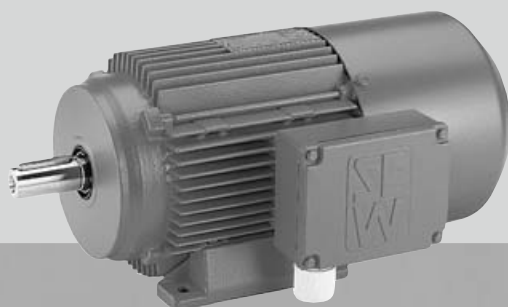




AC Motors DR/DV/DT/DTE/DVE
Asynchronous Servomotors CT/CV

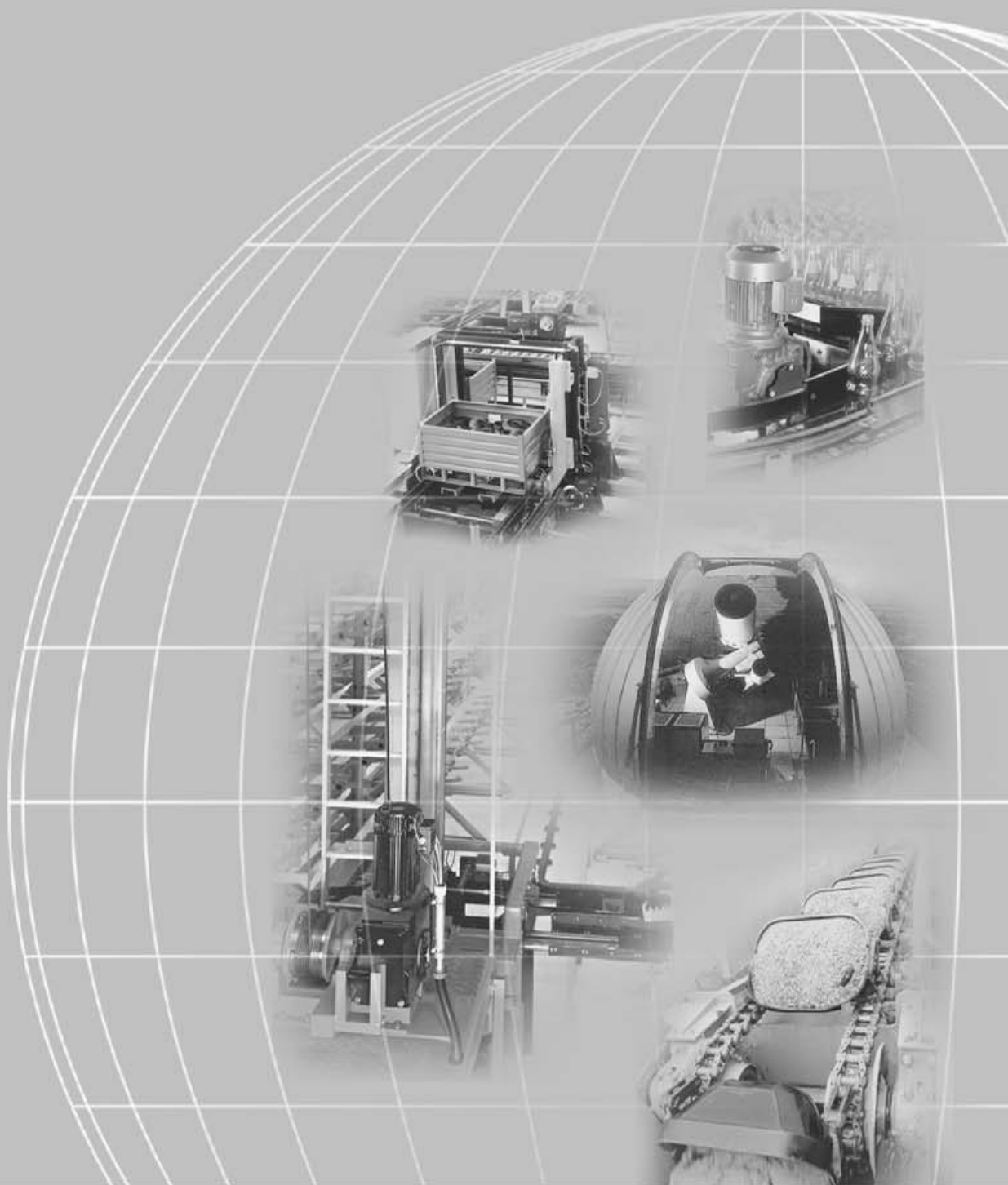
Edition

02/2003



Operating Instructions

1056 7917 / EN



SEW-EURODRIVE





1	Important Notes.....	4
----------	-----------------------------	----------



2	Safety Notes	5
----------	---------------------------	----------



3	Motor Design	6
----------	---------------------------	----------

3.1	Configuration principles of AC motors	6
3.2	Nameplate, unit designation	7



4	Mechanical Installation.....	9
----------	-------------------------------------	----------

4.1	Before you begin.....	9
4.2	Preliminary work	9
4.3	Installing the motor.....	10
4.4	Installation tolerances	11

5	Electrical Installation	12
----------	--------------------------------------	-----------

5.1	Wiring notes	12
5.2	Special aspects for operation with a frequency inverter	12
5.3	Special aspects of single-phase motors	12
5.4	Special aspects of torque motors and low-speed motors	13
5.5	Special aspects in switching operation	13
5.6	Connecting the motor.....	14
5.7	Preparing motor sizes 56 and 63	15
5.8	Connecting motor DT56...+/BMG.....	15
5.9	Single-phase version ET56.....	16
5.10	Connecting the motor using the IS plug connector	16
5.11	Connecting the motor using plug connectors AS.. and AM..	20
5.12	Connecting the motor using ASK1 plug connector	20
5.13	Connecting the brake.....	22
5.14	Accessory equipment.....	23



6	Startup.....	27
----------	---------------------	-----------

6.1	Prerequisites for startup.....	27
6.2	Altering the blocking direction on motors with backstop	28



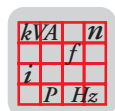
7	Malfunctions	29
----------	---------------------------	-----------

7.1	Motor faults	29
7.2	Brake faults.....	30
7.3	Faults when operating with a frequency inverter	30



8	Inspection and Maintenance.....	31
----------	--	-----------

8.1	Inspection and maintenance periods	31
8.2	Preliminary work for motor and brake maintenance	32
8.3	Inspection and maintenance work on the motor	35
8.4	Inspection and maintenance of the brake BMG02.....	37
8.5	Inspection and maintenance of the brake BR03	38
8.6	Inspection and maintenance of the brakes BM15-62, BMG05-122	42



9	Technical Data.....	47
----------	----------------------------	-----------

9.1	Work done, braking torques BMG02.....	47
9.2	Information for ordering a replacement BMG02.....	47
9.3	Work done, working air gap, braking torques BR03, BMG05-8	48
9.4	Work done, working air gap, braking torques BM15 - 62, BMG61/122... ..	49
9.5	Operating currents	50
9.6	Permitted ball bearing types	54
9.7	Lubricant table for anti-friction bearings of SEW motors.....	54



10	Revision Status	55
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1 Important Notes

Safety and warning instructions

Always follow the safety and warning instructions contained in this publication!



Electrical hazard

Possible consequences: Severe or fatal injuries.



Hazard

Possible consequences: Severe or fatal injuries.



Hazardous situation

Possible consequences: Slight or minor injuries.



Harmful situation

Possible consequences: Damage to the drive and the environment.



Tips and useful information.



A requirement of fault-free operation and fulfillment of any rights to claim under guarantee is that you adhere to the information in the operating instructions. Consequently, read the operating instructions before you start operating the drive!

The operating instructions contain important information about service; as a result, they should be kept in the vicinity of the unit.

Waste disposal



This product consists of:

- Iron
- Aluminum
- Copper
- Plastic
- Electronics components

Please dispose of the parts in accordance with the applicable regulations.



2 Safety Notes

Preliminary remarks

The following safety notes are principally concerned with the use of motors. When operating **geared motors**, please also refer to the safety notes for gear units in the corresponding operating instructions.

Please also pay attention to the supplementary safety notes in the individual sections of these operating instructions.

General information

During and after operation, motors and geared motors have live and moving parts and their surfaces may be hot.

All work related to transportation, putting into storage, setting up/mounting, connection, startup, maintenance and repair should only be performed by trained personnel observing

- the corresponding detailed operating instructions and wiring diagrams,
- the warning and safety signs on the motor/geared motor,
- the specific regulations and requirements for the system and
- national/regional regulations governing safety and the prevention of accidents.

Severe injuries and damage to property may result from

- incorrect use,
- incorrect installation or operation,
- removal of required protective covers or the housing when this is not permitted.

Designated use

These electric motors are intended for industrial systems. They comply with the applicable standards and regulations and meet the requirements of the Low Voltage Directive 73/23/EEC.

The technical data and the information about permitted conditions can be found on the nameplate and in the documentation.

It is essential to observe all specified information!

Transportation

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

Tighten screwed in transport lugs firmly. They are only designed for the weight of the motor/geared motor; do not attach any additional loads.

The installed lifting eyebolts are in accordance with DIN 580. The loads and regulations specified in that document must always be observed. If the geared motor is equipped with two suspension eye lugs or lifting eyebolts, then both of the suspension eye lugs should be used for transportation. In this case, the tension force vector of the slings must not exceed a 45° angle in accordance with DIN 580.

Use suitable, sufficiently rated handling equipment if necessary. Remove any transportation fixtures prior to startup.

Installation/mounting

Follow the instructions in Sec. 'Mechanical Installation!'

Inspection and maintenance

Follow the instructions in Sec. 'Inspection and Maintenance!'

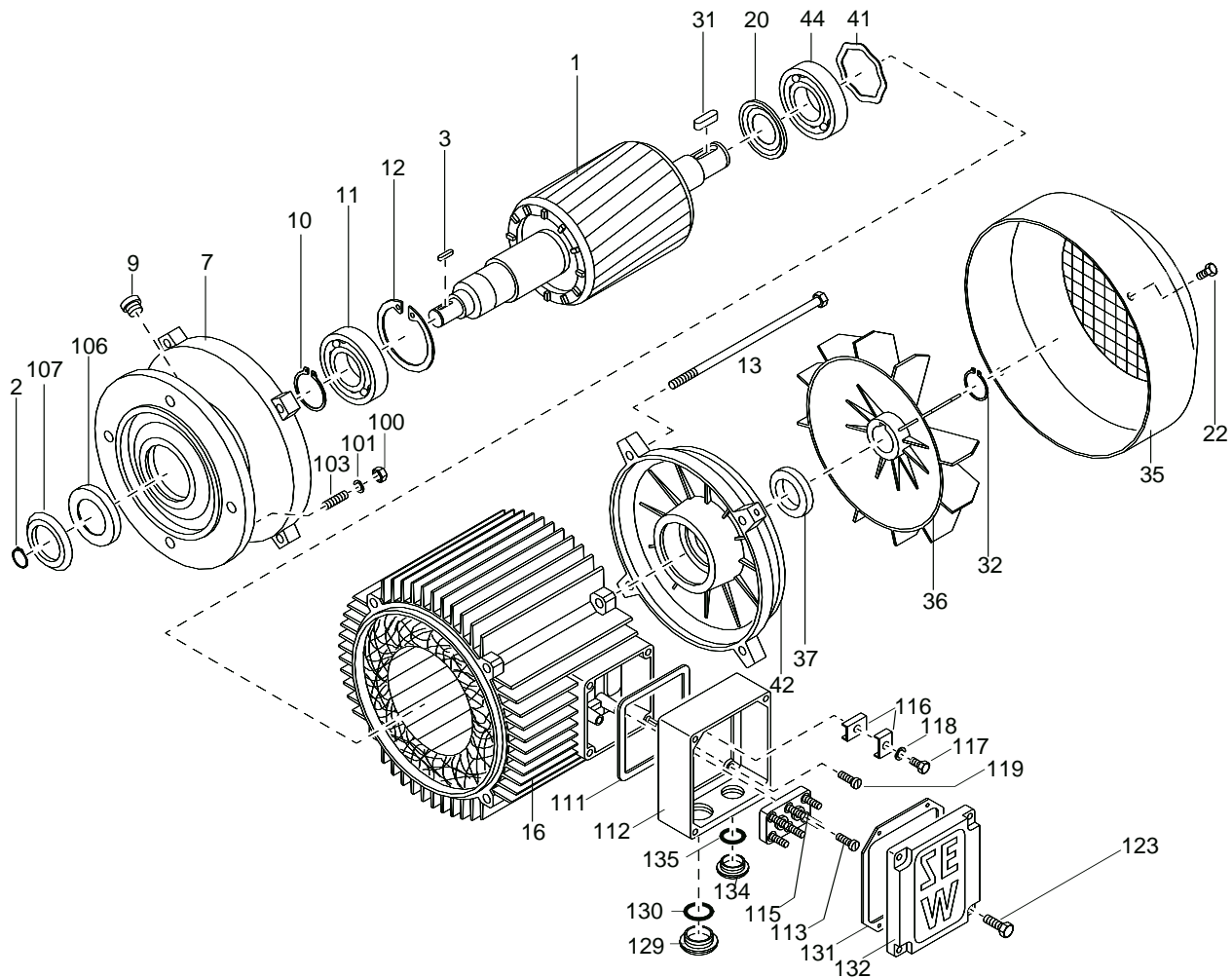


3 Motor Design



The following illustration is intended to explain the general structure. Its purpose is only to make it easier to assign components to the spare parts lists. Discrepancies are possible depending on the motor size and version!

3.1 Configuration principles of AC motors



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Key

1 Rotor, cpl.	31 Key	107 Oil flinger	131 Sealing washer
2 Circlip	32 Circlip	111 Seal	132 Terminal box cover
3 Key	35 Fan guard	112 Terminal box lower part	134 Screw plug
7 Flanged end shield	36 Fan	113 Machine screw	135 Sealing washer
9 Screw plug	37 V-ring	115 Terminal board	
10 Circlip	41 Equalizing ring	116 Terminal yoke	
11 Grooved ball bearing	42 B bearing end shield	117 Hex head screw	
12 Circlip	44 Grooved ball bearing	118 Lock washer	
13 Hex head screw (tie rod)	100 Hex nut	119 Machine screw	
16 Stator, cpl.	101 Lock washer	123 Hex head screw	
20 Nilos ring	103 Stud	129 Screw plug	
22 Hex head screw	106 Oil seal	130 Sealing washer	



3.2 Nameplate, unit designation

Nameplate

Example: Brake motor DFV 160 M4 /BM

SEW-EURODRIVE		Bruchsal / Germany		CE	
Typ	DFV 160 M 4 /BM			3 ~ IEC 34	
Nr.	01.3001234568.0001.00			IM	B5
kW	11 S1			cos φ	0.83
50Hz V	220 - 240 Δ / 380 - 415 Y			A	39.0 / 22.5
60Hz V	240 - 266 Δ / 415 - 460 Y			A	35.5 / 20.5
r/min	1440 / 1740			IP	55
Bremse	V 230 AC			Nm	150
Kg	109			Gleichrichter	BGE1.5
Schmierstoff				KL	F
Made in Germany 184 103 3.16				EFF 2	

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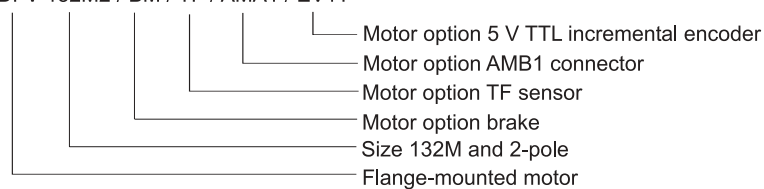
Unit designation

Examples: AC(brake)motors DR/DT/DV/DTE/DVE

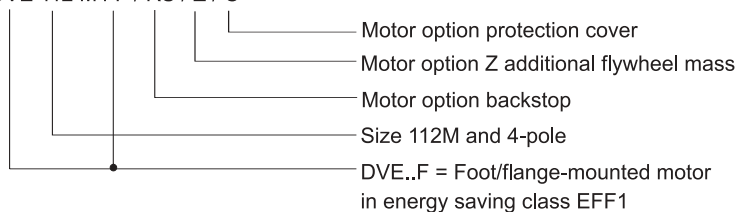
DT 90S4 / BMG / TF / IS



DFV 132M2 / BM / TF / AMA1 / EV1T



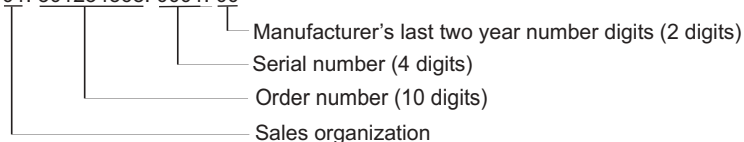
DVE 112 M4 F / RS / Z / C



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Example: Factory number

01. 301234568. 0001. 00



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**Nameplate**

Example: Servo brake motor CT90L4 / BMG / TF / ES1S

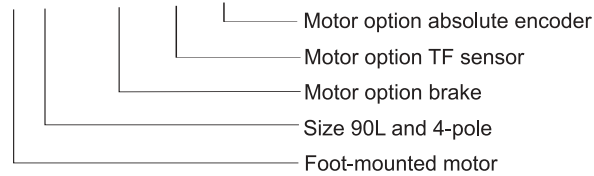
SEW-EURODRIVE		Bruchsal / Germany		CE	
Typ	CT90L4 BMG TF / ES1S			3 ~ IEC 34	
Nr.	01.3410069302.0001.00				
Nm	30.5	max. Motor	i	:1	
Nm	10.5	r/min	3000		
		Hz	103	V	345
				A	7.9
IM	B5	kg	28	IP	54
				iso. Kl.	F
Bremse	V 230~	Nm	20	Gleichrichter	BGE 1.5
Schmierstoff					
Made in Germany 186 475 0.13					

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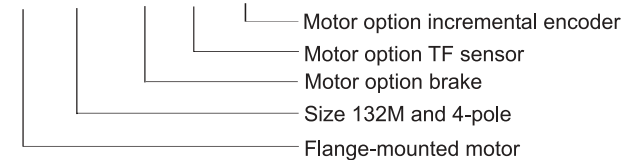
Unit designation

Examples: Servo (brake) motors CT/CV

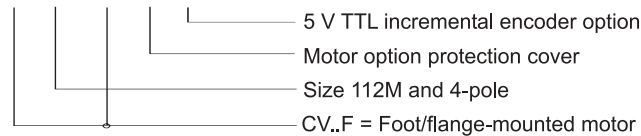
CT 90L4 / BMG / TF / AV1Y



CFV 132M4 / BM / TF / EV1S



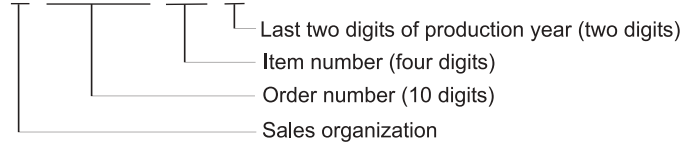
CV 112M4 F / C / ES2R



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Example: Factory number

01.3410069302.0001.00



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4 Mechanical Installation



It is essential to comply with the safety notes in Sec. 2 during installation!

4.1 Before you begin

The drive may only be installed if

- the entries on the nameplate of the drive and/or the output voltage of the frequency inverter match the voltage supply system,
- the drive is undamaged (no damage caused by transportation or storage) and
- it is certain that the following requirements have been fulfilled:
 - Ambient temperature between -25°C and $+40^{\circ}\text{C}$ ¹
 - No oil, acid, gas, vapors, radiation, etc.
 - Installation altitude max. 1000 m above sea level
 - Note the restrictions for encoders
 - Special designs: drive configured in accordance with the ambient conditions

4.2 Preliminary work

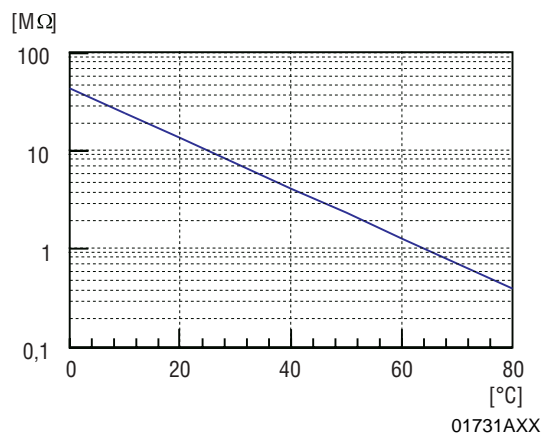
Motor shaft ends must be thoroughly cleaned of anti-corrosion agents, contamination or such like (use a commercially available solvent). Do not allow the solvent to penetrate the bearings or shaft seals – this could cause material damage!

Extended storage of motors

- Please note the reduced grease utilization period of the ball bearings after storage periods exceeding one year.
- Check whether the motor has absorbed moisture as a result of being stored for a long time. Measure the insulation resistance to do this (measuring voltage 500 V).



The insulation resistance (→ following figure) varies greatly depending on the temperature! The motor must be dried if the insulation resistance is not adequate.

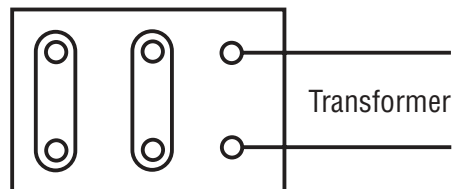


1. Minimum temperature for motors with backstop: -15°C , note that the temperature range of the gear unit may also be limited (→ gear unit operating instructions)

**Drying the motor**

Heat up the motor

- with hot air or
- using an isolation transformer
 - connect the windings in series (→ following figure)
 - auxiliary AC voltage supply max. 10% of the rated voltage with max. 20% of the rated current



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

Check the terminal box to see whether

- the inside is clean and dry,
- the connections and fastening parts are free from corrosion,
- the joint seals are ok,
- the cable screw fittings are tight, otherwise clean or replace them.

4.3 Installing the motor

The motor or geared motor may only be mounted or installed in the specified mounting position on a level and torsionally rigid support structure which is not subject to shocks.

Carefully align the motor and the driven machine to avoid placing any unacceptable strain on the output shafts (observe permitted overhung load and axial thrust data!).

Do not butt or hammer the shaft extension.

Use an appropriate cover to protect motors in vertical mounting positions from objects or fluids entering (protection cowl C).

Ensure an unobstructed cooling air supply and that air heated by other apparatus cannot be drawn in or reused.

Balance components for subsequent mounting on the shaft with a half key (motor shafts are balanced with a half key).

Any condensation drain holes will be sealed by plastic plugs and should only be opened when necessary; open condensation drain holes are not permitted, since this invalidates higher classes of enclosure.

For brake motors with manual brake release, screw in either the hand lever (with self-reengaging manual brake release) or setscrew (with lockable manual brake release).

Note the following for encoder mounting:

Foot-mounted motors CT/DT71, CT/DT(E)90, CV/DV(E)132M, CV/DV(E)160L must be mounted on supports because the radius of the cover is greater than the shaft height.

For foot-mounted (brake)motors of sizes DTE90L and DVE132M, the shaft height is that of the next larger IEC standard motor (100 mm or 160 mm). The foot dimensions of the DTE90, DVE180 and DVE225 motors deviate from the IEC dimensions, see section "Notes on dimension sheets" in the Geared Motors catalog.



Installation in damp areas or in the open

If possible, arrange the terminal box so the cable entries are pointing downwards.

Coat the threads of cable screw fittings and pocket caps with sealant and tighten them well – then coat them again.

Seal the cable entry well.

Thoroughly clean the sealing surfaces of terminal boxes and terminal box covers prior to reassembly; gaskets must be glued in on one side. Fit new gaskets to replace brittle ones!

Restore the anticorrosive coating if necessary.

Check the enclosure.

4.4 Installation tolerances

Shaft end	Flanges
Diameter tolerance in accordance with DIN 748 <ul style="list-style-type: none"> • ISO k6 at $\varnothing \leq 50$ mm • ISO m6 at $\varnothing > 50$ mm • Center bore in accordance with DIN 332, shape DR.. 	Centering shoulder tolerance in accordance with DIN 42948 <ul style="list-style-type: none"> • ISO j6 at $\varnothing \leq 230$ mm • ISO h6 at $\varnothing > 230$ mm



5 Electrical Installation



It is essential to comply with the safety notes in Sec. 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.

5.1 Wiring notes

Comply with the safety notes during installation.

Protection against interference from brake control systems

Do not route brake cables alongside switched-mode power cables, since otherwise there is a risk of disrupting brake controllers.

Switched-mode power cables include, in particular:

- Output cables from frequency and servo controllers, converters, soft start units and brake units
- Connecting harnesses to braking resistors, etc.

Protection against interference from motor protection devices

To provide protection against interference from SEW motor protection devices (temperature sensors TF, winding thermostats TH):

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

5.2 Special aspects for operation with a frequency inverter

When motors are powered by inverters, you must adhere to the wiring instructions issued by the inverter manufacturer. It is essential to pay close attention to the operating instructions for the frequency inverter.

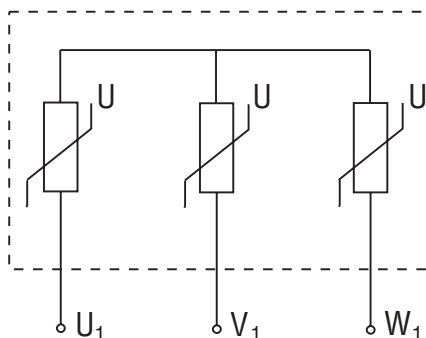
5.3 Special aspects of single-phase motors

Bear in mind that SEW single-phase motors are supplied without accessory equipment such as capacitors, starting relays or centrifugal switches (exception: ET56L4 → Sec. 'Single-phase version ET56'). Any parts you need must be obtained from your dealer and connected according to the corresponding instructions and wiring diagrams.



5.4 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, we recommend protection using the varistor circuit shown below. The size of the varistors depends, among other factors, on the starting frequency – note for project planning!



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5.5 Special aspects in switching operation

When the motors are used in switching operation, any possible malfunctions of the switchgear must be excluded by appropriate wiring. According to EN 60204 (electrical equipment of machines), motor windings must have interference suppression in order to protect the numerical or programmable logic controllers. Since it is primarily switching operations which lead to the disruptions, we recommend installing protective circuitry on the switching devices.



5.6 Connecting the motor



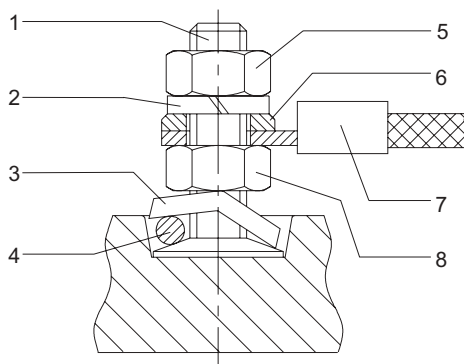
In case of operation with electronic control units, it is essential to adhere to the corresponding operating instructions/wiring diagrams!

Connecting the motor via terminal boxes

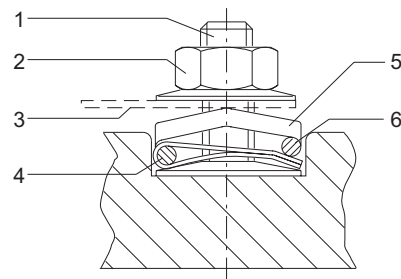
- According to the wiring diagram provided
- Check the cross sections of cables
- Arrange terminal links correctly
- Tighten screw connections and protective earth conductors firmly
- In terminal boxes: Check winding connections and tighten them if necessary

Small connection parts

Please note: In the case of motor sizes DR63 - DV132S, the small connection parts (connection nuts for feeder cables, terminal links, lock washer and washers) are supplied in a bag. Depending on the type of terminal board, install the parts in accordance with the figure below. In the connection on the right in the figure below, the second retaining nut, the lock washer and the washer are not used. The external connection (6) can be installed directly or as a lug (4) below the terminal washer (5).



- 1 Terminal stud
- 2 Lock washer
- 3 Terminal washer
- 4 Motor terminal lead
- 5 Top nut
- 6 Washer
- 7 External connection
- 8 Bottom nut



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- 1 Terminal stud
- 2 Hex nut with flange
- 3 Terminal link
- 4 Motor with Stock connection terminal
- 5 Terminal washer
- 6 External connection



The asynchronous servomotors of the CT/CV series will be shipped with switched terminal links according to the nameplate.

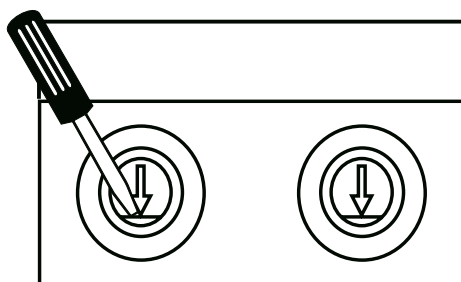


5.7 Preparing motor sizes 56 and 63



Important: Wear safety glasses – danger of injury from fragments!

- Put on the terminal box cover and tighten screws
- Define which cable entries to open
- Open the cable entries
 - with a chisel or similar (hold at an angle)
 - by tapping lightly with a hammer



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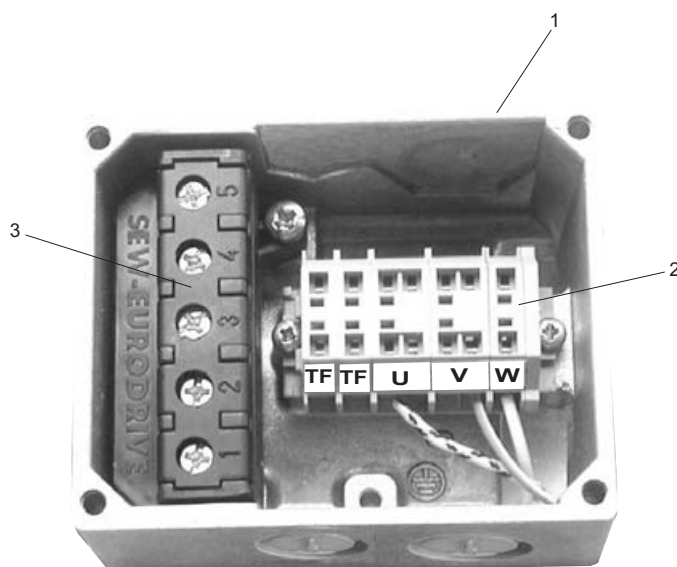


Caution – Do not punch through into the inside of the terminal box!

- Open the terminal box, remove any pieces that may have broken off
- Secure the cable screw fittings with the supplied lock nuts

5.8 Connecting motor DT56...+/BMG

The motor has a star point with three fixed connection points in the winding overhang. The power supply leads (L1, L2, L3) are connected to a spring cage terminal block (2) in the terminal box (1). The brake BMG02 is controlled using the brake rectifier BG1.2 (3). As an alternative, the brake can be controlled from the switch cabinet using BM series rectifiers.



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5.9 Single-phase version ET56

The single-phase motor ET56 is supplied with a mounted and connected running capacitor :

1~230 V, 50 Hz $C_B = 4 \mu\text{F}$

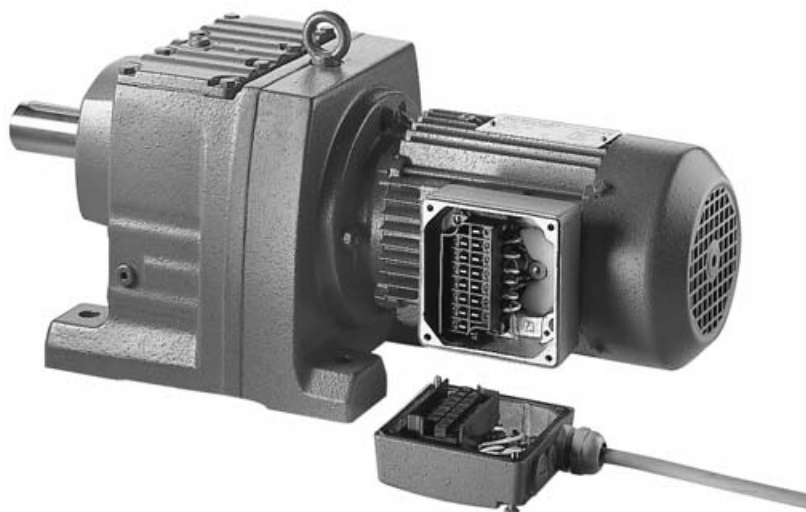
1~230 V, 60 Hz $C_B = 4 \mu\text{F}$

1~110 V, 60 Hz $C_B = 20 \mu\text{F}$



No full-load startup is possible with the running capacitor alone! The single-phase motor cannot be combined with a TF.

5.10 Connecting the motor using the IS plug connector



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The IS plug connector is supplied 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.

The IS plug connection 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! See the following table for American Wire Gauge (AWG) line cross sections!)

Line cross section

Make sure the type of line corresponds to the applicable regulations. The rated currents are specified on the motor nameplate. The line cross sections that can be used are listed in the following table.

Without variable terminal link	With variable terminal link	Link cable	Double assignment (motor and brake/SR)
0.25 - 4.0 mm ²	0.25 - 2.5 mm ²	max. 1.5 mm ²	max. 1 x 2.5 and 1 x 1.5 mm ²
23 - 12 # AWG	23 - 14 # AWG	max. 16 # AWG	max. 1 x 14 # and 1 x 16 # AWG



Wiring the upper section of the plug connector

- Loosen the housing cover screws
 - Remove the housing cover
- Remove the screws from the upper section of the plug connector
 - Remove the upper section of the plug connector from the cover
- Strip the insulation off the connection lead
 - Strip about 9 mm insulation off the connecting leads
- Pass the cable through the cable screw fitting

Wiring as shown in wiring diagram DT82, DT83

- Connect the lines as shown in the wiring diagram
 - Tighten the clamping screws carefully!
- Install the plug connector (→ Sec. 'Installing the plug connector')

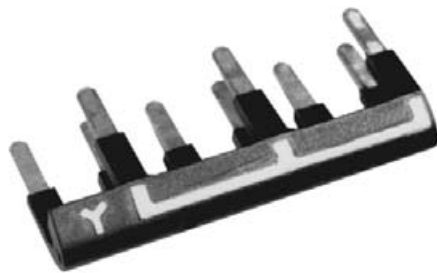
Wiring as shown in wiring diagram DT81

For Δ / Δ startup:

- Connect with six lines
 - Tighten the clamping screws carefully!
 - Motor contactors in the switch cabinet
- Install the plug connector (→ Sec. 'Installing the plug connector')

For Δ or Δ operation:

- Connect as shown in the wiring diagram
- Install the variable terminal link as shown in the following figures according to desired motor operation (m or W)
- Install the plug connector (→ Sec. 'Installing the plug connector')



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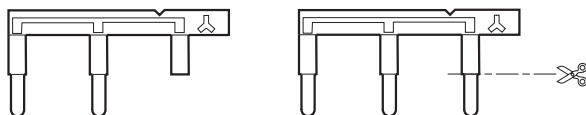


Connecting the motor using the IS plug connector

Brake control system BSR – preparing the variable terminal link

For Δ operation:

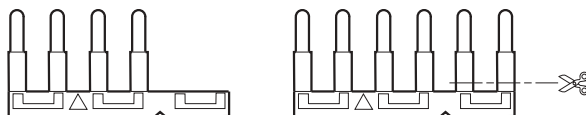
On the W side of the variable terminal link as shown in the following figure: Remove only the bare metal pin of the marked prong horizontally – touch guard!



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For Δ operation:

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



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Wiring according to the DT81 wiring diagram for W or m 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
- Install 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 (→ Sec. 'Installing the plug connector')



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Installing the plug connector

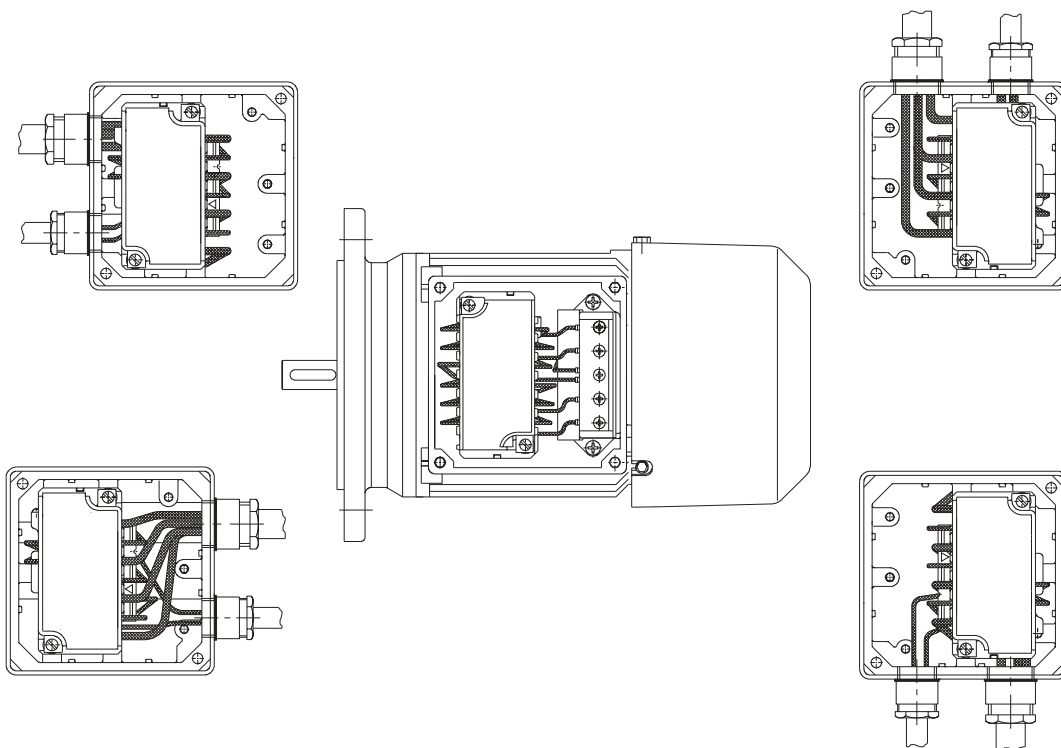
The housing cover of the IS plug connector can be screwed onto the lower section of the plug connector depending on the required position of the cable lead. The upper section of the plug connector shown in the following figure must first be installed in the housing cover so it will match the position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



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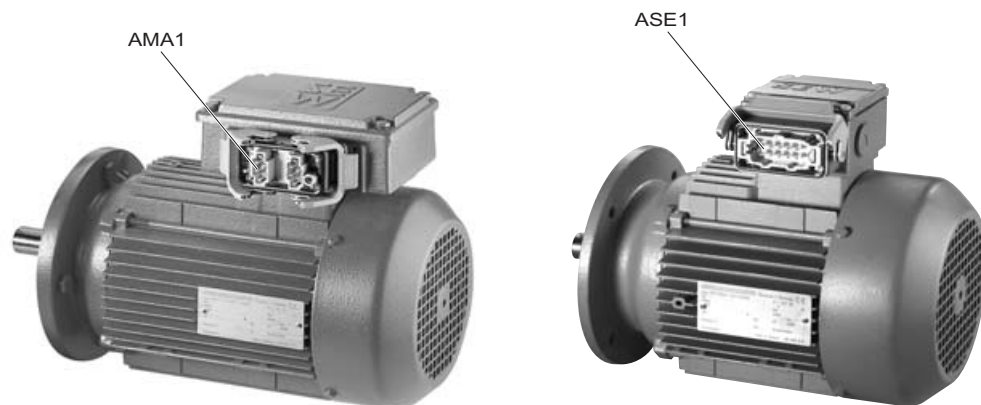
Mounting position of the upper section of the plug connector in the housing cover



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5.11 Connecting the motor using plug connectors AS.. and AM..



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Plug connectors AS.. or AM.. are mounted on the side of the terminal box. They are fastened onto the terminal box either with two clips as in the AMA1, AMB1 and ASB1 or with one clip as in the AMD1, AME1, ASD1 and ASE1.

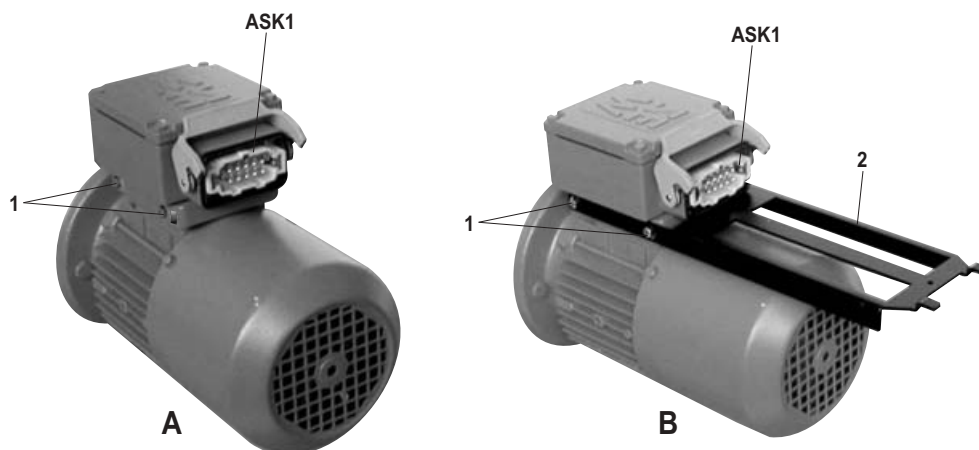


The ASD1 and ASE1 types with single clip closure correspond to the DESINA regulation issued by the Association of German Machine Tool Manufacturers (VDW).

The ASA1 / ASD1 or ASB1 / ASE1 and the AMA1 / AMD1 are supplied with their bases fully wired up, including additional features such as a brake rectifier.

The customer is responsible for obtaining the upper sections of the connectors from the dealer and connecting them in accordance with the wiring diagrams (supplied with the motor).

5.12 Connecting the motor using ASK1 plug connector



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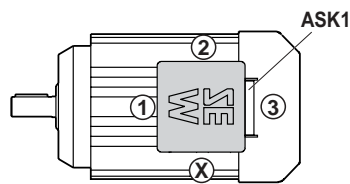
Drives with ASK1 plug connector are certified according to the ECOFAST specification (version 1.1). Switchgear or control units which also have to be certified can be connected to SEW-EURODRIVE motors using a pre-fabricated system cable or a carrier plate (installation integrated in the motor → Fig. B). The ASK1 plug connector with single-clip locking is mounted on the side of the terminal box and fully wired, including additional features such as a brake rectifier.



- The system cable pre-fabricated according to the ECOFAST specification must be obtained from a specialist retailer by the customer.
- For installation integrated in the motor according to the ECOFAST specification, the customer must obtain the carrier plate from SEW-EURODRIVE by quoting part number 0187 390 3. Carrier plates from other manufacturers do not fit on SEW-EURODRIVE motors.

Position of the plug connector

Possible positions of the ASK1 plug connector are "X" (= standard position), "1", "2" or "3." Unless specified otherwise, the unit is supplied with the plug connector in position "3." For installation integrated into the motor (using the carrier plate), units are supplied with the plug connector in position "3" only.



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Installing the carrier plate

- Loosen and remove four retaining screws (1) below the terminal box (→ Fig. A)
- Place the carrier plate (2) against the bores for the retaining screws and install it by tightening the four retaining screws (1) (→ Fig. B)



5.13 Connecting the brake

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



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 wiring diagram supplied with the brake.
- **Note:** 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 to EN 60947-4-1.
- If necessary, for version with manual brake release you can install
 - hand lever (for manually disengaging brake)
 - or manual brake release screw (for fixing brake in the disengaged position)
- After a new brake disk has been fitted, the maximum braking torque will be achieved after a few cycles.

Connecting the brake control system

The DC disk brake is powered from a brake control system with protection circuit. This control is accommodated in the terminal box / IS lower part or must be installed in the switch cabinet (→ Sec. 'Wiring notes').



- **Check the line cross sections - braking currents (→ Sec. 'Technical Data')**
- Connect the brake control system according to the wiring diagram supplied with the brake
- For motors in thermal classification H, install the brake rectifier in the switch cabinet!



5.14 Accessory equipment



Connect supplied accessory equipment according to the wiring diagrams included.

Temperature sensor TF



Do not apply any voltage!

The positive temperature coefficient (PTC) thermistors comply with DIN 44082.

Resistance measurement (measuring instrument with $V \leq 2.5 \text{ V}$ or $I < 1 \text{ mA}$):

- Standard measured values: 20...500 Ω , thermal resistance $> 4000 \text{ } \Omega$
- Measured values pole-changing with separate winding: 40...1000 Ω , thermal resistance $> 4000 \text{ } \Omega$

Winding thermostats TH

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

	V_{AC}		V_{DC}	
Voltage V [V]	250	400	60	24
Current ($\cos \varphi = 1.0$) [A]	2.5	0.75	1.0	1.6
Current ($\cos \varphi = 0.6$) [A]	1.6	0.5		
Contact resistance max. 1 ohm at 5 V = / 1 mA				

Forced cooling fan

Motor size 71 - 132S

VS System

- 1 x 230 V_{AC} , 50 Hz
- Connection in separate terminal box
- Max. connection cross section 3 x 1.5 mm^2
- Cable screw fitting M16x1.5



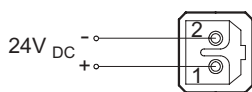
Please refer to the VS wiring diagram for information about connecting the VS system (order number: 0975 8385).



VR System

- $24\text{ V}_{\text{DC}} \pm 20\%$
- Connection via plug connector
- Max. connection cross section $3 \times 1\text{ mm}^2$
- Cable screw fitting Pg7 with inside diameter 7 mm

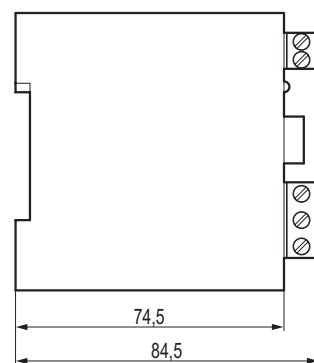
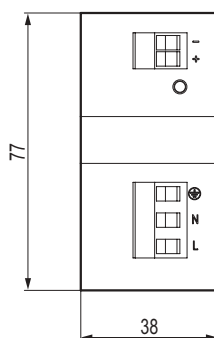
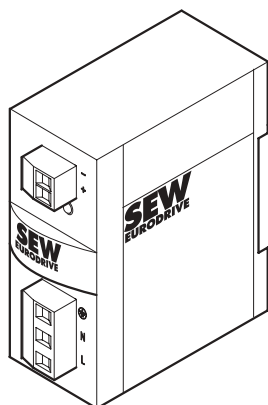
The **VR forced cooling fan** is available for 24 V DC voltage and for 100 ... 240 V AC voltage.



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The AC voltage type includes a VR forced cooling fan and the UWU51A switch-mode power supply (→ following figure).

- Input: 100 ... 240 V_{AC} -6% / +10%, 50/60 Hz
- Output: 24 V_{DC} -1% / +2%, 1.25 A
- Connection: Screw terminals 0.2 ... 2.5 mm², separable
- Enclosure: IP20; attachment to EN 50022 DIN rail in the switch cabinet



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Please refer to the VR wiring diagram for information about connecting the VR forced cooling fan (order number: 0880 3198)



Motor size 132M - 280

V system

- 3 x 400 V_{AC}, 50 Hz
- Connection in separate terminal box
- Max. connection cross section 4 x 1.5 mm²
- Cable screw fitting M16x1.5



Please refer to the VS or V wiring diagram for information about connecting the VS and V systems (order no: 0975 8385).

A transformer may be present in the VS system in order to adapt to a voltage other than the standard. VS and V systems are also available for 60 Hz

Encoder overview

Encoder	for SEW motor	Type of encoder	Shaft	Specification	Supply	Signal
EH1T ¹⁾	DR63...	Encoder	Hollow shaft	-	5 V _{DC} regulated	5 V _{DC} TTL/RS-422
EH1S ²⁾					24 V _{DC}	1 V _{SS} sin/cos
EH1R						5 V _{DC} TTL/RS-422
EH1C						24 V _{DC} HTL
ES1T ¹⁾	CT/DT/CV/DV71...100 DTE/DVE90...100	Encoder	Spread shaft	-	5 V _{DC} regulated	5 V _{DC} TTL/RS-422
ES1S ²⁾					24 V _{DC}	1 V _{SS} sin/cos
ES1R						5 V _{DC} TTL/RS-422
ES1C						24 V _{DC} HTL
ES2T ¹⁾	CV/DV(E)112...132S				5 V _{DC} regulated	5 V _{DC} TTL/RS-422
ES2S ²⁾					24 V _{DC}	1 V _{SS} sin/cos
ES2R						5 V _{DC} TTL/RS-422
ES2C						24 V _{DC} HTL
EV1T ¹⁾	CT/CV71...200 DT/DV71...280 DTE/DVE90...225		Solid shaft		5 V _{DC} regulated	5 V _{DC} TTL/RS-422
EV1S ²⁾					24 V _{DC}	1 V _{SS} sin/cos
EV1R						5 V _{DC} TTL/RS-422
EV1C						24 V _{DC} HTL
NV11	DT/DV71...132 DTE/DVE90...132S	Proximity sensor	Solid shaft	A track	24 V _{DC}	1 pulse/revolution, NO contact
NV21				A+B track		
NV12				A track		2 pulses/revolution, NO contact
NV22				A+B track		
NV16				A track		6 pulses/revolution, NO contact
NV26				A+B track		
AV1Y	CT/CV71...200 DT/DV71...280 DTE/DVE90...225	Absolute encoder	Solid shaft	-	15/24 V _{DC}	MSSI interface and 1 V _{SS} sin/cos
AV1H ³⁾		HIPERFACE® encoder			12 V _{DC}	RS485 interface and 1 V _{SS} sin/cos

1) recommended encoder for operation with MOVITRAC[®] 31C

2) recommended encoder for operation with MOVIDRIVE[®]

3) recommended encoder for operation with MOVIDRIVE[®] compact



- Refer to the following wiring diagrams for information about connecting ES1./ES2./EV1. /EH1. encoders and AV1Y / AV1H absolute encoders:
 - Wiring diagram ES1./ES2./EV1./EH1. encoder: Order number 0918 6832
 - Wiring diagram AV1Y absolute encoder: Order number 0918 6808
 - Wiring diagram AV1H absolute encoder: Order number 1052 9705



Maximum vibration load for encoders $\leq 10g \approx 100 \text{ m/s}^2$

Encoder connection

When connecting the encoders to the inverters, always follow the operating instructions for the relevant inverter!

- Maximum line length (inverter - encoder):
 - 100 m with a capacitance per unit length $\leq 120 \text{ nF/km}$
- Core cross section: $0.20 \dots 0.5 \text{ mm}^2$
- Use a shielded cable with twisted pairs of insulated conductors (exception: cable for HTL sensor) and connect the shield over a large surface area at both ends:
 - to the encoder in the cable screw fitting or in the encoder plug
 - to the inverter on the electronics shield clamp or to the housing of the sub D plug
- Route the encoder cables separately from the power cables, maintaining a gap of at least 200 mm.



6 Startup

6.1 Prerequisites for startup



It is essential to comply with the safety notes in Sec. 2 during startup!

***Before startup,
make sure that***

- the drive is undamaged and not blocked,
- the measures stipulated in the 'Preliminary work' section are performed after extended storage,
- all connections have been made properly,
- the direction of rotation of the motor/geared motor is correct
 - (motor rotating clockwise: U, V, W to L1, L2, L3),
- all protective covers have been fitted correctly,
- all motor protection equipment is active and set for the rated motor current,
- in the case of hoist drives, the self-reengaging manual brake release is used,
- there are no other sources of danger present.

***During startup,
make sure that***

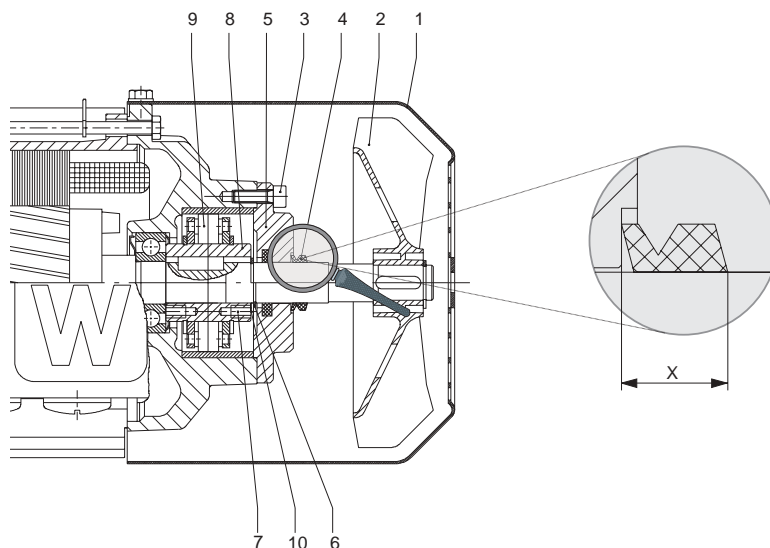
- the motor is running correctly (no overload, no speed fluctuation, no loud noises, etc.),
- the correct braking torque is set according to the specific application (→ Sec. 'Technical data').
- in case of problems (→ Sec. 'Malfunctions').



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



6.2 Altering the blocking direction on motors with backstop



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Dimension 'x'
after installation

Motor	Dimension 'x' after installation
DT71/DT80	6.7 mm
DT(E)90/DV(E)100	9.0 mm
DV(E)112/132S	9.0 mm
DV(E)132M - 160M	11.0 mm
DV(E)160L - 225	11.0 mm
DV250 - 280	13.5 mm



Do not start up the motor in the blocking direction (note the phase angle when connecting). Note the direction of rotation of the output shaft and the number of stages when mounting the motor on a gear unit. The backstop can be operated once in the blocking direction at half the motor voltage for checking purposes.

1. **Isolate the motor from supply, safeguarding it against unintentional power-up.**
2. Remove the fan guard (1) and the fan (2); remove the machine screws (3).
3. Remove the V-ring (4) and sealing flange with felt ring (5). (Collect the grease for subsequent use.)
4. Remove the circlip (6) (not with DT71/80); in addition for DV132M-160M: remove the equalizing rings (10).
5. Pull the carrier (8) and wedge element train (9) completely off via the tapped bores (7), turn them by 180° and press them back on.
6. Refill the grease.
7. **Important: Do not exert pressure on or hit the wedge element train – danger of damaging the material!**
8. During the press-in operation – shortly before the wedge element penetrates the locking collar – slowly turn the rotor shaft by hand in the direction of rotation. This allows the wedge element to slide into the locking collar more easily.
9. Install the remaining parts of the backstop by following steps 4. to 2. in reverse order. Note the installation dimension 'x' for the V-ring (4).



7 Malfunctions

7.1 Motor faults

Fault	Possible cause	Remedy
Motor does not start up	Interruption in connecting harness	Check connections, correct if necessary
	Brake does not release	→ Sec. 'Brake faults'
	Fuse blown	Replace fuse
	Motor protection has tripped	Check motor protection is set correctly, rectify any fault
	Motor contactor does not switch, fault in control	Check motor contactor control, rectify any fault
Motor does not start or only with difficulty	Motor designed for delta connection but used in star connection	Correct circuit
	Voltage and frequency deviate markedly from setpoint, at least during switch-on	Provide better power supply system; check cross section of connecting harness
Motor does not start in star connection, only in delta connection	Torque not sufficient in star connection	Switch on directly if delta inrush current is not too great; otherwise use a larger motor or a special version (contact SEW)
	Contact fault on star delta switch	Rectify fault
Incorrect direction of rotation	Motor connected incorrectly	Swap over two phases
Motor hums and has high current consumption	Brake does not release	→ Sec. 'Brake faults'
	Winding defective	Send motor to specialist workshop for repair
	Rotor rubbing	
Fuses blow or motor protection trips immediately	Short circuit in line	Rectify short circuit
	Short circuit in motor	Send motor to specialist workshop for repair
	Lines connected incorrectly	Correct circuit
	Ground fault on motor	Send motor to specialist workshop for repair
Severe speed loss under load	Overload	Perform power measurement, use larger motor or reduce load if necessary
	Voltage drops	Increase cross section of connecting harness
Motor heats up excessively (measure temperature)	Overload	Perform power measurement, use larger motor or reduce load if necessary
	Inadequate cooling	Correct cooling air supply or clear cooling air passages, retrofit forced cooling fan if necessary
	Ambient temperature too high	Adhere to permitted temperature range
	Use delta connection for motor rather than star connection as provided for	Correct circuit
	Loose contact in connecting harness (one phase missing)	Rectify loose contact
	Fuse blown	Look for and rectify cause (see above); replace fuse
	Supply voltage deviates from rated motor voltage by more than 5%. A higher voltage has a particularly unfavorable effect in motors with low-speed winding since in these, the no-load current is already close to the rated current even when the voltage is normal.	Adapt motor to supply voltage
	Rated operating mode (S1 to S10, DIN 57530) exceeded, e.g. due to excessive starting frequency	Adapt rated operating mode of motor to required operating conditions; if necessary call in a specialist to determine what is the correct drive
Excessively loud	Ball bearing compressed, contaminated or damaged	Re-align motor, inspect ball bearing (→ Sec. 'Permitted ball bearing types') and replace if necessary (→ Sec. 'Lubricant table for anti-friction bearings of SEW motors')
	Vibration of rotating parts	Rectify cause, possibly imbalance
	Foreign bodies in cooling air passages	Clean the cooling air passages



7.2 Brake faults

Fault	Possible cause	Remedy
Brake does not release	Incorrect voltage on brake control unit	Apply correct voltage
	Brake control unit failed	Fit a new brake control system, check internal resistance and insulation of brake coil, check switchgear
	Max. permitted working air gap exceeded because brake lining worn down	Measure and set working air gap
	Voltage drop along connecting harness > 10%	Provide for correct connection voltage; check cable cross section
	Inadequate cooling, brake overheats	Replace type BG brake rectifier with type BGE
	Brake coil has interturn fault or short circuit to exposed conductive part	Replace complete brake and brake control system (specialist workshop), check switchgear
Motor does not brake	Working air gap not correct	Measure and set working air gap
	Brake lining worn down	Replace entire brake disk
	Incorrect braking torque	Change the braking torque (→ Sec. 'Technical data') <ul style="list-style-type: none"> by the type and number of brake springs Brake BMG 05: by installing the same brake coil body design as in the BMG 1 brake Brake BMG 2: by installing the same brake coil body design as in the BMG 4 brake
	BM(G) only: Working air gap so large that setting nuts come into contact	Set the working air gap
	BR03, BM(G) only: Manual brake release device not set correctly	Adjust setting nuts
Brake is applied with time lag	Brake is switched on AC voltage side	Switch on DC and AC voltage sides (e.g. BSR); please refer to wiring diagram
Noises in vicinity of brake	Gearing wear caused by jolting startup	Check project planning
	Pulsating torques due to incorrectly set frequency inverter	Check/correct setting of frequency inverter according to operating instructions

7.3 Faults when operating with a frequency inverter



The symptoms described in Sec. 'Motor faults' may also occur when the motor is operated with a frequency inverter. Please refer to the frequency inverter operating instructions for the significance of the problems which occur and to find information about rectifying the problems.

Customer service

Please provide the following information if you require the assistance of our customer service department:

- Nameplate data (complete)
- Nature and extent of the fault
- Time and peripheral circumstances of the fault
- Presumed cause



8 Inspection and Maintenance



- Only use genuine spare parts in accordance with the valid parts list!
- Always replace the brake control system when you replace the brake coil!
- Motors can become very hot during operation – danger of burns!
- Secure hoist drives or lower them (danger of dropping).
- Isolate the motor and brake from the power supply before starting work, safeguarding them against unintentional power-up!

8.1 Inspection and maintenance periods

Equipment/components	Frequency	What to do
Brake <ul style="list-style-type: none"> • BMG02 • BR03 • BMG05-8 • BM15-62 • BMG61/122 without encoder mounting 	<ul style="list-style-type: none"> • If used as a working brake: At least every 3000 hours of operation¹⁾ 	Inspecting the brake <ul style="list-style-type: none"> • Measure the brake disk thickness • Brake disk, lining • Measure and set working air gap • Pressure plate • Carrier / gearing • Pressure rings
Brake <ul style="list-style-type: none"> • BMG02 • BR03 • BMG05-8 • BM15-62 • BMG61/122 with encoder mounting 	<ul style="list-style-type: none"> • If used as a holding brake: Every 2 to 4 years, depending on operating conditions¹⁾ 	Inspecting the brake <ul style="list-style-type: none"> • Extract the abraded matter • Except for BMG61/122 with encoder mounting: Inspect the switch elements and change if necessary (e.g. in case of burn-out) • Measure the working air gap • BMG61/122 with encoder mounting: Maintenance by SEW-EURODRIVE only!
Motor	<ul style="list-style-type: none"> • Every 10,000 hours of operation 	Inspect the motor: <ul style="list-style-type: none"> • Check ball bearings and replace if necessary • Replace the oil seal • Clean the cooling air passages
Motor with backstop		<ul style="list-style-type: none"> • Change the low-viscosity grease in the backstop
Tacho-generator		<ul style="list-style-type: none"> • Inspection / maintenance according to corresponding operating instructions
Drive	<ul style="list-style-type: none"> • Varies (depending on external factors) 	<ul style="list-style-type: none"> • Touch up or renew the surface/anticorrosion coating

1) The periods of wear are affected by many factors and may be short. The system manufacturer must calculate the required inspection/maintenance intervals individually in accordance with the project planning documents (e.g. Drive Engineering - Practical Implementation, Vol. 4).

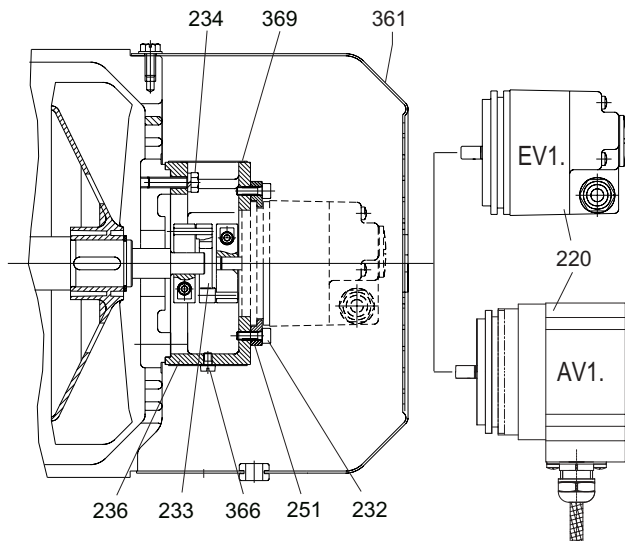


8.2 Preliminary work for motor and brake maintenance



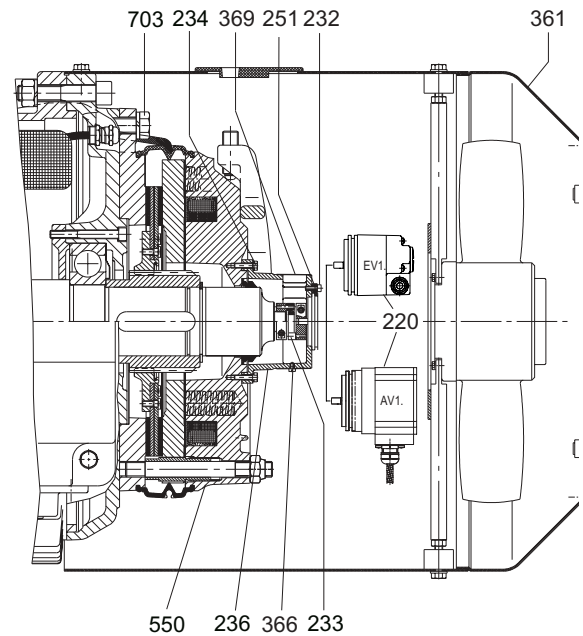
Isolate the motor and brake from the power supply before starting work, safeguarding them against unintentional power-up!

Removing the incremental encoder EV1. / absolute encoder AV1H



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Removal of EV1. / AV1H on motors up to size 225



51324AXX

Removal of EV1. / AV1H on motors from size 250 upwards

Key

220 Encoder	236 Intermediate flange	369 Cover plate
232 Machine screw	251 Conical spring washer	550 Brake
233 Coupling	361 Hood cover / fan guard	703 Hex head screw
234 Hex head screw	366 Machine screw	

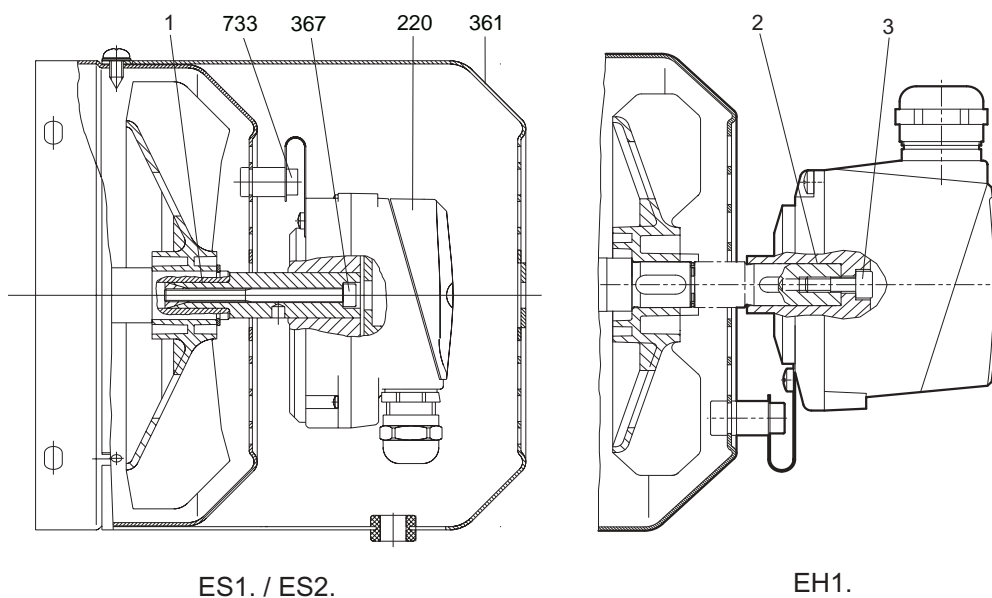
- Remove the hood cover or fan guard (361). If a forced cooling fan is fitted, remove it first.
- Remove the machine screw (366) from the intermediate flange and remove the cover plate (369).
- Unscrew the clamping hub connection of the coupling.
- Loosen machine screws (232) and turn the conical spring washers (251) outwards.
- Remove the encoder (220) together with the coupling (233).
- Lever off the intermediate flange (236) after removing the screws (234).

Note:

During re-assembly, make sure the runout of the shaft end is ≤ 0.05 mm.



Removing the incremental encoder ES1. / ES2.



51341AXX

Key

220	Encoder	361	Hood cover
367	Retaining screw	733	Retaining screw for the torque arm

ES1. / ES2.

- Remove the hood cover (361).
- Loosen the retaining screws (733) for the torque arm.
- Open the screw cover on the back wall of the encoder (220).
- Unscrew the central retaining screw (367) by about 2 – 3 turns and loosen the cone by tapping lightly on the head of the screw. Then unscrew the retaining screw and pull off the encoder.

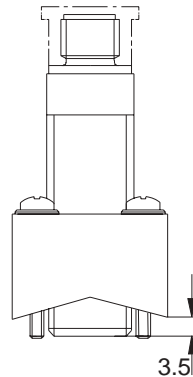
EH1.

- Unscrew the central retaining screws [3] and remove encoder.

Note:

During re-assembly:

- Apply NOCO® fluid to the encoder spigot [1] or shaft end [2].
- Tighten the central retaining screw (367) to 2.9 Nm.

***Removing the proximity sensor NV1. / NV2.***

01114CXX

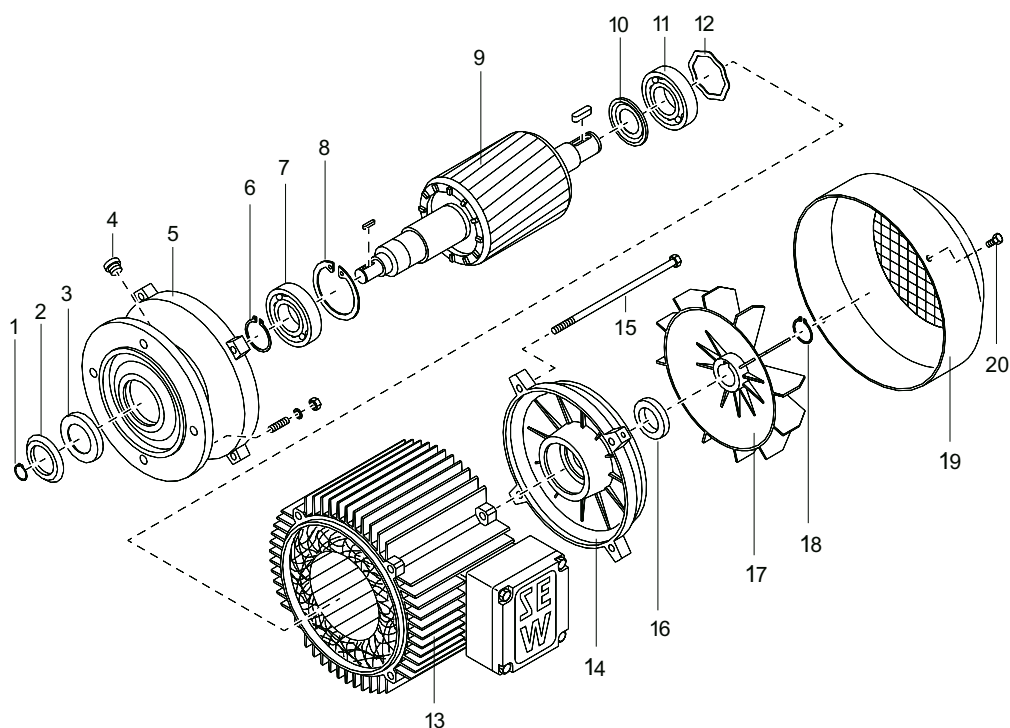
**Important! It is essential for the fan wheel to be at standstill!**

- Disconnect plug
- Pull off the fan guard including NV1. / NV2. Do not tilt it to avoid damaging the proximity switch.
- If the mounting block has been removed from the fan guard or has come loose, it is essential to ensure the following during re-assembly:
The switching surface of the proximity switch must be calibrated to a distance of 3.5 mm from the edge of the prismatic block (→ figure above).



8.3 Inspection and maintenance work on the motor

Example: Motor DFT90



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Key

1 Circlip	8 Circlip	15 Hex head screw
2 Oil flinger	9 Rotor	16 V-ring
3 Oil seal	10 Nilos ring	17 Fan
4 Screw plug	11 Ball bearing	18 Circlip
5 Drive end bearing bracket	12 Equalizing ring	19 Fan guard
6 Circlip	13 Stator	20 Housing screw
7 Ball bearing	14 Non drive end bearing bracket	



Sequence



Isolate the motor and brake from the power supply, safeguarding them against unintentional power-up!

1. Remove the forced cooling fan and encoder, if fitted (→ Sec. 'Preliminary work for motor and brake maintenance').
2. Remove the flange cover or fan guard (19) and the fan (17).
3. Remove the hexagon head cap screws (15) from the drive end bearing bracket (5) and the non-drive end bearing bracket (14), release the stator (13) from the drive end bearing bracket.
4. **Motors with brake BM/BMG:**
 - Open the terminal box cover, remove brake cable from the rectifier.
 - Push the non-drive end bearing bracket and the brake off the stator and carefully lift them off (if necessary, run the brake cable along with trailing wire).
 - Pull the stator back by approx. 3 to 4 cm.
5. **Motors with brake BMG02, BR03:**
 - Remove the complete brake with the releasing lever (on units with manual brake release).
6. Visual check: Are there traces of gear oil or condensation inside the stator?
 - If not, continue with 9.
 - If there is condensation, continue with 7.
 - If there is gear oil, have the motor repaired by a specialist workshop.
7. If there is moisture inside the stator:
 - With geared motors: Remove the motor from the gear unit.
 - With motors without a gear unit: Remove the drive end flange.
 - Remove the rotor (9).
8. Clean the winding, dry it and check it electrically (→ Sec. 'Preliminary work').
9. Replace new ball bearings (7, 11) (use authorized ball bearings only → Sec. 'Permitted ball bearing types').
10. Replace oil seal (3) in the drive end bearing bracket.
11. Reseal the stator seat and grease the V-ring or labyrinth seal (DR63).
12. Install the motor, brake etc.
13. Then check the gear unit (→ gear unit operating instructions).

Lubrication of the backstop

The backstop is supplied with Mobil LBZ low-viscosity grease as lubricant and anticorrosion protection. If you want to use a different grease, make sure it complies with NLGI class 00/000, with a base oil viscosity of 42 mm²/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.

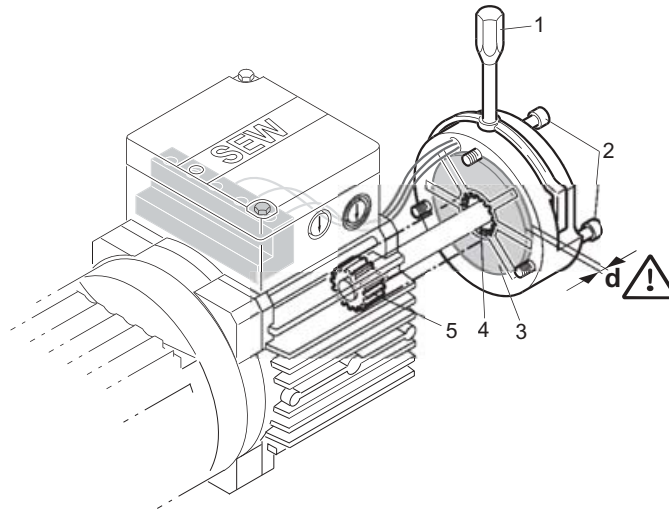
Motor type	71/80	90/100	112/132S	132M-160M	160L...225	250/280
Grease [g]	9	15	15	20	45	80



8.4 Inspection and maintenance of the brake BMG02

Measure the brake disk thickness, replace brake BMG02

The status of the brake disk is determined by measuring the brake disk thickness. Replace the brake BMG02 when the brake disk thickness reaches the minimum value (→ figure below). It is not possible to adjust the working air gap.



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1. **Isolate the motor and brake from the power supply, safeguarding them against unintentional power-up!**
2. Remove the hand lever (1, on units with manual brake release). Remove the fan guard and the fan.
3. Loosen the screws (2) and remove the complete brake with the releasing lever (on units with manual brake release)
4. Measure the thickness 'd' of the brake disk (3):

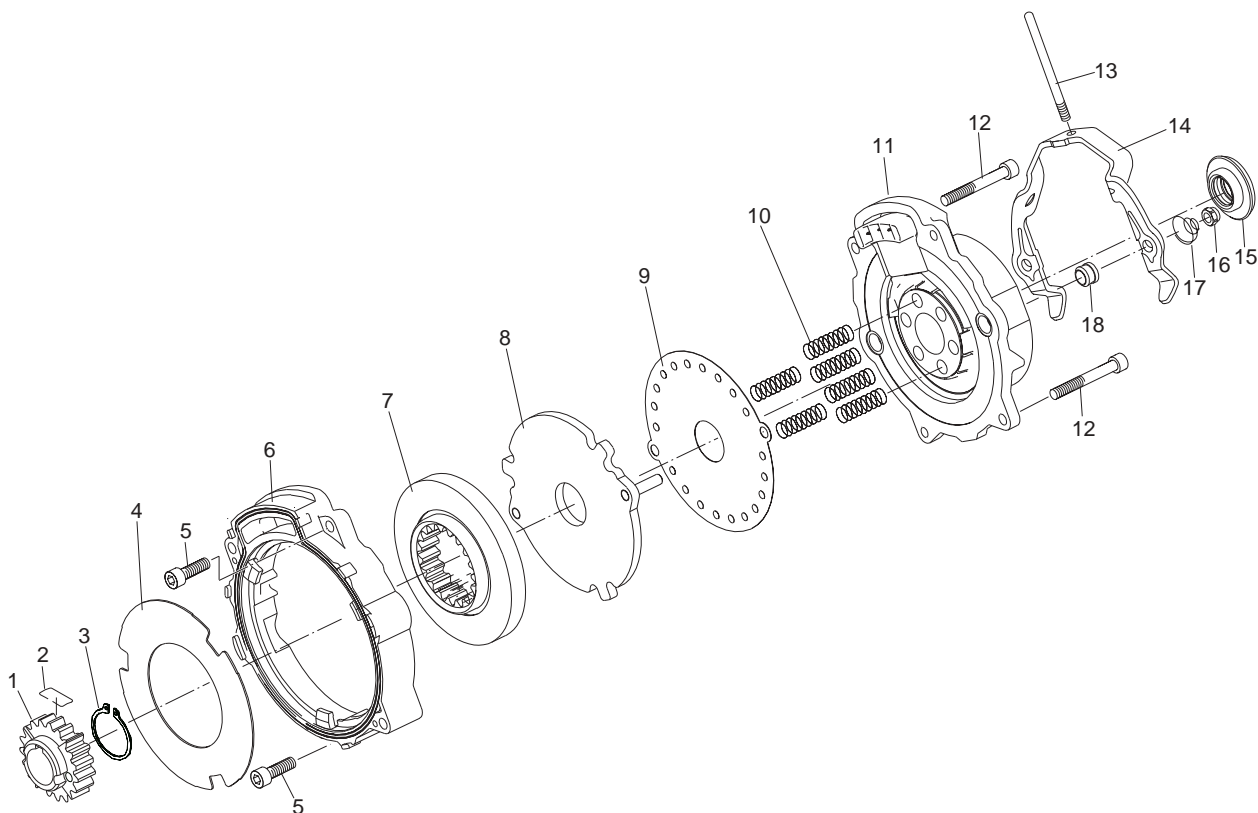
Brake Type	Thickness 'd' of the brake disk [mm]		Max. braking torque [Nm]
	max.	min.	
BMG02	6	5.4	0.8
		5.6	1.2



5. **Replace the complete brake when the brake disk thickness has reached the minimum value.**
6. Mount the complete brake on the motor:
 - Make sure that the gearing of the brake disk (4) engages in the gearing of the carrier (5).
 - Route the electric brake leads through the non drive-end bearing bracket and the inside of the motor into the terminal box.
7. Use bolts (2) to fit the brake back onto the non drive-end bearing bracket.
8. Re-install the fan, fan guard and hand lever (1) (on units with manual brake release).



8.5 Inspection and maintenance of the brake BR03



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Key

1 Carrier	7 Brake disk	13 Hand lever
2 Clip	8 Pressure plate with stud	14 Releasing lever
3 Circlip	9 Damping plate	15 Sealing washer
4 Friction plate	10 Brake springs	16 Lock nut
5 Bolt	11 Brake coil body	17 Conical coil spring
6 Guide ring	12 Bolt	18 Sealing element

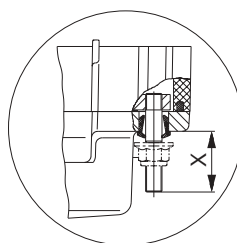


Inspecting brake BR03, measure the working air gap



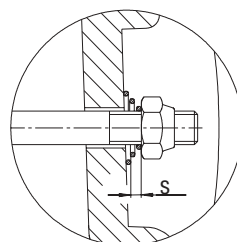
The working air gap cannot be adjusted and can only be measured by means of the stroke of the pressure plate when the brake is released.

1. **Isolate the motor and brake from the power supply, safeguarding them against unintentional power-up!**
2. Remove the hand lever (13, on units with manual brake release). Remove the fan guard and the fan.
3. Remove the lock nuts (16) and, if manual brake release is fitted, remove the conical coil springs (17) and the releasing lever (14).
4. Measure clearance x (→ following figure) with the brake at rest:



50066AXX

- From the end of the stud on the pressure plate (8) to the brake coil body (11).
5. Release the brake electrically.
 6. Measure clearance x with the brake released:
 - From the end of the stud on the pressure plate (8) to the brake coil body (11).
 7. The differential corresponds to the working air gap, i.e. the stroke of the pressure plate (18):
 - If the working air gap ≤ 0.8 mm, reinstall the conical coil springs (17), releasing lever (14) and lock nuts (16).
 - If the working air gap ≥ 0.8 mm, replace the entire brake.
 - Use setting nuts to set the floating clearance 's' between the conical coil springs (pressed flat) and the setting nuts (→ following figure).



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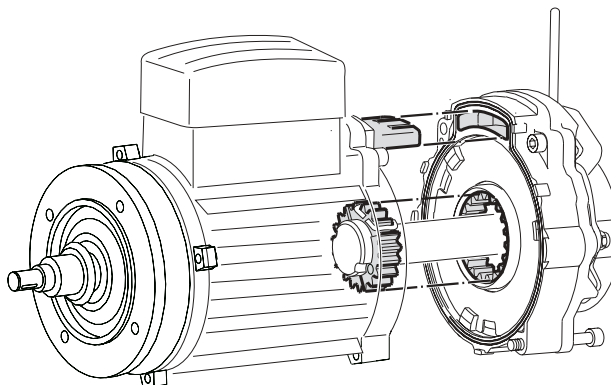
Brake	Floating clearance s [mm]
BR03	2



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



8. Reassemble the removed parts. Connect the new brake (replaced if the working air gap ≥ 0.8 mm) to the motor (→ following figure):
 - Make sure the gearing of the brake disk engages in the gearing of the carrier and that the plug on the motor end fits into the socket on the brake end.



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Altering the braking torque BR03

The braking torque can be changed in steps (→ Sec. 'Work done, working air gap, braking torques of brake BR03, BMG05-8')

- by installing different brake springs.
- by changing the number of brake springs.



1. **Isolate the motor and brake from the power supply, safeguarding them against unintentional power-up!**
2. Remove the hand lever (13, on units with manual brake release). Remove the fan guard and the fan.
3. Loosen the bolts (12) and remove the complete brake with the releasing lever (on units with manual brake release).
4. Loosen the screws (5) and remove the guide ring (6) with friction plate (4), brake disk (7), pressure plate (8) and damping plate (9).
5. Remove the brake springs (10) from the brake coil body (11) and replace them by new ones.
6. Position the new brake springs symmetrically.
7. Slide the damping plate (9) over two studs attached to the pressure plate (8) so the embossing pattern is located with the projecting side facing the pressure plate.
8. Pressure plate (8):
 - Place on the brake springs (10) together with the damping plate (9).
 - Guide the studs attached to the pressure plate (8) through the holes in the brake coil body (6) and make sure the pressure plate is in the correct position.
9. Place the flat side of the brake disk (7) on the pressure plate (8).

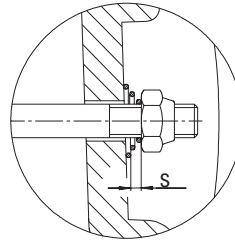
Note: Do not bring the disk into contact with grease or oil!
10. Place the guide ring (6) and friction disk (4) onto the brake disk (7), press down and install the screws (5).





11. Units with manual brake release:

- Put on the conical coil springs (17) and releasing lever (14), install the lock nuts (16).
- With manual brake release: Use setting nuts to set the floating clearance 's' between the conical coil springs (pressed flat) and the setting nuts (→ following figure).



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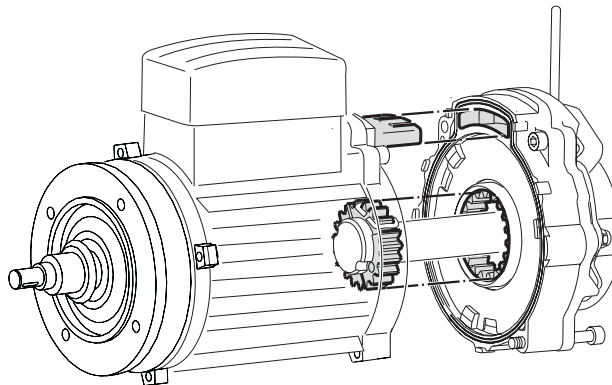
Brake	Floating clearance s [mm]
BR03	2



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

12. Connect the complete brake back onto the motor (→ following figure):

- Make sure the gearing of the brake disk engages in the gearing of the carrier and that the plug on the motor end fits into the socket on the brake end.



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13. Re-install the fan, fan guard and hand lever (10) (on units with manual brake release).

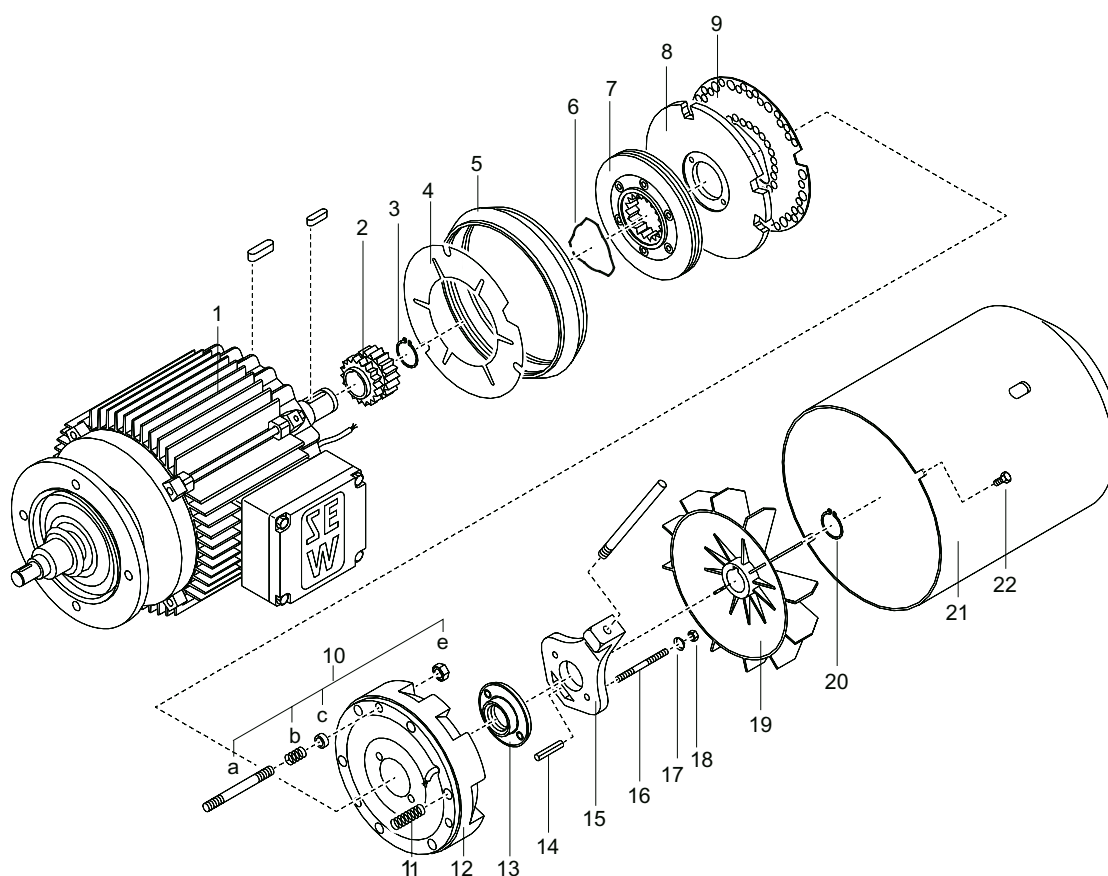


8.6 Inspection and maintenance of the brakes BM15-62, BMG05-122



Brakes BMG61 / BMG122 with encoder mounting are only used as holding brakes.
Maintenance work by SEW-EURODRIVE only.

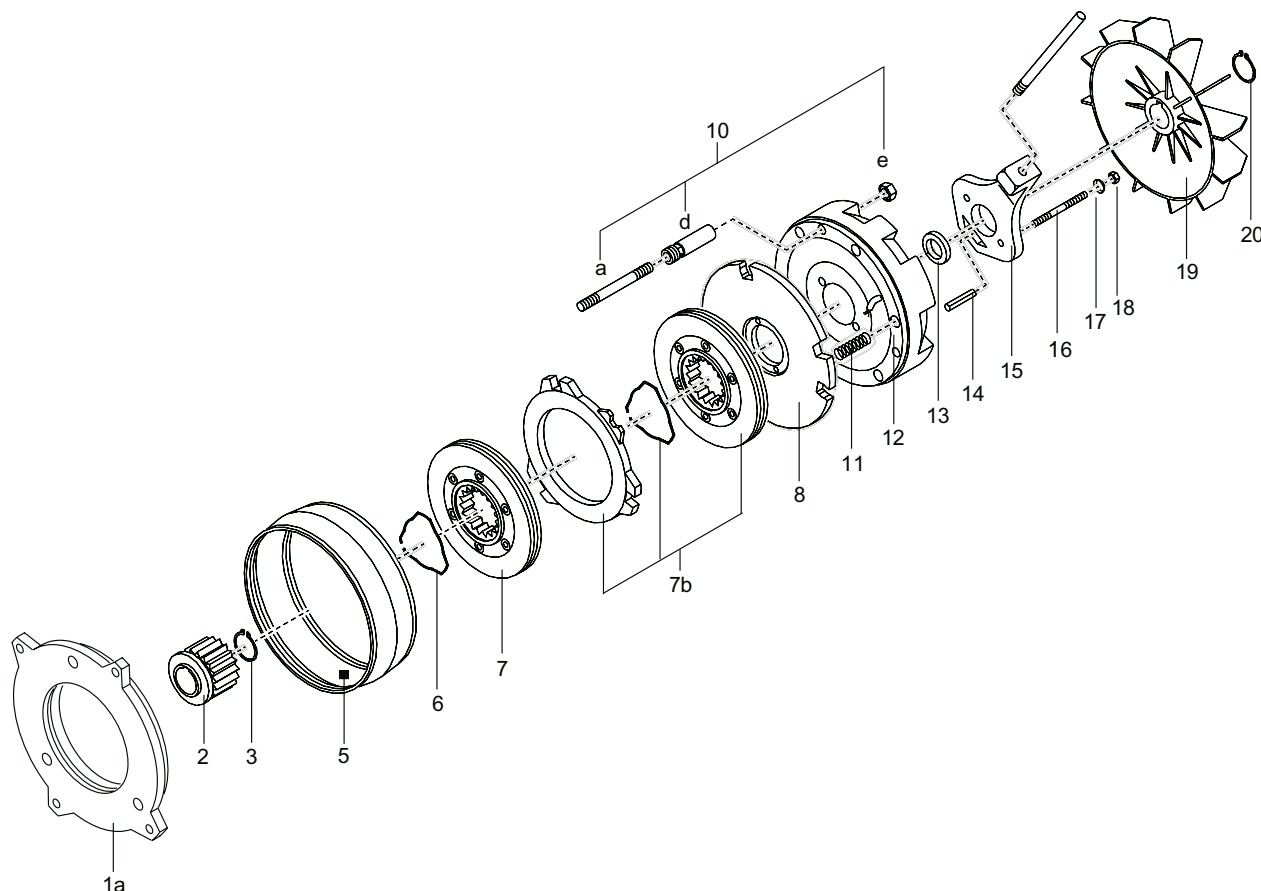
Brake BM(G)05-15



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Brakes BM30-62, BMG61/122



50920AXX

Key

1 Motor with brake bearing bracket	8 Pressure plate	14 Dowel pin
1a BMG61/122 only: Intermediate flange	9 Damping plate (BMG only)	15 Release lever with hand lever
2 Carrier	10a Stud (3 pcs.)	16 Stud (2 pcs.)
3 Circlip	10b Counter spring	17 Conical coil spring
4 Niro disk (BMG only)	10c Pressure ring	18 Setting nut
5 Rubber sealing collar	10d Setting sleeve	19 Fan
6 Annular spring	10e Hex nut	20 Circlip
7 Brake disk	11 Brake spring	21 Fan guard
7b BM 32, 62 only: Brake stationary disk, annular spring, Brake disk	12 Brake coil body	22 Housing screw
	13 In BMG: Seal In BM: V-ring	



Setting the working air gap in brakes BMG05-8 / BM15-62 / BMG61/122 without encoder mounting



1. **Isolate the motor and brake from the power supply, safeguarding them against unintentional power-up!**
2. Remove the following:
 - If installed, forced cooling fan, tacho/encoder (→ Sec. 'Preliminary work for motor and brake maintenance').
 - Flange cover or fan guard (21).
3. Push the rubber sealing collar (5) aside:
 - Release the clip to do this, if necessary.
 - Extract the abraded matter.
4. Measure the brake disk (7, 7b):

If the brake disk is

 - ≤ 9 mm on brake motors up to size 100
 - ≤ 10 mm on brake motors up to size 112
 - ≤ 12 mm on brake motors up to size 250

replace the brake disk (→ Sec. 'Changing the brake disk BMG 05-8, BM 15-62').
5. **In BM30-62 / BMG61/122 without encoder mounting:**

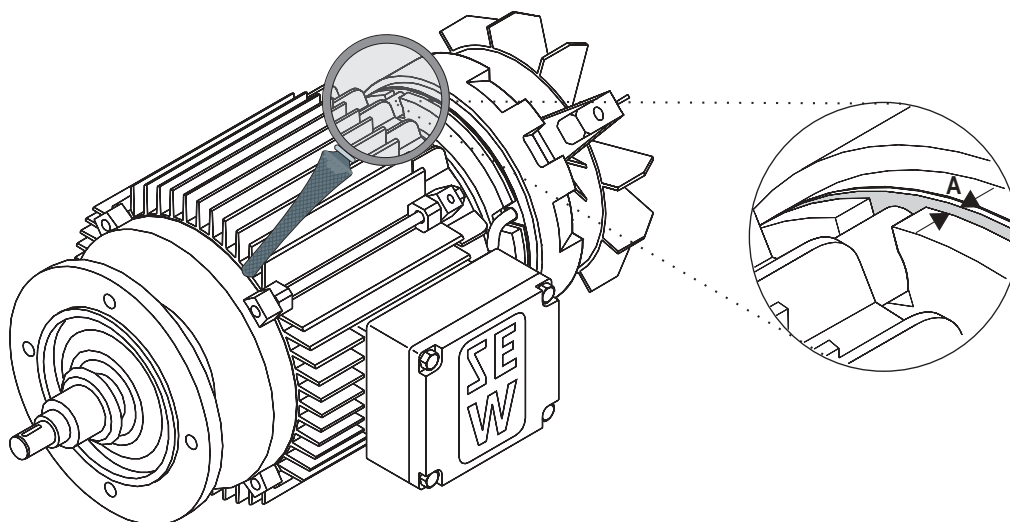
Loosen the setting sleeve (10d) by turning it towards the bearing bracket.
6. Measure the working air gap A (→ following figure)

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

 - In BM, between the pressure plate (8) and the brake coil body (12).
 - With BMG, between the pressure plate (8) and the damping plate (9).
7. Tighten the hex nuts (10e)
 - until the working air gap is set correctly (→ Sec. 'Technical data').
 - in BM 30-62, until the working air gap is initially 0.25 mm.
8. **In BM30-62 / BMG61/122 without encoder mounting:**

Tighten the setting sleeves

 - against the brake coil body.
 - until the working air gap is set correctly (→ Sec. 'Technical Data').
9. Fit the rubber sealing collar back in place and re-install the removed parts.



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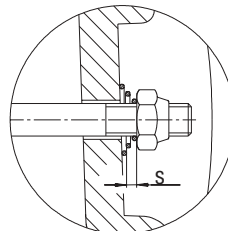


Fitting a new brake disk in brakes BMG05-8 / BM15-62 / BMG61/122 without encoder mounting

When fitting a new brake disk (in BMG05-4 ≤ 9 mm; in BMG62 ≤ 10 mm; in BMG61/122 ≤ 12 mm) inspect the other removed parts as well and fit new ones if necessary.



1. **Isolate the motor and brake from the power supply, safeguarding them against unintentional power-up!**
2. Remove the following:
 - If installed, forced cooling fan, tacho/encoder (\rightarrow Sec. 'Preliminary work for motor and brake maintenance').
 - Flange cover or fan guard (21), circlip (20) and fan (19).
3. Remove the rubber sealing collar (5) and the manual brake release:
 - Setting nuts (18), conical coil springs (17), studs (16), release lever (15), dowel pin (14).
4. Loosen hex nuts (10e), carefully pull off the brake coil body (12) (brake cable!) and take out the brake springs (11).
5. Remove the damping cable (9), pressure plate (8) and brake disk (7, 7b) and clean the brake components.
6. Install new brake disk.
7. Re-install the brake components
 - except for the rubber sealing collar, fan and fan guard, set the working air gap (\rightarrow Sec. 'Inspecting brake BMG 05-8, BM 30-62, setting the working air gap', points 5 to 8).
8. With manual brake release: Use setting nuts to set the floating clearance 's' between the conical coil springs (pressed flat) and the setting nuts (\rightarrow following figure).



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Brake	Floating clearance s [mm]
BMG05-1	1.5
BM15-62, BMG2-8, BMG61/122	2



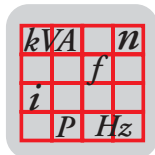
Notes

Important: 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.

9. Re-install the rubber sealing collar and the removed parts
 - The lockable manual brake release (type HF) is already released if a resistance is encountered when operating the grub screw.
 - The self-reengaging manual brake release (type HR) can be operated with normal hand pressure.



Important: In brake motors with self-reengaging manual brake release, the manual brake release lever must be removed after startup/maintenance! A bracket is provided for storing it on the outside of the motor.



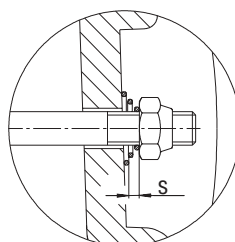
Changing the braking torque of BMG05-122, BM15-62

The braking torque can be changed in steps (→ Sec. 'Technical data')

- by installing different brake springs.
- by changing the number of brake springs.
- by changing the brake coil body:
 - **BMG05:** if the maximum braking torque is not sufficient for the specific application, install the brake coil body (12) of brake BMG1 of the same design in order to ensure safe braking
 - **BMG2:** if the maximum braking torque is not sufficient for the specific application, install the brake coil body (12) of brake BMG4 of the same design in order to ensure safe braking



1. **Isolate the motor and brake from the power supply, safeguarding them against unintentional power-up**
2. Remove the following:
 - If installed, forced cooling fan, tacho/encoder (→ Sec. 'Preliminary work for motor and brake maintenance')
 - Flange cover or fan guard (21), circlip (20) and fan (19)
3. Remove the rubber sealing collar (5) and the manual brake release:
 - Setting nuts (18), conical coil springs (17), studs (16), release lever (15), dowel pin (14).
4. Loosen hex nuts (10e), pull off the coil body (12)
 - by approx. 50 mm (watch the brake cable!).
5. Change or add brake springs (11)
 - Position the brake springs symmetrically.
6. Re-install the brake components
 - except for the rubber sealing collar, fan and fan guard. Set the working air gap (→ Sec. 'Setting the working air gap', points 5 to 8).
7. With manual brake release: Use setting nuts to set the floating clearance 's' between the conical coil springs (pressed flat) and the setting nuts (→ following figure)



01111BXX

Brake	Floating clearance s [mm]
BMG05-1	1.5
BMG2-8, BMG61/122, BM15-62	2

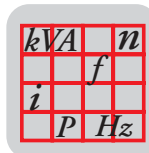


Note

Important: 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.

8. Re-install the rubber sealing collar and the removed parts.

Replace setting nuts (18) and hexagon nuts (10e) if the removal procedure is repeated!



9 Technical Data

9.1 Work done, braking torques BMG02

Brake type	For motor size	Work done until maintenance [10 ⁶ J]	Thickness of the brake disk [mm]		Braking torque [Nm]
			max.	min.	
BMG02	DT56 ET56	30	6	5.6 5.4	1.2 0.8

9.2 Information for ordering a replacement BMG02

Brake type	Voltage	Braking torque	Brake part number
	[V _{DC}]	[Nm]	
BMG02	24	0.8	0574 319 2
		1.2	0574 323 0
BMG02/HR	24	0.8	0574 327 3
		1.2	0574 331 1

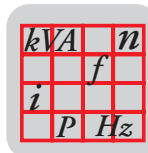
Brake type	Voltage	Braking torque	Brake part number
	[V _{AC}]	[Nm]	
BMG02	230	0.8	0574 320 6
		1.2	0574 324 9
	400	0.8	0574 321 4
		1.2	0574 325 7
	460/500	0.8	0574 322 2
		1.2	0574 326 5
BMG02/HR	230	0.8	0574 328 1
		1.2	0574 332 X
	400	0.8	0574 329 X
		1.2	0574 333 8
	460/500	0.8	0574 330 3
		1.2	0574 334 6



9.3 Work done, working air gap, braking torques BR03, BMG05-8

Brake type	for Motor size	Work done until maintenance [10 ⁶ J]	Working air gap [mm]		Braking torque [Nm]	Braking torque settings Type and no. of springs		Order number of springs	
			min. ¹⁾	max.		Normal	Red	Normal	Red
BR03	63	200	-	0.8	3.2 2.4 1.6 0.8	6 4 3 -	- 2 - 6	185 815 7	185 873 4
BMG05 ²⁾	71	120	0.25	0.6	5.0 4.0 2.5 1.6 1.2	3 2 - - -	- 2 6 4 3	135 017 X	135 018 X
BMG1	80	120			10 7.5 6.0	6 4 3	- 2 3		
BMG2 ³⁾	90 100	260			20 16 10 6.6 5.0	3 2 - - -	- 2 6 4 3	135 150 8	135 151 6
BMG4	100	260			40 30 24	6 4 3	- 2 3		
BMG8	112M 132S	600	0.3	1.2	75 55 45 37 30 19 12.6 9.5	6 4 3 3 2 - - -	- 2 3 - 2 6 4 3	184 845 3	135 570 8

- 1) Please note when checking the working air gap: Parallelism tolerances on the brake disk may give rise to deviations of ± 0.15 mm after a test run.
- 2) BMG05: If the maximum braking torque (5 Nm) is not sufficient, it is possible to install the brake coil body of the BMG1 brake.
- 3) BMG2: If the maximum braking torque (20 Nm) is not sufficient, it is possible to install the brake coil body of the BMG4 brake.

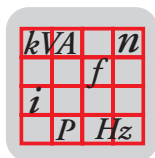


9.4 Work done, working air gap, braking torques BM15 - 62, BMG61/122

Brake type	for Motor size	Work done until maintenance [10 ⁶ J]	Working air gap [mm]		Braking torque [Nm]	Braking torque settings Type and no. of springs		Order number of springs	
			min. ¹⁾	max.		Normal	Red	Normal	Red
BM15	132M, ML 160M	1000	0.3	1.2	150	6	-	184 486 5	184 487 3
					125	4	2		
					100	3	3		
					75	3	-		
					50	-	6		
					35	-	4		
BM30	160L 180	1500	0.3	1.2	25	-	3	136 998 9	136 999 7
					300	8	-		
					250	6	2		
					200	4	4		
					150	4	-		
					125	2	4		
BM31	200 225	1500	0.3	1.2	100	-	8	136 998 9	136 999 7
					75	-	6		
					50	-	4		
					300	4	-		
					250	2	4		
					200	-	8		
BM32 ²⁾	180	1500	0.4	1.2	150	-	6	136 998 9	136 999 7
					100	-	4		
					600	8	-		
					500	6	2		
					400	4	4		
					300	4	-		
BM62 ²⁾	200 225	1500	0.4	1.2	250	2	4	186 838 1	186 839 X
					200	-	8		
					150	-	6		
					100	-	4		
					600	8	-		
					500	6	2		
BMG61	250 280	2500	0.3	1.2	400	4	4	186 838 1	186 839 X
					300	4	-		
					200	-	8		
					1200	8	-		
					1000	6	2		
					800	4	4		
BMG122 ²⁾			0.4		600	4	-		
					400	-	8		

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

2) Double disk brake



9.5 Operating currents

The current values I_H (holding current) specified in the tables are r.m.s. values. Use only r.m.s. instruments for your measurement. The inrush current (accelerator current) I_B only flows for a short time (max. 120 ms) when the brake is released or during voltage dips below 70 % of rated voltage. There is no increased inrush current if the BG brake rectifier is used or if there is a direct DC voltage supply – both are possible with brakes up to size BMG4 only.

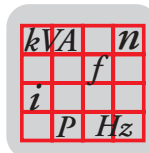
BMG02, BR03 brake

	BMG02	BR03
Motor size	56	63
Max. braking torque [Nm]	1.2	3.2
Braking power [W]	25	25
Inrush current ratio I_B/I_H	-	4

Rated voltage V_N		BMG02		BR03	
V_{AC}	V_{DC}	I_H [A _{AC}]	I_G [A _{DC}]	I_H [A _{AC}]	I_G [A _{DC}]
	24	-	0.72	-	0.72
24 (23-26)	10	-	-	1.5	1.80
42 (40-45)	18	-	-	0.81	1.01
48 (46-50)	20	-	-	0.72	0.90
53 (51-56)	22	-	-	0.64	0.80
60 (57-63)	24	-	-	0.57	0.72
67 (64-70)	27	-	-	0.50	0.64
73 (71-78)	30	-	-	0.45	0.57
85 (79-87)	36	-	-	0.40	0.51
92 (88-98)	40	-	-	0.35	0.45
110 (99-110)	44	-	-	0.31	0.40
120 (111-123)	48	-	-	0.28	0.36
133 (124-138)	54	-	-	0.25	0.32
147 (139-154)	60	-	-	0.22	0.29
160 (155-173)	68	-	-	0.20	0.25
184 (174-193)	75	-	-	0.17	0.23
208 (194-217)	85	-	-	0.16	0.20
230 (218-243)	96	0.14	0.18	0.14	0.18
254 (244-273)	110	-	-	0.12	0.16
290 (274-306)	125	-	-	0.11	0.14
318 (307-343)	140	-	-	0.10	0.13
360 (344-379)	150	-	-	0.09	0.11
400 (380-431)	170	0.08	0.10	0.08	0.10
460 (432-500)	190	0.07	0.09	0.07	0.09

Key

- I_B Accelerator current – brief inrush current
- I_H Holding current r.m.s. value in the connecting harness to the SEW brake rectifier
- I_G Direct current with direct DC voltage supply with rated voltage V_N
- V_N Rated voltage (rated voltage range)



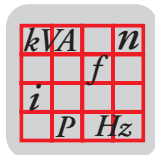
Brake BMG 05 - BMG 4

	BMG05	BMG1	BMG2	BMG4
Motor size	71/80	80	90/100	100
Max. braking torque [Nm]	5	10	20	40
Braking power [W]	32	36	40	50
Inrush current ratio I_B/I_H	4	4	4	4

Rated voltage V_N		BMG05		BMG 1		BMG 2		BMG 4	
V_{AC}	V_{DC}	I_H [A _{AC}]	I_G [A _{DC}]	I_H [A _{AC}]	I_G [A _{DC}]	I_H [A _{AC}]	I_G [A _{DC}]	I_H [A _{AC}]	I_G [A _{DC}]
	24		1.38		1.54		1.77		2.20
24 (23-25)	10	2.0	3.3	2.4	3.7	-	-	-	-
42 (40-46)	18	1.14	1.74	1.37	1.94	1.46	2.25	1.80	2.80
48 (47-52)	20	1.02	1.55	1.22	1.73	1.30	2.00	1.60	2.50
56 (53-58)	24	0.90	1.38	1.09	1.54	1.16	1.77	1.43	2.20
60 (59-66)	27	0.81	1.23	0.97	1.37	1.03	1.58	1.27	2.00
73 (67-73)	30	0.72	1.10	0.86	1.23	0.92	1.41	1.14	1.76
77 (74-82)	33	0.64	0.98	0.77	1.09	0.82	1.25	1.00	1.57
88 (83-92)	36	0.57	0.87	0.69	0.97	0.73	1.12	0.90	1.40
97 (93-104)	40	0.51	0.78	0.61	0.87	0.65	1.00	0.80	1.25
110 (105-116)	48	0.45	0.69	0.54	0.77	0.58	0.90	0.72	1.11
125 (117-131)	52	0.40	0.62	0.48	0.69	0.52	0.80	0.64	1.00
139 (132-147)	60	0.36	0.55	0.43	0.61	0.46	0.70	0.57	0.88
153 (148-164)	66	0.32	0.49	0.39	0.55	0.41	0.63	0.51	0.79
175 (165-185)	72	0.29	0.44	0.34	0.49	0.37	0.56	0.45	0.70
200 (186-207)	80	0.26	0.39	0.31	0.43	0.33	0.50	0.40	0.62
230 (208-233)	96	0.23	0.35	0.27	0.39	0.29	0.44	0.36	0.56
240 (234-261)	110	0.20	0.31	0.24	0.35	0.26	0.40	0.32	0.50
290 (262-293)	117	0.18	0.28	0.22	0.31	0.23	0.35	0.29	0.44
318 (294-329)	125	0.16	0.25	0.19	0.27	0.21	0.31	0.25	0.39
346 (330-369)	147	0.14	0.22	0.17	0.24	0.18	0.28	0.23	0.35
400 (370-414)	167	0.13	0.20	0.15	0.22	0.16	0.25	0.20	0.31
440 (415-464)	185	0.11	0.17	0.14	0.19	0.15	0.22	0.18	0.28
500 (465-522)	208	0.10	0.15	0.12	0.17	0.13	0.20	0.16	0.25

Key

- I_B Accelerator current – brief inrush current
- I_H Holding current r.m.s. value in the connecting harness to the SEW brake rectifier
- I_G Direct current with direct DC voltage supply
- V_N Rated voltage (rated voltage range)


**Brake BMG 8 -
BM 32/62**

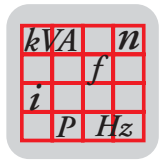
	BMG8	BM 15	BM30/31; BM32/62
Motor size	112/132S	132M-160M	160L-225
Max. braking torque [Nm]	75	150	600
Braking power [W]	65	95	130
Inrush current ratio I_B/I_H	6.3	7.5	8.5

Rated voltage V_N		BMG8	BM 15	BM 30/31; BM 32/62
V_{AC}	V_{DC}	I_H [A _{AC}]	I_H [A _{AC}]	I_H [A _{AC}]
	24	2.77 ¹⁾	4.15 ¹⁾	5.00 ¹⁾
42 (40-46)	-	2.31	3.35	-
48 (47-52)	-	2.10	2-95	-
56 (53-58)	-	1.84	2.65	-
60 (59-66)	-	1.64	2.35	-
73 (67-73)	-	1.46	2.10	-
77 (74-82)	-	1.30	1.87	-
88 (83-92)	-	1.16	1.67	-
97 (93-104)	-	1.04	1.49	-
110 (105-116)	-	0.93	1.32	1.78
125 (117-131)	-	0.82	1.18	1.60
139 (132-147)	-	0.73	1.05	1.43
153 (148-164)	-	0.66	0.94	1.27
175 (165-185)	-	0.59	0.84	1.13
200 (186-207)	-	0.52	0.74	1.00
230 (208-233)	-	0.46	0.66	0.90
240 (234-261)	-	0.41	0.59	0.80
290 (262-293)	-	0.36	0.53	0.71
318 (294-329)	-	0.33	0.47	0.63
346 (330-369)	-	0.29	0.42	0.57
400 (370-414)	-	0.26	0.37	0.50
440 (415-464)	-	0.24	0.33	0.44
500 (465-522)	-	0.20	0.30	0.40

1) Direct current in BSG operation

Key

- I_H Holding current r.m.s. value in the connecting harness to the SEW brake rectifier
- I_B Accelerator current – brief inrush current
- I_G Direct current with direct DC voltage supply
- V_N Rated voltage (rated voltage range)

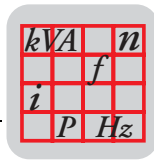

BMG61, BMG122
brake

	BMG61	BMG122
Motor size	250M...280S	
Max. braking torque [Nm]	600	1200
Braking power [W]	200	
Inrush current ratio I_B/I_H	6	

Rated voltage V_N V_{AC}	BMG61/122 I_H [A _{AC}]
208 (194-217)	1.50
230 (218-243)	1.35
254 (244-273)	1.20
290 (274-306)	1.10
318 (307-343)	1.00
360 (344-379)	0.85
400 (380-431)	0.75
460 (432-484)	0.65
500 (485-500)	0.60

Key

- I_B Accelerator current – brief inrush current
 I_H Holding current r.m.s. value in the connecting harness to the SEW brake rectifier
 V_N Rated voltage (rated voltage range)



9.6 Permitted ball bearing types

Motor type	Driving end A bearing (AC motor, brake motor)			Non-driving end B bearing (Foot/flange-mounted, gearmotors)	
	Flange-mounted motor	Gearmotor	Foot-mounted motor	AC motor	Brake motor
DT56	-	6302-Z-J	-	6001-2RS-J	6001-2RS-J
DFR63	6203-Z-J	6303-Z-J	-	6202-2C-J	6202-2RS-J-C3
DT71-DT80	6204-Z-J	6303-Z-J	6204-Z-J	6203-J	6203-RS-J-C3
DT(E)90 - DV(E)100		6306-Z-J		6205-J-2Z	6205-RS-J-C3
DV(E)112 - 132S	6208-Z-J	6307-Z-J	6208-Z-J	6207-J-2Z	6207-RS-J-C3
DV(E)132M - 160M		6309-Z-J-C3		6209-2Z-J-C3	
DV(E)160L - 180L		6312-Z-J-C3		6213-2Z-J-C3	
DV(E)200 - 225		6314-Z-J-C3		6314-Z-J-C3	
DV250 - 280		6316-Z-J-C3		6315-Z-J-C3	

9.7 Lubricant table for anti-friction bearings of SEW motors



The motor anti-friction bearings are factory-filled with the greases listed below. SEW-EURODRIVE recommends filling one third of the cavities between the rolling elements with grease when regreasing.

The bearings with the lubricants from Klüber are designed as sealed bearings 2Z or 2RS..

	Ambient temperature	Manufacturer	Type
Anti-friction bearing in motor	-25 °C ... +80 °C	Esso	Unirex EQ3 ¹⁾
	+80 °C ... +100 °C	Klüber	Barrierta L55/2 ²⁾
	-45 °C ... +60 °C	Klüber	Asonic GHYF2 ²⁾

1) Mineral lubricant (= mineral-based anti-friction bearing grease)

2) Synthetic lubricant (= synthetic anti-friction bearing grease)

10 Revision Status

The following additions and changes have been made to the previous edition of the AC Motors operating instructions (publication number: 1055 3517, edition 10/2002):

- | | |
|--|--|
| General | <ul style="list-style-type: none">• The energy saving motors DTE / DVE and encoder EH1. have been added to the operating instructions. |
| Electrical Installation section | <ul style="list-style-type: none">• The energy saving motor information has been added in the table "Encoder overview." |
| Startup section | <ul style="list-style-type: none">• The energy saving motors information has been added to the table in the paragraph "Altering the block direction on motors with backstop." |
| Inspection/
Maintenance section | <ul style="list-style-type: none">• The paragraphs "Preliminary work for motor and brake maintenance" and "Removing the incremental encoders ES1. / ES2. / EH1." have been revised.• The table "Lubrication of the backstop" now includes motor type 250/280. |
| Technical Data section | <ul style="list-style-type: none">• The table "Permitted ball bearing types" has been revised. |



Index

A

AC motor configuration 6
Altering the blocking direction 28

B

Brake faults 30

C

Connecting accessory equipment 23
Connecting the motor 14
Connecting the motor using plug connection ASK1 20
Connecting the motor using plug connection IS 16
Connecting the motor using plug connections AS.. and AM.. 20

E

Electrical installation 12
Encoder ES1. / ES2. removal 33
Encoder EV1. / AV1H removal 32
Encoder overview 25
Extended storage of motors 9

F

Factory number 7
Forced cooling fan 23

I

Inspection and maintenance of the brake BMG02 37
Inspection and maintenance of the brake BR03 38
Inspection and maintenance of the brakes BM15-62, BMG05-122 42
Inspection and maintenance periods 31
Inspection and maintenance work on the motor 35
Installation tolerances 11

L

Lubricant table for anti-friction bearings of motors 54

M

Mechanical Installation 9
Motor faults 29

N

Nameplate 7

O

Operating currents 50

P

Permitted ball bearing types 54
Proximity sensor NV1. / NV2. removal 33

S

Single-phase motor ET56 16

Startup 27

T

Technical data 47
Temperature sensor TF 23

U

Unit designation 7

W

Winding thermostat TH 23



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Production Assembly Sales Service	Greenville	SEW-EURODRIVE INC. 1295 Old Spartanburg Highway P.O. Box 518 Lyman, S.C. 29365	Tel. +1 (0) 864 4 39 75 37 Fax Sales +1 (0) 864 439-78 30 Fax Manuf. +1 (0) 864 4 39-99 48 Fax Ass. +1 (0) 864 4 39-05 66 Telex 805 550 http://www.seweurodrive.com cslyman@seweurodrive.com



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Assembly Sales Service	San Francisco	SEW-EURODRIVE INC. 30599 San Antonio St. Hayward, California 94544-7101	Tel. +1 (0) 510 4 87-35 60 Fax +1 (0) 510 4 87-63 81 cshayward@seweurodrive.com
	Philadelphia/PA	SEW-EURODRIVE INC. Pureland Ind. Complex 2107 High Hill Road, P.O. Box 481 Bridgeport, New Jersey 08014	Tel. +1 (0) 856 4 67-22 77 Fax +1 (0) 856 4 67-37 92 csbridgeport@seweurodrive.com
	Dayton	SEW-EURODRIVE INC. 2001 West Main Street Troy, Ohio 45373	Tel. +1 (0) 9 37 3 35-00 36 Fax +1 (0) 9 37 4 40-37 99 cstroy@seweurodrive.com
	Dallas	SEW-EURODRIVE INC. 3950 Platinum Way Dallas, Texas 75237	Tel. +1 (0) 214 3 30-48 24 Fax +1 (0) 214 3 30-47 24 csdallas@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 (0) 241 8 32 98 04 Fax +58 (0) 241 8 38 62 75 sewventas@cantv.net sewfinanzas@cantv.net

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