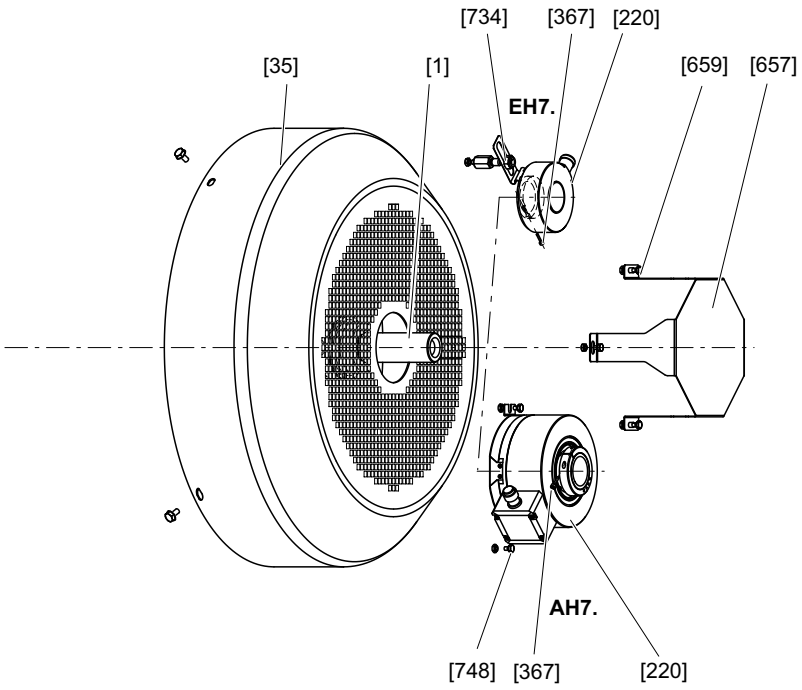
1. Loosen the screws [22] and remove the forced cooling fan guard [170].
2. Remove the cable grommet [269] with encoder cable from the forced cooling fan guard [170].
3. Loosen the screws [232] and [936] and remove the torque bracket [935].
4. Loosen the retaining screw [220] on the encoder and remove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

Re-assembly

1. Apply NOCO® Fluid to the encoder shaft.
2. 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 (70.8 lb-in).
3. Place the torque bracket [935] on the spacing bushings [934] and tighten the screws [936] with 11 Nm (97.4 lb-in).
4. Attach the torque arm of the encoder [A] to the torque bracket [935] using the screws [232]. The tightening torque must be 6 Nm (53.1 lb-in).
5. Pull the cable of the encoder [220] through the cable grommet [269]. Insert the cable grommet [269] into the forced cooling fan guard [170].
6. Mount the forced cooling fan guard [170] and tighten the screws [22] with 28 Nm (247.8 lb-in).

7.5.4 Removing the incremental encoder from DR.315

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



9007199662370443

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

EH7. Removing the encoder:

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].

AH7. Removing the encoder:

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

Proceed as follows to re-assemble the encoder:

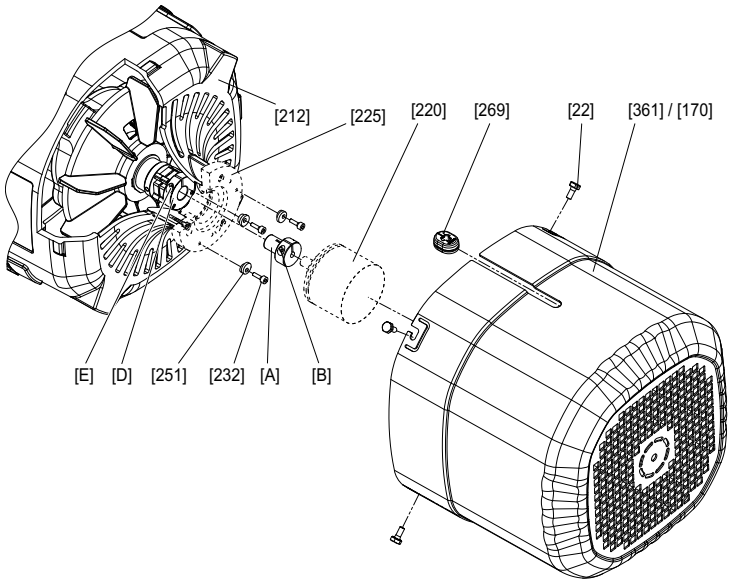
1. Apply NOCO® Fluid to the encoder spigot.
2. Mount fan guard [35].
3. Push the encoder [220] on the shaft and fasten it with the retaining screw [367] applying a tightening torque according to the following table:

Encoder	Tightening torque
EH7.	0.7 Nm (6.2 lb in)
AH7.	3.0 Nm (26.6 lb in)

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

7.5.5 Removing/installing incremental encoders, absolute encoders and special encoders from/on DR.71 – 225 with XV.A mounting adapter

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



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[22]	Screw	[361]	Cover (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)		

EV.., AV.. and XV. encoder removal

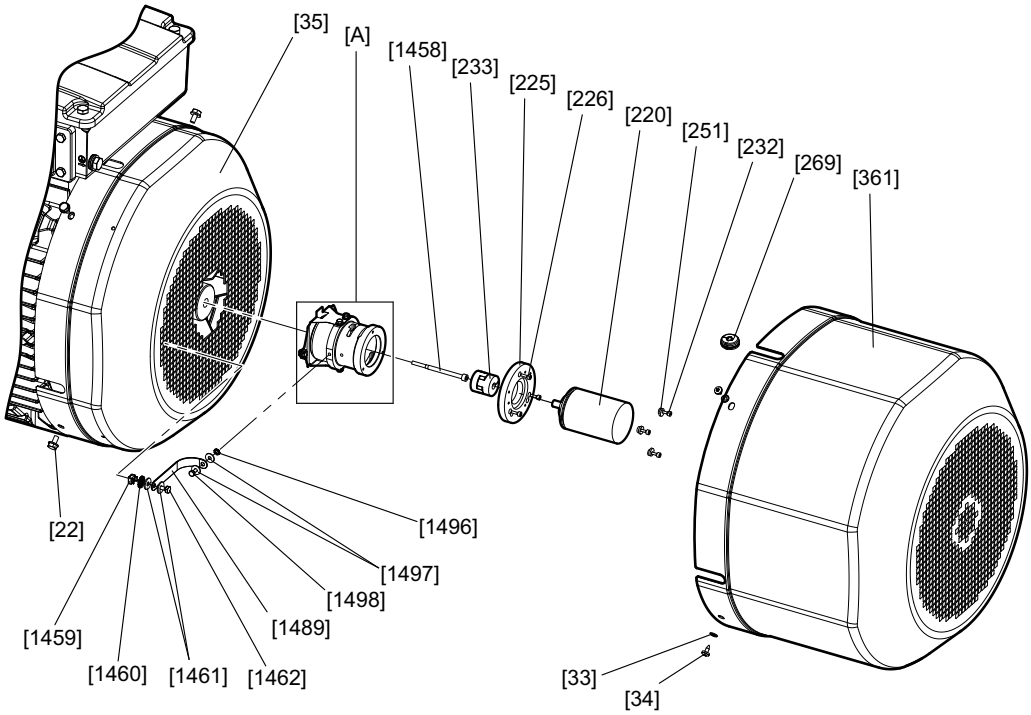
1. Remove the protection cover [361] by loosening the screws [22] or remove forced-cooling fan guard [170].
2. Loosen the retaining screws [232] and turn the conical spring washers [251] outwards.
3. Loosen the clamping screw [E] of the coupling.
4. Remove the adapter [A] and the encoder [220].

Re-assembly

1. Proceed according to chapter "Connecting XV.A encoder mounting adapter to DR.71 – 225 motors (page 34)" to mount the encoder.

7.5.6 Removing/installing incremental encoders, absolute encoders and special encoders with EV.A / AV.A mounting adapter from/on DR.250 – 280.

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



7715963915

[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" (page 97).
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 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 the EV.., AV.. encoder

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].

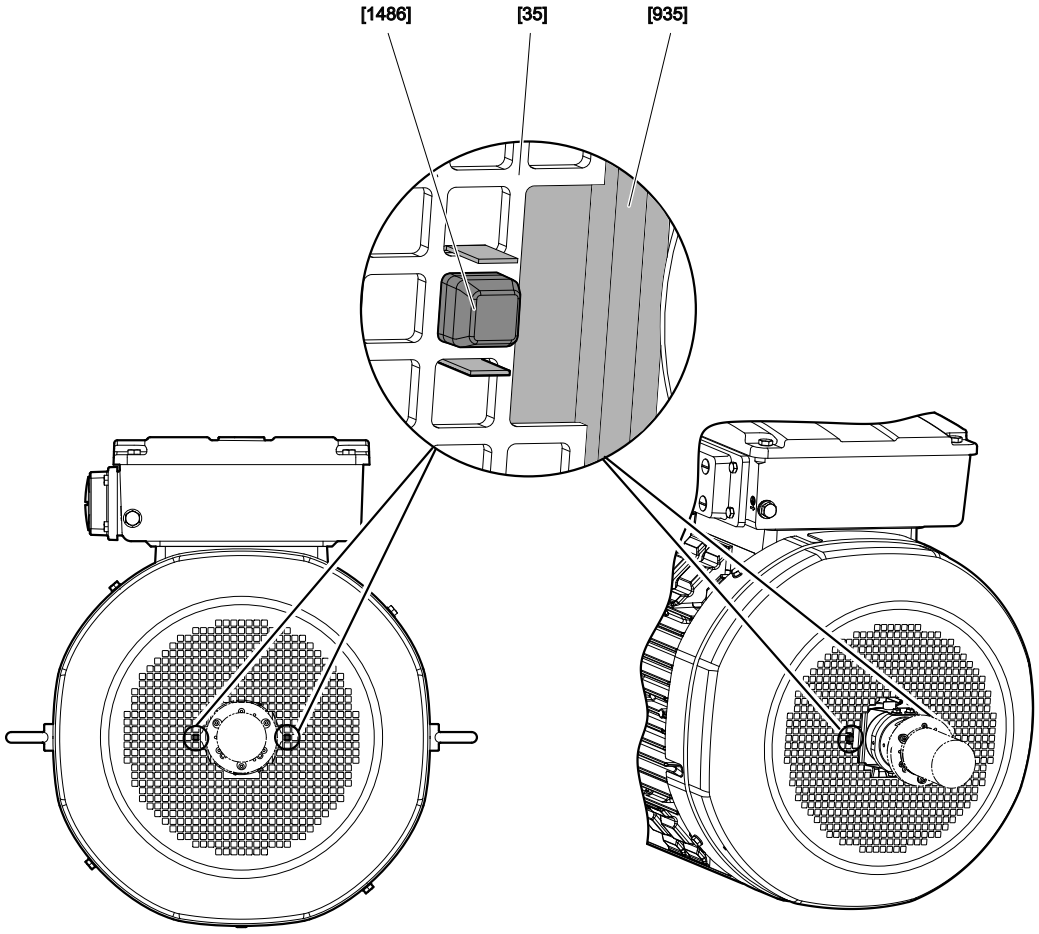
Re-assembly

1. Proceed as described in chapter "Installing the EV.A / AV.A encoder mounting adapter on DR.250 – 280 motors (page 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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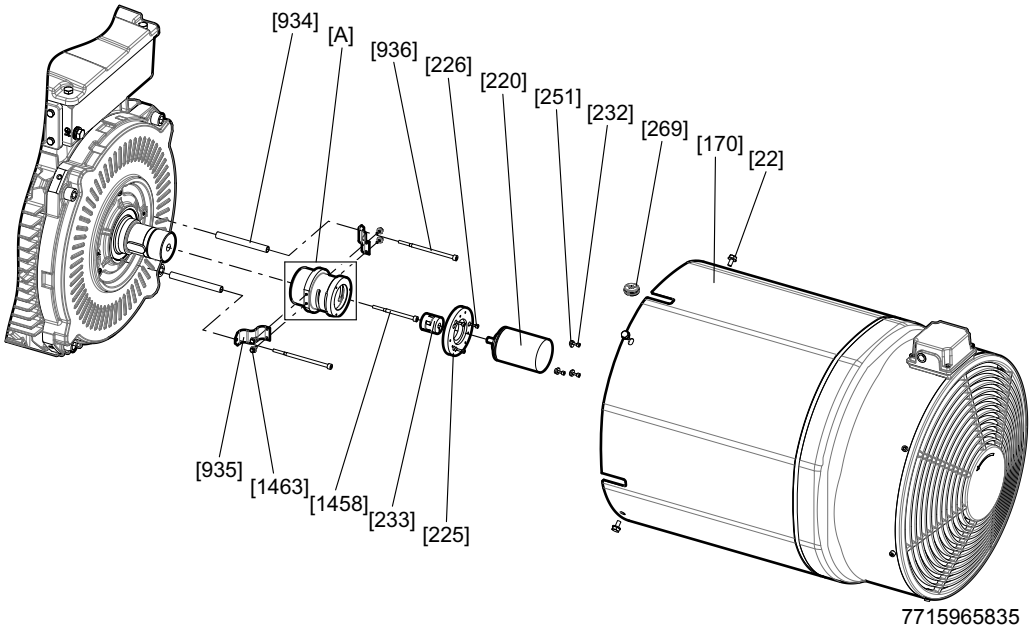
7.5.7 Removing/installing incremental encoders, absolute encoders and special encoders with EV.A / AV.A mounting adapter from/on DR.250 – 280 motors with /V forced cooling fan.

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.

EV.., AV.. and XV. encoder removal

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].

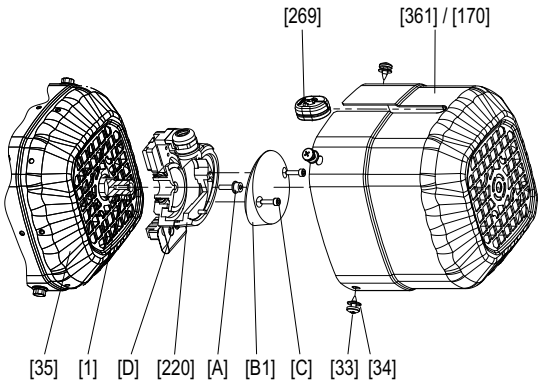
Re-assembly

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

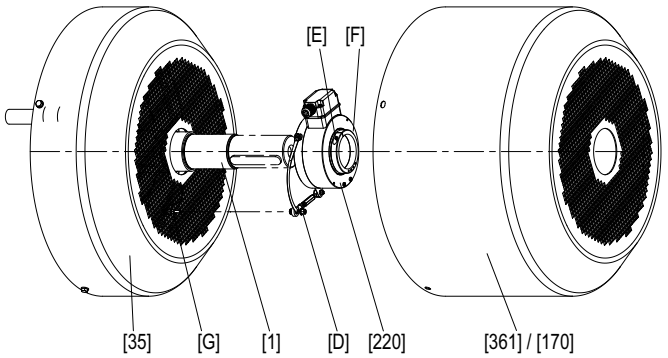
7.5.8 Removing/installing hollow shaft encoders from/to XH.. of DR.71 – 225

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

Encoder connection via XH1A mounting adapter



Encoder connection 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 arm
[D] Nut of the torque arm
[E] Screw
[F] Clamping ring
[G] Nut of the torque arm

Removing hollow shaft encoders from XH1A mounting adapter

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

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 arm [G].
4. Remove encoder [220] from rotor [1].

Reinstalling hollow shaft encoders to XH1A mounting adapter

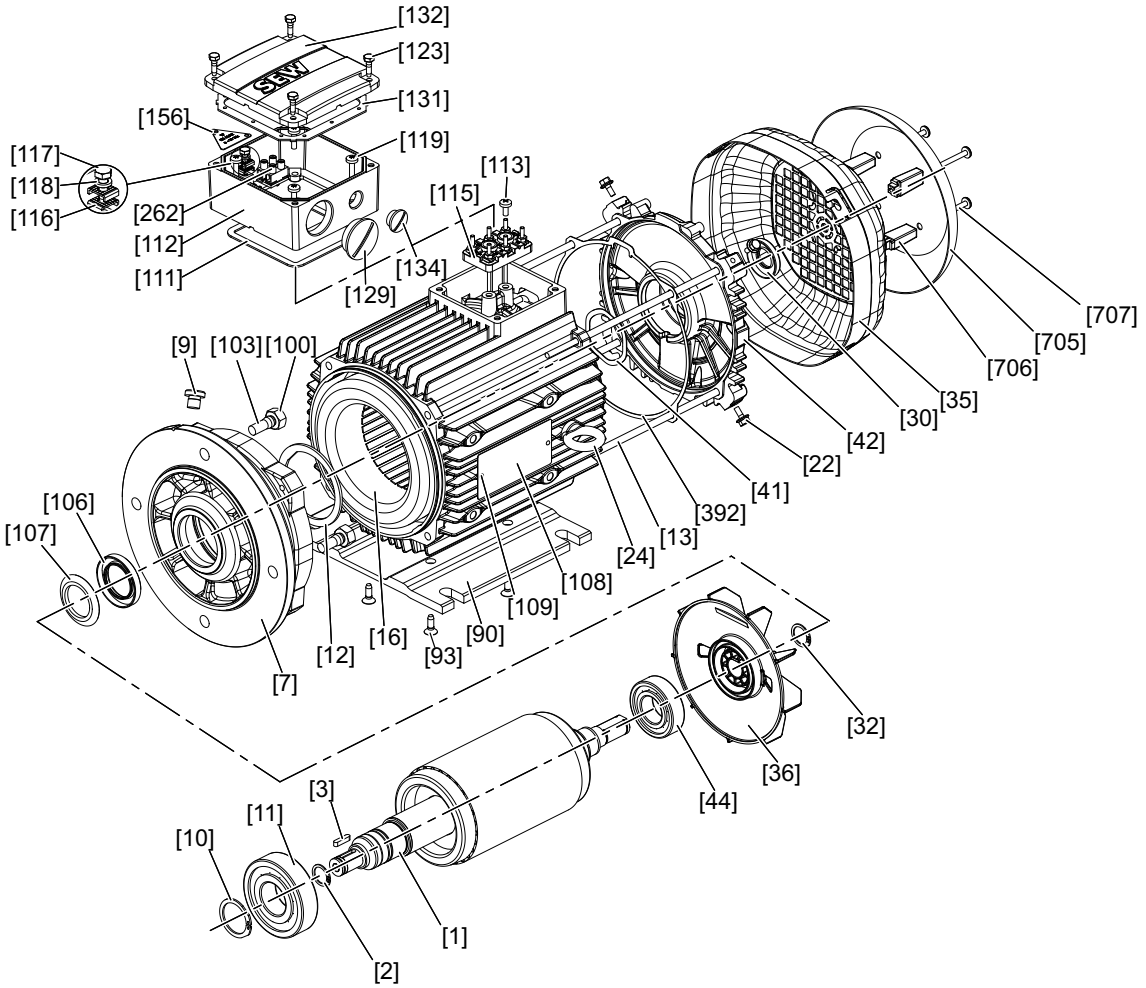
1. Push encoder [220] on rotor [1].
2. Mount torque arm via screws [D].
3. Fasten encoder [220] via screw [A] with a tightening torque of 2.9 Nm [25.7 lb-in]
4. Fasten encoder cover [B] via screws [C] with a tightening torque of 3 Nm [26.6 lb-in]
5. Install cover [361] or forced cooling fan guard [170].

Reinstalling hollow shaft encoders to XH7A and XH8A mounting adapter

1. Push encoder [220] on rotor [1].
2. Mount torque arm via nut [D] with a tightening torque of 10.3 Nm [91.2 lb-in].
3. Fasten clamping ring [F] via screw [E] with a tightening torque of 5 Nm [44.3 lb-in]
4. Install cover [361] or forced cooling fan guard [170].

7.6 Inspection/maintenance for DR.71-DR.280 motors

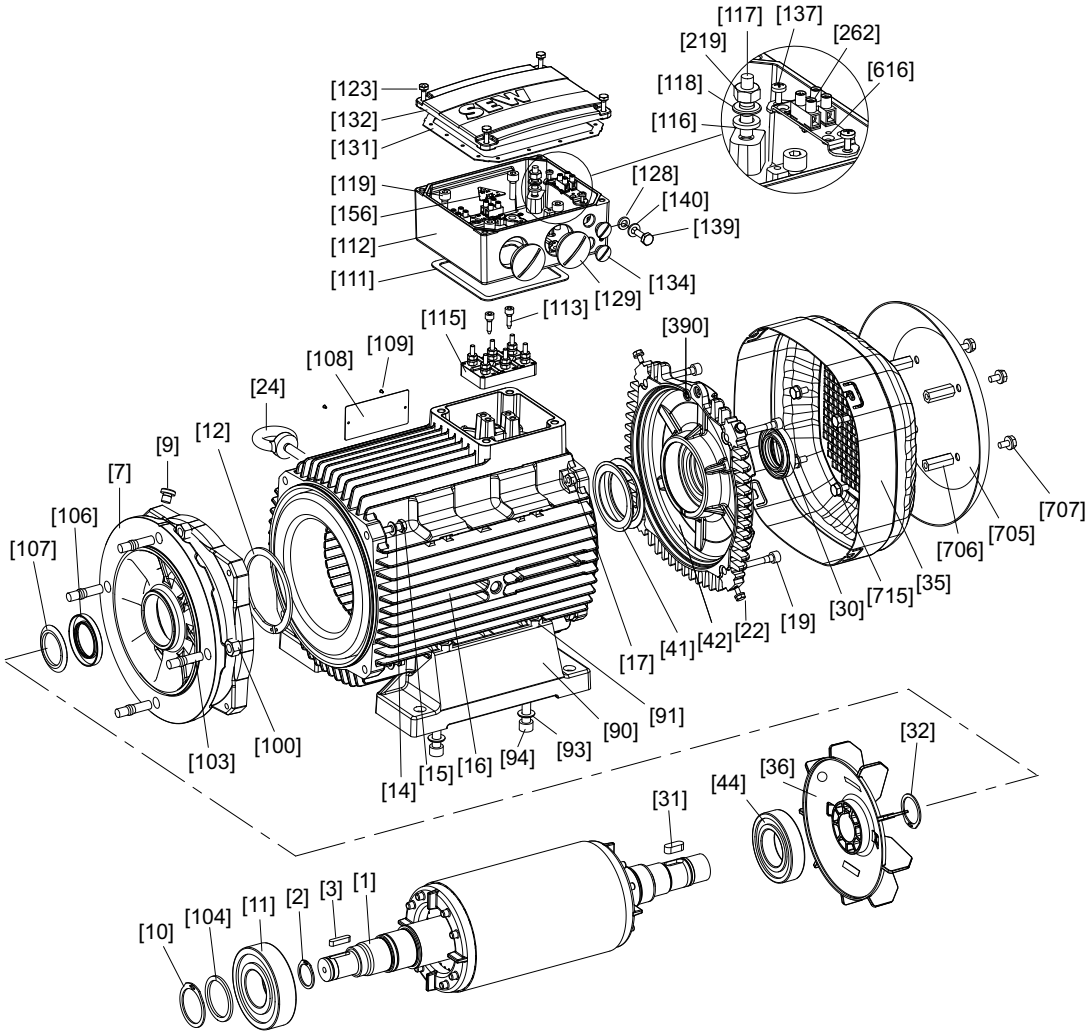
7.6.1 DR.71 – DR.132 – basic structure



173332747

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

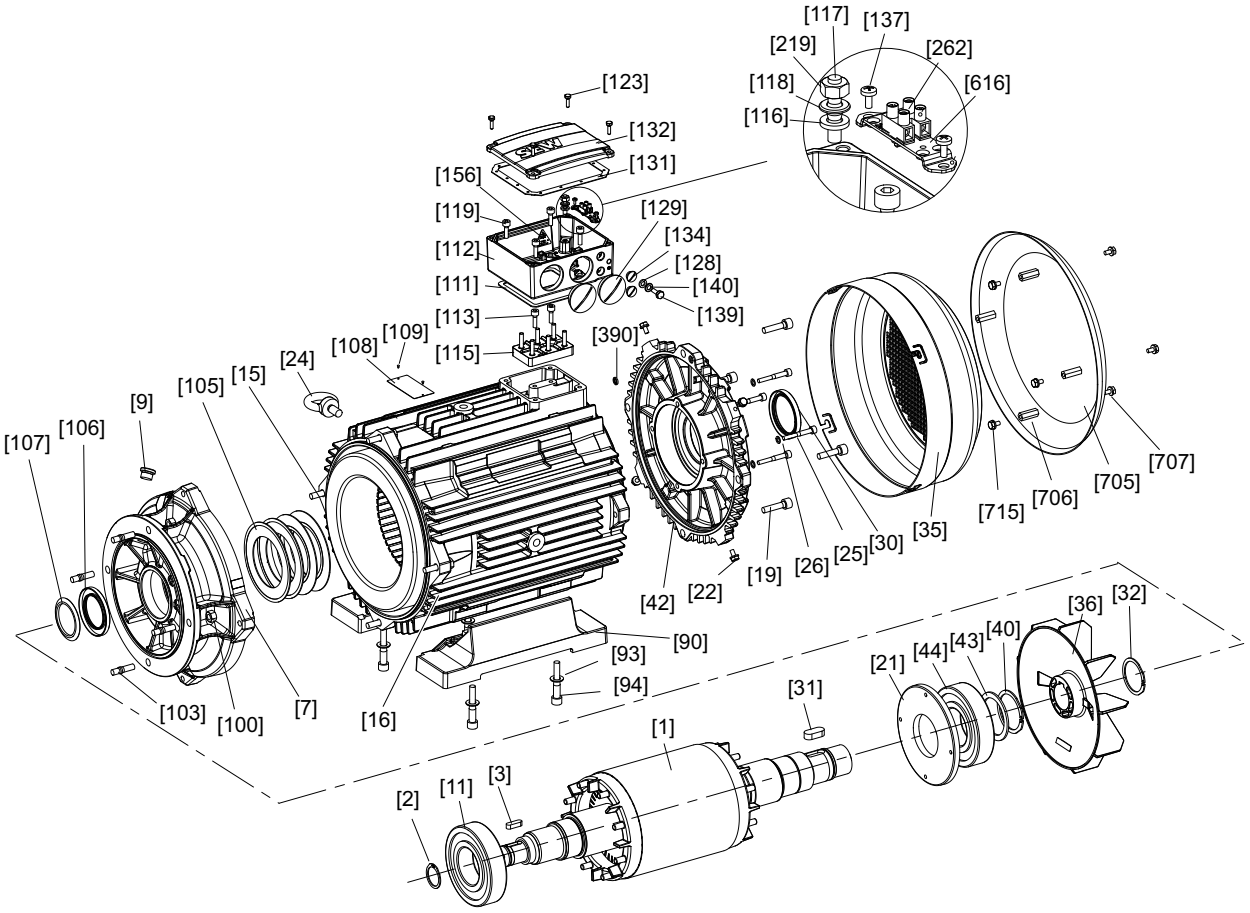
7.6.2 DR.160 – DR.180 – basic structure



527322635

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

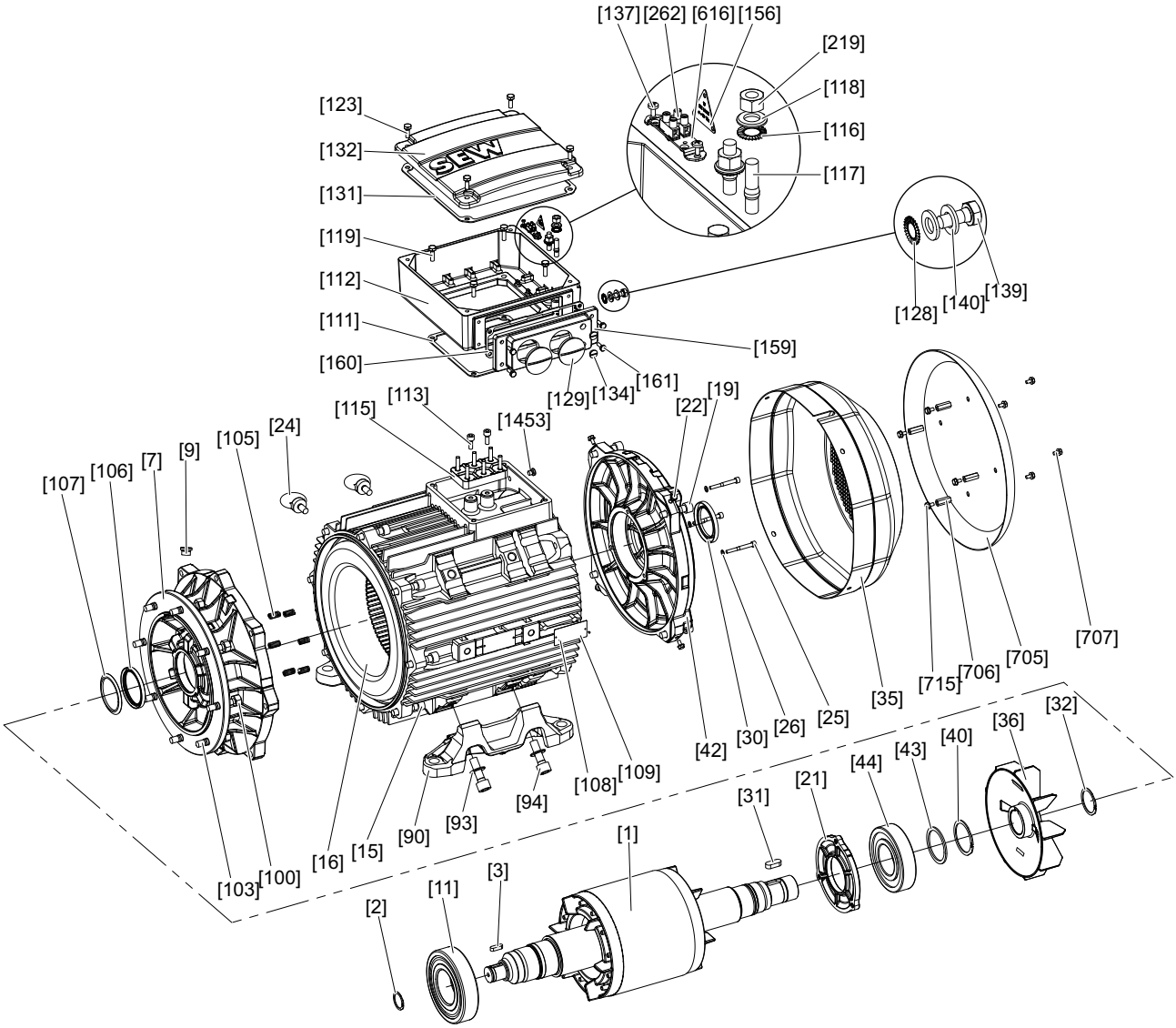
7.6.3 DR.200 – DR.225 – basic structure



1077856395

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

7.6.4 DR.250 – DR.280 – basic structure



7435669131

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

7.6.5 Inspection steps for DR.71 – DR.280 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 incremental encoder (if installed).

   See chapter "Motor and brake maintenance – preliminary work" (page 90).

2. Remove fan guard [35] and fan [36].
3. Remove stator:
   - **Size DR.71 – DR.132:** Remove machine screws [13] from flanged endshield [7] and B-side endshield [42]. Remove stator [16] from flanged endshield [7].
   - **Size DR.160 – DR.180:** Loosen cap screws [19] and remove B-side endshield [42]. Loosen hexagon screw [15] and remove stator from flanged endshield.
   - **Size DR.200 – DR.225:**
     - Loosen hexagon screw [15] and remove the flanged endshield [7] from the stator.
     - With gearmotors: Remove oil flinger [107]
     - 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].
   - **Sizes DR.250 – DR.280**

     Without /ERF or /NS option
     - Loosen cap screws [15] and remove the flange [7]. With gearmotors, pull off the oil flinger [107].
     - 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].

     With /ERF or /NS option
     - Loosen 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]. With gearmotors, pull off the oil flinger [107].

4. Visual inspection: Is there any moisture or gear unit oil inside the stator?
   - If not, proceed with step 7
   - If there is moisture, proceed with step 5
   - If there is gear oil, have the motor repaired by a specialist workshop
5. If there is moisture inside the stator:
   - With gearmotors: Remove the motor from the gear unit
   - With motors without a gear unit: Remove the A-flange
   - Remove the rotor [1]
6. Clean the winding, dry it and check it electrically (see chapter "Drying the motor" (page 27)).
7. Replace the grooved ball bearings [11], [44] with permitted ball bearings.

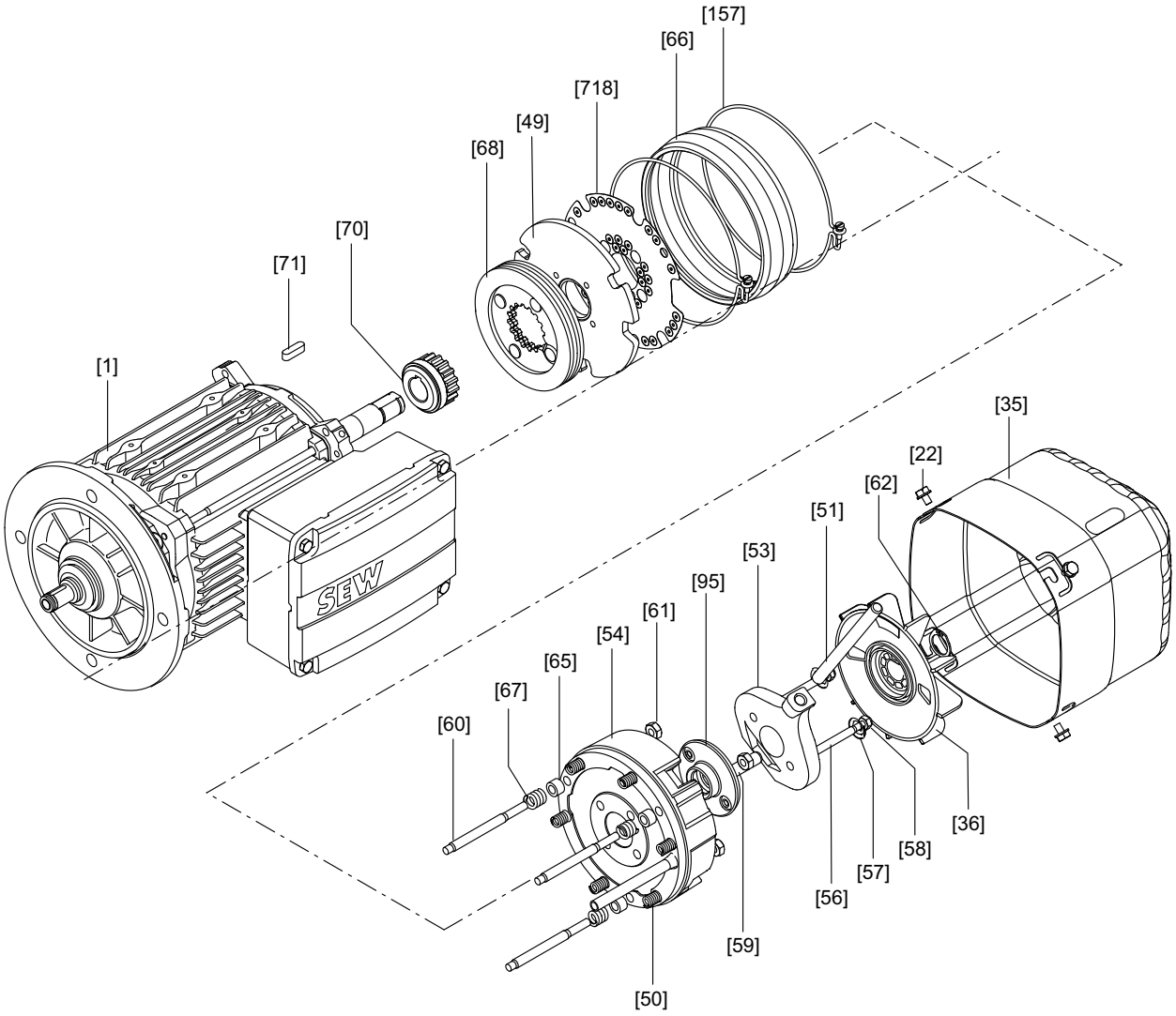
   See section "Permitted rolling bearing types" (page 158).
8. Reseal the shaft:
   - A-side: Replace the oil seal [106]
   - B-side: Replace the oil seal [30]

     Coat the sealing lip with grease (Klüber Petamo GHY 133).
9. Reseal the stator seat:
   - Seal the sealing surface with duroplastic sealing compound

     (operating temperature -40 °C...+180 °C) e.g. "Hylomar L Spezial".
   - For size DR.71-DR.132: Replace sealing [392].
10. Install the motor and accessory equipment.

7.7 Inspection/maintenance for DR.71-DR.280 brakemotors

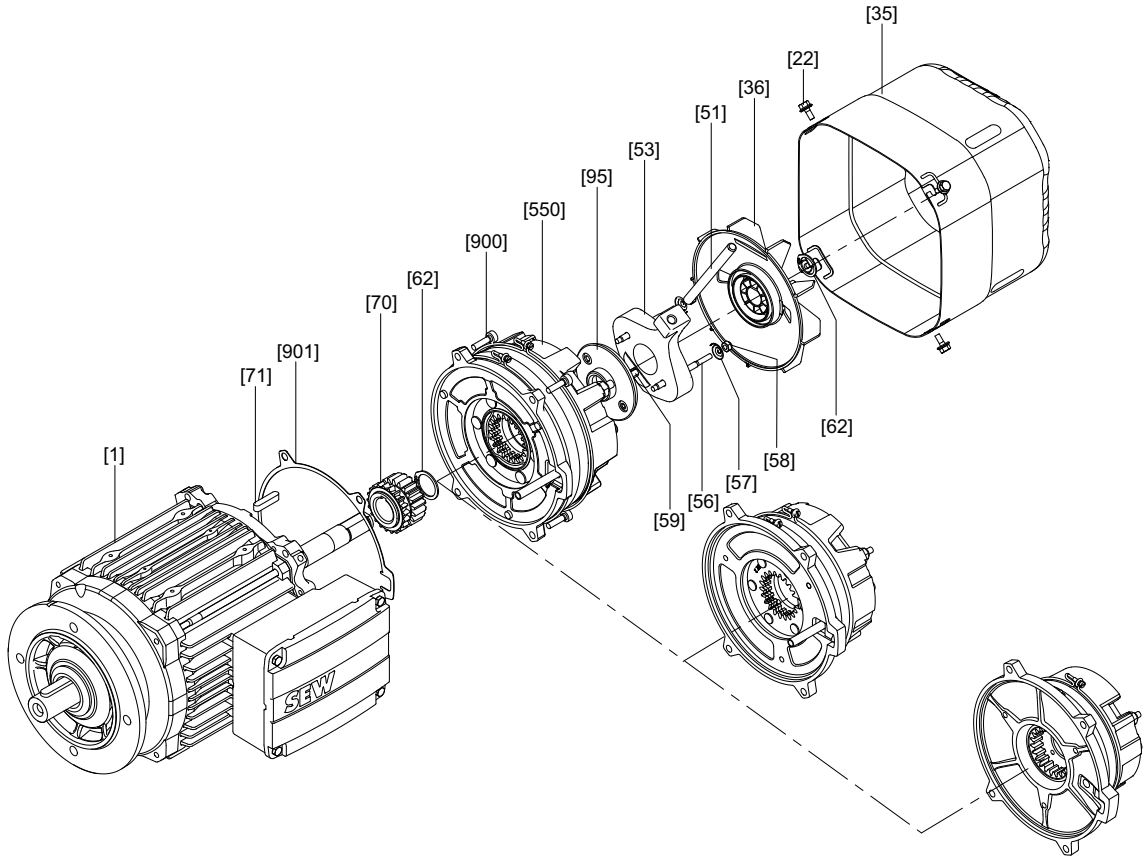
7.7.1 Basic structure of DR.71 – DR.80 brakemotors



174200971

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

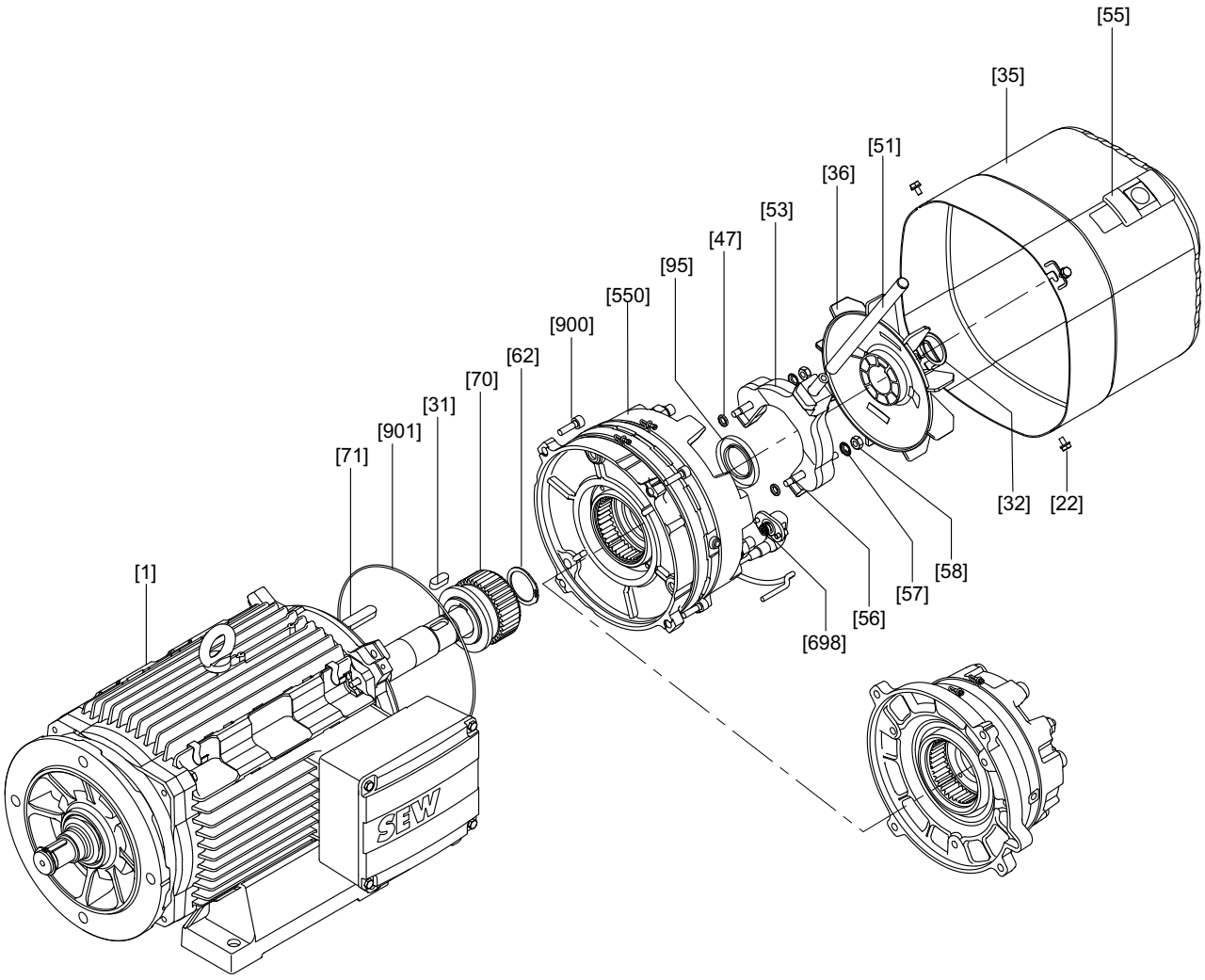
7.7.2 Basic structure of DR.90 – DR.132 brakemotors



179981963

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

7.7.3 Basic structure of DR.160 – DR.280 brakemotors



527223691

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

7.7.4 Inspection steps for DR.71 – DR.280 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 incremental encoder (if installed).

   See chapter "Motor and brake maintenance – preliminary work" (page 90).

2. Remove fan guard [35] and fan [36].
3. Remove stator:
   - **Sizes DR.71 – DR.132:** Remove cap screws [13] from flange [7] and B-side endshield [42]. Remove stator [16] from flange [7].
   - **Sizes DR.160 – DR.180:** Loosen cap screws [19] and remove B-side endshield [42]. Loosen hex head screw [15] and remove stator from flange.
   - **Sizes DR.200 – DR.225:**
     - Loosen hex head screw [15] and remove flange [7] from stator.
     - With gearmotors: Remove oil flinger [107]
     - Loosen cap screws [19] and remove the rotor [1] together with the B-side endshield [42].
     - Loosen cap screws [25] and remove the rotor [1] from the B-side endshield [42].
   - **Sizes DR.250 – DR.280**

     Without /ERF or /NS option:
     - Loosen cap screws [15] and remove flange [7] from stator.
     - With gearmotors: Remove oil flinger [107]
     - Loosen cap screws [19] and remove the B-side endshield [42] together with the rotor [1].
     - Loosen cap screws [25] and remove the rotor [1] from the B-side endshield [42].

     With /ERF or /NS option:
     - 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].
     - With gearmotors, pull off the oil flinger [107].
4. Remove the brake cable:
   - **BE05 – BE11:** Remove the terminal box cover and unfasten the brake cable from the rectifier.
   - **BE20 – BE122:** Loosen safety screws of the brake plug connector [698] and remove plug connector.
5. Push the brake off the stator and carefully lift it off.
6. Pull the stator back by about. 3 to 4 cm.

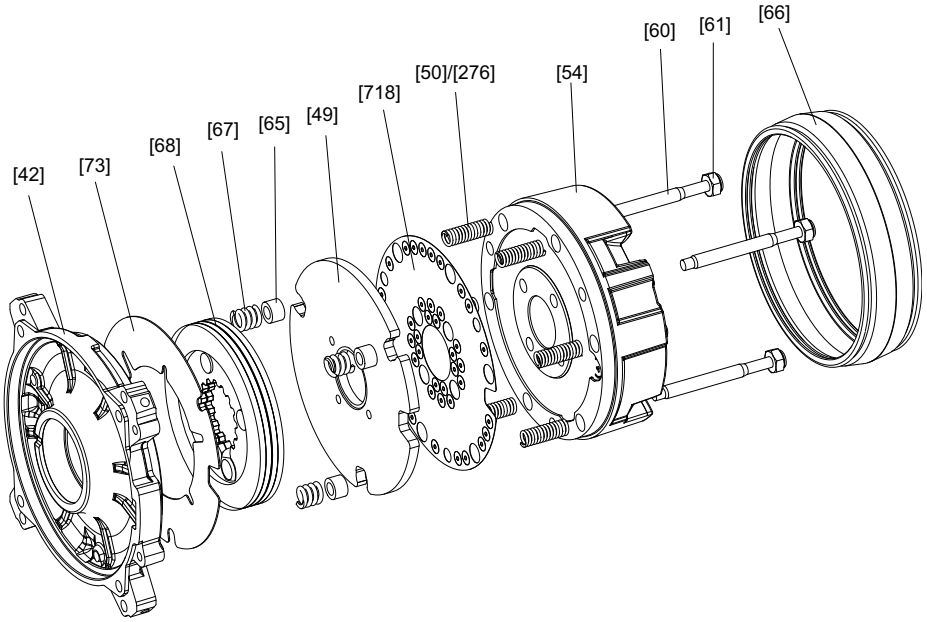
7. Visual inspection: Is there any moisture or gear unit oil inside the stator?
   - If not, proceed with step 10
   - If there is moisture, proceed with step 8
   - If there is gear oil, have the motor repaired by a specialist workshop
8. If there is moisture inside the stator:
   - With gearmotors: Remove the motor from the gear unit
   - With motors without a gear unit: Remove the A-flange
   - Remove the rotor [1]
9. Clean the winding, dry it and check it electrically (see chapter "Drying the motor" (page 27)).
10. Replace the grooved ball bearings [11], [44] with permitted ball bearings.

    See section "Permitted rolling bearing types" (page 158).
11. Reseal the shaft:
    - A-side: Replace the oil seal [106]
    - B-side: Replace the oil seal [30]

      Coat the sealing lip with grease (Klüber Petamo GHY 133).
12. Reseal the stator seat:
    - Seal the sealing surface with duroplastic sealing compound

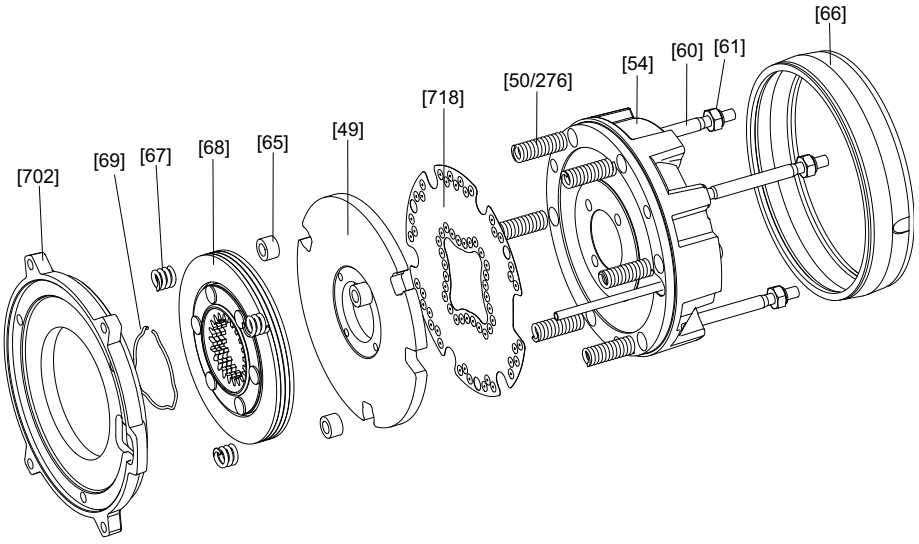
      (Operating temperature –40 °C to +180 °C) e.g. "Hylomar L Spezial".
    - For size DR.71-DR.132: Replace sealing [392].
13. **Motor sizes DR.160 – DR.280:** Replace the O-ring [901] between the brake end-shield [42] and the pre-assembled brake [550]. Install the pre-assembled brake [550]
14. Install the motor, the brake and accessory equipment.

7.7.5 Basic structure of BE05 – BE2 brakes (DR.71 – DR.80)



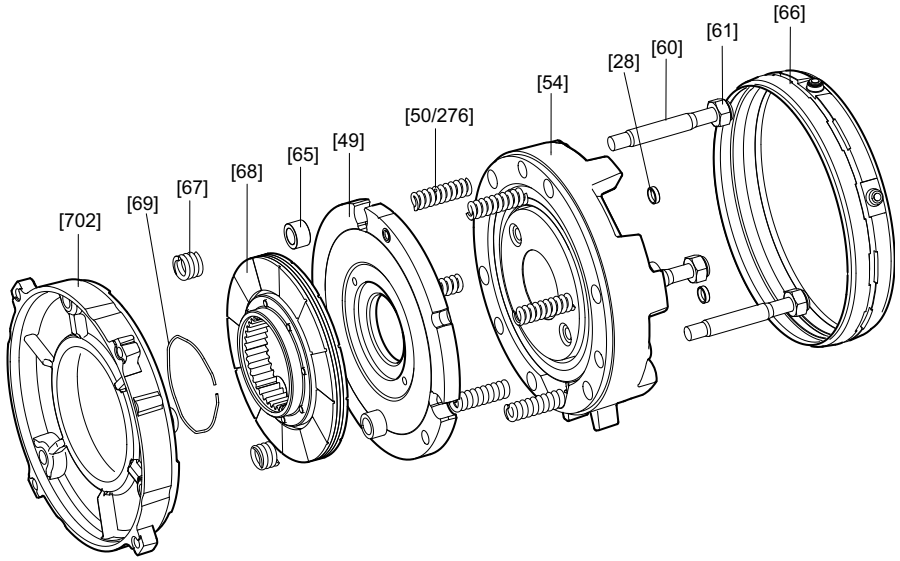
[42] Brake endshield
[49] Pressure plate
[50] Brake spring (normal)
[54] Magnet, complete
[60] Stud 3x
[61] Hex nut
[65] Pressure ring
[66] Rubber sealing collar
[67] Counter spring
[68] Brake disk
[73] Stainless steel disk
[276] Brake spring (blue)
[718] Damping plate

7.7.6 Basic structure of BE1 – BE11 brakes (DR.90 – DR.160)



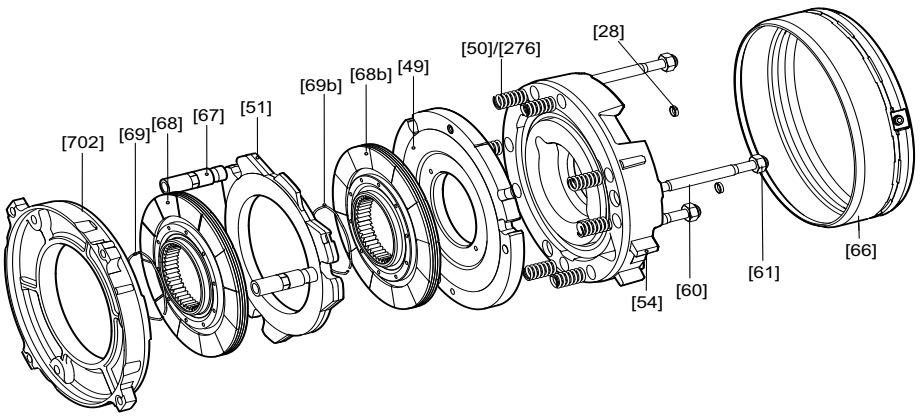
[49] Pressure plate
[50] Brake spring (normal)
[54] Magnet, complete
[60] Stud 3x
[61] Hex nut
[65] Pressure ring
[66] Rubber sealing collar
[67] Counter spring
[68] Brake disk
[69] Circular spring
[276] Brake spring (blue)
[702] Friction disk
[718] Damping plate

7.7.7 Basic structure of BE20 brakes (DR.160 – DR.180)



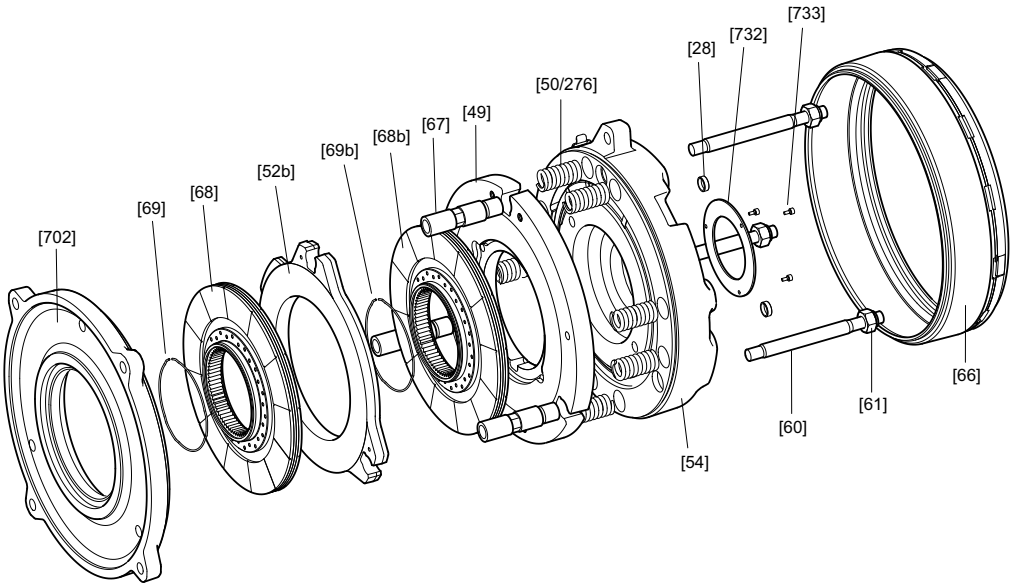
[28] Closing cap
[49] Pressure plate, complete
[50] Brake spring (normal)
[54] Magnet, complete
[60] Stud 3x
[61] Hex nut
[65] Pressure ring
[66] Rubber sealing collar
[67] Counter spring
[68] Brake disk
[69] Circular spring
[276] Brake spring (blue)
[702] Friction disk

7.7.8 Basic structure of BE30 – BE32 brakes (DR.180 – DR.225)



[28] Closing cap
[49] Pressure plate, complete
[50] Brake spring (normal)
[51] Brake plate
[54] Magnet, complete
[60] Stud 3x
[61] Hex nut
[66] Rubber sealing collar
[67] Setting sleeve
[68] Brake disk
[69] Circular spring
[276] Brake spring (blue)
[702] Friction disk

7.7.9 Basic structure of BE60 – BE122 brakes (DR.250 – DR.280)



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[28]	Closing cap	[66]	Rubber sealing collar	[702]	Friction disk
[49]	Pressure plate	[67]	Adjusting sleeve	[732]	Cover disk
[50]	Brake spring	[68]	Brake disk	[733]	Screw
[52b]	Brake plate (BE122 only)	[68b]	Brake disk (BE122 only)		
[54]	Magnet, complete	[69]	Circular spring		
[60]	Stud 3 x	[69b]	Circular spring (BE122 only)		
[61]	Hex nut	[276]	Brake spring		

7.7.10 Setting the working air gap of BE05 – BE122 brakes

⚠ WARNING

Risk of crushing if the drive starts up unintentionally.

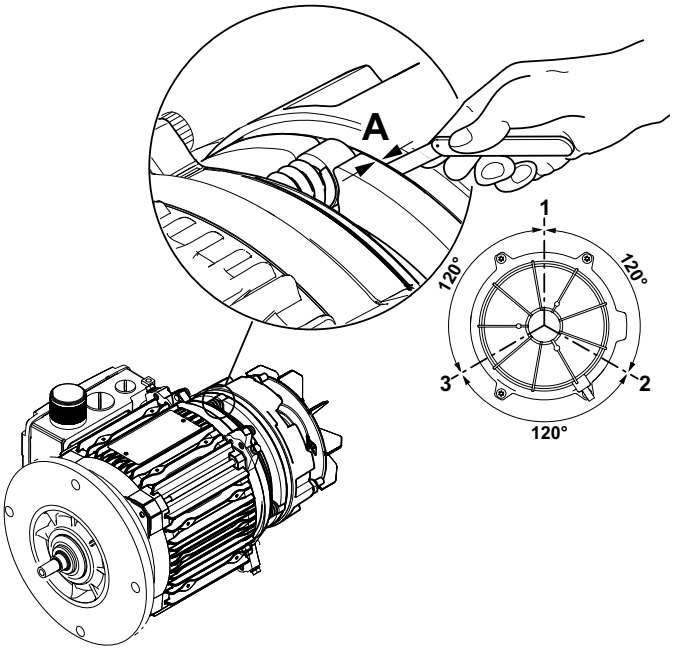
Severe or fatal injuries.

- 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 incremental encoder (if installed)

     See chapter "Motor and brake maintenance – preliminary work" (page 90).
   - Flange cover or fan guard [35]
2. Push the rubber sealing collar [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" (page 145).
   - Replace brake disk if necessary, see chapter "Replacing the brake disk of BE05 – BE32 brakes" (page 118).
4. **BE30 – BE32:** Unfasten the setting sleeves [67] by turning them towards the brake 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 the pressure plate [49] and damping plate [718]
   - **for BE20 – 32:** between the pressure plate [49] and brake coil body [54]
   - **for BE60 – 122:** between the pressure plate [49] and magnet [54]



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6. **BE050 – BE20:** Tighten the hex nuts [61] until the working air gap is set correctly, see chapter "Technical Data" (page 145).

   BE30 – BE62: Tighten the hex nuts [61] until the working air gap is 0.25 mm.

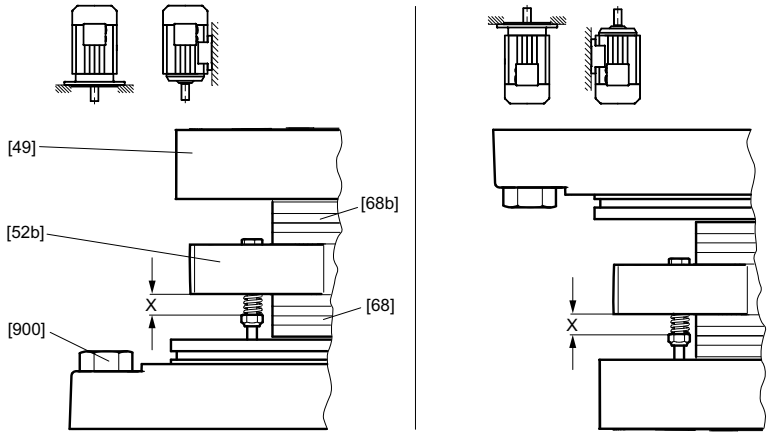
   BE120 – BE122: Tighten the hex nuts [61] until the working air gap is 0.30 mm.

7. If you are mounting the BE32 in a vertical position, set the 3 springs on the brake plate to the following measurement:

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 as follows:

Mounting position	X in [mm]
Brake at the top	10.0
Brake at the bottom	10.0



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

8. **BE30 – BE122:** Tighten the setting sleeves [67]
   - towards the magnet
   - until the working air gap is set correctly, see chapter "Technical Data" (page 145).
9. Put the rubber sealing collar back in place and re-install the dismantled parts.

7.7.11 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" (page 87), 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-DR.80 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 – DR.280 motor sizes cannot 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 .

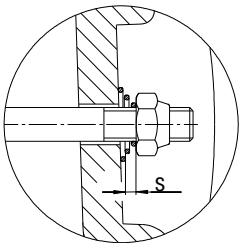
1. Remove the following:
   - Forced cooling fan and incremental encoder (if installed)

     See chapter "Motor and brake maintenance – preliminary work" (page 90).
   - Flange cover or fan guard [35], circlip [32/62] and fan [36]
2. Remove the brake cable
   - **BE05 – BE11:** Remove the terminal box cover and unfasten the brake cable from the rectifier.
   - **BE20 – BE122:** Loosen safety screws of the brake plug connector [698] and remove plug connector.
3. Remove the rubber sealing collar [66]
4. Loosen hex nuts [61], carefully pull off the magnet [54] (brake cable!) and take out the brake springs [50].
5. **BE05 – BE11:** 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]
6. Clean the brake components
7. Install new brake disk(s).
8. Re-install the brake components,
   - Leave out the fan and the fan guard, because the working air gap has to be set first, see chapter "Setting the working air gap of the BE05 – BE122 brakes" (page 116).
9. 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).

This 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 [mm]
BE05, BE1, BE2, BE5	1.5
BE11, BE20, BE30, BE32 **BE60, BE62** **BE120, BE122**	2

10.Put the rubber sealing collar back 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

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

7.7.12 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 (only possible for BE05 and BE1)
- By changing the brake (from motor size DR.90).
- By changing to a two-disk brake (BE30 only)

For the possible braking torque steps, please refer to chapter "Technical Data" (page 145).

7.7.13 Changing the brake spring of BE05 – BE122 brakes

⚠ WARNING

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries.

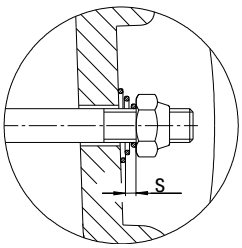
- Isolate the motor, brake, and forced cooling fan, if installed, from the power supply before starting work, safeguarding them against unintentional re-start.
- Carefully observe the steps described below.

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

     See chapter "Motor and brake maintenance – preliminary work" (page 90).
   - Flange cover or fan guard [35], circlip [32/62] and fan [36]
2. Remove the brake cable
   - **BE05 – BE11:** Remove the terminal box cover and unfasten the brake cable from the rectifier.
   - **BE20 – BE122:** Loosen safety screws of the brake plug connector [698] and remove plug connector.
3. Remove the rubber sealing collar [66] and the manual brake release:
   - Setting nuts [58], conical coil springs [57], studs [56], releasing lever [53], spiral dowel pin [59]
4. Unfasten hex nuts [61] and pull off the magnet [54]
   - By approx. 50 mm (watch the brake cable)
5. Change or add brake springs [50/276]
   - Arrange brake springs symmetrically
6. Re-install the brake components
   - 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 the BE05 – BE122 brakes" (page 116).

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).

   This 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 [mm]
BE05, BE1, BE2, BE5	1.5
BE11, BE20, BE30, BE32 **BE60, BE62** **BE120, BE122**	2

8. Put the rubber sealing collar back in place and re-install the dismantled parts.

INFORMATION

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

7.7.14 Changing the magnet of BE05 – BE122 brakes

⚠ WARNING

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries.

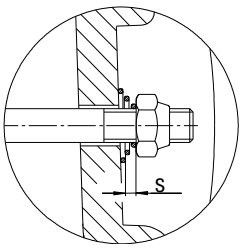
- Isolate the motor, brake, and forced cooling fan, if installed, from the power supply before starting work, safeguarding them against unintentional re-start.
- Carefully observe the steps described below.

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

     See chapter "Motor and brake maintenance – preliminary work" (page 90).
   - Flange cover or fan guard [35], circlip [32/62] and fan [36]
2. Remove the rubber sealing collar [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 – BE11:** Remove the terminal box cover and unfasten the brake cable from the rectifier.
   - **BE20 – BE122:** Loosen safety screws of the brake plug connector [698] and remove plug connector.
4. Unfasten hex nuts [61], remove magnet [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" (page 145).
6. Re-install the brake components
   - 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 the BE05-BE20 brakes" (page 116).

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).

   This 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 [mm]
BE05, BE1, BE2, BE5	1.5
BE11, BE20, BE30, BE32 **BE60, BE62** **BE120, BE122**	2

8. Put the rubber sealing collar back in place and re-install the dismantled parts.
9. Replace brake controller 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.

7.7.15 Changing the brake of DR.71 – DR.80 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 steps described below.

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

     See chapter "Motor and brake maintenance – preliminary work" (page 90).
   - 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 cap 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]

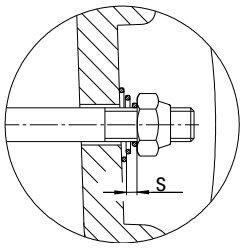
     Apply grease to the sealing lip (see chapter "Order information for lubricants and anti-corrosion agents" (page 159)).
7. In case of manual brake release: Use the setting nuts to adjust the floating clearance "s" between the conical coil springs (pressed flat) and the setting nuts (see following figure).

⚠ 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 [mm]
BE05; BE1; BE2	1.5

7.7.16 Replacing the brake of DR.90 – DR.225 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 steps described below.

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

     See chapter "Motor and brake maintenance – preliminary work" (page 90).
   - Flange cover or fan guard [35], circlip [32/62] and fan [36]
2. Remove the brake cable
   - **BE05 – BE11:** Remove the terminal box cover and unfasten the brake cable from the rectifier.
   - **BE20 – BE32:** 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 – DR.132:** 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]

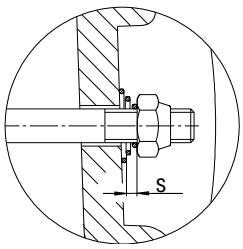
     Apply grease to the sealing lip (see chapter "Order information for lubricants and anti-corrosion agents" (page 159)).
8. In case of manual brake release: Use the setting nuts to adjust the floating clearance "s" between the conical coil springs (pressed flat) and the setting nuts (see following figure).

⚠ 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.



177241867

Brake	Floating clearance s [mm]
BE05, BE1, BE2, BE5	1.5
BE11, BE20, BE30, BE32	2

7.7.17 Changing the brake of DR.250 – DR.280 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 steps described below.

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

     See chapter "Motor and brake maintenance – preliminary work" (page 90)
   - Flange cover or fan guard [35], circlip [32/62] and fan [36]
2. **BE60 – BE62:** 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 – BE122**: 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]

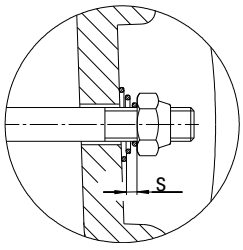
     Apply grease to the sealing lip (see chapter "Order information for lubricants and anti-corrosion agents" (page 159)).
7. In case of manual brake release: Use the setting nuts to adjust the floating clearance "s" between the conical coil springs (pressed flat) and the setting nuts (see following figure).

⚠ 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.

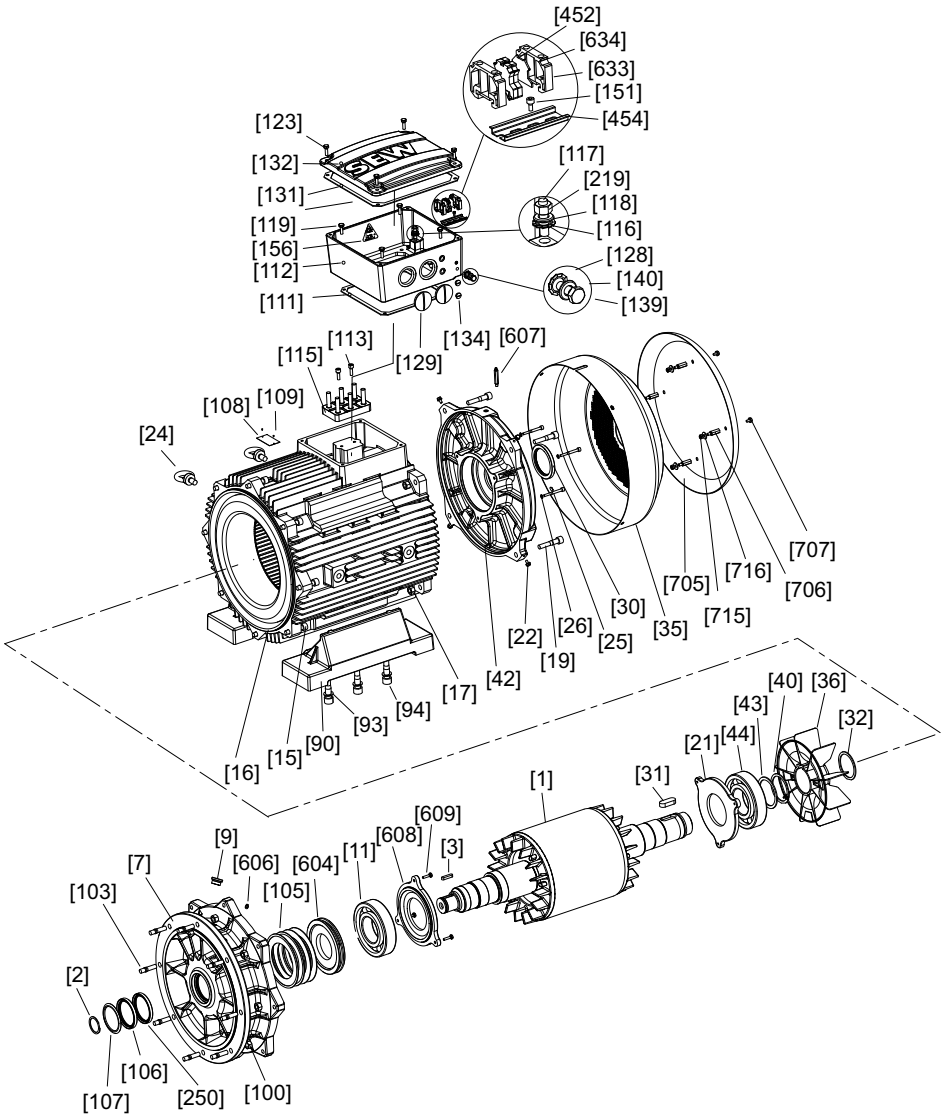


177241867

Brake	Floating clearance s [mm]
BE60, BE62 **BE120, BE122**	2

7.8 Inspection/maintenance for DR.315 motor

7.8.1 DR.315 – basic structure



18014398861480587

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

7.8.2 DR.315 – inspection steps

⚠ 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 incremental encoder (if installed).

   See chapter "Motor and brake maintenance – preliminary work" (page 90).

   With gearmotors: Remove the motor from the gear unit.
2. Remove fan guard [35] and fan [36].
3. Unfasten machine screws [25] and [19], and remove B-side endshield [42].
4. Unfasten machine screws [15] from the flange [7] and remove the complete rotor [1] together with the flange. With gearmotors, pull off the oil flinger [107].
5. Loosen screws [609] and separate the rotor from the flange [7]. Before disassembly, protect the oil seal seat from damage using adhesive tape or a protective sleeve.
6. Visual inspection: Is there any moisture or gear unit oil inside the stator?
   - If not, proceed with step 8.
   - If there is moisture, proceed with step 7
   - If there is gear oil, have the motor repaired by a specialist workshop
7. If there is moisture inside the stator:

   Clean the winding, dry it and check it electrically (see chapter "Drying the motor" (page 27)).
8. Replace the rolling bearing [11], [44] with permitted rolling bearing types.

   See chapter "Permitted rolling bearing types" (page 158).

   Fill the bearing with grease until it is two-thirds full.

   See chapter "Bearing lubrication DR.315" (page 88).

   Important: Place the oil seal flange [608] and [21] onto the rotor shaft before installing the bearings.
9. Starting on the A-side, mount the motor vertically.
10. Place the cup springs [105] and lubrication ring [604] into the bearing bore of the flange [7].

    Hang the rotor 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].

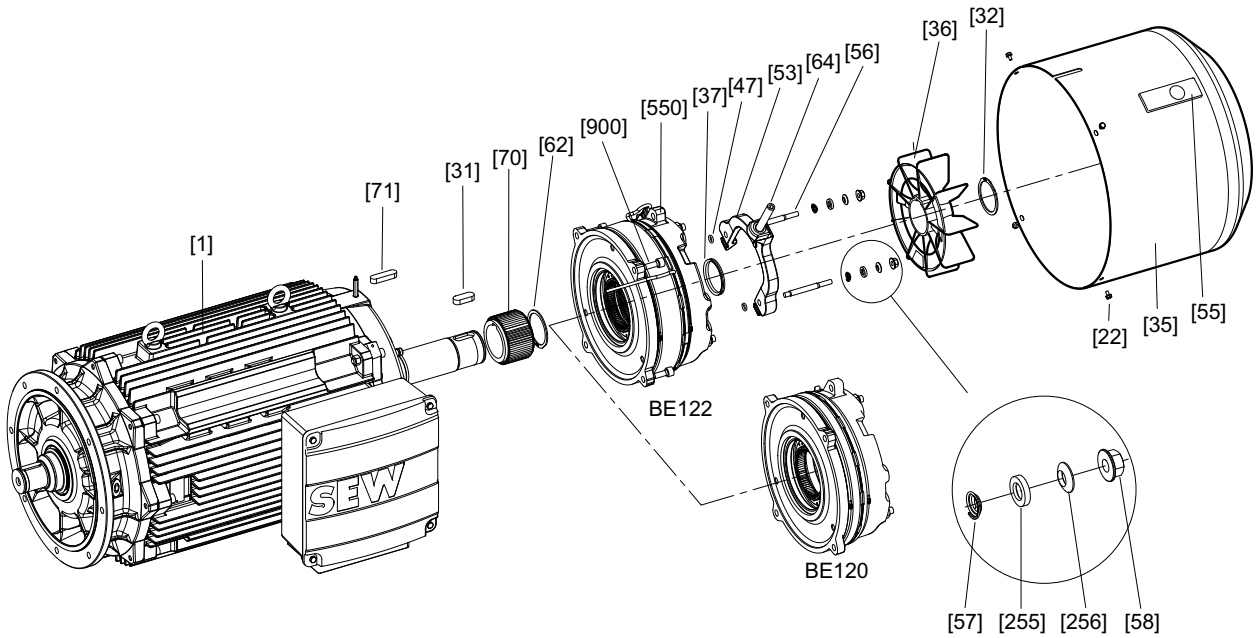
11. Mount the stator [16].
    - Reseal the stator seat: Seal the sealing surface with duroplastic sealing compound (operating temperature: -40 °C ... +180 °C) e.g. "Hylomar L Spezial".

      Important: Protect the winding overhang from damage.
    - Screw in the stator [16] and flange [7] with screws [15].
12. Before mounting the B-side endshield [42], screw in the M8 setscrew approximately 200 mm into the oil seal flange [21].
13. Before mounting the B-side endshield [42], feed the setscrew in through a bore for the screw [25]. Screw in the B-side endshield [42] and stator [16] using machine screws [19] and hex nuts [17]. Lift the oil seal flange [21] with the setscrew, and fasten using 2 screws [25]. Remove the setscrew and screw in the remaining screws [25].
14. Renew oil seals
    - A-side: Insert the oil seal [106] and – for gearmotors – the oil seal [250], and replace the oil flinger [107].

      With gearmotors, fill about two-thirds of the space between the two oil seals with grease (Klüber Petamo GHY133).
    - B-side: Insert the oil seal [30], and coat the sealing lip with the same grease.
15. Install the fan [36] and fan guard [35].

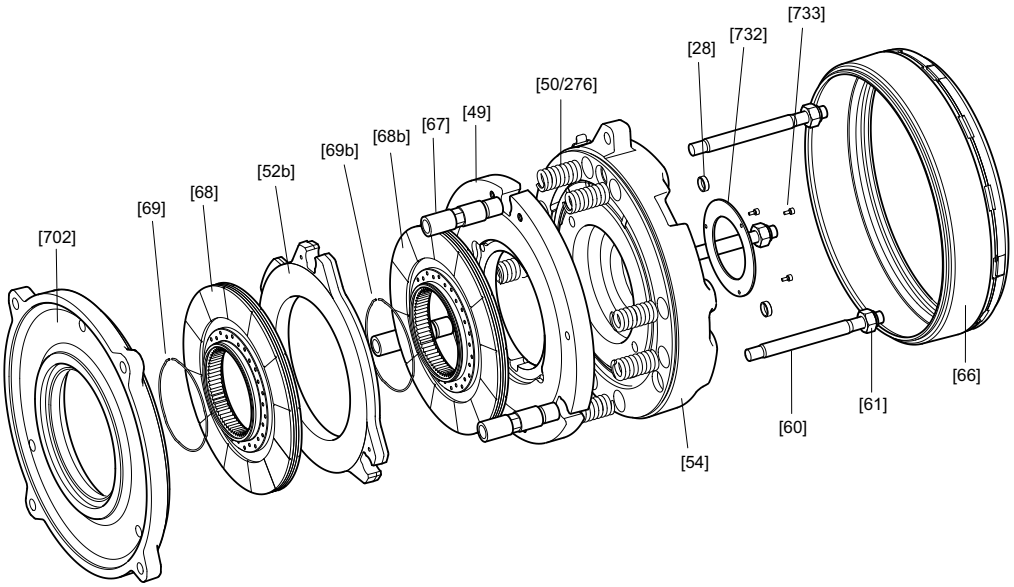
7.9 Inspection/maintenance for DR.315 brakemotors

7.9.1 DR.315 brakemotor – basic structure



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

7.9.2 Basic structure of BE120 – BE122 brakes



353594123

[28]	Closing cap	[66]	Rubber sealing collar	[702]	Friction disk
[49]	Pressure plate	[67]	Adjusting sleeve	[732]	Cover disk
[50]	Brake spring	[68]	Brake disk	[733]	Screw
[52b]	Brake plate (BE122 only)	[68b]	Brake disk (BE122 only)		
[54]	Magnet, complete	[69]	Circular spring		
[60]	Stud 3 x	[69b]	Circular spring (BE122 only)		
[61]	Hex nut	[276]	Brake spring		

7.9.3 DR.315 brakemotor – inspection steps

⚠ 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 incremental encoder (if installed)

   See chapter "Motor and brake maintenance – preliminary work" (page 90).
2. Remove fan guard [35] and fan [36]
3. Unfasten brake connector
4. Loosen screws [900] and remove pre-assembled brake [550] from brake endshield.
5. Unfasten machine screws [25] and [19], and remove B-side endshield [42].
6. Unfasten machine screws [15] from the flange [7] and remove the complete rotor [1] together with the flange. With gearmotors, pull off the oil flinger [107].
7. Loosen screws [609] and separate the rotor from the flange [7]. Before disassembly, protect the oil seal seat from damage using adhesive tape or a protective sleeve.
8. Visual inspection: Is there any moisture or gear unit oil inside the stator?
   - If not, proceed with step 8.
   - If there is moisture, proceed with step 7
   - If there is gear oil, have the motor repaired by a specialist workshop
9. If there is moisture inside the stator:

   Clean the winding, dry it and check it electrically (see chapter "Preliminary work" (page 90)).
10. Replace the rolling bearing [11], [44] with permitted rolling bearing types.

    See section"Permitted rolling bearing types" (page 158).

    Fill two-thirds of the bearing with grease.

    See section "Bearing lubrication DR.315" (page 88).

    Important: Place the oil seal flange [608] and [21] onto the rotor shaft before installing the bearings.
11. Starting on the A-side, mount the motor vertically.
12. Place the cup springs [105] and lubrication ring [604] into the bearing bore of the flange [7].

    Hang the rotor onto the B-side thread, and guide into the flange [7].

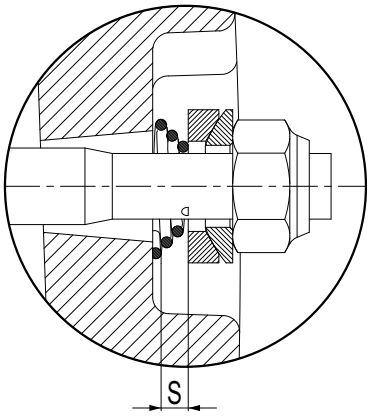
    Fasten the oil seal flange [608] to the flange [7] using the hex head bolts [609].

13. Mount the stator [16].
    - Reseal the stator seat: Seal the sealing surface with duroplastic sealing compound (operating temperature: -40 °C ... +180 °C) e.g. "Hylomar L Spezial".

      Important: Protect the winding overhang from damage.
    - Screw in the stator [16] and flange [7] with screws [15].
14. Before mounting the brake endshield, screw in the M8 setscrew approximately 200 mm into the oil seal flange [21].
15. Before mounting the brake endshield [42], feed the setscrew in through a bore for the screw [25]. Screw in the brake endshield and stator [16] using machine screws [19] and hex nuts [17]. Lift the oil seal flange [21] with the setscrew, and fasten using 2 screws [25]. Remove the setscrew and screw in the remaining screws [25].
16. Renew oil seals
    - A-side: Insert the oil seals [106], the oil flinger [107], and the oil seal [250] for gearmotors.

      Fill about two-thirds of the space between the two oil seals with grease (Klüber Petamo GHY133).
    - B-side: Insert the oil seal [30], and coat the sealing lip with the same grease. This applies to gearmotors only.
17. Align the cam of the friction disk, and mount the brake onto the brake endshield using a screw [900].
18. With manual brake release: Use setting nuts to set the floating clearance "s" between the conical coil springs (pressed flat) and the setting nuts (see following figure).

    This 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 [mm]
BE120; BE122	2

19. Install the fan [36] and fan guard [35].
20. Install the motor and accessory equipment.

7.9.4 Setting the working air gap of BE120 – BE122 brakes

⚠ 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.

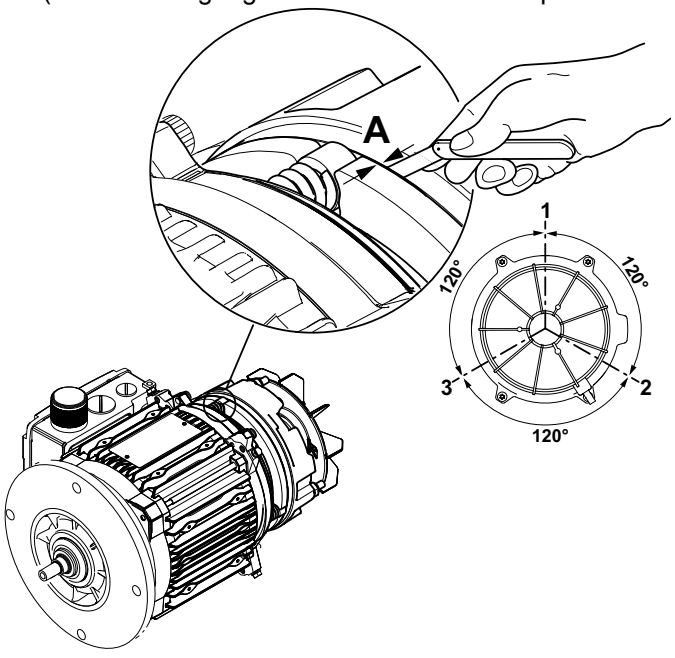
1. Remove forced cooling fan and incremental encoder (if installed)

   See chapter "Motor and brake maintenance – preliminary work" (page 90)
2. Remove fan guard [35] and fan [36]
3. Push the rubber sealing collar [66] aside,
   - release the clamping strap, if necessary
   - Sucking off any abrasion
4. Measure the brake disk [68, 68b]:

   Replace brake disk if ≤ 12 mm.

   See chapter "Replacing the brake disk of BE120-BE122 brakes" (page 136).
5. Unfasten the setting sleeves [67] by turning it towards the endshield
6. Measure the working air gap A (see the following figure)

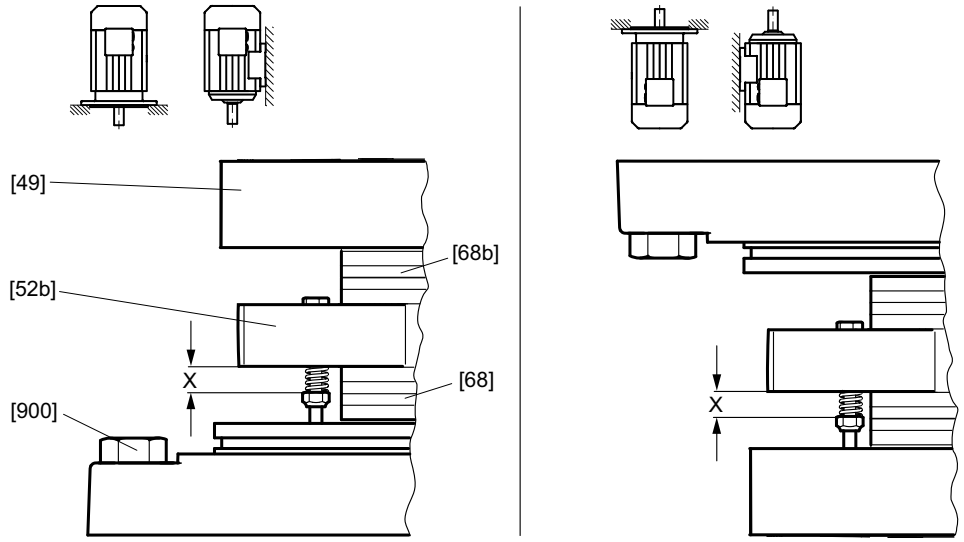
   (use a feeler gauge and measure at three points offset by 120°):



179978635

7. Tighten the hex nuts [61]
8. If you are mounting the BE122 in a vertical position, set the 3 springs on the brake stationary disc to the following measurement:

Mounting position	X in [mm]
Brake at the top	10.0
Brake at the bottom	10.5



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

9. Tighten the setting sleeves
   - towards the magnet
   - Until the working air gap is set correctly, see chapter "Technical Data" (page 145)
10. Put the rubber sealing collar back in place and re-install the dismantled parts.

7.9.5 Replacing the brake disk of BE120 – BE122 brakes

In addition to the brake elements listed in column "BE brake", see chapter "Inspection and maintenance intervals" (page 87), 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.

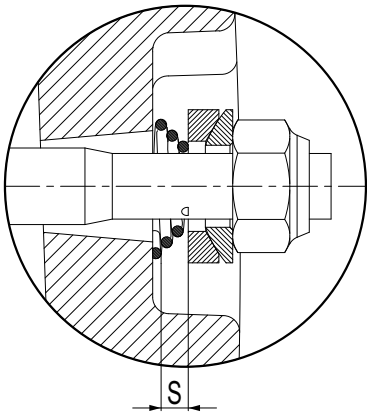
- Isolate the motor, brake, and forced cooling fan, if installed, from the power supply before starting work, safeguarding them against unintentional re-start.
- Carefully observe the following steps!

1. Remove forced cooling fan and incremental encoder (if installed)

   See chapter "Motor and brake maintenance – preliminary work" (page 90)
2. Remove the fan guard [35], circlip [32] and fan [36]
3. Loosen the plug connector on the magnet
4. Remove the rubber sealing collar [66] and the manual brake release:
   – Setting nuts [58], conical seat [255], spherical washer [256], conical coil springs [57], studs [56], releasing lever [53]
5. Unfasten hex nuts [61], carefully remove magnet [54], and remove brake springs [50/265].
6. Remove the pressure plate [49] and brake disk [68b], and clean the brake components.
7. Install a new brake disk.
8. Re-install the brake components,
   – Leave out the fan and the fan guard, because the working air gap has to be set first, see chapter "Setting the working air gap of the BE120 – BE122 brakes" (page 134).

9. 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).

   This 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 [mm]
BE120; BE122	2

10. Put the rubber sealing collar back 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.
- After replacing the brake disk, the maximum braking torque is reached only after several cycles.

7.9.6 Changing the braking torque of BE120 – BE122 brakes

The braking torque can be altered in stages,

- By changing the type and number of brake springs
- By changing the brake

For the possible braking torque steps, please refer to chapter "Technical Data" (page 145).

7.9.7 Changing the brake spring of BE0120– BE122 brakes

⚠ WARNING

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries.

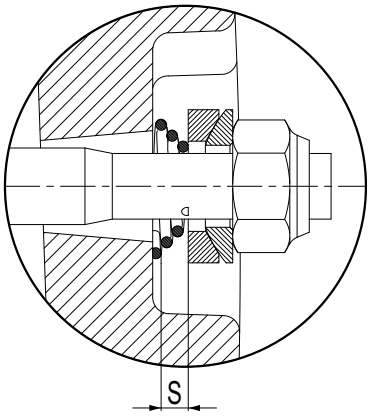
- Isolate the motor, brake, and forced cooling fan, if installed, from the power supply before starting work, safeguarding them against unintentional re-start.
- Carefully observe the steps described below.

1. Remove forced cooling fan and incremental encoder (if installed)

   See chapter "Motor and brake maintenance – preliminary work" (page 90)
2. Remove the flange cover or fan guard [35], circlip [32] and fan [36]
3. Unfasten the plug connector on the magnet [54] and protect it from getting dirty
4. Remove the rubber sealing collar [66] and the manual brake release:
   – Setting nuts [58], conical seat [255], spherical washer [256], conical coil springs [57], studs [56], releasing lever [53]
5. Unfasten hex nuts [61] and pull off the magnet [54]
   – by about 50 mm
6. Change or add brake springs [50/265]
   – Arrange brake springs symmetrically
7. Re-install the brake components
   – Leave out the fan and the fan guard, because the working air gap has to be set first, see chapter "Setting the working air gap of the BE120 – BE122 brakes" (page 134).

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).

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



353592459

Brake	Floating clearance s [mm]
BE120; BE122	2

9. Put the rubber sealing collar back in place and re-install the dismantled parts.

INFORMATION

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

7.9.8 Replacing the brake of DR.315

INFORMATION

The mounting position for installation should correspond to the specifications on the nameplate; make sure that the intended mounting position is permitted.

⚠ WARNING

Risk of crushing if the drive starts up unintentionally.

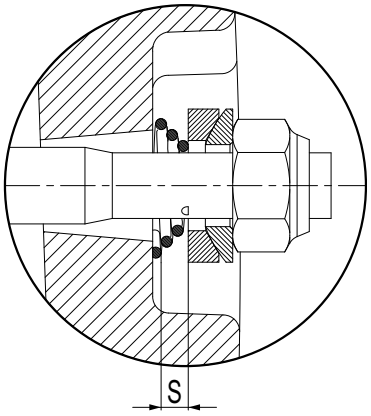
Severe or fatal injuries.

- 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 incremental encoder (if installed)

   See chapter "Motor and brake maintenance – preliminary work" (page 90)
2. Remove the flange cover or fan guard [35], circlip [32] and fan [36]
3. Unfasten brake connector
4. Unfasten screws [900] and remove brake from brake endshield.
5. Align the cam of the friction disk, and mount the brake onto the brake endshield using a screw [900].
6. With manual brake release: Use setting nuts to set the floating clearance "s" between the conical coil springs (pressed flat) and the setting nuts (see following figure).

   This 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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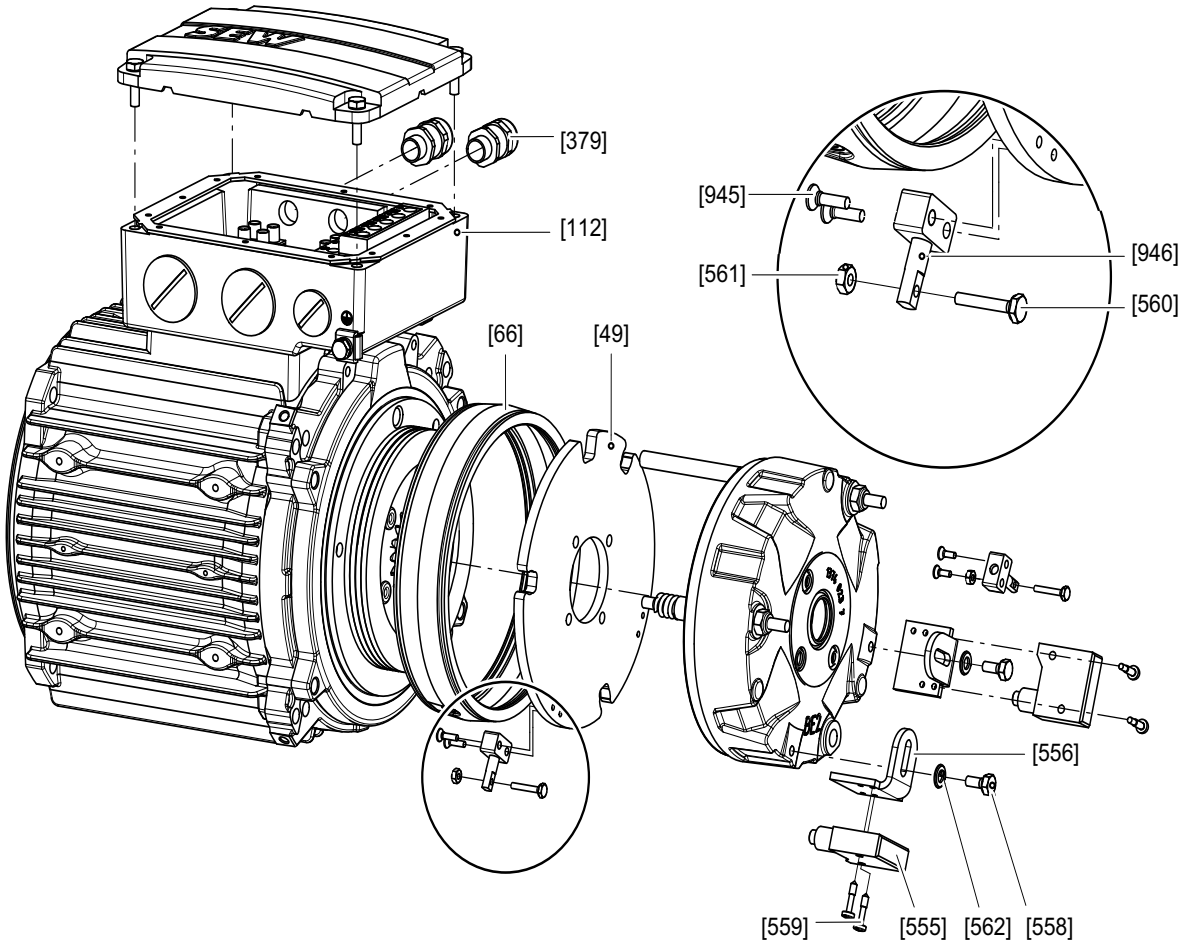
Brake	Floating clearance s [mm]
BE120; BE122	2

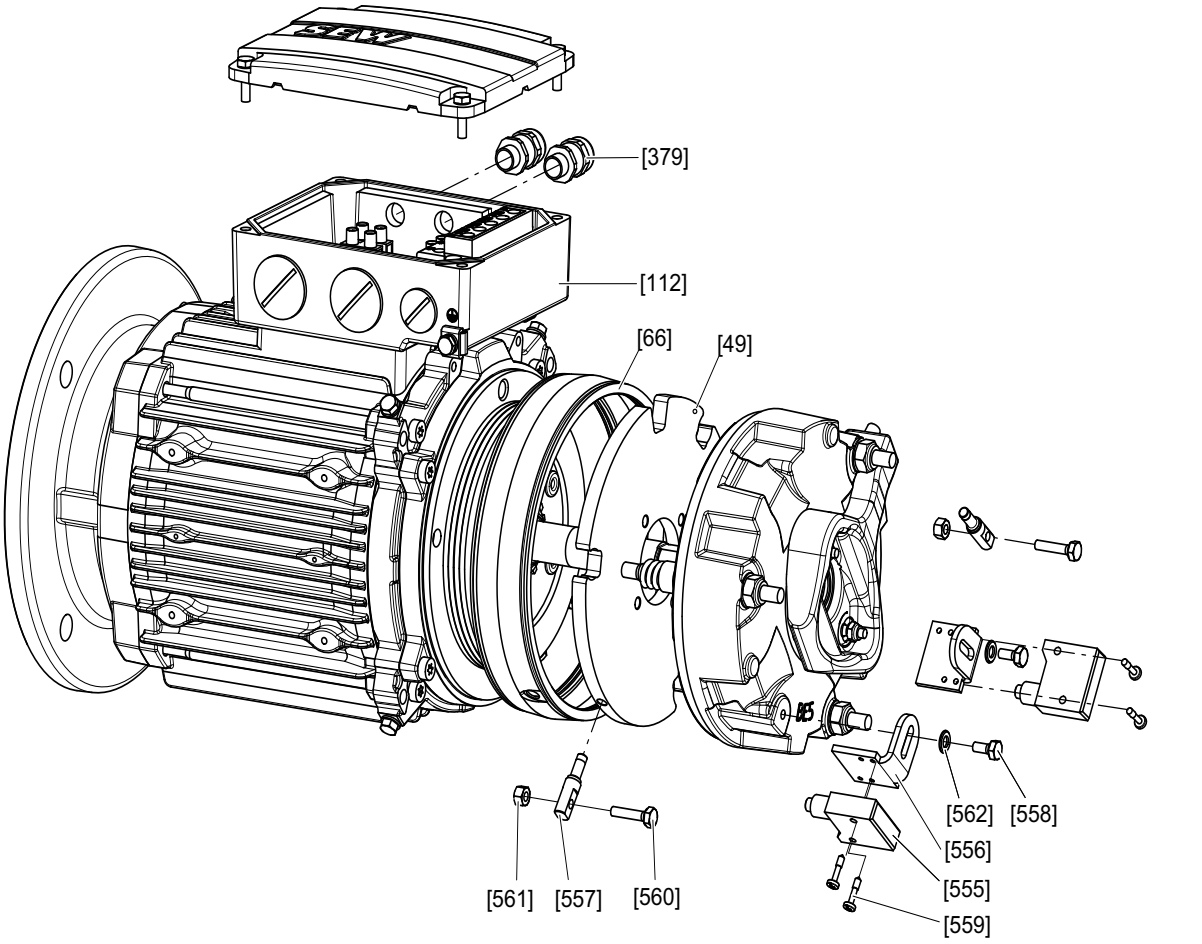
7.10 Inspection/maintenance – DUB

7.10.1 Basic structure of DUB on DR.90 – 100 motors with BE2 brakes



[49] Pressure plate for DUB
[66] Rubber sealing for DUB
[112] Terminal box lower part
[379] Cable gland
[555] Microswitch
[556] Angle bracket
[557] Bolts
[558] Hex head screw
[559] Pan head screw
[560] Hex head screw
[561] Stud
[562] Washer
[945] Countersunk screw
[946] Mounting plate, complete

7.10.2 Basic structure of DUB on DR.90-315 motors with BE5 – BE122 brakes



[49] Pressure plate for DUB
[66] Rubber sealing for DUB
[112] Terminal box lower part
[379] Cable gland
[555] Microswitch
[556] Angle bracket
[557] Bolts
[558] Hex head screw
[559] Pan head screw
[560] Hex head screw
[561] Stud
[562] Washer

7.10.3 Inspection/maintenance of the 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 and, if necessary, adjust the working air gap according to section "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, apply 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, change the position of the motor shaft manually several times.

7.10.4 Inspection/maintenance of the 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 section "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, apply hex nut [561] to eliminate the longitudinal play from the thread.
3. **For BE2 – BE5:** 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 – BE122: 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.

7.10.5 Inspection/maintenance of the DUB for function and wear monitoring

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

8 Technical data

8.1 Work done, working air gap, braking torques

If you use encoders and brakes with functional safety, the values for the maximum working air gaps and the work done until maintenance are reduced. For the new values, refer to the "Safety-Rated Encoders – Functional Safety for AC Motors DR.71–225, 315" addendum to the operating instructions.

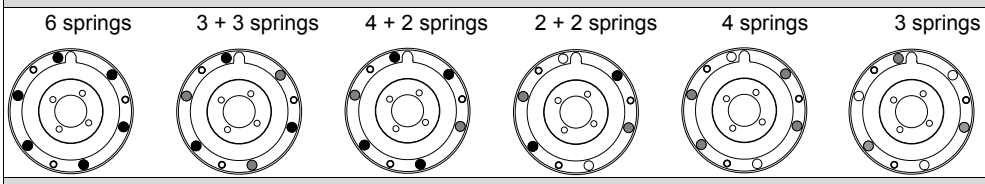
Brake Type	Work done until maintenance	Working air gap [mm]		Brake disk [mm]	Part number damping plate/pole sheet	Braking torque settings					
						Braking torque	Type and number of brake springs			Order number of brake springs	
	[10^6 J]	min. [1]	max.	min.		[Nm (lb-in)]	Normal	Blue	White	Normal	Blue/ white
BE05	120	0.25	0.6	9.0	1374 056 3	5.0 (44) 3.5 (31) 2.5 (22) 1.8 (16)	3 – – –	– 6 4 3	– – – –	0135 017 X	1374 137 3
BE1	120	0.25	0.6	9.0	1374 056 3	10 (88.5) 7.0 (62) 5.0 (44)	6 4 3	– 2 –	– – –	0135 017 X	1374 137 3
BE2	180	0.25	0.6	9.0	1374 019 9	20 (177) 14 (124) 10 (88.5) 7.0 (62) 5.0 (44)	6 2 2 – –	– 4 2 4 3	– – – – –	1374 024 5	1374 052 0
BE5	390	0.25	0.9	9.0	1374 069 5	55 (487) 40 (354) 28 (248)	6 2 2	– 4 2	– – –	1374 070 9	1374 071 7
						20 (177) 14 (124)	– –	– –	6 4		1374 773 8
BE11	640	0.3	1.2	10.0	1374 171 3	110 (974) 80 (708) 55 (487) 40 (354) 28 (248)	6 2 2 – –	– 4 2 4 3	– – – – –	1374 183 7	1374 184 5
					1374 171 3 + 1374 699 5	20 (177)	–	–	4	1374 183 7	1374 778 9
BE20	1000	0.3	1.2	10.0	–	200 (1770) 150 (1328) 110 (974) 80 (708) 55 (487)	6 4 3 3 –	– 2 3 – 4	– – – – –	1374 322 8	1374 248 5
					1374 675 8	40 (354)	–	3	–		
BE30	1500	0.3	1.2	10.0	–	300 (2655) 200 (1770) 150 (1328) 100 (885) 75 (667)	8 4 4 – –	– 4 – 8 6	– – – – –	0187 455 1	1374 435 6
BE32	1500	0.4	1.2	10.0	–	600 (5310) 500 (4425) 400 (3540) 300 (2655) 200 (1770) 150 (1328)	8 6 4 4 – –	– 2 4 – 8 6	– – – – – –	0187 455 1	1374 435 6
					1374 673 1	100 (885)	–	4	–		

Brake Type	Work done until maintenance	Working air gap [mm]		Brake disk [mm]	Part number damping plate/pole sheet	Braking torque settings					
						Braking torque	Type and number of brake springs			Order number of brake springs	
	[10^6 J]	min. 1)	max.	min.		[Nm (lb-in)]	Normal	Blue	White	Normal	Blue/ white
BE60	2500	0.3	1.2	10.0	–	600 (5310)	8	–	–	0186 838 1	1374 520 4
						500 (4425)	6	2	–		
						400 (3540)	4	4	–		
						300 (2655)	4	–	–		
						200 (1770)	–	8	–		
BE62	2500	0.4	1.2	10.0	–	1200 (10621)	8	–	–	0186 838 1	1374 520 4
						1000 (8851)	6	2	–		
						800 (7081)	4	4	–		
						600 (5310)	4	–	–		
						400 (3540)	–	8	–		
BE120	390	0.6	1.2	12.0	–	1000 (8851)	8	–	–	1360 877 0	1360 831 2
						800 (7081)	6	2	–		
						600 (5310)	4	4	–		
						400 (3540)	4	–	–		
BE122	300	0.8	1.2	12.0	–	2000 (17701)	8	–	–	1360 877 0	1360 831 2
						1600 (14161)	6	2	–		
						1200 (10621)	4	4	–		
						800 (7081)	4	–	–		

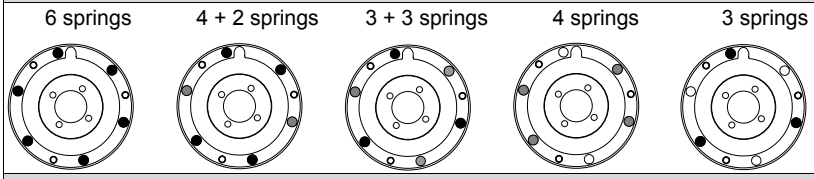
1) When checking the working air gap, note: Parallelism tolerances on the brake disk may cause deviations of ± 0.15 mm after a test run.

The following table shows the brake spring layout:

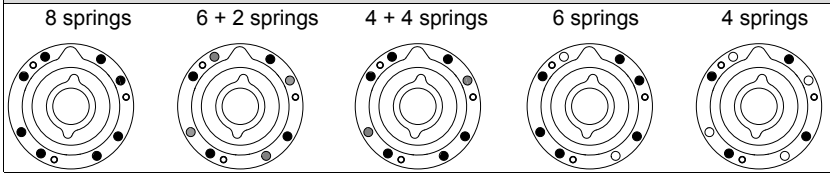
BE05 – BE11:



BE20:



BE30 – BE122:



8.2 Braking torque assignment

8.2.1 Motor sizes DR.71 – DR.100

Motor type	Brake type	Braking torque steps [Nm (lb-in)]										
DR.71	BE05	1.8 (16)	2.5 (22)	3.5 (31)	5.0 (44)							
	BE1				5.0 (44)	7.0 (62)	10 (88)					
DR.80	BE05	1.8 (16)	2.5 (22)	3.5 (31)	5.0 (44)							
	BE1				5.0 (44)	7.0 (62)	10 (88)					
	BE2				5.0 (44)	7.0 (62)	10 (88.5)	14 (124)	20 (177)			
DR.90	BE1				5.0 (44)	7.0 (62)	10 (88)					
	BE2				5.0 (44)	7.0 (62)	10 (88)	14 (124)	20 (177)			
	BE5							14 (124)	20 (177)	28 (248)	40 (354)	55 (487)
DR.100	BE2				5.0 (44)	7.0 (62)	10 (88)	14 (124)	20 (177)			
	BE5							14 (124)	20 (177)	28 (248)	40 (354)	55 (487)

8.2.2 Motor sizes DR.112 – DR.225

Motor type	Brake type	Braking torque steps [Nm (lb-in)]												
DR.112	BE5	14 (124)	20 (180)	28 (248)	40 (354)	55 (487)								
	BE11			20 (180)	40 (354)	55 (487)	80 (708)	110 (974)						
DR.132	BE5			28 (248)	40 (354)	55 (487)								
	BE11			20 (180)	40 (354)	55 (487)	80 (708)	110 (974)						
DR.160	BE11			20 (180)	40 (354)	55 (487)	80 (708)	110 (974)						
	BE20				40 (354)	55 (487)	80 (708)	110 (974)	150 (1328)	200 (1770)				
DR.180	BE20				40 (354)	55 (487)	80 (708)	110 (974)	150 (1328)	200 (1770)				
	BE30						75 (667)	100 (885)	150 (1328)	200 (1770)	300 (2655)			
	BE32							100 (885)	150 (974)	200 (1770)	300 (2655)	400 (3540)	500 (4425)	600 (5310)
DR.200/225	BE30						75 (667)	100 (885)	150 (974)	200 (1770)	300 (2655)			
	BE32							100 (885)	150 (1328)	200 (1770)	300 (2655)	400 (3540)	500 (4425)	600 (5310)

8.2.3 Motor sizes DR.250 – 280

Motor type	Brake type	Braking torque steps [Nm (lb-in)]								
DR.250/280	BE60	200 (1770)	300 (2655)	400 (3540)	500 (4425)	600 (5310)				
	BE62			400 (3540)		600 (5310)	800 (7081)	1000 (8851)	1200 (10621)	
	BE120			400 (3540)		600 (5310)	800 (7081)	1000 (8851)		
	BE122						800 (7081)		1200 (10621)	1600 (14161)

8.2.4 Motor size DR.315

Motor type	Brake type	Braking torque steps [Nm (lb-in)]						
DR.315	BE120	400 (3540)	600 (5310)	800 (7081)	1000 (8851)			
	BE122			800 (7081)		1200 (10621)	1600 (14161)	2000 (17701)

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 (accelerator 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
Max. braking torque [Nm (lb-in)]	5/10 (44/88)	20 (177)
Braking power [W (hp)]	32 (0,043)	43 (0,058)
Inrush current ratio I_B/I_H	4	4

Nominal voltage V_N		BE05, BE1		BE2	
AC V	**DC V**	**I_H [AC A]**	**I_{DC} [DC A]**	**I_H [AC A]**	**I_{DC} [DC A]**
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

Key

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_{DC} Direct current with direct DC voltage supply
V_N Nominal voltage (nominal voltage range)

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 (accelerator 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
Max. braking torque [Nm (lb-in)]	55 (487)	110 (974)	200 (1770)	300/600 (2655/5310)	600/1200 (5310/10620)
Braking power [W (hp)]	49 (0,066)	77 (0.10)	100 (0.13)	130 (0.17)	195 (0.26)
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
AC V	DC V	I_H [AC A]	I_H [AC A]	I_H [AC A]	I_H [AC A]	I_H [AC A]
60 (57-63)	**24**	1.28	2.05	2.55	–	–
120 (111-123)	**48**	0.64	1.04	1.28	1.66	–
147 (139-154)	**60**	0.51	0.83	1.02	1.33	–
184 (174-193)	**80**	0.41	0.66	0.81	1.05	–
208 (194-217)	**90**	0.37	0.59	0.72	0.94	1.50
230 (218-243)	**96**	0.33	0.52	0.65	0.84	1.35
254 (244-273)	**110**	0.29	0.47	0.58	0.75	1.20
290 (274-306)	**125**	0.26	0.42	0.51	0.67	1.12
330 (307-343)	**140**	0.23	0.37	0.46	0.59	0.97
360 (344-379)	**160**	0.21	0.33	0.41	0.53	0.86
400 (380-431)	**180**	0.18	0.30	0.37	0.47	0.77
460 (432-484)	**200**	0.16	0.27	0.33	0.42	0.68
500 (485-542)	**220**	0.15	0.24	0.29	0.38	0.60
575 (543-600)	**250**	0.13	0.22	0.26	0.34	0.54

Key

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_{DC} Direct current with direct DC voltage supply
V_N Nominal voltage (nominal voltage range)

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 (accelerator 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
Max. braking torque [Nm (lb-in)]	1000 (8851)	2000 (17701)
Braking power [W (hp)]	250 (0.34)	250 (0.34)
Inrush current ratio I_B/I_H	4.9	4.9

Nominal voltage V_N		BE120	BE122
V_{AC}	V_{DC}	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

Key

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_{DC} Direct current with direct DC voltage supply
V_N Nominal voltage (nominal voltage range)

8.4 Resistors

8.4.1 Brake BE05, BE1, BE2, BE5

	BE05, BE1	BE2	BE5
Max. braking torque [Nm (lb-in)]	5/10 (44/88)	20 (177)	55 (487)
Braking power [W (hp)]	3 2 (0.043)	43 (0,058)	49 (0,066)
Inrush current ratio I_B/I_H	4	4	5.7

Nominal voltage V_N		BE05, BE1		BE2		BE5	
V_{AC}	V_{DC}	R_B	R_T	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	2.20	10.5
120 (111-123)	**48**	19.4	59.0	14.4	44.0	8.70	42.0
147 (139-159)	**60**	31.0	94.0	23.0	69.0	13.8	66
184 (174-193)	**80**	48.5	148	36.0	111	22.0	105
208 (194-217)	**90**	61.0	187	45.5	139	27.5	132
230 (218-243)	**96**	78.0	235	58.0	174	34.5	166
254 (244-273)	**110**	97.0	295	72.0	220	43.5	210
290 (274-306)	**125**	122	370	91	275	55.0	265
330 (307-343)	**140**	154	470	115	350	69.0	330
360 (344-379)	**160**	194	590	144	440	87.0	420
400 (380-431)	**180**	245	740	182	550	110	530
460 (432-484)	**200**	310	940	230	690	138	660
500 (485-542)	**220**	385	1180	290	870	174	830
575 (543-600)	**250**	490	1480	365	1100	220	1050

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

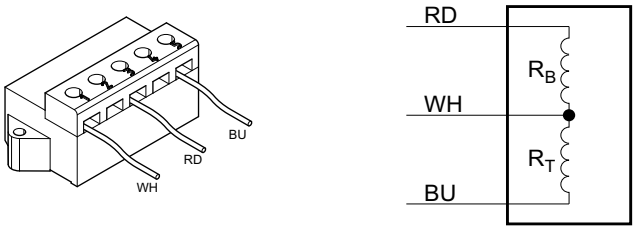
	BE11	BE20	BE30, BE32	BE60, BE62
Max. braking torque [Nm (lb-in)]	110 (974)	200 (1770)	300/600 (2655/5310)	600/1200 (5310/10620)
Braking power [W (hp)]	77 (0.10)	100 (0.13)	130 (0.17)	195 (0.26)
Inrush current ratio I_B/I_H	6.6	7.5	8.5	9.2

Nominal voltage V_N		BE11		BE20		BE30, BE32		BE60, BE62	
V_{AC}	V_{DC}	R_B	R_T	R_B	R_T	R_B	R_T	R_B	R_T
60 (57-63)	**24**	1.20	7.6	1.1	7.1	–	–	–	–
120 (111-123)	**48**	4.75	30.5	3.3	28.6	2.1	15.8	–	–
147 (139-159)	**60**	7.7	43.5	5.4	36.0	3.7	27.5	–	–
184 (174-193)	**80**	12.0	76.0	8.4	57	5.3	39.8	–	–
208 (194-217)	**90**	15.1	96	10.6	71.7	6.7	50	3.95	32.5
230 (218-243)	**96**	19.0	121	13.3	90.3	8.4	63	5.0	41.0
254 (244-273)	**110**	24.0	152	16.7	134	10.6	79.3	6.3	52.0
290 (274-306)	**125**	30.0	191	21.1	143	13.3	100	5.6	64.0
330 (307-343)	**140**	38.0	240	26.5	180	16.8	126	9.9	80.0
360 (344-379)	**160**	47.5	305	33.4	227	21.1	158	12.6	101
400 (380-431)	**180**	60	380	42.1	286	26.6	199	15.8	128
460 (432-484)	**200**	76	480	52.9	360	33.4	251	19.9	163
500 (485-542)	**220**	95	600	66.7	453	42.1	316	25.5	205
575 (543-600)	**250**	120	760	83.9	570	53.0	398	31.5	260

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

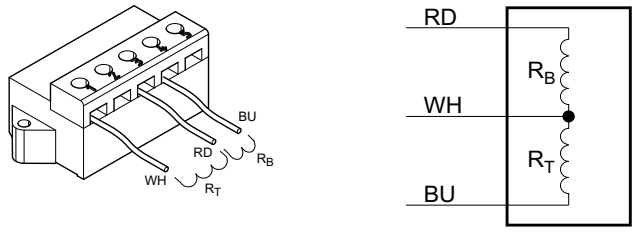
Cut-off in the AC circuit

The following illustration shows how to measure resistance with cutoff in the AC circuit.



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.



BS accelerator coil
TS coil section
R_B accelerator coil resistance at 20 °C [Ω]
R_T coil section resistance at 20 °C [Ω]
V_N nominal voltage (nominal voltage range)

RD red
WH white
BU blue

INFORMATION

When measuring the resistance of the coil section (R_T) or the acceleration 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.

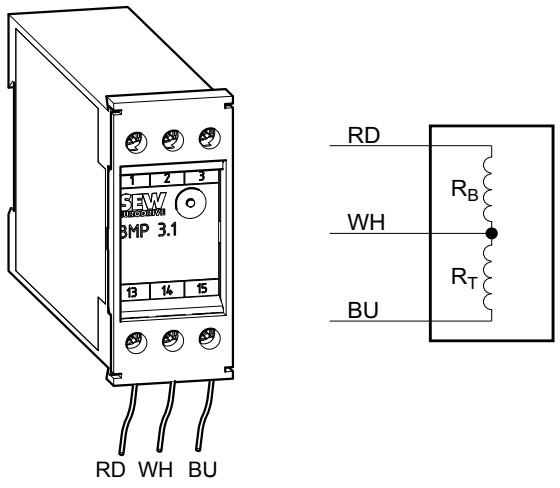
8.4.4 Brake BE120, BE122

	BE120, BE122
Max. braking torque [Nm (lb-in)]	1000/2000 (8851/17701)
Braking power [W (hp)]	250 (0.34)
Inrush current ratio I_B/I_H	4.9

Nominal voltage V_N		BE120, BE122	
V_{AC}	V_{DC}	R_B	R_T
230 (218-243)	**–**	8.0	29.9
254 (244-273)	**–**	10.1	37.2
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	150.0
575 (543-600)	**–**	50.5	189.0

8.4.5 Resistance measurement BE120, BE122

The following illustration shows how to measure resistance with BMP 3.1.



BS accelerator coil
TS coil section
R_B accelerator coil resistance at 20 °C [Ω]
R_T coil section resistance at 20 °C [Ω]
V_N nominal voltage (nominal voltage range)

INFORMATION

When measuring the resistance of the coil section (R_T) or the acceleration 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.

8.5 Brake rectifier combinations

8.5.1 Brakes BE05, BE1, BE2, BE5, BE11, BE20, BE30, BE32, BE60, BE62

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

		BE05	BE1	BE2	BE5	BE11	BE20	BE30, BE32	BE60, BE62
BG	BG 1.5	X[1]	X[1]	X[1]	•	–	–	–	–
	BG 3	X[2]	X[2]	X[2]	–	–	–	–	–
BGE	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 1.5	•	•	•	–	–	–	–	–
	BMS 3	•	•	•	–	–	–	–	–
BME	BME 1.5	•	•	•	•	•	•	•	X
	BME 3	•	•	•	•	•	•	•	X
BMH	BMH 1.5	•	•	•	•	•	•	•	–
	BMH 3	•	•	•	•	•	•	•	–
BMK	BMK 1.5	•	•	•	•	•	•	•	–
	BMK 3	•	•	•	•	•	•	•	–
BMP	BMP 1.5	•	•	•	•	•	•	•	–
	BMP 3	•	•	•	•	•	•	•	–
BMV	BMV 5	•	•	•	•	•	•	–	–
BSG	BSG	•	•	•	X	X	X	–	–
BSR	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 brake rated voltage of AC 150 - 500 V
X[2] Standard design with brake rated voltage of AC 24/42 - 150 V
• as required
– Not permitted

8.5.2 Brake BE120, BE122

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

	BE120	BE122
BMP 3.1	X	X

8.6 Brake control system

8.6.1 Wiring space of the motor

The following tables list 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.

Motor sizes DR.71 – DR.280

Type	Function	Voltage	Holding current I_{Hmax} [A]	Type	Part number	Color code
Size	One-way rectifier	AC 150...500 V	1.5	BG 1.5	825 384 6	Black
		AC 24...500 V	3.0	BG 3	825 386 2	Brown
BGE	One-way rectifier with electronic switching	AC 150...500 V	1.5	BGE 1.5	825 385 4	Red
		AC 42...150 V	3.0	BGE 3	825 387 0	Blue
BSR	One-way rectifier + current relay for cut-off in the DC circuit	AC 150...500 V	1.0	BGE 1.5 + SR 11	825 385 4 826 761 8	
			1.0	BGE 1.5 + SR 15	825 385 4 826 762 6	
		AC 42...150 V	1.0	BGE 3 + SR11	825 387 0 826 761 8	
			1.0	BGE 3 + SR15	825 387 0 826 762 6	
BUR	One-way rectifier + voltage relay for cut-off in the DC circuit	AC 150...500 V	1.0	BGE 1.5 + UR 15	825 385 4 826 759 6	
		AC 42...150 V	1.0	BGE 3 + UR 11	825 387 0 826 758 8	
BS	Varistor protection circuit	DC 24 V	5.0	BS24	826 763 4	Water blue
BSG	Electronic switching	DC 24 V	5.0	BSG	825 459 1	White

Motor size DR.315

Type	Function	Voltage	Holding current I_{Hmax} [A]	Type	Part number	Color code
BMP	Half-wave rectifier with electronic switching, integrated voltage relay for cut-off in the DC circuit.	AC 230...575 V	2.8	BMP 3.1	829 507 7	

8.6.2 Control cabinet

The following tables list the technical data of brake control systems for installation in the control cabinet, and the assignment regarding the motor size and connection technology. The different housings have different colors (= color code) to make them easier to distinguish.

Motor sizes DR.71 – DR.280

Type	Function	Voltage	Holding current I_{Hmax} [A]	Type	Part number	Color code
BMS	One-way rectifier as BG	AC 150...500 V	1.5	BMS 1.5	825 802 3	Black
		AC 42...150 V	3.0	BMS 3	825 803 1	Brown
BME	One-way rectifier with electronic switching as BGE	AC 150...500 V	1.5	BME 1.5	825 722 1	Red
		AC 42...150 V	3.0	BME 3	825 723 X	Blue
BMH	One-way rectifier with electronic switching and heating function	AC 150...500 V	1.5	BMH 1.5	825 818 X	Green
		AC 42...150 V	3	BMH 3	825 819 8	Yellow
BMP	One-way rectifier with electronic switching, integrated voltage relay for cut-off in the DC circuit	AC 150...500 V	1.5	BMP 1.5	825 685 3	White
		AC 42...150 V	3.0	BMP 3	826 566 6	Light blue
BMK	One-way rectifier with electronic switch mode, DC 24 V control input and separation in the DC circuit	AC 150...500 V	1.5	BMK 1.5	826 463 5	Water blue
		AC 42...150 V	3.0	BMK 3	826 567 4	Bright red
BMV	Brake control unit with electronic switching, DC 24 V control input and fast cut-off	DC 24 V	5.0	BMV 5	1 300 006 3	White

Motor size DR.315

Type	Function	Voltage	Holding current I_{Hmax} [A]	Type	Part number	Color code
BMP	Half-wave rectifier with electronic switching, integrated voltage relay for cut-off in the DC circuit.	AC 230...575 V	2.8	BMP 3.1	829 507 7	

8.7 Permitted rolling bearing types

8.7.1 Rolling bearing types for motor sizes DR.71 – DR.280

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-DR.100	6306-2Z-J-C3		6205-2Z-J-C3	6205-2RS-J-C3
DR.112-DR.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	6312-2Z-J-C3		6213-2Z-J-C3	6213-2RS-J-C3
DR.200-DR.225	6314-2Z-J-C3		6314-2Z-J-C3	6314-2RS-J-C3
DR.250 – DR.280	6317-2Z-J-C4		6315-2Z-J-C3	6315-2RS-J-C3

8.7.2 Rolling bearing types for motor size DR.315

Motor type	A-side bearing		B-side bearing	
	IEC motor	Gearmotor	IEC motor	Gearmotor
DR.315K	6319-J-C3	6319-J-C3	6319-J-C3	6319-J-C3
DR.315S				
DR.315M		6322-J-C3		6322-J-C3
DR.315L				

8.7.3 /ERF reinforced bearings for motor sizes DR. 250 – DR.315

Motor type	A-side bearing	B-side bearing	
		IEC motor	Gearmotor
DR.250 – DR.280	NU317E-C3	6315-2Z-J-C3	
DR.315K	NU319E	6319-J-C3	6319-J-C3
DR.315S			
DR.315M			6322-J-C3
DR.315L			

8.7.4 /NIB current-insulated rolling bearings for motor sizes DR.200 – DR.315

Motor type	B-side bearing	
	AC motor	Brakemotor
DR.200-DR.225	6314-J-C3-EI	6314-J-C3-EI
DR.250 – DR.280	6315-Z-J-C3-EI	6315-Z-J-C3-EI
DR.315K	6319-J-C3	6319-J-C3
DR.315S		
DR.315M		6322-J-C3
DR.315L		

8.8 Lubricant tables

8.8.1 Lubricant table for rolling bearings

INFORMATION

Inadequate bearing greases may result in bearing damage.

Motor sizes DR.71 – DR.280

The bearings are 2Z or 2RS closed bearings and cannot be re-lubricated.

	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)

Motor size DR.315

Motors of sizes DR.250 – DR.315 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)

8.9 Order information for lubricants and anti-corrosion agents

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

Usage	Manufacturer	Type	Quantity	Order number
Lubricant for rolling bearings	Esso	Polyrex EM	400 g	09101470
	SKF	GXN	400 g	09101276
Lubricant for sealing rings	Klüber	Petamo GHY 133	10 g	04963458
Anti-corrosion agent and lubricant	SEW-EURODRIVE	NOCO® FLUID	5.5 g	09107819

8.10 Encoder

8.10.1 ES7. and EG7.

Encoder type		ES7S	EG7S	ES7R	EG7R	ES7C	EG7C
For motors		DR.71 – 132	DR.160 – 280	DR.71 – 132	DR.160 – 280	DR.71 – 132	DR.160 – 280
Supply voltage	V_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}		240 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	V_{high}	1 V_{SS}		≥ DC 2.5 V		≥ DC 2.5 V	
	V_{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}	
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					

8.10.2 EH7.

Encoder		EH7R	EH7T	EH7C	EH7S
For motors		DR.315			
Supply voltage	V_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	V_{high}	≥ 2.5		U_b-2	1 V_{ss}
	V_{low}	≤ 0.5		≤ 2.5	
Signal output		TTL (RS-422)		HTL	Sine/cosine
Output current per track	I_{out}	20 mA		30 mA	10 mA
Duty factor		1 : 1 ± 20 %			90° ± 10°
Phase angle A: B		90° ± 20°			-
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}	rpm	6000, 2500 at 60 °C			
Degree of protection		IP65 (EN 60529)			
Connection		12-pin plug connector			

8.10.3 AS7Y and AG7Y

Encoder type		AS7Y	AG7Y
For motors		DR.71 – 132	DR.160 – 280
Supply voltage	V_B	DC 7 – 30 V	
Max. current consumption	I_{in}	140 mA_{RMS}	
Max. pulse frequency	f_{limit}	200 kHz	
Periods per revolution	A, B	2048	
	C	-	
Output amplitude per track	V_{high}	1 V_{SS}	
	V_{low}		
Signal output		Sin/cos	
Output current per track	I_{out}	10 mA_{RMS}	
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 clock input		Recommended receiver to EIA RS-422	
Pulse 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	

8.10.4 AS7W and AG7W

Encoder type		AS7W	AG7W
For motors		DR.71 – 132	DR.160 – 280
Supply voltage	V_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	V_{high} / V_{low}	1 V_{SS}	
Signal output		Sin/cos	
Output current per track	I_{out}	10 mA_{RMS}	
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 according to EIA RS-485	
Serial clock input		Recommended driver to EIA RS-422	
Pulse 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	

8.10.5 AH7Y

Encoder		AH7Y
For motors		DR.315
Supply voltage	V_B	DC 9 V - 30 V
Max. current consumption	I_{in}	150 mA
Periods per revolution	A, B	2048
	C	-
Output amplitude	V_{high}	≥ 2.5 V_{ss}
	V_{low}	≤ 0.5 V_{ss}
Max. pulse frequency		120 kHz
Signal output		TTL (RS-422)
Output current per track	I_{out}	20 mA
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 transfer of absolute value		Synchronous, serial (SSI)
Serial data output		Driver according to EIA RS-485
Serial clock input		Optocoupler, recommended driver to EIA RS-485
Pulse 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

8.10.6 EI7.

EI7. A

Encoder type		EI7C	EI76	EI72	EI71
For motors		DR.71 – 132			
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 (DIN IEC 60469-1)		30 – 70 % (typically: 50 %)			
Phase offset A: B		90 ° ± 20 °			
Vibration resistance		≤ 100 m/s²			
Shock resistance		≤ 1000 m/s²			
Maximum speed	n_{max}	3600 rpm			
Degree of protection		IP65			
Connection		Terminal strip in the terminal box or M12 (4- or 8-pin)			

EI7. B

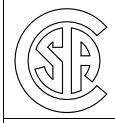
Encoder type		EI7C	EI76	EI72	EI71
For motors		DR.71 – 132			
Supply voltage	V_B	DC 9 – 30 V			
Max. current consumption (with no load)	I_{max}	120 mA_{RMS}			
Max. pulse frequency at n_{max}	f_{max}	1.44 kHz			
Periods per revolution	A, B	24	6	2	1
(signal tracks)	C	-			
Output amplitude per track	V_{high}	≥ 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 (DIN IEC 60469-1) $t = t_{log\_1}/(t_{period})$ n = constant		30 – 70 % (typically: 50 %)			
Phase offset A: B $\varphi_{phase, A:B}$ 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 60068-2-6:2009)			
Maximum speed	n_{max}	3600 rpm			
Degree of protection		IP66			
Connection		Terminal strip in the terminal box or M12 (4- or 8-pin)			

8.10.7 EV1.

Encoder type		EV1T	EV1S	EV1R	EV1C
For motors		DR.71 – 280			
Supply voltage	V_B	DC 5 V	DC 10 V – 30 V		
Max. current consumption	I_{in}	180 mA_{RMS}	160 mA_{RMS}	180 mA_{RMS}	340 mA_{RMS}
Max. pulse frequency	f_{max}	120 kHz			
Periods per revolution	A, B	1024			
	C	1			
Output amplitude per track	V_{high}	≤ DC 2.5 V	1 V_{SS}	≤ 2.5 VDC	≤ V_B DC - 3.5 V
	V_{low}	≤ DC 0.5 V		≤ DC 0.5 V	≤ 1.5 VDC
Signal output		TTL	Sin/cos	TTL	HTL
Output current per track	I_{out}	20 mA_{RMS}	40 mA_{RMS}	20 mA_{RMS}	60 mA_{RMS}
Duty factor		1 : 1 ± 20 %	Sin/cos	1 : 1 ± 20 %	
Phase angle A: B		90 ° ± 20 °	90 °	90 ° ± 20 °	
Vibration resistance		≤ 300 m/s²			
Shock resistance		≤ 1000 m/s²			
Maximum speed	n_{max}	6000 rpm			
Degree of protection		IP66			
Connection		Terminal box on incremental encoder			

8.11 Markings on the nameplate

The following table lists all markings that can occur on a nameplate and an explanation of what they mean:

Mark	Meaning
	CE mark to state compliance with European guidelines, such as the Low Voltage Directive
	ATEX mark to state compliance with the European Directive 94/9/EC
	UR logo to confirm that UL (Underwriters Laboratory) is informed about the registered components; register number by UL: E189357
	DoE mark to confirm compliance with US-American efficiency limit values for AC motors.
	UL logo to confirm that a component is UL (Underwriters Laboratory) tested, also valid for CSA in conjunction with the register number
	CSA mark to confirm the Canadian Standard Association (CSA) and the market conformity of AC motors
	CSAe mark to confirm compliance with the Canadian efficiency limit values for AC motors
	CCC logo to confirm the adherance to the Chinese regulation for small appliances
	VIK mark to confirm the compliance with the directive of the German Association of Industrial Machines (V.I.K.)
	FS mark with code number to identify functional safety relevant components

8.12 Characteristic values of functional safety

8.12.1 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	$B10_d$ 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".

8.12.2 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] [a]	Service life [a]
DR.71 – 132	ES7S	61	20
	AS7W	41	20
	AS7Y	41	20
	EI7C FS	202	20
DR.160 – 315	EG7S	61	20
	AG7W	41	20
	AG7Y	41	20

1) Referring to an ambient temperature of 40 °C

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 surface temperatures on the drive can be very high during operation.

Danger of burns.

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

NOTICE

Improper troubleshooting measures may damage the drive.

Possible damage to property.

- Note the following information.

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

9.1 Motor malfunctions

Malfunction	Possible cause	Remedy
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 deviate considerably from setpoint, at least while being switched on	Provide better power supply system; reduce the power supply load; Check cross section of supply cable, replace with cable of larger cross section if need be
Motor does not start in star connection, only in delta connection	Star connection does not provide sufficient torque	If the delta inrush current is not too high (observe the regulations of the power supplier), start up directly in delta; Check the project planning and use a larger motor or special version if necessary (consult SEW-EURODRIVE)
	Contact fault on star/delta switch	Check the switch, replace if necessary; Check the connections
Incorrect direction of rotation	Motor connected incorrectly	Swap 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	Repair short circuit
	Supply cables connected incorrectly	Correct the wiring, observe the wiring diagram
	Short circuit in 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 need be
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 provided for	Correct the wiring, observe the wiring diagram
	Loose contact in supply cable (one phase missing)	Tighten loose contact, check connections, observe wiring diagram
	Fuse has blown	Look for and rectify cause (see above); replace fuse
	Supply voltage deviates from the rated motor voltage by more than 5% (range A)/ 10% (range B).	Adjust motor to supply voltage.
	Rated operation type (S1 to S10, DIN 57530) exceeded, e.g. through excessive starting frequency	Adjust the rated operating mode of the motor to the required operating conditions; consult a professional to determine the correct drive if necessary

Malfunction	Possible cause	Remedy
Excessively loud	Ball bearing compressed, dirty or damaged	Re-align motor and the driven machine, inspect rolling bearing and replace if necessary. See section "Permitted rolling bearing types" (page 158).
	Vibration of rotating parts	Look for the case, possibly an imbalance; correct the cause, observe method for balancing
	Foreign bodies in cooling air passages	Clean the cooling air passages
	For DR.. motors with rotor designation "J": Load too high	Reduce load

9.2 Brake malfunctions

Malfunction	Possible cause	Remedy
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" section for resistance values). Check switchgear, replace if necessary
	Max. permitted working air gap exceeded because brake lining worn down.	Measure and set working air gap. See the following chapters: • "Setting the working air gap of BE05-BE122 brakes" (page 116) "Setting the working air gap of brakes BE120-BE122" (page 134) If the brake disk is too thin, replace the brake disk. See the following chapters: • "Replacing the brake disk of BE05-BE122 brakes" (page 118) • "Replacing the brake disk of brakes BE120-BE122" (page 136)
	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" section for resistance values). Replace complete brake and brake control (specialist workshop), Check switchgear, replace if necessary
	Rectifier defective	Replace rectifier and brake coil; it may be more economical to replace the complete brake.
Brake does not brake	Working air gap not correct	Measure and set working air gap. See the following chapters: • "Setting the working air gap of BE05-BE122 brakes" (page 116) • "Setting the working air gap of BE120-BE122 brakes" (page 134) If the brake disk is too thin, replace the brake disk. See the following chapters: • "Replacing the brake disk of BE05-BE122 brakes" (page 118) • "Replacing the brake disk of BE120-BE122 brakes" (page 136)
	Brake lining worn	Replace entire brake disk. See the following chapters: • "Replacing the brake disk of BE05-BE32 brakes" (page 118) • "Replacing the brake disk of BE120-BE122 brakes" (page 136)
	Incorrect braking torque.	Check the project planning and change the braking torque if necessary; see chapter "Work done, working air gap, braking torques" (page 145) • by changing the type and number of brake springs. See the following chapters: – "Changing the braking torque of BE05-BE122 brakes" (page 120) – "Changing the braking torque of BE120-BE122 brakes" (page 138) • by selecting a different brake See section "Braking torque assignment" (page 147)

Malfunction	Possible cause	Remedy
Brake does not brake	Working air gap so large that setting nuts for the manual release come into contact.	Set the working air gap. See the following chapters: • "Setting the working air gap of BE05-BE122 brakes" (page 116) • "Setting the working air gap of BE120-BE122 brakes" (page 134)
	Manual brake release device not set correctly	Set the setting nuts for the manual release correctly See the following chapters: • "Changing the braking torque of BE05-BE122 brakes" (page 120) • "Changing the braking torque of BE120-BE122 brakes" (page 138)
	Brake locked by manual brake release HF	Loosen the setscrew, 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 carrier caused by jolting startup	Check the project planning, replace the brake disk if necessary See the following chapters: • "Replacing the brake disk of BE05-BE122 brakes" (page 118) • "Replacing the brake disk of BE120-BE122 brakes" (page 136) Have a specialist workshop replace the carrier
	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 chapter "Motor malfunctions" can 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.

9.4 Customer service

Please have the following information to hand if you require the assistance of our customer service:

- Nameplate data (complete)
- Type and extent of the problem
- Time the problem occurred and any accompanying circumstances
- Assumed cause
- Environmental 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
- Plastic
- Electronic components
- Oil and grease (not mixed with solvents)

10 Appendix

10.1 Wiring diagrams

INFORMATION

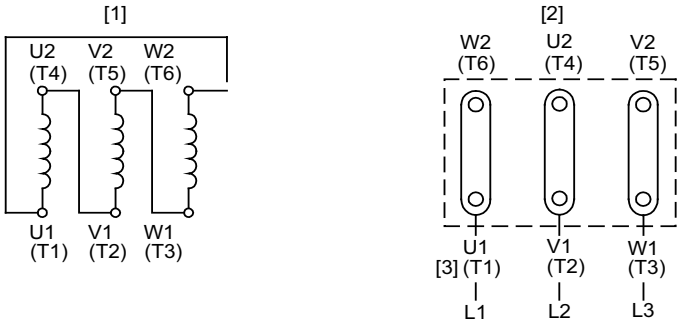
The motor should be connected as shown in the connection wiring diagram or the assignment diagram, which are supplied with the motor. The following section only shows a selection of the common types of connections. You can obtain the relevant wiring diagrams free of charge from SEW-EURODRIVE.

10.1.1 Delta and star connection in wiring diagram R13

AC motor

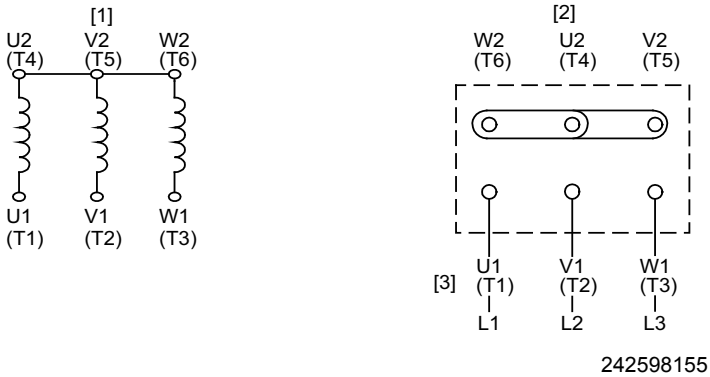
For all motors with one speed, direct switching-on or ⅄/△ startup.

△ *connection* The following figure shows △ connection for low voltage.



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

⅄ *connection* The following figure shows ⅄ connection for high voltage.



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

Change in direction of rotation: Swap connection of 2 supply cables, L1 - L2

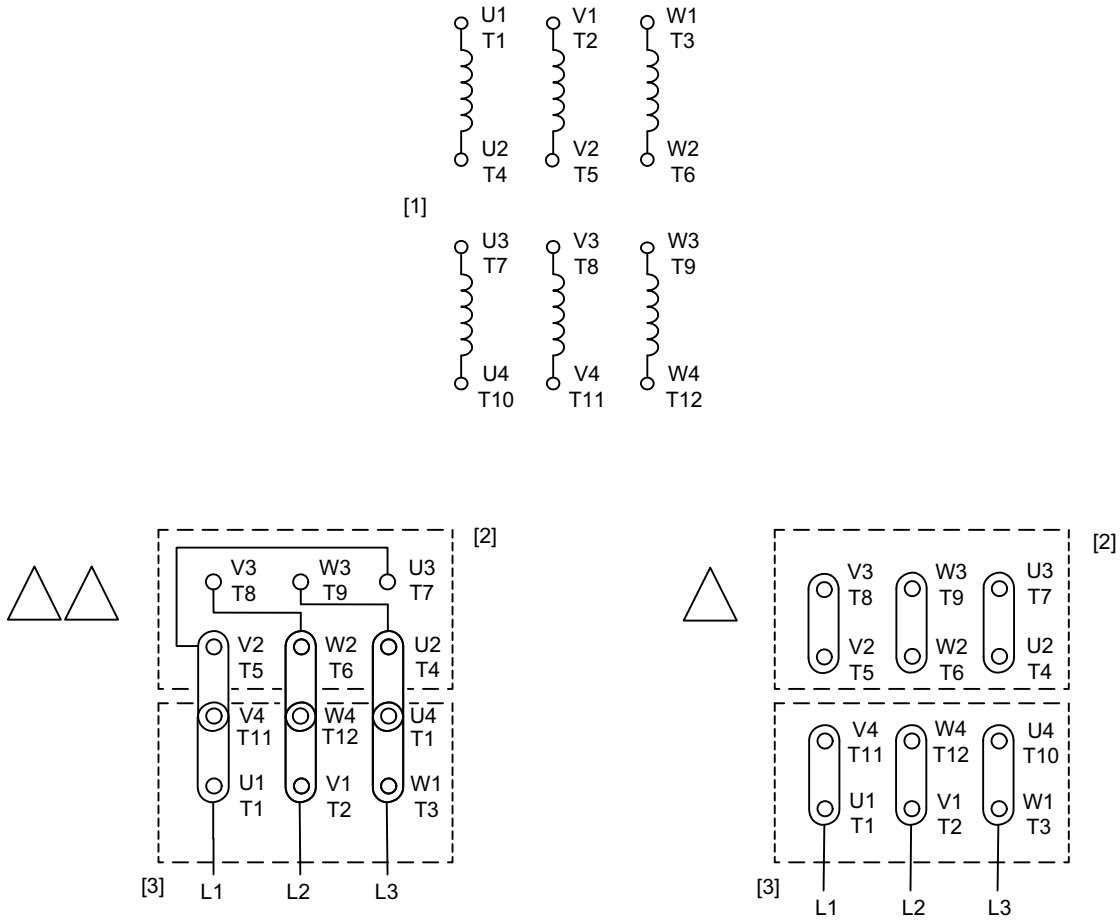
10.1.2 Delta connection with wiring diagram R72 (68192 xx 09)

AC motor

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

△ *connection,*
△△ *connection*

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



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

Change in direction of rotation: Swap connection of 2 supply cables, L1 - L2

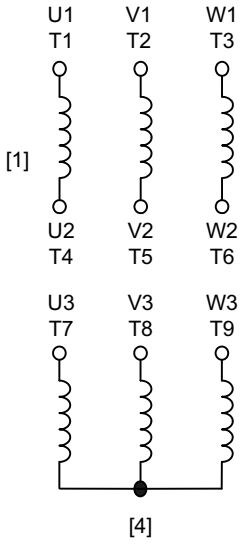
10.1.3 Star connection with wiring diagram R76 (68043 xx 06)

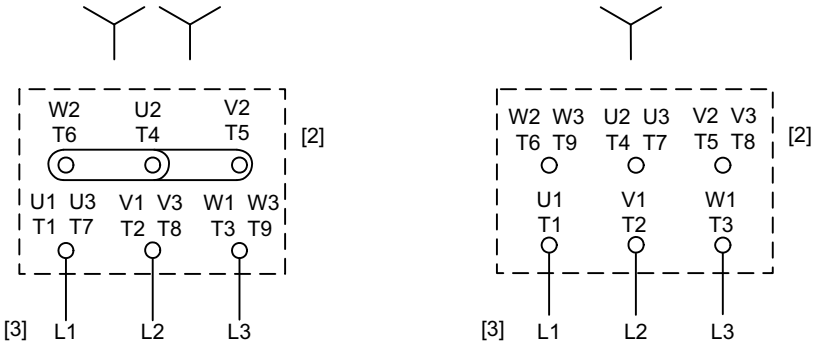
AC motor

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

⅄ connection, ⅄⅄ connection

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





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

Change in direction of rotation: Swap connection of 2 supply cables, L1 - L2

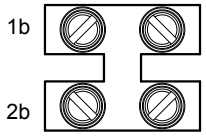
10.1.4 Motor protection with TF or TH for DR.71 – DR.280

TF/TH

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

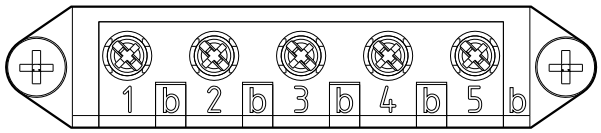
Either a two-pole terminal clip or a five-pole terminal strip is available for connecting to the trip switch.

Example: TF/TH to a two-pole terminal strip



1b	2b
TF/TH	TF/TH

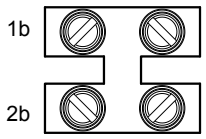
Example: 2 x TF/TH to a five-pole terminal strip



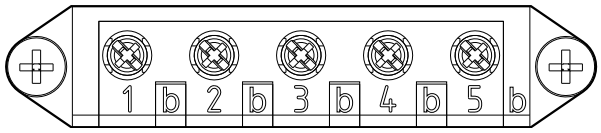
1b	2b	3b	4b	5b
1.TF/TH	1.TF/TH	2.TF/TH	2.TF/TH	-

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.



1b	2b
Hx	Hx



1b	2b	3b	4b	5b
1.TF/TH	1.TF/TH	2.TF/TH	2.TF/TH	-

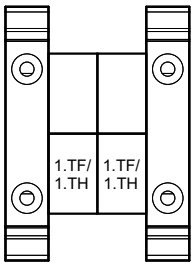
10.1.5 Motor protection with TF or TH for DR.315

TF/TH

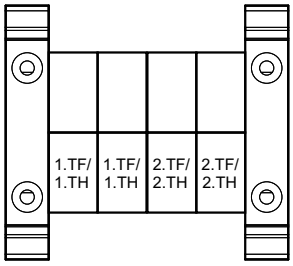
The following figures show the connection of motor protection with TF PTC thermistor sensors or TH bimetallic thermostats.

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

Example: TF/TH to terminal strip



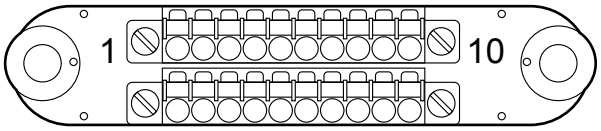
Example: 2 x TF/TH to terminal strip



10.1.6 EI7. built-in encoder A

Connection via terminal strip

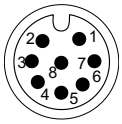
The encoder is equipped with a 10-pole terminal strip:



1e	2e	3e	4e	5e	6e	7e	8e	9e	10e
-	-	-	-	+UB (GY)	GND (PK)	A(cos) (BN)	$\overline{A}(\overline{cos})$ (WH)	B(sin) (YE)	$\overline{B}(\overline{sin})$ (GN)

Connection via M12 plug connector

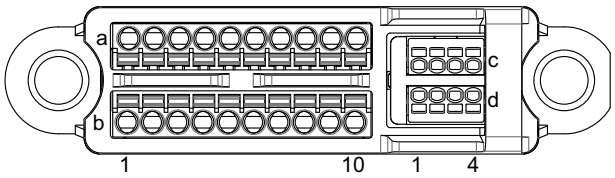
A 4-pin or an 8-pin M12 plug connector is available for the connection:

4-pin M12 plug connector		**8-pin M12 plug connector**	
• A coding • male	 Pin 1: $+V_B$ Pin 2: B (sin) Pin 3: GND Pin 4: A(cos)	• A coding • male	 Pin 1: V_B Pin 2: GND Pin 3: A Pin 4: $\overline{A}$ Pin 5: B Pin 6: $\overline{B}$ Pin 7: TF Pin 8: TF

10.1.7 EI7. built-in encoder B

Connection via terminal strip

The encoder is equipped with a 10-pole terminal strip:



8324612747

INFORMATION

The ranges 1a – 10a, 1c – 4c und 1d – 4d have been pre-configured by SEW-EURODRIVE. They 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)	B[1] (YE)	$\overline{B}$[1] (GN)	see below				**c**
b	TF1	TF1	TF2 opt.	TF2 opt.	+UB	GND	A	$\overline{A}$	B	$\overline{B}$	see below				**d**

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**

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!

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 coding • male	Pin 1: $+V_B$ Pin 2: B Pin 3: GND Pin 4: A	• A coding • male	Pin 1: $+V_B$ Pin 2: GND Pin 3: A Pin 4: $\overline{A}$ Pin 5: B Pin 6: $\overline{B}$ Pin 7: TF1 Pin 8: TF1

10.1.8 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.

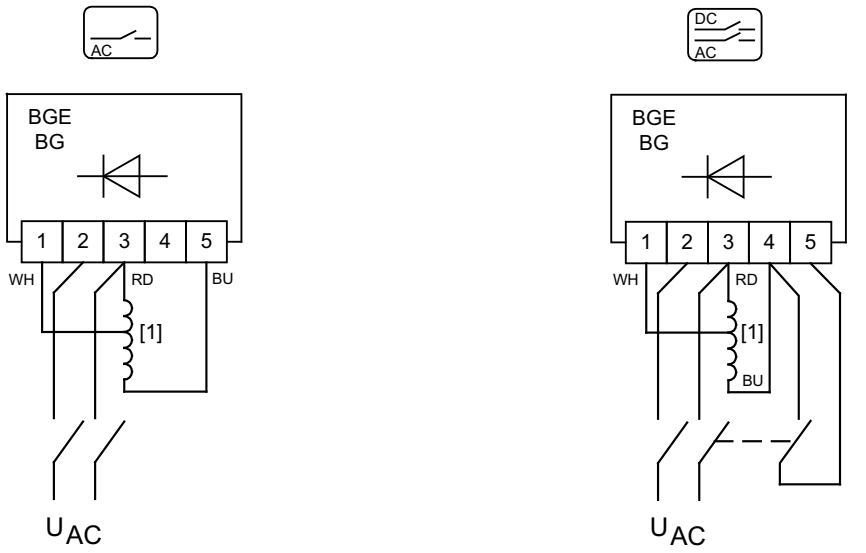
The voltage can be distributed as follows:

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

This does not apply to multi-speed and frequency-controlled motors.

BG / BGE

The following figure shows the wiring for BG and BGE brake rectifiers for the AC-side cut-off as well as the DC and AC-side cut-off.

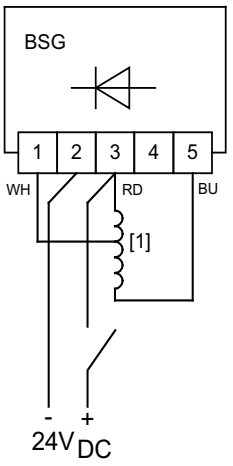


242604811

[1] Brake coil

BSG

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



242606475

[1] Brake coil

BUR

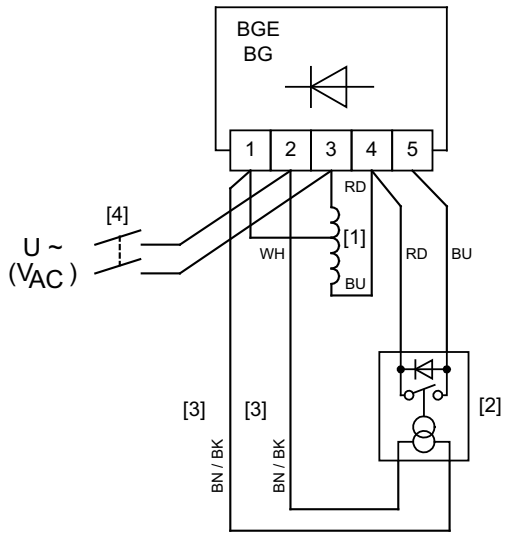
⚠ WARNING

Malfunction caused by incorrect connection for frequency operation.

The drive system might be damaged.

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

The following illustration shows the wiring for the BUR brake control



242608139

[1] Brake coil
[2] UR11/UR15 voltage relay
UR 11 (42-150 V) = BN
UR 15 (150 - 500 V) = BK

10.1.9 BSR brake control

BE brake

BSR brake control

Brake voltage = Phase voltage

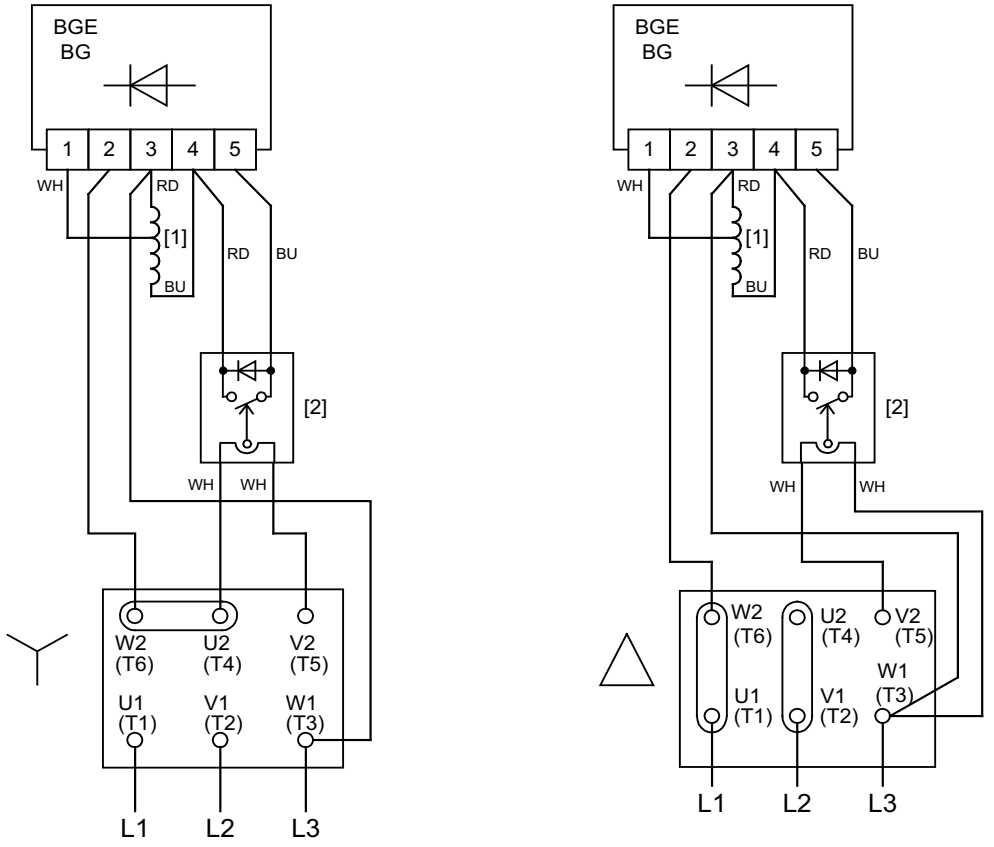
The white connecting leads are the ends of a converter loop and, depending on the motor connection, must be connected to the motor terminal block instead of the △ or 人 bridge.

Factory set to 人 in wiring diagram R13

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

Example: Motor: AC 230 V / AC 400 V

Brake: AC 230 V



242599819

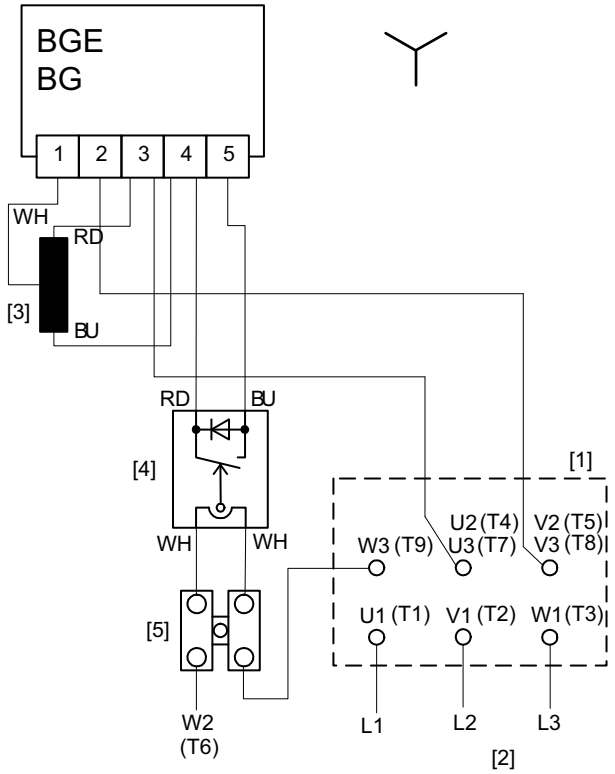
[1] Brake coil
[2] SR11 / 15 current relay

Factory set to ⅄ in wiring diagram R76

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

Example: Motor: AC 230 V / AC 460 V

Brake: AC 230 V



2319077003

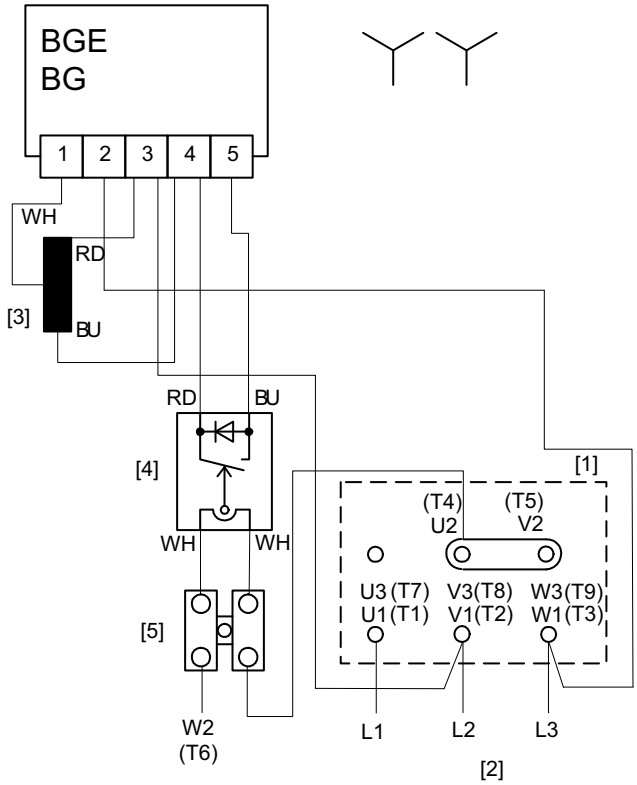
[1] Motor terminal board
[2] Supply cables
[3] Brake coil
[4] SR11 / 15 current relay
[5] Auxiliary terminal

Connection alternative: Factory set to ⅄⅄ in wiring diagram R76

The following figure 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] Supply cables
[3] Brake coil
[4] SR11 / 15 current relay
[5] Auxiliary terminal

10.1.10 BMP3.1 brake control in the terminal box

Brake BE120; BE122

BMP3.1 brake control

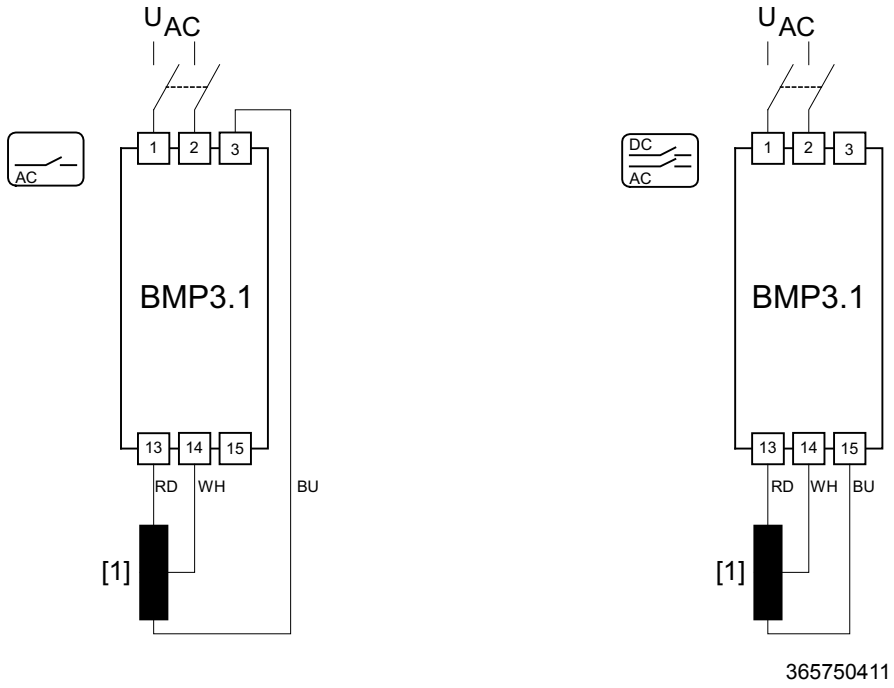
Apply voltage to release the brake (see nameplate).

Contact rating of the brake contactors: AC3 according to EN 60947-4-1

Separate supply cables are required for the voltage supply.

BMP3.1

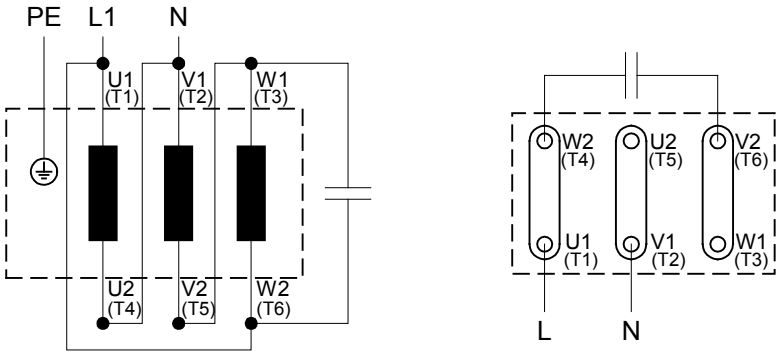
The following figure shows the wiring for the BMP3.1 brake rectifier for the AC-side cut-off as well as the DC and AC-side cut-off.



[1] Brake coil

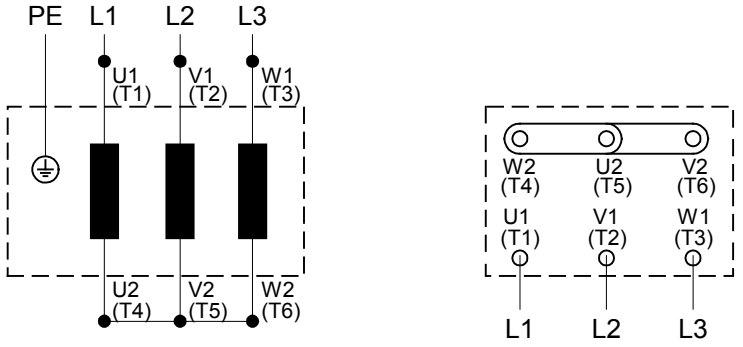
10.1.11 V forced cooling fan

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



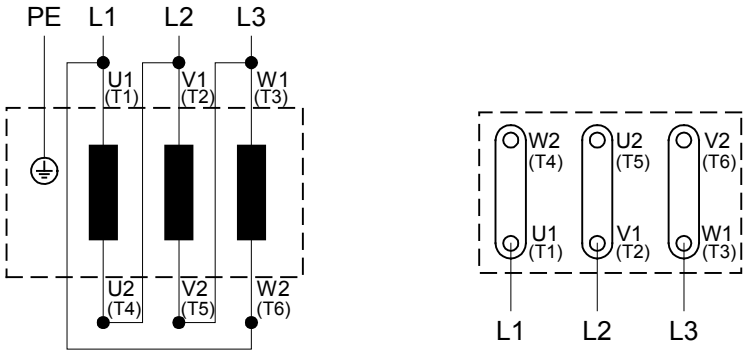
523348491

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



523350155

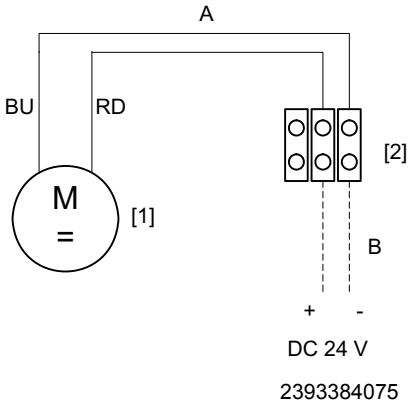
△ *connection* The following figure shows the wiring of the V forced cooling fan with △ connection.



523351819

DC 24 V connection

The following figure shows the wiring of the V forced cooling fan for DC 24 V.



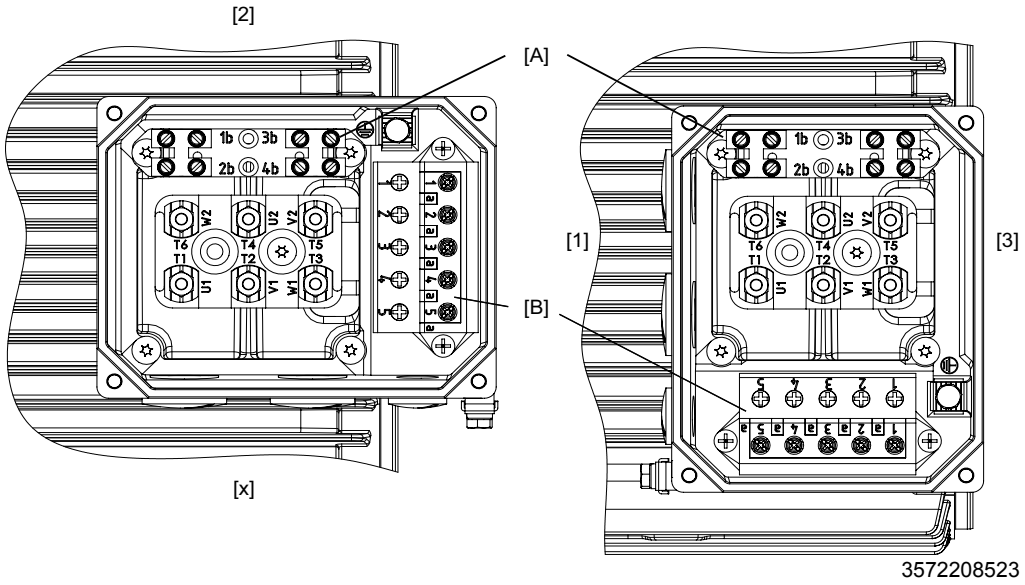
[1]	Forced cooling fan	A	Factory wiring
[2]	Terminal strip	B	Customer

It is essential that you observe the polarity.

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**



3572208523

1) If auxiliary terminal 2 is not provided, you can install auxiliary terminal 1 in the same position.

[1]	Terminal box position 1	[X]	terminal box position X
[2]	Terminal box position 2	[A]	Auxiliary terminal 1
[3]	Terminal box position 3	[B]	Auxiliary terminal 2

Regardless of the terminal box position, auxiliary terminal 1 must always be mounted parallel to the terminal board.

The terminal structure can vary depending on the terminal box design.

11 Address list

Germany			
Headquarters **Production** **Sales**	**Bruchsal**	SEW-EURODRIVE GmbH & Co KG Ernst-Blickle-Straße 42 D-76646 Bruchsal P.O. Box Postfach 3023 • D-76642 Bruchsal	Tel. +49 7251 75-0 Fax +49 7251 75-1970 http://www.sew-eurodrive.de sew@sew-eurodrive.de
Production / Industrial Gear Units	**Bruchsal**	SEW-EURODRIVE GmbH & Co KG Christian-Pähr-Str.10 D-76646 Bruchsal	Tel. +49 7251 75-0 Fax +49 7251 75-2970
Service Competence Center	**Mechanics / Mechatronics**	SEW-EURODRIVE GmbH & Co KG Ernst-Blickle-Straße 1 D-76676 Graben-Neudorf	Tel. +49 7251 75-1710 Fax +49 7251 75-1711 sc-mitte@sew-eurodrive.de
	Electronics	SEW-EURODRIVE GmbH & Co KG Ernst-Blickle-Straße 42 D-76646 Bruchsal	Tel. +49 7251 75-1780 Fax +49 7251 75-1769 sc-elektronik@sew-eurodrive.de
Drive Technology Center	**North**	SEW-EURODRIVE GmbH & Co KG Alte Ricklinger Straße 40-42 D-30823 Garbsen (near Hannover)	Tel. +49 5137 8798-30 Fax +49 5137 8798-55 sc-nord@sew-eurodrive.de
	East	SEW-EURODRIVE GmbH & Co KG Dänkritzer Weg 1 D-08393 Meerane (near Zwickau)	Tel. +49 3764 7606-0 Fax +49 3764 7606-30 sc-ost@sew-eurodrive.de
	South	SEW-EURODRIVE GmbH & Co KG Domagkstraße 5 D-85551 Kirchheim (near München)	Tel. +49 89 909552-10 Fax +49 89 909552-50 sc-sued@sew-eurodrive.de
	West	SEW-EURODRIVE GmbH & Co KG Siemensstraße 1 D-40764 Langenfeld (near Düsseldorf)	Tel. +49 2173 8507-30 Fax +49 2173 8507-55 sc-west@sew-eurodrive.de
	Drive Service Hotline / 24 Hour Service		+49 800 SEWHELP +49 800 7394357
	Additional addresses for service in Germany provided on request!		

France			
Production **Sales** **Service**	**Haguenau**	SEW-USOCOME 48-54 route de Soufflenheim B. P. 20185 F-67506 Haguenau Cedex	Tel. +33 3 88 73 67 00 Fax +33 3 88 73 66 00 http://www.usocome.com sew@usocome.com
Production	**Forbach**	SEW-USOCOME Zone industrielle Technopôle Forbach Sud B. P. 30269 F-57604 Forbach Cedex	Tel. +33 3 87 29 38 00
Assembly **Sales** **Service**	**Bordeaux**	SEW-USOCOME Parc d'activités de Magellan 62 avenue de Magellan - B. P. 182 F-33607 Pessac Cedex	Tel. +33 5 57 26 39 00 Fax +33 5 57 26 39 09
	Lyon	SEW-USOCOME Parc d'affaires Roosevelt Rue Jacques Tati F-69120 Vaulx en Velin	Tel. +33 4 72 15 37 00 Fax +33 4 72 15 37 15
	Nantes	SEW-USOCOME Parc d'activités de la forêt 4 rue des Fontenelles F-44140 Le Bignon	Tel. +33 2 40 78 42 00 Fax +33 2 40 78 42 20

France			
	Paris	SEW-USOCOME Zone industrielle 2 rue Denis Papin F-77390 Verneuil l'Etang	Tel. +33 1 64 42 40 80 Fax +33 1 64 42 40 88
	Additional addresses for service in France provided on request!		

Algeria			
Sales	**Algiers**	REDUCOM Sarl 16, rue des Frères Zaghnoune Bellevue 16200 El Harrach Alger	Tel. +213 21 8214-91 Fax +213 21 8222-84 info@reducom-dz.com http://www.reducom-dz.com

Argentina			
Assembly **Sales**	**Buenos Aires**	SEW EURODRIVE ARGENTINA S.A. Ruta Panamericana Km 37.5, Lote 35 (B1619IEA) Centro Industrial Garín Prov. de Buenos Aires	Tel. +54 3327 4572-84 Fax +54 3327 4572-21 sewar@sew-eurodrive.com.ar http://www.sew-eurodrive.com.ar

Australia			
Assembly **Sales** **Service**	**Melbourne**	SEW-EURODRIVE PTY. LTD. 27 Beverage Drive Tullamarine, Victoria 3043	Tel. +61 3 9933-1000 Fax +61 3 9933-1003 http://www.sew-eurodrive.com.au enquires@sew-eurodrive.com.au
	Sydney	SEW-EURODRIVE PTY. LTD. 9, Sleigh Place, Wetherill Park New South Wales, 2164	Tel. +61 2 9725-9900 Fax +61 2 9725-9905 enquires@sew-eurodrive.com.au

Austria			
Assembly **Sales** **Service**	**Wien**	SEW-EURODRIVE Ges.m.b.H. Richard-Strauss-Strasse 24 A-1230 Wien	Tel. +43 1 617 55 00-0 Fax +43 1 617 55 00-30 http://www.sew-eurodrive.at sew@sew-eurodrive.at

Belarus			
Sales	**Minsk**	SEW-EURODRIVE BY RybalkoStr. 26 BY-220033 Minsk	Tel.+375 17 298 47 56 / 298 47 58 Fax +375 17 298 47 54 http://www.sew.by sales@sew.by

Belgium			
Assembly **Sales** **Service**	**Brussels**	**SEW-EURODRIVE n.v./s.a.** Researchpark Haasrode 1060 Evenementenlaan 7 BE-3001 Leuven	Tel. +32 16 386-311 Fax +32 16 386-336 http://www.sew-eurodrive.be info@sew-eurodrive.be
Service Competence Center	**Industrial Gears**	**SEW-EURODRIVE n.v./s.a.** Rue de Parc Industriel, 31 BE-6900 Marche-en-Famenne	Tel. +32 84 219-878 Fax +32 84 219-879 http://www.sew-eurodrive.be service-wallonie@sew-eurodrive.be

Brazil			
Production **Sales** **Service**	**São Paulo**	SEW-EURODRIVE Brasil Ltda. Avenida Amâncio Gaiolli, 152 - Rodovia Presidente Dutra Km 208 Guarulhos - 07251-250 - SP SAT - SEW ATENDE - 0800 7700496	Tel. +55 11 2489-9133 Fax +55 11 2480-3328 http://www.sew-eurodrive.com.br sew@sew.com.br

Brazil			
Assembly **Sales** **Service**	**Rio Claro**	SEW-EURODRIVE Brasil Ltda. Rodovia Washington Luiz, Km 172 Condomínio Industrial Conpark Caixa Postal: 327 13501-600 – Rio Claro / SP	Tel. +55 19 3522-3100 Fax +55 19 3524-6653 montadora.rc@sew.com.br
	Joinville	SEW-EURODRIVE Brasil Ltda. Rua Dona Francisca, 12.346 – Pirabeiraba 89239-270 – Joinville / SC	Tel. +55 47 3027-6886 Fax +55 47 3027-6888 filial.sc@sew.com.br
	Indaiatuba	SEW-EURODRIVE Brasil Ltda. Estrada Municipal Jose Rubim, 205 Rodovia Santos Dumont Km 49 13347-510 - Indaiatuba / SP	Tel. +55 19 3835-8000 sew@sew.com.br

Bulgaria			
Sales	**Sofia**	BEVER-DRIVE GmbH Bogdanovetz Str.1 BG-1606 Sofia	Tel. +359 2 9151160 Fax +359 2 9151166 bever@bever.bg

Cameroon			
Sales	**Douala**	Electro-Services Rue Drouot Akwa B.P. 2024 Douala	Tel. +237 33 431137 Fax +237 33 431137 electrojemba@yahoo.fr

Canada			
Assembly **Sales** **Service**	**Toronto**	SEW-EURODRIVE CO. OF CANADA LTD. 210 Walker Drive Bramalea, ON L6T 3W1	Tel. +1 905 791-1553 Fax +1 905 791-2999 http://www.sew-eurodrive.ca l.watson@sew-eurodrive.ca
	Vancouver	SEW-EURODRIVE CO. OF CANADA LTD. Tilbury Industrial Park 7188 Honeyman Street Delta, BC V4G 1G1	Tel. +1 604 946-5535 Fax +1 604 946-2513 b.wake@sew-eurodrive.ca
	Montreal	SEW-EURODRIVE CO. OF CANADA LTD. 2555 Rue Leger Lasalle, PQ H8N 2V9	Tel. +1 514 367-1124 Fax +1 514 367-3677 a.peluso@sew-eurodrive.ca
	Additional addresses for service in Canada provided on request!		

Chile			
Assembly **Sales** **Service**	**Santiago**	SEW-EURODRIVE CHILE LTDA. Las Encinas 1295 Parque Industrial Valle Grande LAMPA RCH-Santiago de Chile P.O. Box Casilla 23 Correo Quilicura - Santiago - Chile	Tel. +56 2 75770-00 Fax +56 2 75770-01 http://www.sew-eurodrive.cl ventas@sew-eurodrive.cl

China			
Production **Assembly** **Sales** **Service**	**Tianjin**	SEW-EURODRIVE (Tianjin) Co., Ltd. No. 46, 7th Avenue, TEDA Tianjin 300457	Tel. +86 22 25322612 Fax +86 22 25323273 info@sew-eurodrive.cn http://www.sew-eurodrive.cn
Assembly **Sales** **Service**	**Suzhou**	SEW-EURODRIVE (Suzhou) Co., Ltd. 333, Suhong Middle Road Suzhou Industrial Park Jiangsu Province, 215021	Tel. +86 512 62581781 Fax +86 512 62581783 suzhou@sew-eurodrive.cn

China			
	Guangzhou	SEW-EURODRIVE (Guangzhou) Co., Ltd. No. 9, JunDa Road East Section of GETDD Guangzhou 510530	Tel. +86 20 82267890 Fax +86 20 82267922 guangzhou@sew-eurodrive.cn
	Shenyang	SEW-EURODRIVE (Shenyang) Co., Ltd. 10A-2, 6th Road Shenyang Economic Technological Development Area Shenyang, 110141	Tel. +86 24 25382538 Fax +86 24 25382580 shenyang@sew-eurodrive.cn
	Wuhan	SEW-EURODRIVE (Wuhan) Co., Ltd. 10A-2, 6th Road No. 59, the 4th Quanli Road, WEDA 430056 Wuhan	Tel. +86 27 84478388 Fax +86 27 84478389 wuhan@sew-eurodrive.cn
	Xi'An	SEW-EURODRIVE (Xi'An) Co., Ltd. No. 12 Jinye 2nd Road Xi'An High-Technology Industrial Development Zone Xi'An 710065	Tel. +86 29 68686262 Fax +86 29 68686311 xian@sew-eurodrive.cn
	Additional addresses for service in China provided on request!		

Colombia			
Assembly **Sales** **Service**	**Bogotá**	SEW-EURODRIVE COLOMBIA LTDA. Calle 22 No. 132-60 Bodega 6, Manzana B Santafé de Bogotá	Tel. +57 1 54750-50 Fax +57 1 54750-44 http://www.sew-eurodrive.com.co sew@sew-eurodrive.com.co

Croatia			
Sales **Service**	**Zagreb**	KOMPEKS d. o. o. Zeleni dol 10 HR 10 000 Zagreb	Tel. +385 1 4613-158 Fax +385 1 4613-158 kompeks@inet.hr

Czech Republic			
Sales **Assembly** **Service**	**Hostivice**	SEW-EURODRIVE CZ s.r.o. Floriánova 2459 253 01 Hostivice	Tel. +420 255 709 601 Fax +420 235 350 613 http://www.sew-eurodrive.cz sew@sew-eurodrive.cz
	Drive Service Hotline / 24 Hour Service	HOT-LINE +420 800 739 739 (800 SEW SEW)	**Servis:** Tel. +420 255 709 632 Fax +420 235 358 218 servis@sew-eurodrive.cz

Denmark			
Assembly **Sales** **Service**	**Copenhagen**	SEW-EURODRIVEA/S Geminivej 28-30 DK-2670 Greve	Tel. +45 43 9585-00 Fax +45 43 9585-09 http://www.sew-eurodrive.dk sew@sew-eurodrive.dk

Egypt			
Sales **Service**	**Cairo**	Copam Egypt for Engineering & Agencies 33 EI Hegaz ST, Heliopolis, Cairo	Tel. +20 2 22566-299 +1 23143088 Fax +20 2 22594-757 http://www.copam-egypt.com/ copam@datum.com.eg

Estonia			
Sales	**Tallin**	ALAS-KUUL AS Reti tee 4 EE-75301 Peetri küla, Rae vald, Harjumaa	Tel. +372 6593230 Fax +372 6593231 veiko.soots@alas-kuul.ee

Finland			
Assembly **Sales** **Service**	**Lahti**	SEW-EURODRIVE OY Vesimäentie 4 FIN-15860 Hollola 2	Tel. +358 201 589-300 Fax +358 3 780-6211 http://www.sew-eurodrive.fi sew@sew.fi
Production **Assembly**	**Karkkila**	SEW Industrial Gears Oy Valurinkatu 6, PL 8 FI-03600 Karkkila, 03601 Karkkila	Tel. +358 201 589-300 Fax +358 201 589-310 sew@sew.fi http://www.sew-eurodrive.fi

Gabon			
Sales	**Libreville**	ESG Electro Services Gabun Feu Rouge Lalala 1889 Libreville Gabun	Tel. +241 741059 Fax +241 741059 esg_services@yahoo.fr

Great Britain			
Assembly **Sales** **Service**	**Normanton**	SEW-EURODRIVE Ltd. Beckbridge Industrial Estate Normanton West Yorkshire WF6 1QR	Tel. +44 1924 893-855 Fax +44 1924 893-702 http://www.sew-eurodrive.co.uk info@sew-eurodrive.co.uk
	Drive Service Hotline / 24 Hour Service		Tel. 01924 896911

Greece			
Sales	**Athens**	Christ. Boznos & Son S.A. 12, K. Mavromichali Street P.O. Box 80136 GR-18545 Piraeus	Tel. +30 2 1042 251-34 Fax +30 2 1042 251-59 http://www.boznos.gr info@boznos.gr

Hong Kong			
Assembly **Sales** **Service**	**Hong Kong**	SEW-EURODRIVE LTD. Unit No. 801-806, 8th Floor Hong Leong Industrial Complex No. 4, Wang Kwong Road Kowloon, Hong Kong	Tel. +852 36902200 Fax +852 36902211 contact@sew-eurodrive.hk

Hungary			
Sales **Service**	**Budapest**	SEW-EURODRIVE Kft. H-1037 Budapest Kunigunda u. 18	Tel. +36 1 437 06-58 Fax +36 1 437 06-50 http://www.sew-eurodrive.hu office@sew-eurodrive.hu

India			
Registered Office **Assembly** **Sales** **Service**	**Vadodara**	SEW-EURODRIVE India Private Limited Plot No. 4, GIDC POR Ramangamdi • Vadodara - 391 243 Gujarat	Tel. +91 265 3045200, +91 265 2831086 Fax +91 265 3045300, +91 265 2831087 http://www.seweurodriveindia.com salesvadodara@seweurodrivein-dia.com
Assembly **Sales** **Service**	**Chennai**	SEW-EURODRIVE India Private Limited Plot No. K3/1, Sipcot Industrial Park Phase II Mambakkam Village Sriperumbudur - 602105 Kancheepuram Dist, Tamil Nadu	Tel. +91 44 37188888 Fax +91 44 37188811 saleschennai@seweurodriveindia.com

Ireland			
Sales **Service**	**Dublin**	Alperton Engineering Ltd. 48 Moyle Road Dublin Industrial Estate Glasnevin, Dublin 11	Tel. +353 1 830-6277 Fax +353 1 830-6458 info@alperton.ie http://www.alperton.ie

Israel			
Sales	**Tel-Aviv**	Liraz Handasa Ltd. Ahofer Str 34B / 228 58858 Holon	Tel. +972 3 5599511 Fax +972 3 5599512 http://www.liraz-handasa.co.il office@liraz-handasa.co.il

Italy			
Assembly **Sales** **Service**	**Solaro**	SEW-EURODRIVE di R. Blickle & Co.s.a.s. Via Bernini,14 I-20020 Solaro (Milano)	Tel. +39 02 96 9801 Fax +39 02 96 799781 http://www.sew-eurodrive.it sewit@sew-eurodrive.it

Ivory Coast			
Sales	**Abidjan**	SICA Société Industrielle & Commerciale pour l'Afrique 165, Boulevard de Marseille 26 BP 1173 Abidjan 26	Tel. +225 21 25 79 44 Fax +225 21 25 88 28 sicamot@aviso.ci

Japan			
Assembly **Sales** **Service**	**Iwata**	SEW-EURODRIVE JAPAN CO., LTD 250-1, Shimoman-no, Iwata Shizuoka 438-0818	Tel. +81 538 373811 Fax +81 538 373855 http://www.sew-eurodrive.co.jp sewjapan@sew-eurodrive.co.jp

Kazakhstan			
Sales	**Almaty**	ТОО "СЕВ-ЕВРОДРАЙВ" пр.Райымбека, 348 050061 г. Алматы Республика Казахстан	Тел. +7 (727) 334 1880 Факс +7 (727) 334 1881 http://www.sew-eurodrive.kz sew@sew-eurodrive.kz

Kenya			
Sales	**Nairobi**	Barico Maintenances Ltd Kamutaga Place Commercial Street Industrial Area P.O.BOX 52217 - 00200 Nairobi	Tel. +254 20 6537094/5 Fax +254 20 6537096 info@barico.co.ke

Latvia			
Sales	**Riga**	SIA Alas-Kuul Katlakalna 11C LV-1073 Riga	Tel. +371 6 7139253 Fax +371 6 7139386 http://www.alas-kuul.com info@alas-kuul.com

Lebanon			
Sales Lebanon	**Beirut**	Gabriel Acar & Fils sarl B. P. 80484 Bourj Hammoud, Beirut	Tel. +961 1 510 532 Fax +961 1 494 971 ssacar@inco.com.lb
		After Sales Service	service@medrives.com

Lebanon			
Sales Jordan / Kuwait / Saudi Arabia / Syria	**Beirut**	Middle East Drives S.A.L. (offshore) Sin El Fil. B. P. 55-378 Beirut	Tel. +961 1 494 786 Fax +961 1 494 971 info@medrives.com http://www.medrives.com
		After Sales Service	service@medrives.com

Lithuania			
Sales	**Alytus**	UAB Irseva Statybininku 106C LT-63431 Alytus	Tel. +370 315 79204 Fax +370 315 56175 irmantas@irseva.lt http://www.sew-eurodrive.lt

Luxembourg			
Assembly **Sales** **Service**	**Brussels**	**SEW-EURODRIVE n.v./s.a.** Researchpark Haasrode 1060 Evenementenlaan 7 BE-3001 Leuven	Tel. +32 16 386-311 Fax +32 16 386-336 http://www.sew-eurodrive.lu info@sew-eurodrive.be

Madagascar			
Sales	**Antananarivo**	Ocean Trade BP21bis. Andraharo Antananarivo. 101 Madagascar	Tel. +261 20 2330303 Fax +261 20 2330330 oceantrabp@moov.mg

Malaysia			
Assembly **Sales** **Service**	**Johor**	SEW-EURODRIVE SDN BHD No. 95, Jalan Seroja 39, Taman Johor Jaya 81000 Johor Bahru, Johor West Malaysia	Tel. +60 7 3549409 Fax +60 7 3541404 sales@sew-eurodrive.com.my

Mexico			
Assembly **Sales** **Service**	**Quéretaro**	SEW-EURODRIVE MEXICO SA DE CV SEM-981118-M93 Tequisquiapan No. 102 Parque Industrial Quéretaro C.P. 76220 Quéretaro, México	Tel. +52 442 1030-300 Fax +52 442 1030-301 http://www.sew-eurodrive.com.mx scmexico@seweurodrive.com.mx

Morocco			
Sales **Service**	**Mohammedia**	SEW-EURODRIVE SARL 2 bis, Rue Al Jahid 28810 Mohammedia	Tel. +212 523 32 27 80/81 Fax +212 523 32 27 89 sew@sew-eurodrive.ma http://www.sew-eurodrive.ma

Namibia			
Sales	**Swakopmund**	DB Mining & Industrial Services Einstein Street Strauss Industrial Park Unit1 Swakopmund	Tel. +264 64 462 738 Fax +264 64 462 734 sales@dbmining.in.na

Netherlands			
Assembly **Sales** **Service**	**Rotterdam**	SEW-EURODRIVE B.V. Industrieweg 175 NL-3044 AS Rotterdam Postbus 10085 NL-3004 AB Rotterdam	Tel. +31 10 4463-700 Fax +31 10 4155-552 Service: 0800-SEWHELP http://www.sew-eurodrive.nl info@sew-eurodrive.nl

New Zealand			
Assembly **Sales** **Service**	**Auckland**	SEW-EURODRIVE NEW ZEALAND LTD. P.O. Box 58-428 82 Greenmount drive East Tamaki Auckland	Tel. +64 9 2745627 Fax +64 9 2740165 http://www.sew-eurodrive.co.nz sales@sew-eurodrive.co.nz
	Christchurch	SEW-EURODRIVE NEW ZEALAND LTD. 10 Settlers Crescent, Ferrymead Christchurch	Tel. +64 3 384-6251 Fax +64 3 384-6455 sales@sew-eurodrive.co.nz

Nigeria			
Sales	**Lagos**	EISNL Engineering Solutions and Drives Ltd Plot 9, Block A, Ikeja Industrial Estate (Ogba Scheme) Adeniyi Jones St. End Off ACME Road, Ogba, Ikeja, Lagos Nigeria	Tel. +234 (0)1 217 4332 team.sew@eisnl.com http://www.eisnl.com

Norway			
Assembly **Sales** **Service**	**Moss**	SEW-EURODRIVE A/S Solgaard skog 71 N-1599 Moss	Tel. +47 69 24 10 20 Fax +47 69 24 10 40 http://www.sew-eurodrive.no sew@sew-eurodrive.no

Pakistan			
Sales	**Karachi**	Industrial Power Drives Al-Fatah Chamber A/3, 1st Floor Central Commercial Area, Sultan Ahmed Shah Road, Block 7/8, Karachi	Tel. +92 21 452 9369 Fax +92-21-454 7365 seweurodrive@cyber.net.pk

Peru			
Assembly **Sales** **Service**	**Lima**	SEW DEL PERU MOTORES REDUCTORES S.A.C. Los Calderos, 120-124 Urbanizacion Industrial Vulcano, ATE, Lima	Tel. +51 1 3495280 Fax +51 1 3493002 http://www.sew-eurodrive.com.pe sewperu@sew-eurodrive.com.pe

Poland			
Assembly **Sales** **Service**	**Lodz**	SEW-EURODRIVE Polska Sp.z.o.o. ul. Techniczna 5 PL-92-518 Łódź	Tel. +48 42 676 53 00 Fax +48 42 676 53 49 http://www.sew-eurodrive.pl sew@sew-eurodrive.pl
	Service	Tel. +48 42 6765332 / 42 6765343 Fax +48 42 6765346	Linia serwisowa Hotline 24H Tel. +48 602 739 739 (+48 602 SEW SEW) serwis@sew-eurodrive.pl

Portugal			
Assembly **Sales** **Service**	**Coimbra**	SEW-EURODRIVE, LDA. Apartado 15 P-3050-901 Mealhada	Tel. +351 231 20 9670 Fax +351 231 20 3685 http://www.sew-eurodrive.pt infosew@sew-eurodrive.pt

Romania			
Sales **Service**	**Bucharest**	Sialco Trading SRL str. Brazilia nr. 36 011783 Bucuresti	Tel. +40 21 230-1328 Fax +40 21 230-7170 sialco@sialco.ro

Russia			
Assembly **Sales** **Service**	**St. Petersburg**	ZAO SEW-EURODRIVE P.O. Box 36 RUS-195220 St. Petersburg	Tel. +7 812 3332522 +7 812 5357142 Fax +7 812 3332523 http://www.sew-eurodrive.ru sew@sew-eurodrive.ru

Senegal			
Sales	**Dakar**	SENEMECA Mécanique Générale Km 8, Route de Rufisque B.P. 3251, Dakar	Tel. +221 338 494 770 Fax +221 338 494 771 senemeca@sentoo.sn http://www.senemeca.com

Serbia			
Sales	**Beograd**	DIPAR d.o.o. Ustanicka 128a PC Košum, IV sprat SRB-11000 Beograd	Tel. +381 11 347 3244 / +381 11 288 0393 Fax +381 11 347 1337 office@dipar.rs

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

Slovakia			
Sales	**Bratislava**	SEW-Eurodrive SK s.r.o. Rybničná 40 SK-831 06 Bratislava	Tel. +421 2 33595 202 Fax +421 2 33595 200 sew@sew-eurodrive.sk http://www.sew-eurodrive.sk
	Žilina	SEW-Eurodrive SK s.r.o. Industry Park - PChZ ulica M.R.Štefánika 71 SK-010 01 Žilina	Tel. +421 41 700 2513 Fax +421 41 700 2514 sew@sew-eurodrive.sk
	Banská Bystrica	SEW-Eurodrive SK s.r.o. Rudlovská cesta 85 SK-974 11 Banská Bystrica	Tel. +421 48 414 6564 Fax +421 48 414 6566 sew@sew-eurodrive.sk
	Košice	SEW-Eurodrive SK s.r.o. Slovenská ulica 26 SK-040 01 Košice	Tel. +421 55 671 2245 Fax +421 55 671 2254 sew@sew-eurodrive.sk

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

South Africa			
Assembly **Sales** **Service**	**Johannesburg**	SEW-EURODRIVE (PROPRIETARY) LIMITED Eurodrive House Cnr. Adcock Ingram and Aerodrome Roads Aeroton Ext. 2 Johannesburg 2013 P.O.Box 90004 Bertsham 2013	Tel. +27 11 248-7000 Fax +27 11 494-3104 http://www.sew.co.za info@sew.co.za

South Africa			
	Cape Town	SEW-EURODRIVE (PROPRIETARY) LIMITED Rainbow Park Cnr. Racecourse & Omuramba Road Montague Gardens Cape Town P.O.Box 36556 Chempet 7442 Cape Town	Tel. +27 21 552-9820 Fax +27 21 552-9830 Telex 576 062 bgriffiths@sew.co.za
	Durban	SEW-EURODRIVE (PROPRIETARY) LIMITED 2 Monaco Place Pinetown Durban P.O. Box 10433, Ashwood 3605	Tel. +27 31 700-3451 Fax +27 31 700-3847 cdejager@sew.co.za
	Nelspruit	SEW-EURODRIVE (PTY) LTD. 7 Christie Crescent Vintonia P.O.Box 1942 Nelspruit 1200	Tel. +27 13 752-8007 Fax +27 13 752-8008 robermeyer@sew.co.za

South Korea			
Assembly **Sales** **Service**	**Ansan**	SEW-EURODRIVE KOREA CO., LTD. B 601-4, Banweol Industrial Estate #1048-4, Shingil-Dong, Danwon-Gu, Ansan-City, Kyunggi-Do Zip 425-839	Tel. +82 31 492-8051 Fax +82 31 492-8056 http://www.sew-korea.co.kr master.korea@sew-eurodrive.com
	Busan	SEW-EURODRIVE KOREA Co., Ltd. No. 1720 - 11, Songjeong - dong Gangseo-ku Busan 618-270	Tel. +82 51 832-0204 Fax +82 51 832-0230 master@sew-korea.co.kr

Spain			
Assembly **Sales** **Service**	**Bilbao**	SEW-EURODRIVE ESPAÑA, S.L. Parque Tecnológico, Edificio, 302 E-48170 Zamudio (Vizcaya)	Tel. +34 94 43184-70 Fax +34 94 43184-71 http://www.sew-eurodrive.es sew.spain@sew-eurodrive.es

Swaziland			
Sales	**Manzini**	C G Trading Co. (Pty) Ltd PO Box 2960 Manzini M200	Tel. +268 2 518 6343 Fax +268 2 518 5033 engineering@cgtrading.co.sz

Sweden			
Assembly **Sales** **Service**	**Jönköping**	SEW-EURODRIVE AB Gnejsvägen 6-8 S-55303 Jönköping Box 3100 S-55003 Jönköping	Tel. +46 36 3442 00 Fax +46 36 3442 80 http://www.sew-eurodrive.se jonkoping@sew.se

Switzerland			
Assembly **Sales** **Service**	**Basel**	Alfred Imhof A.G. Jurastrasse 10 CH-4142 Münchenstein bei Basel	Tel. +41 61 417 1717 Fax +41 61 417 1700 http://www.imhof-sew.ch info@imhof-sew.ch

Thailand			
Assembly **Sales** **Service**	**Chonburi**	SEW-EURODRIVE (Thailand) Ltd. 700/456, Moo.7, Donhuaroh Muang Chonburi 20000	Tel. +66 38 454281 Fax +66 38 454288 sewthailand@sew-eurodrive.com

Tunisia			
Sales	**Tunis**	T. M.S. Technic Marketing Service Zone Industrielle Mghira 2 Lot No. 39 2082 Fouchana	Tel. +216 79 40 88 77 Fax +216 79 40 88 66 http://www.tms.com.tn tms@tms.com.tn

Turkey			
Assembly **Sales** **Service**	**Istanbul**	SEW-EURODRIVE Hareket Sistemleri Sanayi Ticaret Limited Şirketi Gebze Organize Sanayi Bölgesi 400.Sokak No:401 TR-41480 Gebze KOCAELİ	Tel. +90-262-9991000-04 Fax +90-262-9991009 http://www.sew-eurodrive.com.tr sew@sew-eurodrive.com.tr

Ukraine			
Assembly **Sales** **Service**	**Dnipropetrovsk**	ООО «СЕВ-Евродрайв» ул.Рабочая, 23-В, офис 409 49008 Днепропетровск	Тел. +380 56 370 3211 Факс. +380 56 372 2078 http://www.sew-eurodrive.ua sew@sew-eurodrive.ua

United Arab Emirates			
Sales **Service**	**Sharjah**	Copam Middle East (FZC) Sharjah Airport International Free Zone P.O. Box 120709 Sharjah	Tel. +971 6 5578-488 Fax +971 6 5578-499 copam_me@eim.ae

USA			
Production **Assembly** **Sales** **Service**	**Southeast Region**	SEW-EURODRIVE INC. 1295 Old Spartanburg Highway P.O. Box 518 Lyman, S.C. 29365	Tel. +1 864 439-7537 Fax Sales +1 864 439-7830 Fax Manufacturing +1 864 439-9948 Fax Assembly +1 864 439-0566 Fax Confidential/HR +1 864 949-5557 http://www.seweurodrive.com cslyman@seweurodrive.com
Assembly **Sales** **Service**	**Northeast Region**	SEW-EURODRIVE INC. Pureland Ind. Complex 2107 High Hill Road, P.O. Box 481 Bridgeport, New Jersey 08014	Tel. +1 856 467-2277 Fax +1 856 845-3179 csbridgeport@seweurodrive.com
	Midwest Region	SEW-EURODRIVE INC. 2001 West Main Street Troy, Ohio 45373	Tel. +1 937 335-0036 Fax +1 937 332-0038 cstroy@seweurodrive.com
	Southwest Region	SEW-EURODRIVE INC. 3950 Platinum Way Dallas, Texas 75237	Tel. +1 214 330-4824 Fax +1 214 330-4724 csdallas@seweurodrive.com
	Western Region	SEW-EURODRIVE INC. 30599 San Antonio St. Hayward, CA 94544	Tel. +1 510 487-3560 Fax +1 510 487-6433 cshayward@seweurodrive.com
	Additional addresses for service in the USA provided on request!		

Venezuela			
Assembly **Sales** **Service**	**Valencia**	SEW-EURODRIVE Venezuela S.A. Av. Norte Sur No. 3, Galpon 84-319 Zona Industrial Municipal Norte Valencia, Estado Carabobo	Tel. +58 241 832-9804 Fax +58 241 838-6275 http://www.sew-eurodrive.com.ve ventas@sew-eurodrive.com.ve sewfinanzas@cantv.net

Vietnam			
Sales	**Ho Chi Minh City**	**All sectors except harbor, steel, coal power and offshore:** Nam Trung Co., Ltd 250 Binh Duong Avenue, Thu Dau Mot Town, Binh Duong Province HCM office: 91 Tran Minh Quyen Street District 10, Ho Chi Minh City	Tel. +84 8 8301026 Fax +84 8 8392223 namtrungco@hcm.vnn.vn truongtantam@namtrung.com.vn khanh-nguyen@namtrung.com.vn
		Harbor and offshore: DUC VIET INT LTD Industrial Trading and Engineering Services A75/6B/12 Bach Dang Street, Ward 02, Tan Binh District, 70000 Ho Chi Minh City	Tel. +84 8 62969 609 Fax +84 8 62938 842 totien@ducvietint.com
		Coal power and steel: Thanh Phat Co Ltd DMC Building, L11-L12, Ward3, Binh Thanh Dist, Ho Chi Minh City	Tel. +84 835170381 Fax +84 835170382 sales@thanh-phat.com
	Hanoi	Nam Trung Co., Ltd R.205B Tung Duc Building 22 Lang ha Street Dong Da District, Hanoi City	Tel. +84 4 37730342 Fax +84 4 37762445 namtrunghn@hn.vnn.vn

Zambia			
Sales	**Kitwe**	EC Mining Limited Plots No. 5293 & 5294,Tangaanyika Road, Off Mutentemuko Road, Heavy Industrial Park, P.O.BOX 2337 Kitwe	Tel. +260 212 210 642 Fax +260 212 210 645 sales@ecmining.com http://www.ecmining.com

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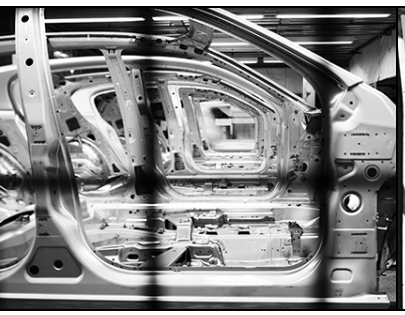

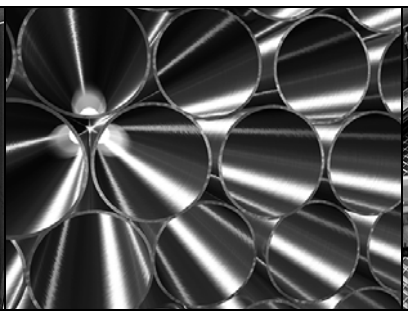


SEW-EURODRIVE
Driving the world

SEW-EURODRIVE GmbH & Co KG
P.O. Box 3023
76642 BRUCHSAL
GERMANY
Phone +49 7251 75-0
Fax +49 7251 75-1970
sew@sew-eurodrive.com

➞ www.sew-eurodrive.com