SEW EURODRIVE

Explosion-Proof AC Motors, Asynchronous Servomotors

Edition 10/2008

16715217 / EN

Operating Instructions

SEW EURODRIVE

Contents

1 General Information

1.1 Use of operating instructions

The operating instructions are an integral part of the product and contain important information for operation and service. The operating instructions are written for all persons who assemble, install, start up, and service this product.

The operating instructions must be kept available in a legible condition. Ensure 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 completely and understood them. If you are unclear about any of the information in this documentation or require further information, please contact SEW-EURODRIVE.

1.2 Structure of the safety notes

The safety notes in these operating instructions are structured as follows:

Symbol	SIGNAL WORD
	Nature and source of danger Possible consequence(s) if disregarded. • Measure(s) to avoid the danger.

Symbol	Signal word	Meaning	Consequences if disregarded
Example:  General danger  Specific danger, e.g. electric shock	**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 ABOUT EXPLOSION PROTECTION**	Important information about explosion protection	Removal of explosion protection and resulting hazards
	**TIP**	Useful information or tip Simplifies handling of the drive system	

1.3 Rights to claim under limited warranty

Adhering to the operating instructions is a prerequisite for fault-free operation and the fulfillment of any rights to claim under limited warranty. You should therefore read the operating instructions before you start working with the unit.

1.4 Exclusion of liability

You must comply with the information contained in these operating instructions to ensure safe operation of the explosion-proof electric motors 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 Copyright

2 Safety Notes

2.1 Preliminary information

The following safety notes are primarily concerned with the operation of explosion-proof electric motors. If using gear units, please also refer to the safety notes for gear units in the pertinent operating instructions.

Also consider the supplementary safety notes in the individual sections of these operating instructions.

2.2 General information

⚠ DANGER

During operation, motors and gearmotors may have live, bare and movable or rotating parts as well as hot surfaces, depending on their protection type.

Explosive gas mixtures or concentrations of dust can lead to severe or fatal injuries in conjunction with hot, live and moving parts of electrical machinery.

Severe or fatal injuries

- All work related to transportation, storage, installation/assembly, connection, startup, maintenance and servicing may be carried out only by qualified specialists under strict observance of:
  - The pertinent detailed operating instructions
  - The warning and safety signs on the motor/gearmotor
  - All other project planning documents, operating instructions and wiring diagrams related to the drive
  - The system-specific regulations and requirements
  - The national and regional regulations governing safety and prevention of accidents
- Never install damaged products.
- Immediately report any damage to the shipping company.

Removing required covers without authorization, improper use as well as incorrect installation or operation may result in severe injuries to persons or damage to property.

Consult the documentation for further information. Observe the "Applicable documentation" section.

2.3 Target group

All mechanical work must be carried out by trained specialists only. Specialists in this context are persons who are familiar with the setup, mechanical installation, troubleshooting and maintenance for this product. Further, they are qualified as follows:

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

All electrical engineering work may be carried out by qualified electricians only. Qualified electricians in this context are persons who are familiar with the electronic installation, startup, troubleshooting and maintenance for this product. Further, they are qualified as follows:

- They are trained in electrical engineering, e.g. as an electrician 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 may be carried out only by persons who are trained appropriately.

2.4 Designated use

The explosion-proof motors are intended for industrial systems and may only be used in accordance with the information provided in SEW-EURODRIVE's technical documentation and the information given on the nameplate. They meet the requirements set forth in Directive 94/9/EC and comply with the applicable standards and regulations.

	INFORMATION ABOUT EXPLOSION PROTECTION
	The motor is only allowed to be operated under the conditions described in the "Startup" section. A motor may only be operated with the frequency inverter when the requirements of the EC prototype test certificates and/or these operating instructions and the information on the nameplate of the motor, if available, are fulfilled. There may be no aggressive substances in the vicinity that could damage the paint and seals.

2.5 Other applicable documentation

The following publications and documents should also be observed:

- Operating instructions "Explosion-Proof Gear Units R..7, F..7, K..7, S..7 Series, Spiroplan® W" for any gearmotors that are mounted.
- Operating instructions of any mounted frequency inverter for motors powered by inverters.
- Operating instructions of any attached options
- Pertinent wiring diagrams

2.6 Transportation

Immediately upon receipt of the shipment, inspect it for any damage that may have occurred during shipping. Where applicable, inform the shipping company of any damage immediately. It may be necessary to preclude startup.

Tighten installed eyebolts. They are rated only for 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 or lifting eyebolts, use both of the eyebolts 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 necessary. Remove any transportation restraints prior to startup.

2.7 Extended storage

Observe the notes in the "Extended storage" section (see page 15).

2.8 Installation/assembly

Observe the notes in the "Mechanical Installation" section (see page 15).

2.9 Electrical connection

Only qualified personnel may carry out any work. During this work, the machine must be at a standstill, disconnected, and safeguarded against an accidental restart. This also applies to auxiliary circuits (e.g. anti-condensation heating).

Ensure that the unit is de-energized.

Exceeding the tolerances in EN 60034-1 (VDE 0530, part 1) – voltage +5%, frequency +2%, curve shape, symmetry – increases the heating and influences electromagnetic compatibility. Observe nameplate data and the wiring diagram in the terminal box.

Pay attention to the wiring information and differing data on the nameplate, and also observe the wiring diagram.

The connection should be a permanent, secure electrical connection (no protruding wire ends); use the cable end pieces intended for this purpose. Establish a secure protective earth connection. When the motor is connected, the distances to non-insulated and live parts must not be shorter than the minimum values according to EN 60079-15 or EN 60079-7 and national regulations. With low voltage, the distances should be no shorter than the following values:

Rated voltage V_N	Distance for motors in category 3	Distance for motors in category 2
< 500 V	5 mm	8 mm
> 500 – < 690 V	5.5 mm	10 mm

The terminal box must be free of foreign objects, dirt and humidity. Close unused cable entry openings and the box itself so they are dust and water proof. Secure key for test run without output elements. When operating low-voltage machines, check that they are functioning correctly before startup.

Observe the notes in the "Electrical Installation" section.

2.10 Startup / operation

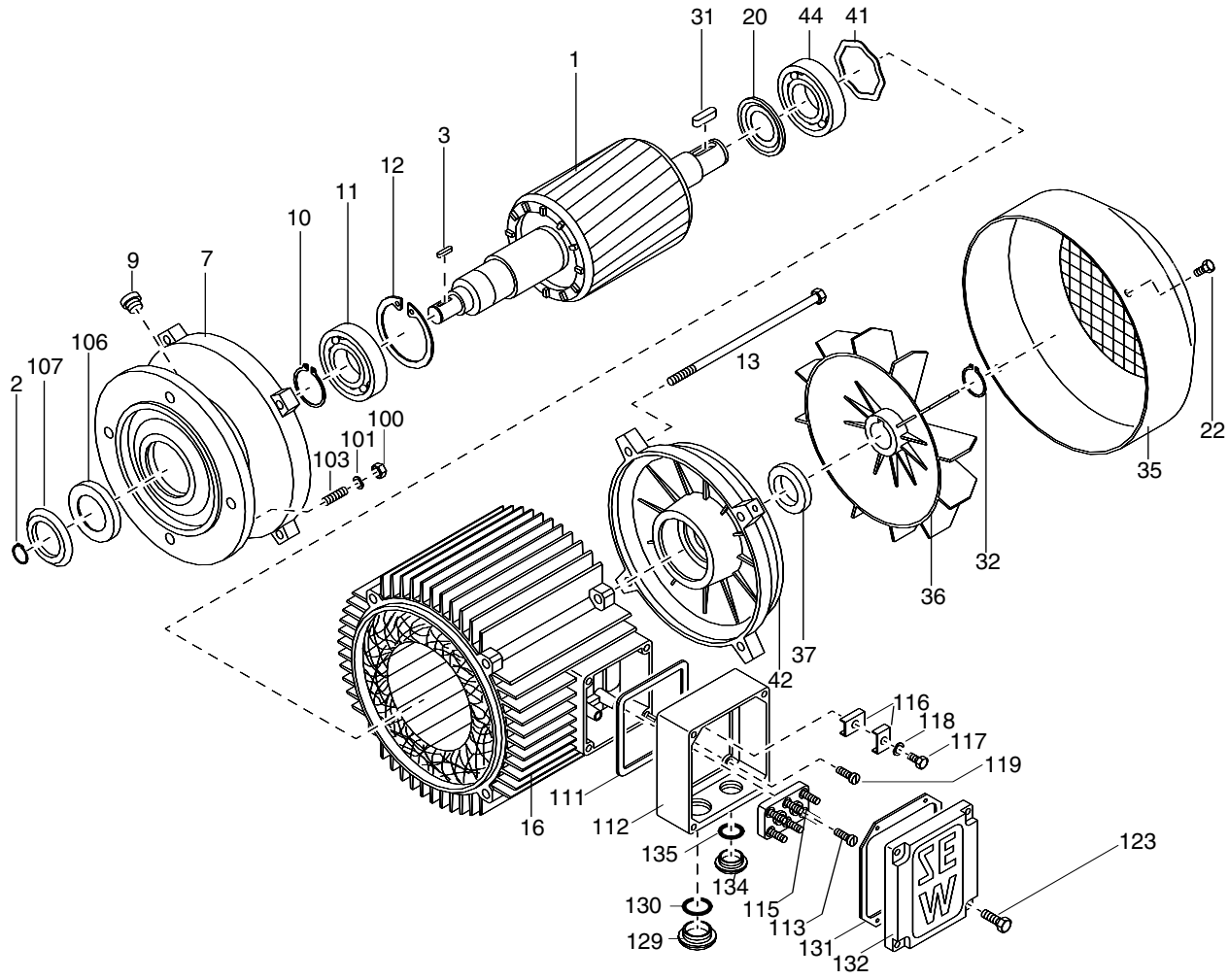
Secure key for test run without output elements. Do not deactivate monitoring and protection devices, even in test mode.

Switch off the (gear)motor whenever changes occur in relation to normal operation (e.g. increased temperature, noise, vibration), even if in doubt. Determine the cause and contact SEW-EURODRIVE, if required.

3 Motor Design

	TIP
	The following illustration shows the general structure. Its only purpose is to facilitate the assignment of components to the spare parts lists. Deviations are possible depending on the motor size and version.

3.1 AC motor



1	Rotor, complete	31	Key	107	Oil flinger	131	Sealing ring
2	Circlip	32	Circlip	111	Gasket	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 ring
9	Screw plug	37	V-ring	115	Terminal board		
10	Circlip	41	Equalizing ring	116	Terminal clip		
11	Grooved ball bearing	42	B-side endshield	117	Hex head bolt		
12	Circlip	44	Grooved ball bearing	118	Lock washer		
13	Hex head bolt (tie rod) (4x)	100	Hex nut (4x)	119	Machine screw		
16	Stator, complete	101	Lock washer (4x)	123	Hex head bolt (4x)		
20	Stainless steel ring	103	Stud (4x)	129	Screw plug		
22	Hex head bolt (4x)	106	Oil seal	130	Sealing ring		

3.2 Type code, nameplate, unit designation

3.2.1 Type code

The operating instructions apply to the following motor designs:

Standard AC motor

DT.., DV..	Foot-mounted version
DR.., ..DT.., ..DV..	Attached motor for gear units
DFR.., DFT.., DFV..	Flange-mounted version
DT..F, DV..F	Foot-mounted and flange-mounted version

Asynchronous servomotors

CT...	Foot-mounted version / attached motor sizes 71 to 90
CFT...	Flange mounted version sizes 71 to 90
CV...	Foot-mounted version / attached motor sizes 100 to 200
CFV...	Flange mounted version sizes 100 to 200

3.2.2 Nameplate for category 2 motors

Example: Category 2G

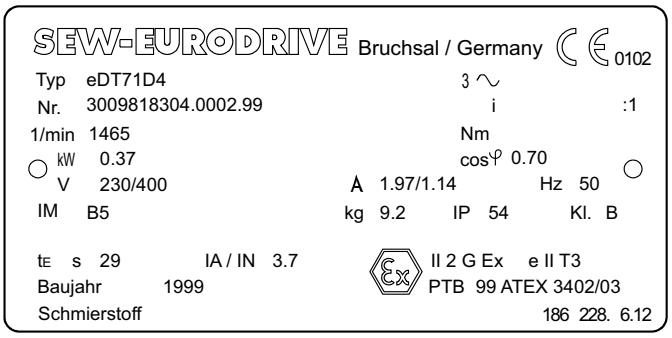


Fig. 1: Nameplate for category 2G

Example: Category 2GD

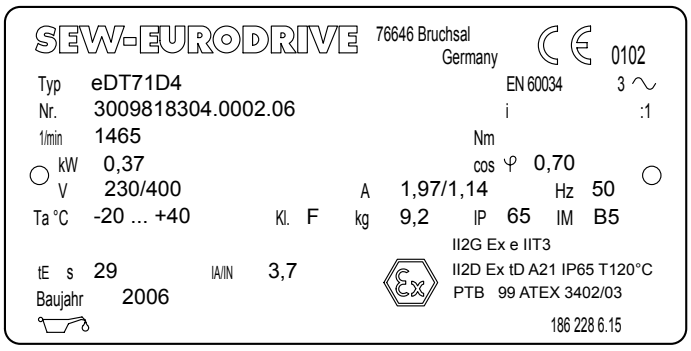
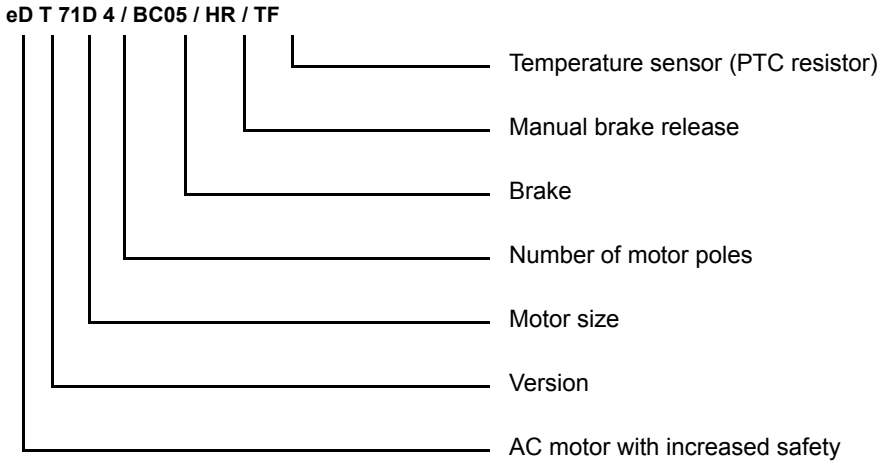


Fig. 2: Nameplate for category 2GD

3.2.3 Unit designation

Example: AC (brake) motor category 2G



3.2.4 Nameplate for category 3 motors: Motor series DR, DT(E), DV(E)

Example: Category 3GD

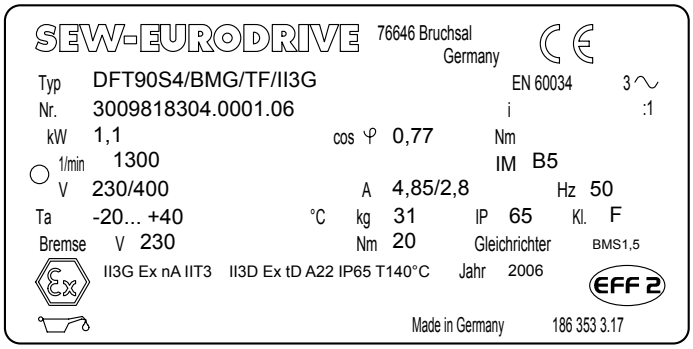
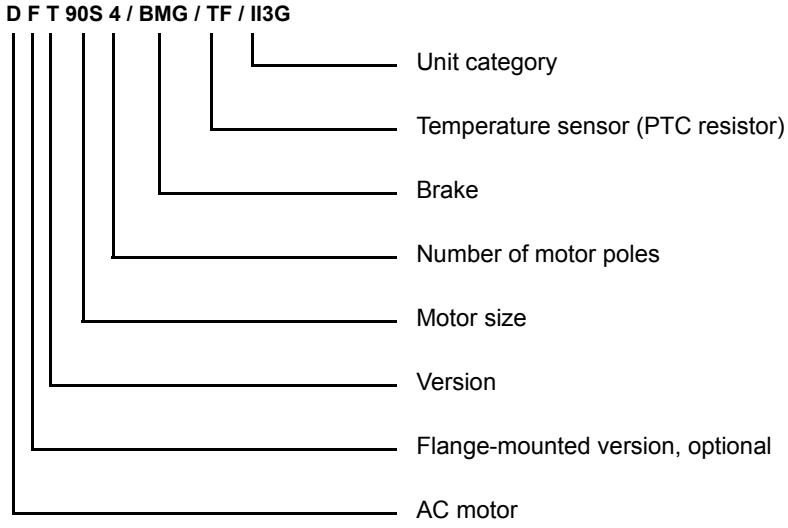


Fig. 3: Nameplate

3.2.5 Unit designation

Example: AC (brake) motor in category 3G



3.2.6 Nameplate for category 3 motors: CT, CV motor series

Example:
Category 3D

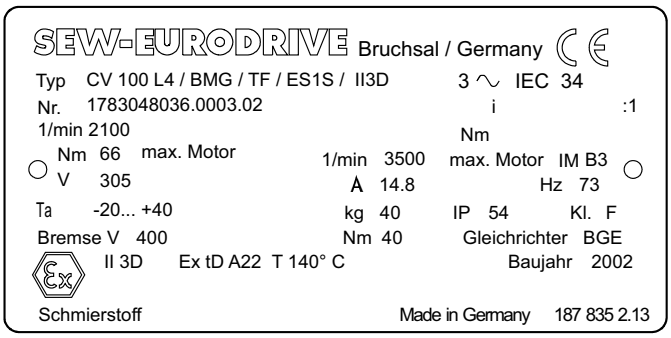
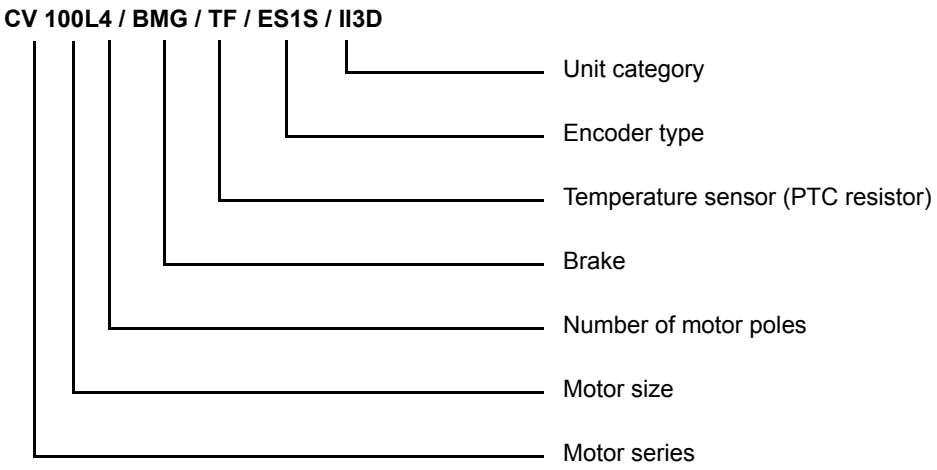


Fig. 4: Nameplate

3.2.7 Unit designation

Example:
Asynchronous servo (brake) motors in category II3D



4 Mechanical Installation

	TIP
	Observe the safety notes in section 2 during installation.

4.1 Before you begin

The drive may only be installed when

- the information on the nameplate of the drive match the voltage supply system.
- the drive is undamaged (no damage caused by transportation or storage).
- it is certain that the conditions for the operational environment are complied with (see the "Safety Notes" section).

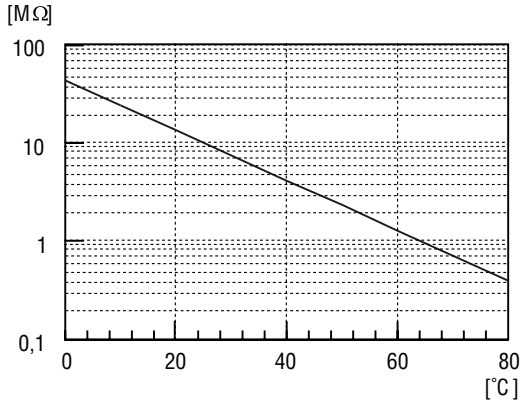
4.2 Mechanical installation

4.2.1 Preliminary work

Extended storage of motors

- Note that the service life of the lubricant in the ball bearings is reduced by 10% per year after the first year of storage.
- Check whether the motor has absorbed moisture as a result of being stored for a long time. To do so, measure the insulation resistance (measuring voltage 500 V).

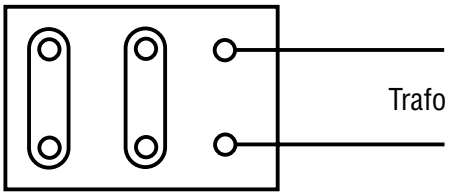
The insulation resistance (see following figure) varies greatly depending on the temperature. The motor must be dried if the insulation resistance is not adequate.



Drying the motor

Heat the motor:

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



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 fastening parts are free from corrosion
- the joint seals are OK
- the cable glands are sealed, if not, clean or replace them

4.2.2 Installation tolerances

Shaft end	Flanges
Diameter tolerance in accordance with DIN 748 • ISO k6 at ∅ ≤ 50 mm • ISO m6 at ∅ ≥ 50 mm • Center bore in accordance with DIN 332, shape DR..	Centering shoulder tolerance to DIN 42948 • ISO j6 at ∅ ≤ 230 mm • ISO h6 at ∅ ≥ 230 mm

4.2.3 Installing the motor

- The motor or gearmotor may only be mounted or installed in the specified mounting position on a level, vibration-proof and torsionally rigid support structure.
- Clean the output shafts thoroughly to ensure they are free of anti-corrosion agents (use a commercially available solvent). Do not allow the solvent to penetrate the bearings and sealing rings – this could damage the material.
- Carefully align the motor and the driven machine to avoid placing any excessive strain on the motor shafts (observe permitted overhung and axial loads).
- Do not butt or hammer the shaft end.
- Ensure that the cooling air supply is unobstructed, and make sure that the hot exhaust air from other units is not drawn in.
- Balance components for subsequent mounting on the shaft with a half key (output shafts are balanced with a half key).

	INFORMATION ABOUT EXPLOSION PROTECTION
	• If using belt pulleys: – Only use belts that do not build up an electrostatic charge. – Do not exceed the maximum permitted overhung load; for motors without gear units, see the "Maximum permitted overhung loads" section (see page 118). • Use an appropriate cover to protect motors in vertical mounting positions from objects or fluids entering (protection cowl C).

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.
- Coat the threads of cable glands and screw plugs with sealing compound and tighten them well – then coat them again.
- Seal the cable entry well.
- Clean the sealing surfaces of the terminal box and the terminal box cover carefully before re-assembly; gaskets have to be glued in on one side. Replace brittle gaskets.
- Restore the anticorrosion coating if necessary.
- Check the validity of the degree of protection according to nameplate.

5 Electrical Installation

	TIP
	• Observe the safety notes in section 2 during installation. • Use switch contacts in utilization category AC-3 according to EN 60947-4-1 for switching the motor and the brake.

5.1 General information

5.1.1 Additional regulations for potentially explosive atmospheres

In addition to the generally applicable installation regulations for low-voltage electrical equipment (e.g. DIN IEC 60364, DIN EN 50110), it is also necessary to comply with the special provisions on setting up electrical machinery in potentially explosive atmospheres (operating safety regulations in Germany; EN 60079-14; EN 50281-1-2; EN 61241-14 and specific provisions for the machine).

5.1.2 Compulsory use of the wiring diagrams

Connect the motor only as shown in the wiring diagram included with the motor. Do not connect or start up the motor if this wiring diagram is missing. You can obtain the valid wiring diagram from SEW-EURODRIVE free of charge.

5.1.3 Cable entries

The terminal boxes have metric tapped holes according to EN 50262 or NPT tapped holes according to ANSI B1.20.1-1983. All metric cable entries are provided with ATEX certified closing plugs.

To establish the correct cable entry, the closing plugs must be replaced by ATEX-approved cable glands with strain relief. Select the cable gland corresponding to the outside diameter of the cable used. The IP enclosure of the cable entry must be at least as high as the IP enclosure of the motor.

All cable entries that are not required must be sealed off with an ATEX certified closing plug after completion of the installation (→ Maintaining the enclosure).

5.1.4 Equipotential bonding

In accordance with EN 60079-14, IEC 61241-14 and EN 50281-1-1, a connection to an equipotential bonding system may be required. Observe the "Improving the grounding (EMC)" section (see page 20).

5.2 Wiring notes

Comply with the safety notes during installation.

5.2.1 Protection against interference from brake controls

To protect against interference from brake controls, do not run brake cables together with switched-mode power cables in one cable.

Switched-mode power cables include in particular:

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

5.2.2 Protection against interference from motor protection devices

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

- Route sensor cables together with motor cables in one cable. Only SEW hybrid cables can be used for this purpose.

  Take particular care to check that the wiring is EMC compliant when connecting the cables.
- Do not route unshielded supply cables together with switched-mode power cables in one cable.

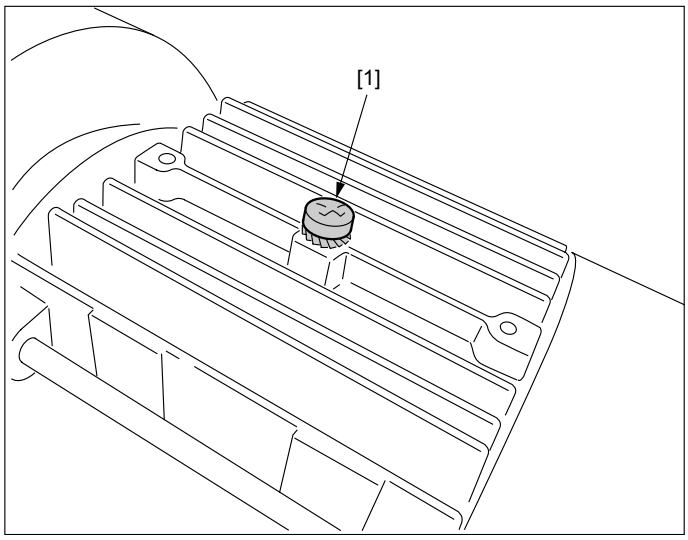
5.3 Special features when operating with a frequency inverter

When motors are supplied from inverters, you must observe the corresponding wiring instructions issued by the manufacturer of the inverter. It is essential to observe the "Operating Modes and Limits" section and the operating instructions of the frequency inverter.

5.4 Improving the grounding (EMC)

For improved, low-impedance grounding at high frequencies, we recommend using the following connections with the DR/DV(E)/DT(E) AC motors:

- Size DT71 to DV(E)132S: [1] M5x10 self-tapping screw and 2 serrated lock washers according to DIN 6798 in the stator housing.



- Sizes DV(E)112M to DV(E)280: Screw and 2 serrated lock washers in the bore of the eyebolt.

  Thread size of the eyebolt:

  – DV(E)112/132S: M8
  – DV(E)132M to 180L: M12
  – DV(E)200 to 280: M16

5.5 Ambient conditions during operation

5.5.1 Ambient temperature

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

5.5.2 Installation altitude

The maximum installation altitude of 1000 m above sea level must not be exceeded unless a different installation height is specified on the nameplate.

5.5.3 Hazardous radiation

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

5.5.4 Hazardous gases, vapors and dusts

If used according to their designated use, explosion-proof motors are incapable of igniting explosive gases, vapors or dusts. However, explosion-proof motors may not be subjected to gases, vapors or dusts that endanger operational safety, for example through

- Corrosion
- Damage to the protective coating
- Damage to the sealing material

etc.

5.6 Motors and brake motors in category 2G, 2D and 2GD

5.6.1 General information

The explosion-proof and dust explosion-proof SEW-EURODRIVE motors of the eDR, eDT and eDV series are designed for the following application zones.

Motor category	Area of application
2G	Application in zone 1 and compliance with the design requirements for equipment group II, category 2G.
2D	Application in zone 21 and compliance with the design requirements for equipment group II, category 2D.
2GD	Application in zone 1 or zone 21 and compliance with the design requirements for equipment group II, category 2GD.

5.6.2 Brakes in flameproof enclosure protection type "d"

In addition, SEW-EURODRIVE offers brakes in the determinant protection type "d" to EN 50018 or EN 60079-1 for use in potentially explosive atmospheres. With brake motors, the flameproof enclosure only extends to the brake cavity. The motor and the wiring space for the brake are designed in protection type "e".

5.6.3 Terminal boxes

Depending on the category, the terminal boxes have the following minimum degrees of protection.

Motor category	Enclosure
2G	IP54
2D	IP65
2GD	IP65

5.6.4 Designation "X"

If the designatioin "X" appears after the certificate number of the declaration of conformity or the EC prototype test certificate, this indicates that the certificate contains special conditions for safe application of the motors.

5.6.5 Temperature classes

The motors are authorized for temperature classes T3 and T4. The temperature class of the motor can be found on the nameplate, the declaration of conformity or the EC prototype test certificate supplied with each motor.

5.6.6 Surface temperature

The surface temperature is max. 120 °C. The surface temperature of the motor can be found on the nameplate, the declaration of conformity or the EC prototype test certificate.

5.6.7 Protection against excessively high surface temperatures

The increased safety protection type requires that the motor be switched off before it reaches the maximum permitted surface temperature.

The motor can be protected with a motor protection switch or a positive temperature coefficient (PTC) thermistor. The type of motor protection is specified in the EC prototype test certificate.

5.6.8 Protection exclusively with motor protection switch

Note the following when installing the motor protection switch according to EN 60947:

- **For categories 2G and 2GD:** With starting current ratio I_A/I_N listed on the nameplate, the response time of the motor protection switch must be less than the t_E heating time of the motor.
- The motor protection switch must trip immediately if a phase fails.
- The motor protection switch must be approved by a named body and provided with a corresponding inspection number.
- The motor protection switch must be set to the rated motor current indicated on the nameplate or in the prototype test certificate.

5.6.9 Protection exclusively with PTC thermistor (TF)

The positive coefficient thermistor must be evaluated using a suitable device. Observe the applicable installation regulations.

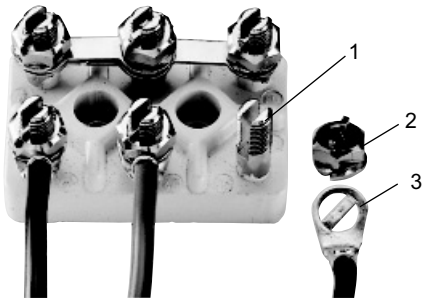
5.6.10 Protection with motor protection switch and additional PTC thermistor

The conditions stated for exclusive protection with motor protection switches also apply here. Protection with positive temperature coefficient thermistors (TF) represents only a supplementary protection measure, which is irrelevant to certification for potentially explosive conditions.

	INFORMATION ABOUT EXPLOSION PROTECTION
	Proof of the efficacy of the installed protective equipment is required prior to startup.

5.6.11 Motor connection

Motors with a terminal block with slotted terminal studs [1] according to Directive 94/9/EC (see following illustration) may only be connected using cable lugs [3] according to DIN 46295. The cable lugs [3] are attached using forcing nuts with an integrated lock washer [2].



Alternatively, a solid round wire may be used for the connection. The diameter of the wire must correspond to the width of the slot in the terminal stud (→ following table).

Motor size	Slot width of the terminal stud [mm]	Tightening torque of forcing nut [Nm]
eDT 71 C, D	2.5	4.0
eDT 80 K, N		
eDT 90 S, L		
eDT 100 LS, L		
eDV 100 M, L		
eDV 112 M	3.1	4.0
eDV 132 S		
eDV 132 M, ML	4.3	6.0
eDV 160 M		
eDV 160 L	6.3	10.0
eDV 180 M, L		

Observe the permitted air and creeping distances when connecting the supply system cable.

5.6.12 Connecting the motor

	TIP
	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 following wiring diagrams can be obtained from SEW-EURODRIVE by specifying the motor order number (see "Type code, nameplate" section):

Series	Number of poles	Pertinent wiring diagram (designation/number) X = placeholder for version
eDR 63	4, 6	DT14 / 08 857 X 03
eDT and eDV	4, 6	DT13 / 08 798 X 06
eDT with brake BC	4	AT101 / 09 861 X 04

Checking cross sections

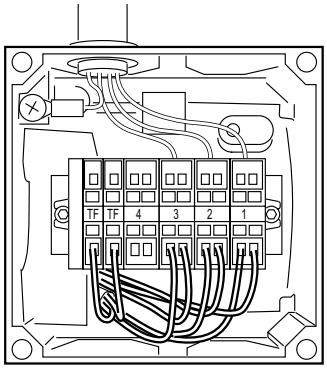
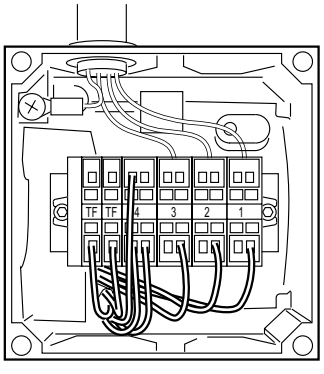
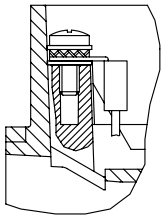
Check the cross sections of the cables based on the rated motor current, the valid installation regulations and the requirements where the unit is installed.

Check the winding connections

Check the winding connections in the terminal box and tighten them if necessary (→ observe tightening torque).

Motor connection

With size 63 motors, the supply cables must be secured in the spring clamp terminal strip according to the wiring diagram. Connect the protective earth to the protective conductor connection so that the cable lug and housing material are separated by a washer.

△ connection	⅄ connection	PE connection
		

	TIP
	The terminal box must be free of foreign objects, dirt and humidity. Unused cable entry openings and the terminal box itself must be closed so they are at least in accordance with the IP degree of protection of the motor.

TF temperature sensor

⚠ NOTICE

Damage to the temperature sensor due to excessive voltage.

Possible destruction of the temperature sensor.

- Do not apply any voltages > 30 V.

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

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

- Standard measured values: 20 to 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, the thermal protection function must be brought into effect immediately.

5.6.13 Connecting the brake

The BC flameproof brake (Ex de) is released electrically. The brake is applied mechanically after the voltage is switched off.

Inspecting the ignition gaps

Check the ignition gaps of the flameproof brake for damage before establishing the connection.

Checking cross sections

The cross sections of the connection cables between the rectifier and the brake must be sufficiently large to guarantee the function of the brake (see "Operating currents" in the "Technical Data" section).

Connecting the brake

The brake rectifier from SEW-EURODRIVE is installed and connected in the control cabinet according to the enclosed circuit diagram, outside the potentially explosive atmosphere. Connect the connection cables between the rectifier and the separate brake terminal box on the motor.

Electrical connection

Connection boxes of the brake have protection type "e".

The maximum cross section that can be connected to the tension spring terminals is 2.5 mm².

5.6.14 Special requirements for the BC brake

The gap values of the BC brake differ from the values in table 1 of the standard EN 60079-1. Reworking the ignition gaps is only permitted if it is based on the gap widths that were determined when the brake was approved. The permitted dimensions and their tolerances are available from SEW-EURODRIVE if required.

5.7 Motors and brake motors of category 3G, 3D and 3GD

5.7.1 General information

The explosion-proof and dust explosion-proof SEW-EURODRIVE motors of the DR 63, DT, DTE, DV and DVE series are designed for the following application zones.

Motor category	Area of application
3G	Application in zone 2 and compliance with the design requirements for equipment group II, category 3G.
3D	Application in zone 22 and compliance with the design requirements for equipment group II, category 3D.
3GD	Application in zone 2 or 22 and compliance with the design requirements for equipment group II, category 3GD.

5.7.2 Enclosure IP54

SEW-EURODRIVE motors in category 3G, 3D and 3GD are supplied with at least enclosure IP54.

5.7.3 Operation at high ambient temperatures

If the nameplate indicates that motors are allowed to be operated up to an ambient temperature of > 50 °C (standard: 40 °C), it is essential that the cables and cable glands used are suited for temperatures ≥ 90 °C.

5.7.4 Temperature class / surface temperature

The motors are designed for temperature class T3. The maximum surface temperature is 120 °C or 140 °C.

5.7.5 Protection against excessively high surface temperatures

Explosion-proof motors in categories 3G, 3D and 3GD ensure safe operation under normal operating conditions. The motor must be switched off securely in the case of overload to avoid the risk of excessively high surface temperatures.

The motor can be protected with a motor protection switch or a positive temperature coefficient (PTC) thermistor. The permitted operating modes depending on the motor protection are listed in the "Permitted operating modes" section (see page 46). SEW-EURODRIVE equips brake motors and multi-speed motors in category 3G, 3D and 3GD with positive coefficient thermistors (TF).

5.7.6 Protection exclusively with motor protection switch

Note the following when installing the motor protection switch according to EN 60947:

- The motor protection switch must trip immediately if a phase fails.
- The motor protection switch must be set to the rated motor current indicated on the nameplate.
- Multi-speed motors must be protected with mutually interlocked motor protection switches for each number of poles.

5.7.7 Protection exclusively with PTC thermistor (TF)

The positive coefficient thermistor must be evaluated using a suitable device. Observe the applicable installation regulations.

5.7.8 Protection with motor protection switch and additional PTC thermistor

The conditions stated for exclusive protection with motor protection switches also apply here. Protection with positive temperature coefficient thermistors (TF) represents only a supplementary protection measure, which is irrelevant to certification for potentially explosive conditions.

	INFORMATION ABOUT EXPLOSION PROTECTION
	Proof of the efficacy of the installed protective equipment is required prior to startup.

5.7.9 Connecting the motor

	TIP
	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 following wiring diagrams can be obtained from SEW-EURODRIVE by specifying the motor order number (see Sec. "Unit designation, nameplate"):

Series	Number of poles	Connection	Pertinent wiring diagram (designation/number) X = placeholder for version
DR63	4, 6	△ / 人	DT14 / 08 857 X 03
DT, DV, DTE, DVE	4, 6, 8	人 / △	DT13 / 08 798 X 6
	8/4 in Dahlander connection	人 / △ △	DT33 / 08 799 X 6
		人 △ / 人 人	DT53 / 08 739 X 1
	All multi-speed motors with separate windings	人 / 人	DT43 / 08 828 X 7
		△ / 人	DT45 / 08 829 X 7
		人 / △	DT48 / 08 767 X 3

Checking cross sections

Check the cross sections of the cables based on the rated motor current, the valid installation regulations and the requirements where the unit is installed.

Check the winding connections

Check the winding connections in the terminal box and tighten them if necessary.

Motor connection

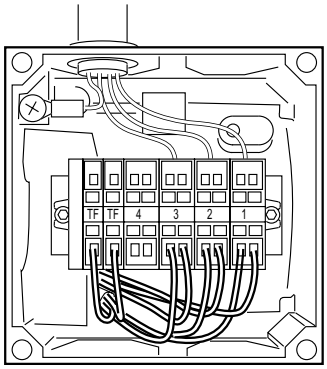
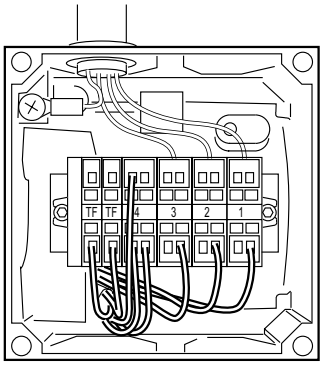
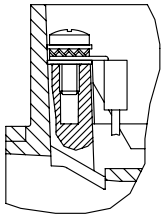
The motors are supplied and connected differently depending on the size and electrical design. Comply with the connection type specified in the table below.

Series	Connection
DR63	Motor connection via tension spring terminal strip
DT, DV, DTE, DVE	Motor connection via terminal board

Observe the permitted air and creeping distances when connecting the supply system cable.

Motor connection tension spring terminal strip

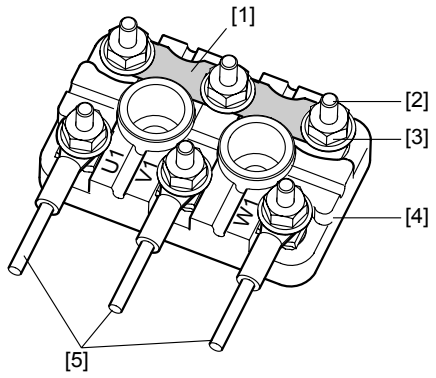
With size 63 motors, the supply cables must be secured in the spring clamp terminal strip according to the wiring diagram. Connect the protective earth to the protective conductor connection so that the cable lug and housing material are separated by a washer.

△ connection	⅄ connection	PE connection
		

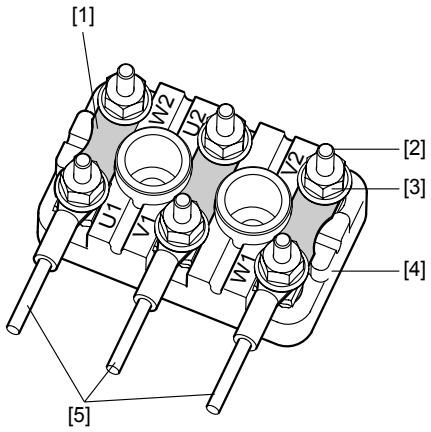
Connecting the motor via terminal boxes

- In accordance with the wiring diagram provided
- Check cable cross section
- Arrange terminal links correctly
- Firmly screw on connections and protective earth conductors
- In the terminal box: Check winding connections and tighten them if necessary

Arrangement of terminal links with ⅄ connection



Arrangement of terminal links with △ connection
Motor size DT.71-DV.225:



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

TIP

The terminal box must be free of foreign objects, dirt and humidity. Unused cable entry openings and the terminal box itself must be closed so they are at least in accordance with the IP degree of protection of the motor.

Motor connection terminal box

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

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

Motor size DT.71-DV.100							
Terminal stud ∅	**Tightening torque for the hex nut**	**Connection at customer end Cross section**	**Version**	**Connection type**	**Scope of delivery**	**PE terminal stud ∅**	**Version**
M4	**1.6 Nm**	**≤ 1.5 mm²**	**1a**	**Solid wire conductor end sleeve**	**Pre-assembled terminal links**	M5	4a
		≤ 6 mm²	**1b**	**Ring cable lug**	**Pre-assembled terminal links**		4b
		≤ 6 mm²	2	Ring cable lug	Small connection accessories enclosed in bag		
M5	2.0 Nm	≤ 2.5 mm²	1a	Solid wire conductor end sleeve	Pre-assembled terminal links		4a
		≤ 16 mm²	1b	Ring cable lug	Pre-assembled terminal links		4b
		≤ 16 mm²	2	Ring cable lug	Small connection accessories enclosed in bag		
M6	3.0 Nm	≤ 35 mm²	3	Ring cable lug	Small connection accessories enclosed in bag		

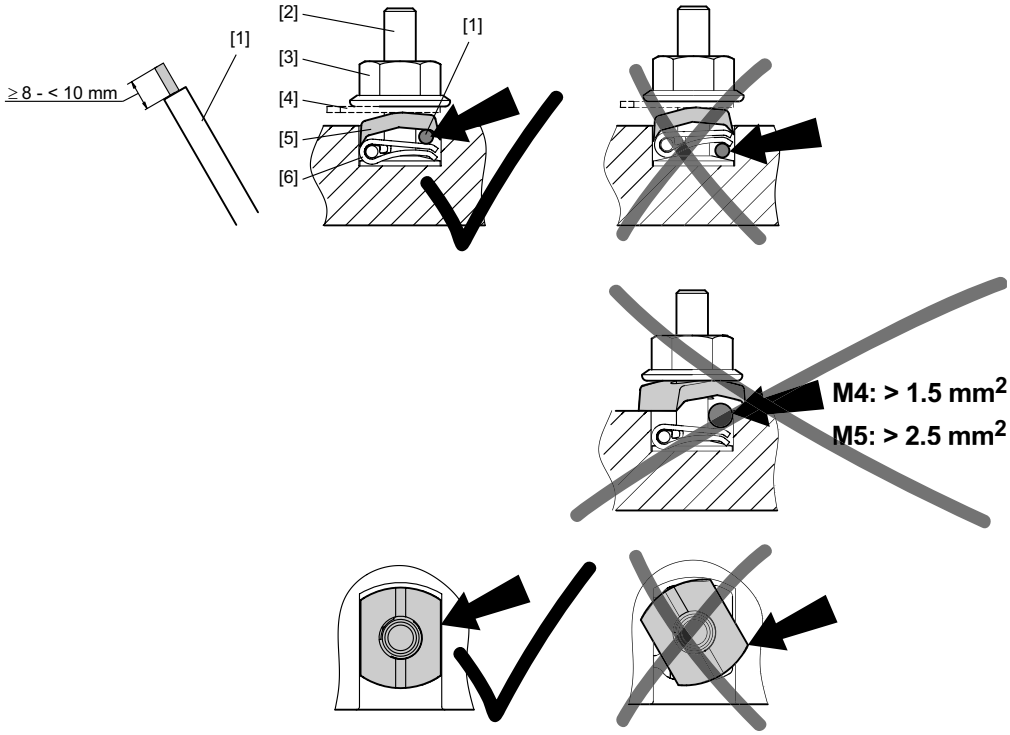
Motor size DV.112-DV.132S							
Terminal stud ∅	**Tightening torque for the hex nut**	**Connection at customer end Cross section**	**Version**	**Connection type**	**Scope of delivery**	**PE terminal stud ∅**	**Version**
M5	**2.0 Nm**	**≤ 2.5 mm²**	**1a**	**Solid wire conductor end sleeve**	**Pre-assembled terminal links**	M5	4a
		≤ 16 mm²	**1b**	**Ring cable lug**	**Pre-assembled terminal links**		4b
		≤ 16 mm²	2	Ring cable lug	Small connection accessories enclosed in bag		
M6	3.0 Nm	≤ 35 mm²	3	Ring cable lug	Small connection accessories enclosed in bag		

Motor size DV.132M-DV.160M							
Terminal stud ∅	**Tightening torque for the hex nut**	**Connection at customer end Cross section**	**Version**	**Connection type**	**Scope of delivery**	**PE terminal stud ∅**	**Version**
M6	**3.0 Nm**	**≤ 35 mm²**	**3**	**Ring cable lug**	**Small connection accessories enclosed in bag**	M8	5
M8	6.0 Nm	≤ 70 mm²	3	Ring cable lug	Small connection accessories enclosed in bag	M10	5

Motor size DV.160L-DV.225							
Terminal stud ∅	**Tightening torque for the hex nut**	**Connection at customer end** **Cross section**	**Version**	**Connection type**	**Scope of delivery**	**PE terminal stud** ∅	**Version**
M8	**6.0 Nm**	**≤ 70 mm²**	**3**	**Ring cable lug**	**Small connection accessories enclosed in bag**	M8	5
M10	10 Nm	≤ 95 mm²	3	Ring cable lug	Small connection accessories enclosed in bag	M10	5
M12	15.5 Nm	≤ 95 mm²	3	Ring cable lug	Connection parts, preassembled	M10	5

Motor size DV.250-DV.280							
Terminal stud ∅	**Tightening torque for the hex nut**	**Connection at customer end** **Cross section**	**Version**	**Connection type**	**Scope of delivery**	**PE terminal stud** ∅	**Version**
M10	**10 Nm**	**≤ 95 mm²**	**3**	**Ring cable lug**	**Small connection accessories enclosed in bag**	**M10**	**5**
M12	15.5 Nm	≤ 95 mm²	3	Ring cable lug	Connection parts, preassembled	M10	5

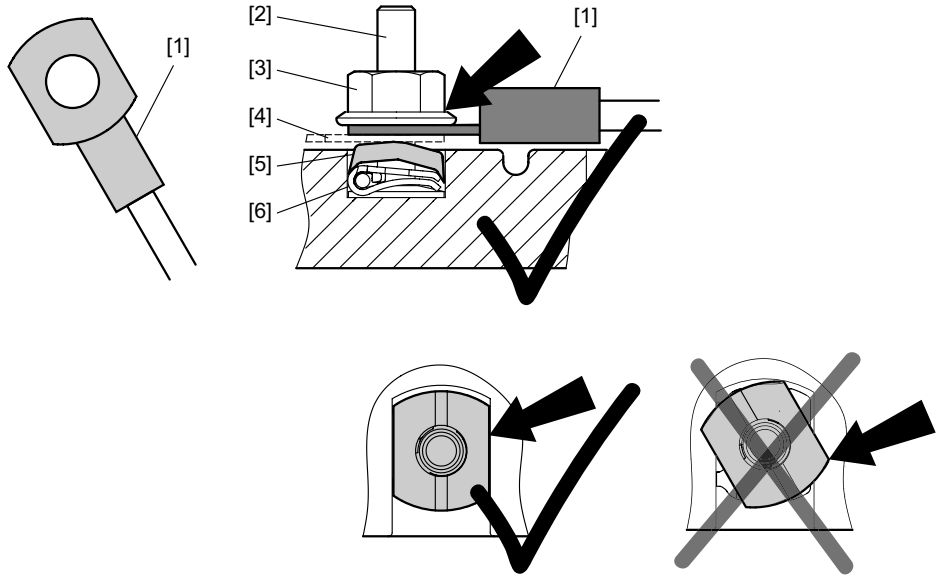
Type 1a:



88866955

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

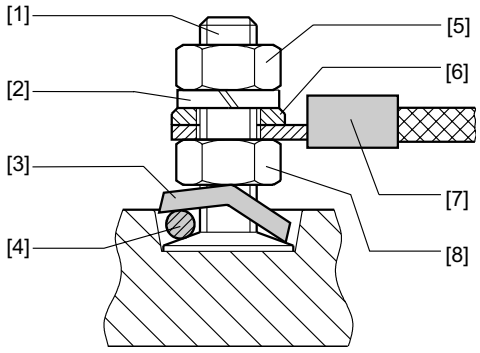
Type 1b:



88864779

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

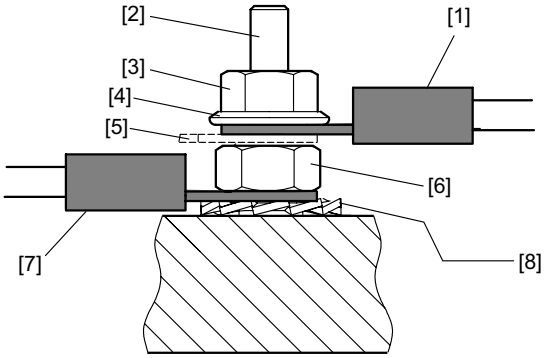
Type 2



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, e.g. according to DIN 46237 or DIN 46234
[8] Lower nut

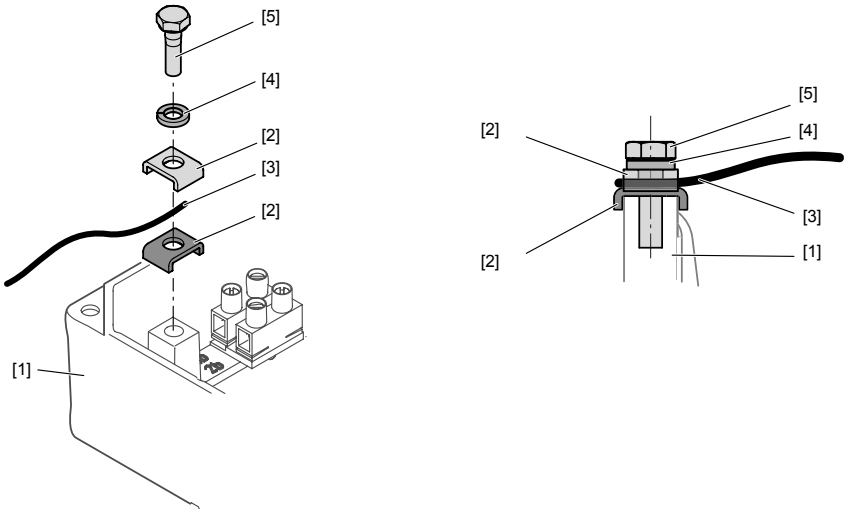
Type 3



199641099

[1] External connection with ring cable lug, e.g. according to DIN 46237 or DIN 46234
[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

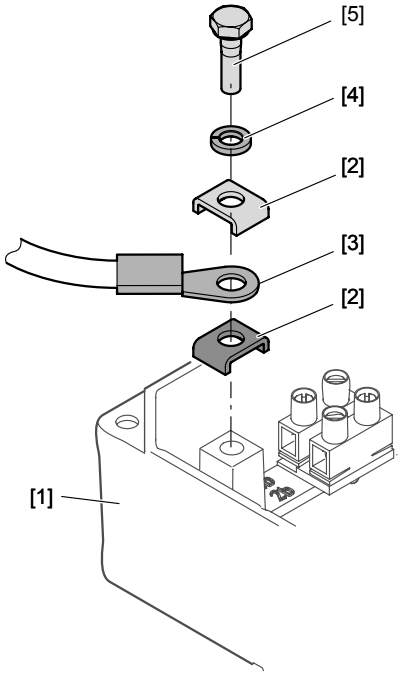
Type 4a

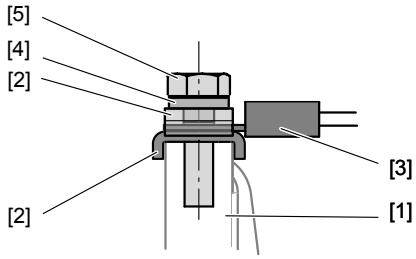


1139606667

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

Type 4b

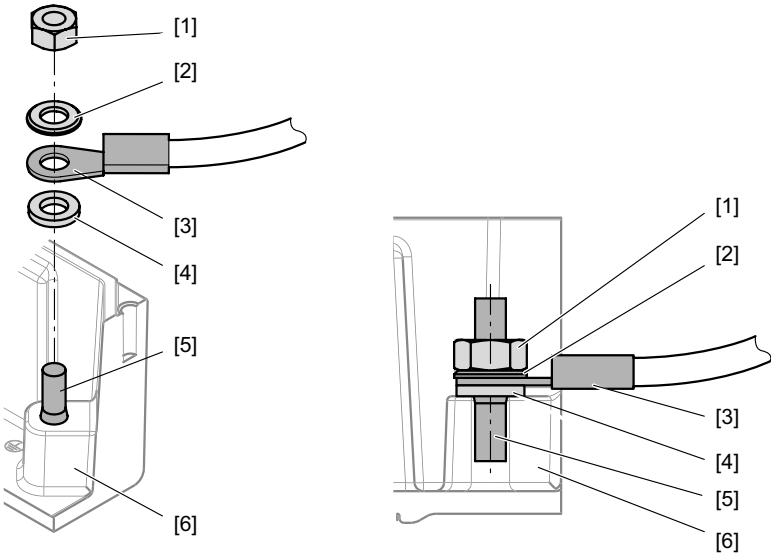




1583271179

[1] Terminal box
[2] Terminal clip
[3] PE conductor with cable lug
[4] Lock washer
[5] Hex head bolt

Type 5



1139608587

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

TF temperature sensor

NOTICE

Damage to the temperature sensor due to excessive voltage.

Possible destruction of the temperature sensor.

- Do not apply any voltages > 30 V.

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

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

- Standard measured values: 20 to 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, the thermal protection function must be brought into effect immediately.

5.7.10 Connecting the brake

The BMG/BM brake is released electrically. The brake is applied mechanically after the voltage is switched off.

Note the limits for permitted work done

⚠ DANGER

Explosion hazard if the maximum permitted braking work per braking operation is exceeded.

Severe or fatal injuries

- The maximum braking work per braking operation must not be exceeded, not even in the case of emergency braking operations.
- It is essential to adhere to the limits for permitted work done (see "Permitted work done by the brake" section (see page 106)).
- The machine designer is responsible for ensuring that the machine dimensions are selected correctly on the basis of the SEW-EURODRIVE project planning regulations and the brake data in "Drive Engineering – Practical Implementation, Vol. 4".

Checking the function of the brake

Check that the brake is functioning correctly prior to startup to make sure the brake linings are not rubbing, as this would lead to excessive heating.

Checking cross sections

The cross sections of the connection cables between the power system, the rectifier and the brake must be sufficiently large to guarantee the function of the brake (see Sec. "Operating currents" in "Technical Data").

Connecting the brake rectifier

Depending on its design and function, the SEW-EURODRIVE brake rectifier or brake control system is installed and connected according to the enclosed circuit diagram. For category 3G and 3GD, the brake rectifier or brake control system has to be installed in the control cabinet outside the potentially explosive area. For category 3D, installation is permitted in the control cabinet outside the potentially explosive area or in the terminal box of the motor.

Connecting the microswitch

Connect the microswitch as described in the "Connecting the microswitch" section (see page 45).

5.7.11 Connecting VE forced cooling fan

Category II3D motors can be equipped with a forced cooling fan as an option. For notes on connection and safe operation, refer to the operating instructions of the VE forced cooling fan.

5.8 Category 3D asynchronous servomotors

5.8.1 General information

The explosion-proof / dust explosion-proof SEW-EURODRIVE motors of the CT and CV series are designed for the following application zones.

Motor category	Area of application
3D	Application in zone 22 and compliance with the design requirements for equipment group II, category 3D.

5.8.2 Enclosure IP54

SEW-EURODRIVE motors in category II3D are supplied with at least enclosure IP54.

5.8.3 Operation at high ambient temperatures

If the nameplate indicates that motors are allowed to be operated up to an ambient temperature of > 50 °C (standard: 40 °C), it is essential that the cables and cable entries used are suited for temperatures ≥ 90 °C.

5.8.4 Temperature class/surface temperature

The maximum surface temperature is 120 °C or 140 °C, depending on the type.

5.8.5 Speed classes

The motors are designed in speed classes 1200 rpm, 1700 rpm, 2100 rpm and 3000 rpm (see the "Operating Modes and Limits" section).

5.8.6 Excessively high surface temperatures

Explosion-proof motors in category II3D ensure safe operation under normal operating conditions. The motor must be switched off securely in the case of overload to avoid the risk of excessively high temperatures.

5.8.7 Protection against overtemperature

To ensure that the permitted limit temperature is not exceeded, explosion-proof asynchronous servomotors in the CT and CV series are always equipped with a positive temperature coefficient thermistor (TF). When installing the positive temperature coefficient thermistor, it is important that the sensor is evaluated by a device approved for this purpose so it complies with the 94/9/EC directive. Observe the applicable installation regulations.

5.8.8 Connecting the motor

	**TIP** 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 following wiring diagrams can be obtained from SEW-EURODRIVE by specifying the motor order number (see the "Unit designation, nameplate" sectíon):

Series	Number of poles	Connection	Pertinent wiring diagram (designation/number) X = placeholder for version
CT, CV	4	△ / 人	DT13 / 08 798 X 6

Checking cross sections

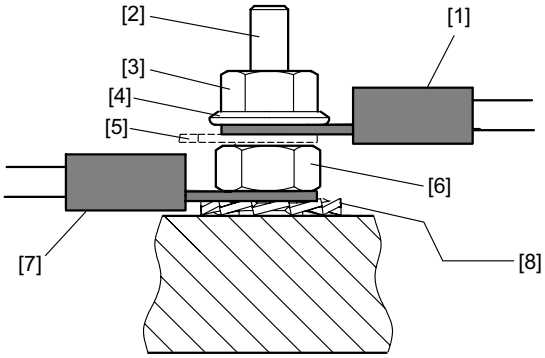
Check the cross sections of the cables based on the rated motor current, the valid installation regulations and the requirements where the unit is installed.

Check the winding connections

Check the winding connections in the terminal box and tighten them if necessary.

	**TIP** The terminal box must be free of foreign objects, dirt and humidity. Unused cable entry openings and the terminal box itself must be closed so they are at least in accordance with the IP degree of protection of the motor.

Motor connection



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

Tightening torques

Arrange the cables and terminal links as shown in the wiring diagram and screw them on firmly. Observe the tightening torques specified in the table below.

Diameter of the terminal stud	Tightening torque of the hex nut [Nm]
M4	1.6
M5	2
M6	3
M8	6
M10	10
M12	15.5
M16	30

TF temperature sensor

⚠ NOTICE

Damage to the temperature sensor due to excessive voltage.

Possible destruction of the temperature sensor.

- Do not apply any voltages > 30 V.

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

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

- Standard measured values: 20 to 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, the thermal protection function must be brought into effect immediately.

5.8.9 Connecting the brake

The BMG/BM brake is released electrically. The brake is applied mechanically after the voltage is switched off.

Note the limits for permitted work done

⚠ DANGER

Explosion hazard if the maximum permitted braking work per braking operation is exceeded.

Severe or fatal injuries

- The maximum braking work per braking operation must not be exceeded, not even in the case of emergency braking operations.
- It is essential to adhere to the limits for permitted work done (Sec. "Permitted work done by the brake" (see page 106)).
- The machine designer is responsible for ensuring that the machine dimensions are selected correctly on the basis of the SEW-EURODRIVE project planning regulations and the brake data in "Drive Engineering – Practical Implementation, Vol. 4".

Checking the function of the brake

Check that the brake is functioning correctly prior to startup to make sure the brake linings are not rubbing, as this would lead to excessive heating.

Checking cross sections

The cross sections of the connection cables between the power system, the rectifier and the brake must be sufficiently large to guarantee the function of the brake (see "Operating currents" in the "Technical Data" section).

Connecting the brake rectifier

Depending on its design and function, the SEW-EURODRIVE brake rectifier or brake control system is

- connected in the terminal box of the motor
- in the switch cabinet outside the potentially explosive atmosphere.

The connection cables between the voltage supply, rectifier and brake connections must always be connected according to the wiring diagram.

Connecting the microswitch

Connect the microswitch as described in the "Connecting the microswitch" section (see page 45).

5.8.10 Connecting VE forced cooling fan

Category II3D motors can be equipped with a forced cooling fan as an option. For notes on connection and safe operation, refer to the operating instructions of the VE forced cooling fan.

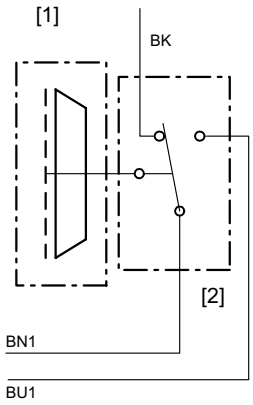
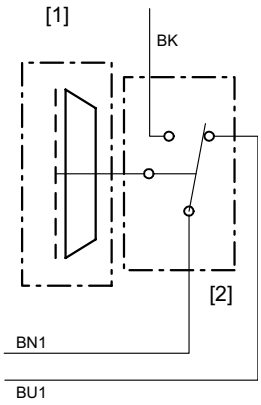
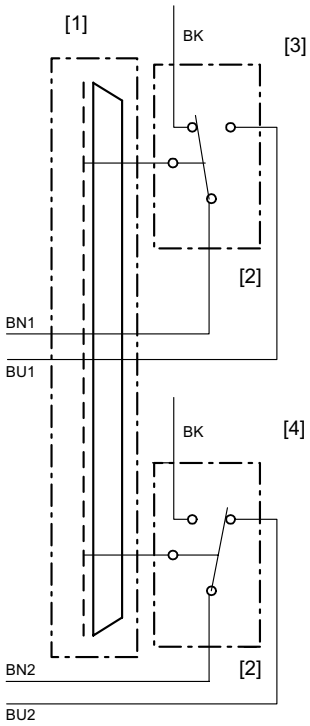
5.9 Connecting the microswitch

The microswitch is connected according to the wiring diagram 09 825 xx 08 assigned to the drive.

The microswitch must be powered via a circuit with an energy limit.

The requirements of EN 60079-15 must be fulfilled or exceeded for areas containing potentially explosive gas/air mixtures. The energy limit is dependent on the gas/air mixture used and must be designed according to the explosion group IIA, IIB or IIC.

The requirements of EN 61241-11 must be met for dust/air mixtures. The power supply must correspond to protection level "ic" according to EN 60079-11. The explosion group must be selected according to the ignition energy of the dust/air mixture, but correspond at least to explosion group IIB.

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

6 Operating Modes and Limits

6.1 Permitted operating modes

Motor type and unit category	Protection against excessively high temperatures exclusively by	Permitted operating mode
eDT../eDV.. II2G	Motor protection switch	• S1 • Heavy starting not possible[1)]
eDT..BC.. II2G	PTC thermistor (TF)	• S1 • S4/No-load starting frequency according to catalog data/Starting frequency is to be calculated under load • Frequency inverter operation according to specifications • Heavy start[1)]
eDT../eDV.. II2D	Motor protection switch and positive coefficient temperature thermistor (TF)	• S1 • No heavy start[1)] • Frequency inverter operation according to specifications
DR/DT(E)/DV(E) II3GD/II3D	Motor protection switch	• S1 • No heavy start[1)]
DR/DT(E)/DV(E) DT(E)..BM../ DV(E)..BM.. II3GD/II3D	PTC thermistor (TF)	• S1 • S4/No-load starting frequency according to catalog data/Starting frequency is to be calculated under load • Heavy start[1)] • Frequency inverter operation according to specifications • With soft-start units

1) Heavy starting is occurring when a motor protection switch that was properly selected and set for normal operating conditions trips during the acceleration time. This is usually the case when the acceleration time is > 1.7 x t_E time.

6.2 Frequency inverter operation in category 2G and 2GD

6.2.1 Using motors of category 2G and 2GD

INFORMATION ABOUT EXPLOSION PROTECTION

The following applies,

- The frequency inverter can only be operated with motors that are permitted for this operating mode according to the EC prototype test certificate.
- It is not permitted to operate more than one of the described motors on one frequency inverter.
- The voltage at the motor terminal board must be projected to prevent excessive overheating.
- Verification that the motor voltage matches the specifications of the EC prototype test certificate must be provided during startup.
- If the motor voltage is too low (undercompensation), slip increases, which causes greater heating in the rotor of the motor.
- If the motor voltage is too high (overcompensation), the stator current is very high and the winding temperature rises more sharply.
- If the mechanical load is the same, operation on a frequency inverter causes a more significant motor temperature rise due to the harmonic content in current and voltage.

6.2.2 Conditions for safe operation

General information

Install the frequency inverter outside the potentially explosive atmosphere.

Motor/frequency inverter combination

Inverters must fulfill the following conditions when supplying explosion-proof motors:

- Control process: constant machine flow
- Rated output current of the frequency inverter ≤ twice the rated motor current
- Clock frequency > 3 kHz

Thermal motor protection

Thermal motor protection is ensured by the following measures:

- Winding temperature monitoring through PTC thermistors (TF) built into the winding. The TF is monitored via an evaluation unit that complies with directive 94/9/EC and is labeled with Ex identification II(2)G.
- Motor current monitoring according to the specifications of the EC prototype test certificate.
- Motor torque limitation according to the specifications of the EC prototype test certificate.

Overvoltage at the motor terminals

The overvoltage at the motor terminals must be limited to < 1700 V. To do so, limit the input voltage at the frequency inverter to 500 V.

If the drive is often operated regeneratively due to the application, you must use output filters (sine filters) to prevent dangerous overvoltages at the motor terminals.

If the voltage at the motor terminals cannot be calculated reliably, the voltage peaks must be measured with suitable equipment after startup, using the rated load of the drive, if possible.

Gear unit

When controlled gearmotors are used, there may be restrictions placed on the maximum speed from the perspective of the gear unit. Consult with SEW-EURODRIVE when the input speeds exceed 1500 rpm.

6.2.3 Calculating the motor voltage

For inverter operation, the motor voltage is calculated as follows:

$$V_{Motor} = V_{Mains} - (\Delta V_{Line\ filter/choke} + \Delta V_{FI} + \Delta V_{Output\ filter} + \Delta V_{Cable})$$

V_{Mains}

The mains voltage is measured directly using a multimeter, or alternatively, by reading the DC link voltage (V_{dclink}) in the inverter ($V_{Mains} = V_{dclink}/1.35$).

$\Delta V_{Line\ filter}$

The voltage drop across the line filter depends on the design of the filter. For more detailed information, please refer to the documentation of the respective line filter.

$\Delta V_{Line\ choke}$

For optional SEW line chokes (ND...), the voltage drop can be calculated using the formula below.

$$\Delta V_{Line\ choke} = I \times \sqrt{3} \times \sqrt{(2 \times \pi \times f \times L)^2 + R^2}$$

Since, in comparison to the inductance L, the ohmic resistance R is small enough to be neglected, the equation can be simplified to:

$$\Delta V_{Line\ choke} = I \times \sqrt{3} \times 2 \times \pi \times f \times L$$

Refer to the documentation of the line choke for the value of the inductance L.

A voltage drop of 5 V (for a supply voltage of 400 V) can be estimated when using a matching line choke and/or a matching line filter from SEW-EURODRIVE.

Determining the inverter input voltage

The inverter input voltage is determined by:

- measuring the mains voltage, or
- calculating the voltage according to the formula $V_{I\_FI} = V_{Mains} - \Delta V_{Line\ choke} - \Delta V_{Line\ filter}$, or
- reading the DC link voltage in the frequency inverter.

$\Delta V_{Output\ filter}$

The voltage drop at the output filter is proportional to the modulated fundamental output frequency and the motor current. It must be requested from the manufacturer of the output filter in individual cases. The voltage drop of SEW output filters can be found in the table "Voltage drop across SEW output filters" (see the section "Parameter setting: Frequency inverters for category 2G and 2GD").

$$\Delta V_{Output\ filter} = I \times \sqrt{3} \times \sqrt{(2 \times \pi \times f \times L)^2 + R^2}$$

Since the resistance R is small enough to be neglected compared to the inductance L, the equation can be simplified to:

$$\Delta V_{Output\ filter} = I \times \sqrt{3} \times 2 \times \pi \times f \times L$$

ΔV_{Cable}

The voltage drop of the incoming cable to the motor depends on the motor current and the cross section, length and material of the cable. The voltage drop can be found in the table "Voltage drop at the motor cable" (see the section "Parameter setting: Frequency inverters for category 2G and 2GD").

V_{FI}

The voltage drop at the inverter is determined by:

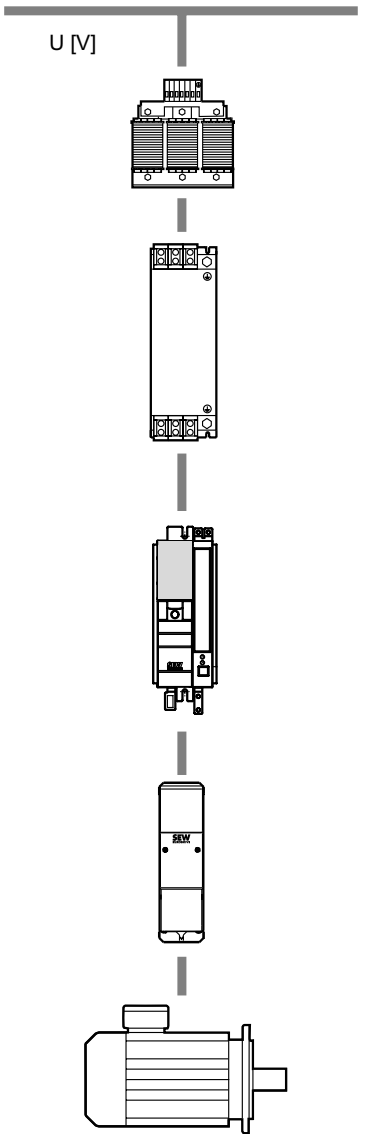
- the voltages along the rectifier path
- the voltages at the output stage transistors
- the principle of converting supply voltage into DC link voltage and into the rotating field voltage
- the anti-overlap times resulting from the clocking of the output stage and the missing voltage-time areas
- the modulation process
- the load state and the energy dissipation of the DC link capacitors

To simplify the calculation, use the value of 7.5% of the supply input voltage. This value is to be taken as the maximum possible voltage drop at the inverter. This makes it possible to plan the project reliably.

	TIP
	The voltage drop across the output filter must be compensated by the slope of the V/f characteristics (breakpoint). The voltage drop across the cable is compensated by the IxR compensation. SEW frequency inverters adjust this value in the "Automatic calibration ON" mode every time the frequency inverter is started.

6.2.4 Determining the motor breakpoint

The calculation of the motor terminal voltage is an important component of project planning. The results must be considered during startup and corrected, if necessary, to prevent excessive heating by undercompensation of the motor.



$$\Delta V_{Line\ choke} = I_E \times \sqrt{3} \times \sqrt{(2 \times \pi \times L_{LC})^2 + R_{LC}{}^2}$$

$\Delta V_{Line\ filter}$
(See "Calculating the motor voltage")

$$V_{I\_FI} = V_{Mains} - \Delta V_{Line\ choke} - \Delta V_{Line\ filter}$$

$$V_{O\_FI} = 0.925 \times V_{I\_FI}$$

ΔV_{HF}
(See "Startup")

ΔV_{Cable}
(See "Startup")

$$V_{Motor\ terminal\ voltage} = V_{O\_FI} - \Delta V_{HF} - \Delta V_{Cable}$$

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f_{max}	= Maximum frequency in Hz
f_{max_HF}	= Maximum frequency when using a sine filter, in Hz
f_{base}	= Base frequency in Hz
f_{Type_HF}	= Breakpoint when using a sine filter, in Hz
V_{I_FI}	= Inverter input voltage, in V
V_{O_FI}	= Inverter output voltage, in V
$\triangle V_{HF}$	= Voltage drop across sine filter, in V
$\triangle V_{Cable}$	= Voltage drop across incoming motor cable, in V
$\triangle V_{Line\ choke}$	= Voltage drop across line choke, in V
$\triangle V_{Line\ filter}$	= Voltage drop across line filter, in V
I_E	= Supply current, in A
L_{LC}	= Inductance of line choke, in H
R_{LC}	= Ohmic resistance of line choke, in Ω

1. The maximum speed must be reduced if the condition shown below is met. For the calculation, read the section "Dimensioning at a lower motor voltage" (see page 51) or "Selecting a matched stator winding" (see page 52).

$$(V_{I\_FI} \times 0.925) - \Delta V_{Cable} < V_{Motor\ rated\ voltage}$$

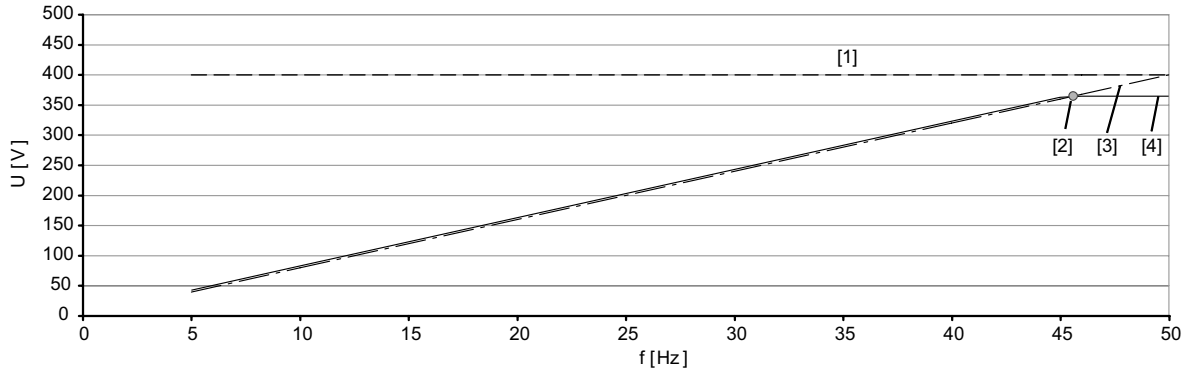
2. If the following condition is met, please read "Dimensioning at a higher supply voltage" (see page 53).

$$(V_{I\_FI} \times 0.925) - \Delta V_{Cable} \geq V_{Motor\ rated\ voltage}$$

3. When using a sine filter, please read "Using a sine filter" (see page 54) to calculate the new breakpoint and the maximum speed.

6.2.5 Dimensioning at a lower motor voltage

Breakpoint: Startup is performed with the motor's rated data (rated voltage and rated frequency).



[1]	Inverter input voltage	[3]	Motor characteristics
[2]	f_{max}	[4]	Motor terminal voltage

Example: Motor 230/400 V; 50 Hz; $\triangle V_{Cable}$: 5 V

The maximum speed must be reduced according to the reduced motor terminal voltage (in this case, caused by the voltage drop in the frequency inverter and across the motor cable) in accordance with the formula below and set in the frequency inverter:

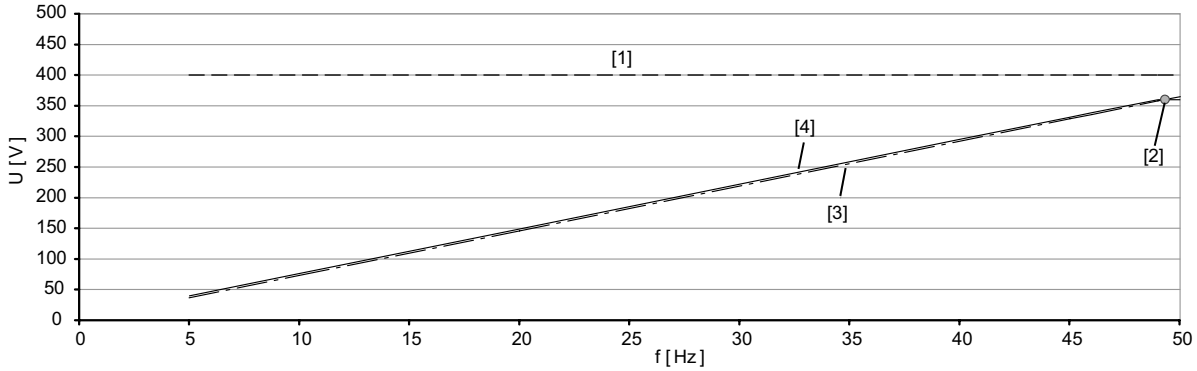
$$f_{max} = \frac{V_{Motor\ terminal\ voltage}}{V_{Motor\ rated\ voltage}} \times f_{base}$$

	TIP
	If the complete setting range of up to 50 Hz is required, read "Delta connection for increasing the maximum speed" (see page 55).

6.2.6 Selecting an matched stator winding

Breakpoint: Select a motor (stator winding) with a rated voltage that is not above the calculated motor terminal voltage. Note that the modified motor winding requires a proportionally higher current.

Startup occurs with the motor's rated data (rated voltage and rated frequency).



[1]	Inverter input voltage	[3]	Motor characteristics
[2]	f_{max}	[4]	Motor terminal voltage

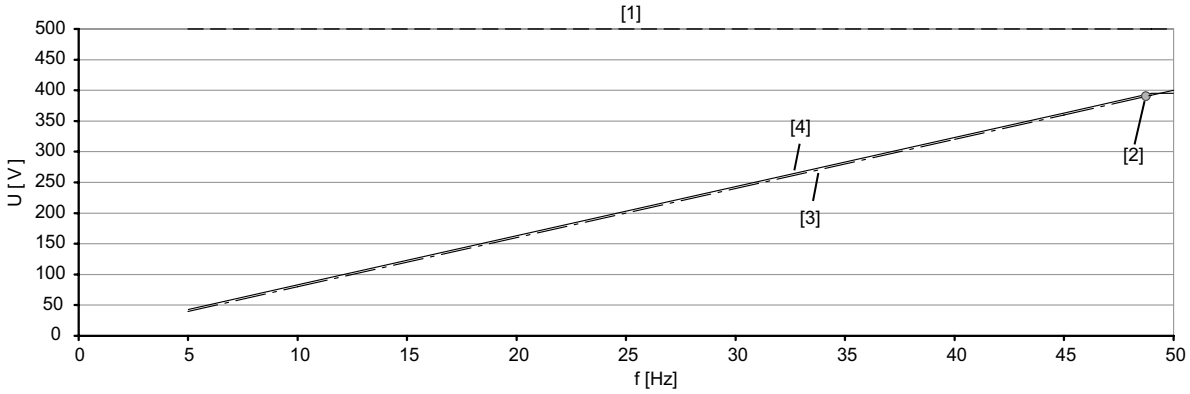
Example: Motor 208/360 V; 50 Hz; $\triangle V_{Cable}$: 5 V

The maximum speed must be reduced according to the reduced motor terminal voltage (voltage drop across the motor cable) in accordance with the following formula and set in the frequency inverter:

$$f_{max} = \frac{V_{Motor\ terminal\ voltage}}{V_{Motor\ rated\ voltage}} \times f_{base}$$

6.2.7 Dimensioning at a higher supply voltage

Breakpoint: Startup occurs with the motor's rated data (rated voltage and rated frequency).



[1]	Inverter input voltage	[3]	Motor characteristics
[2]	f_{max}	[4]	Motor terminal voltage

Example: Motor 230/400 V; 50 Hz; $\triangle V_{Cable}$: 5 V

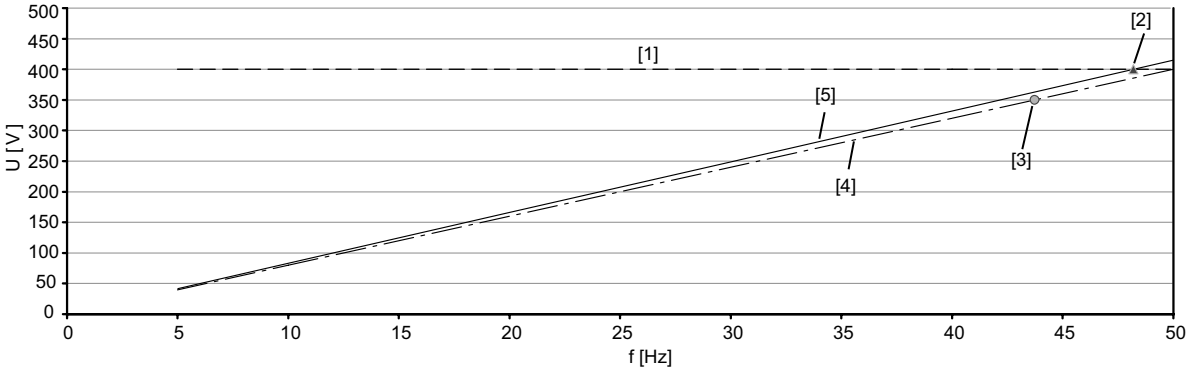
The maximum speed must be reduced according to the reduced motor terminal voltage (voltage drop across the motor cable) in accordance with the following formula and set in the frequency inverter:

$$f_{max} = \frac{V_{Motor\ rated\ voltage} - \Delta V_{Cable}}{V_{Motor\ rated\ voltage}} \times f_{base}$$

6.2.8 Using a sine filter

Breakpoint: Startup is performed with the rated voltage of the motor and with the calculated breakpoint according to the following formula:

$$f_{type\_HF} = \frac{V_{Motor\ rated\ voltage}}{V_{Motor\ rated\ voltage} + \Delta V_{HF}} \times f_N$$



[1]	Inverter input voltage	[4]	Motor characteristics
[2]	TP_HF	[5]	FI characteristic curve
[3]	fmax		

Example: Motor 230/400 V; 50 Hz; $\triangle V_{Cable}$: 5 V

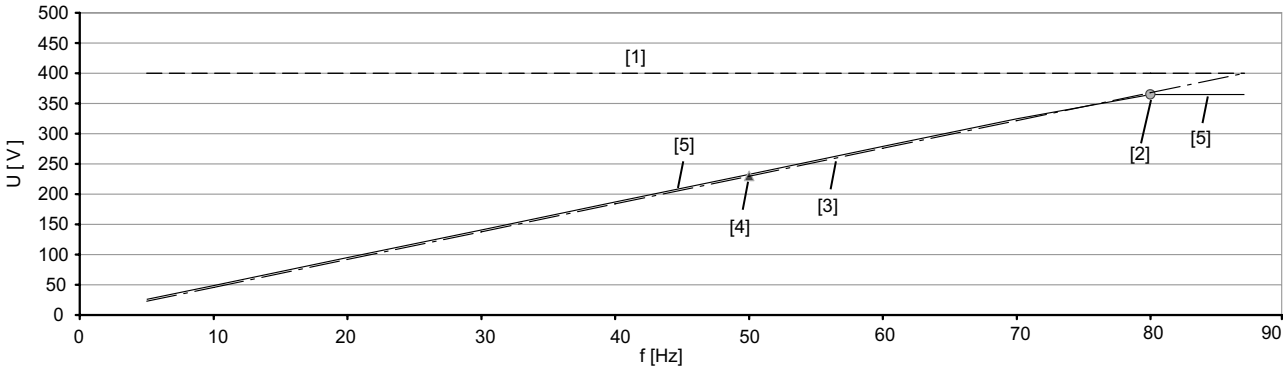
The maximum speed must be reduced according to the reduced motor terminal voltage (in this case caused by the voltage drop in the frequency inverter and across the motor cable) in accordance with the following formula and set in the frequency inverter:

$$f_{max\_HF} = \frac{V_{O\_FI} - \Delta V_{Cable}}{V_{Motor\ rated\ voltage} + \Delta V_{HF}} \times f_{base}$$

6.2.9 Delta connection for increasing the maximum speed

If the complete setting range of up to 50 Hz is required, the motor can also be operated as a delta connection. The voltage drop between the mains supply and the motor terminals are taken into account here.

Breakpoint: Startup occurs with the motor's rated data (rated voltage and rated frequency).



[1]	Inverter input voltage	[4]	Projected speed
[2]	fmax	[5]	Motor terminal voltage
[3]	Motor characteristics		

Example: Motor 230/400 V; 50 Hz; $\triangle V_{Cable}$: 5 V

The maximum speed is also determined here by the reduced motor terminal voltage (in this case caused by the voltage drop in the frequency inverter and across the motor cable) and must be calculated according to the following formula and set in the frequency inverter:

$$f_{max} = \frac{V_{Motor\ terminal\ voltage}}{V_{Motor\ rated\ voltage}} \times f_{base}$$

	TIP
	The increased current consumption of the motor in a delta connection must be observed for the inverter selection. When controlled gearmotors are used, there may be restrictions placed on the maximum speed from the perspective of the gear unit. Consult with SEW-EURODRIVE when the input speeds exceed 1500 rpm.

6.3 Frequency inverter operation in categories 3G, 3D and 3GD

6.3.1 Using motors in category II3GD

	INFORMATION ABOUT EXPLOSION PROTECTION
	The following applies, • Use as category II3G unit in zone 2: The same conditions and restrictions apply as to category II3D motors. • Use as category II3D unit in zone 22: The same conditions and restrictions apply as to category II3G motors • Use as category II3GD unit in both zone 2 and zone 22: In this case, the more stringent conditions and restrictions apply (see details on II3G and II3D).

6.3.2 Conditions for safe operation

General information

Install the frequency inverter outside the potentially explosive atmosphere.

Motor/frequency inverter combination

- The motor/frequency inverter combinations that are listed are recommended for category II3G motors. However, frequency inverters that have similar values with respect to output current and output voltage (EN 60079-15) can also be used.
- The motor/frequency inverter combinations that are listed are recommended for category II3D motors. If you want to operate category II3D motors on other frequency inverters, the maximum speeds/frequencies and the thermal torque limiting characteristic curves must also be observed. In addition, we strongly recommend you use a frequency inverter matching the respective power rating.

Temperature class and maximum surface temperature

- Motors in category II3G are in temperature class T3.
- The maximum surface temperature of II3D motors is 120 °C or 140 °C.
- II3GD motors are in temperature class T3 and have a maximum surface temperature of 120 °C or 140 °C.

Protection against overtemperature

Only motors that are equipped with a positive temperature coefficient thermistor (TF) are permitted for operation on a frequency inverter to ensure that the permitted limit temperature is not exceeded. The positive temperature coefficient thermistor must be evaluated using an appropriate device.

Supply voltage of the frequency inverter

The supply voltage of the frequency inverter must not fall below 400 V.

Overvoltage at the motor terminals

The overvoltage at the motor terminals must be limited to < 1700 V. To do so, limit the input voltage at the frequency inverter to 500 V.

If the drive is often operated regeneratively due to the application (e.g. hoist applications), you must use output filters (sine filters) to prevent dangerous overvoltages at the motor terminals.

If the voltage at the motor terminals cannot be calculated reliably, the voltage peaks must be measured with suitable equipment after startup, using the rated load of the drive, if possible.

EMC measures

The following components are permitted for the MOVIDRIVE® and MOVITRAC® frequency inverters:

- Line filters of the NF...-... series
- Output chokes of the HD... series
- Output filter (sine filter) HF..

  If an output filter is used, the voltage drop over the filter must be compensated for. Observe the "Calculating the motor voltage" section (see page 48).

	INFORMATION ABOUT EXPLOSION PROTECTION
	If a differing type of frequency inverter is used, you must ensure that the output wiring of the frequency inverter used to improve the EMC characteristics does not significantly reduce the terminal voltage at the motor (≤ 5%, based on the rated voltage of the motor).

Maximum permitted torques

Motors operated with a frequency inverter must not exceed the maximum torques specified in this section. The values may be exceeded for brief periods if the effective operating point lies below the thermal limit characteristic curve.

Maximum permitted speeds/ frequencies

It is essential to observe the maximum speeds/frequencies listed in the assignment tables for the motor/frequency inverter combinations. These values must not be exceeded.

Group drives

Group drive means that several motors are connected to one frequency inverter output.

	INFORMATION ABOUT EXPLOSION PROTECTION
	Motors of the DR/DT/DV/DTE/DVE series in category II3G or II3GD for use in zone 2 may generally not be operated as group drive!

The following restrictions apply to motors of the DR/DT/DV/DTE/DVE series in category II3D for use in zone 22:

- The cable lengths specified by the frequency inverter manufacturer must not be exceeded.
- The motors in a group must not be more than two power ratings apart.
- Each motor must be monitored.

Gear unit

When controlled gearmotors are used, there may be restrictions placed on the maximum speed from the perspective of the gear unit. Consult with SEW-EURODRIVE when the input speeds exceed 1500 rpm.

6.4 Motor/inverter assignment: MOVIDRIVE® and MOVITRAC®

Motor type II3GD	Motor connection ⅄		Motor connection △	
	P_{FI} [kW]	n_{max} [rpm]	P_{FI} [kW]	n_{max} [rpm]
DR63S4	0.25[1)]	2100	0.25[1)]	3600
DR63M4	0.25[1)]	2100	0.25[1)]	3600
DR63L4	0.25[1)]	2100	0.37[1)]	3600
DT71D4	0.37[1)]	2100	0.55	3600
DT80K4	0.55	2100	1.1	3600
DT80N4	0.75	2100	1.5	3600
DT90S4	1.1	2100	2.2	3600
DT90L4	1.5	2100	3	3600
DV100M4	2.2	2100	4	3600
DV100L4	3	2100	5.5	3600
DV112M4	4	2100	7.5	3600
DV132S4	5.5	2100	11	3600
DV132M4	7.5	2100	15	3600
DV132ML4	11	2100	15	3600
DV160M4	11	2100	22	3600
DV160L4	15	2100	30	3600
DV180M4	22	2100	37	2700
DV180L4	22	2100	45	2700
DV200L4	30	2100	55	2700
DV225S4	37	2100	75	2700
DV225M4	45	2100	90[2)]	2700
DV250M4	55	2100	110[2)]	2500
DV280S4	75	2100	132[2)]	2500
DTE90K4	0.75	2100	1.5	3600
DTE90S4	1.1	2100	2.2	3600
DTE90L4	1.5	2100	3	3600
DVE100M4	2.2	2100	4	3600
DVE100L4	3	2100	5,5	3600
DVE112M4	4	2100	7.5	3600
DVE132S4	5.5	2100	11	3600
DVE132M4	7.5	2100	15	3600
DVE160M4	11	2100	22	3600
DVE160L4	15	2100	30	3600
DVE180M4	22	2100	37	2700
DVE180L4	22	2100	45	2700
DVE200L4	30	2100	55	2700
DVE225S4	37	2100	75	2700
DVE250M4	55	2100	110[2)]	2500
DVE280S4	75	2100	132[2)]	2500

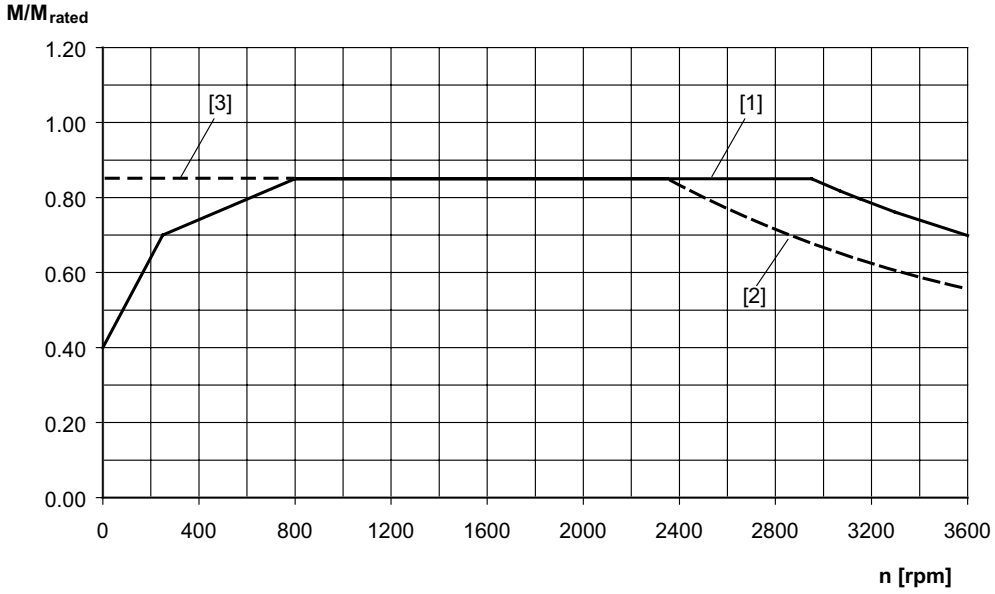
1) MOVITRAC® B only

2) MOVIDRIVE® B only

6.5 Asynchronous motors: Thermal limit characteristic curves

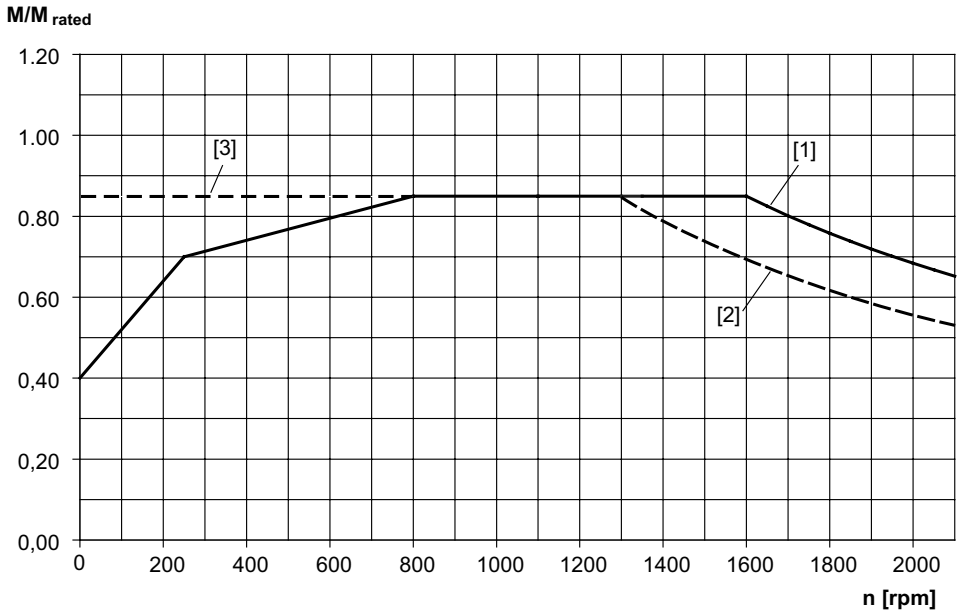
6.5.1 Thermal torque limit characteristic curves

Thermal torque limit characteristic curve in inverter operation for 4-pole AC motors and AC brake motors with a △ connection:



[1] 104 Hz limit characteristic curve
[2] 87 Hz limit characteristic curve
[3] With VE forced cooling fan

Thermal torque limit characteristic curve in inverter operation for 4-pole AC motors and AC brake motors with a ⅄ connection:



[1] 60 Hz limit characteristic curve
[2] 50 Hz limit characteristic curve
[3] With VE forced cooling fan

6.6 Asynchronous servomotors: Limits for current and torque

	INFORMATION ABOUT EXPLOSION PROTECTION
	The values specified in the table for maximum current, torque and speed must not be exceeded during operation.

6.6.1 Speed class 1200 rpm

Motor type	M_N [Nm]	M_{max} [Nm]	n_{max} [rpm]	I_N [A]	I_{max} [A]
CT71D4.../II3D	2.1	6	3500	1.1	2.7
CT80N4.../II3D	4.3	13		1.9	4.4
CT90L4.../II3D	8.5	26		3.3	8.2
CV100M4.../II3D	13	38		4.2	10.9
CV100L4.../II3D	22	66		7.5	20.4
CV132S4.../II3D	31	94		10.1	26.9
CV132M4.../II3D	43	128		10.7	26.9
CV132ML4.../II3D	52	156		16.0	43.2
CV160M4.../II3D	62	186		19.8	52.7
CV160L4.../II3D	81	242		26.7	69.6
CV180M4.../II3D	94	281	2500	32.3	79.2
CV180L4.../II3D	106	319		35.3	88.7
CV200L4.../II3D	170	510		51.0	137.5

6.6.2 Speed class 1700 rpm

Motor type	M_N [Nm]	M_{max} [Nm]	n_{max} [rpm]	I_N [A]	I_{max} [A]
CT71D4.../II3D	2.0	6	3500	1.5	3.7
CT80N4.../II3D	4.3	13		2.6	6.1
CT90L4.../II3D	8.5	26		4.5	11.3
CV100M4/...II3D	13	38		5.8	14.9
CV100L4.../II3D	22	66		10.2	28.0
CV132S4.../II3D	31	94		13.9	37.1
CV132M4.../II3D	41	122		18.5	49.6
CV132ML4.../II3D	49	148		23.1	61.6
CV160M4.../II3D	60	181		26.8	70.7
CV160L4.../II3D	76	227		35.2	90.1
CV180M4.../II3D	89	268	2500	43.3	104.5
CV180L4.../II3D	98	293		50.2	123.0
CV200L4..../II3D	162	485		68.9	183.9

6.6.3 Speed class 2100 rpm

Motor type	M_N [Nm]	M_{max} [Nm]	n_{max} rpm	I_N [A]	I_{max} [A]
CT71D4.../II3D	2.1	6	3500	1.9	4.6
CT80N4.../II3D	4.3	13		3.3	7.6
CT90L4..../II3D	8.5	26		5.7	14.1
CV100M4.../II3D	13	38		7.3	18.8
CV100L4.../II3D	21	64		12.5	34.0
CV132S4.../II3D	31	94		17.4	46.6
CV132M4.../II3D	41	122		18.1	44.9
CV132ML4.../II3D	49	148		26.7	71.3
CV160M4.../II3D	60	179		33.3	87.6
CV160L4.../II3D	75	224		43.9	112.1
CV180M4.../II3D	85	255	2500	52.8	125.6
CV180L4.../II3D	98	293		57.9	141.9
CV200L4.../II3D	149	446		79.8	209.4

6.6.4 Speed class 3000 rpm

Motor type	M_N [Nm]	M_{max} [Nm]	n_{max} [rpm]	I_N [A]	I_{max} [A]
CT71D4.../II3D	2.0	6	3500	2.6	6.1
CT80N4.../II3D	3.8	11		4.3	9.6
CT90L4.../II3D	8.1	24		7.5	18.6
CV100M4.../II3D	13	38		10.0	25.9
CV100L4.../II3D	18	54		15.0	39.5
CV132S4.../II3D	30	89		23.0	60.9
CV132M4.../II3D	38	115		30.4	80.8
CV132ML4.../II3D	44	133		36.9	96.1
CV160M4.../II3D	54	163		43.0	110.9
CV160L4.../II3D	72	217		59.1	149.3
CV180M4.../II3D	79	237	2500	69.9	161.8
CV180L4.../II3D	94	281		84.6	204.4
CV200L4.../II3D	123	370		98.5	246.0

6.7 Asynchronous servomotors: Thermal limit characteristic curves

6.7.1 Observe the speed class

During project planning, observe that the characteristic curves are different for each speed class.

6.7.2 Operating mode

The characteristic curves show the permitted torque ratings in continuous duty S1. Determine the effective operating point for differing operating modes.

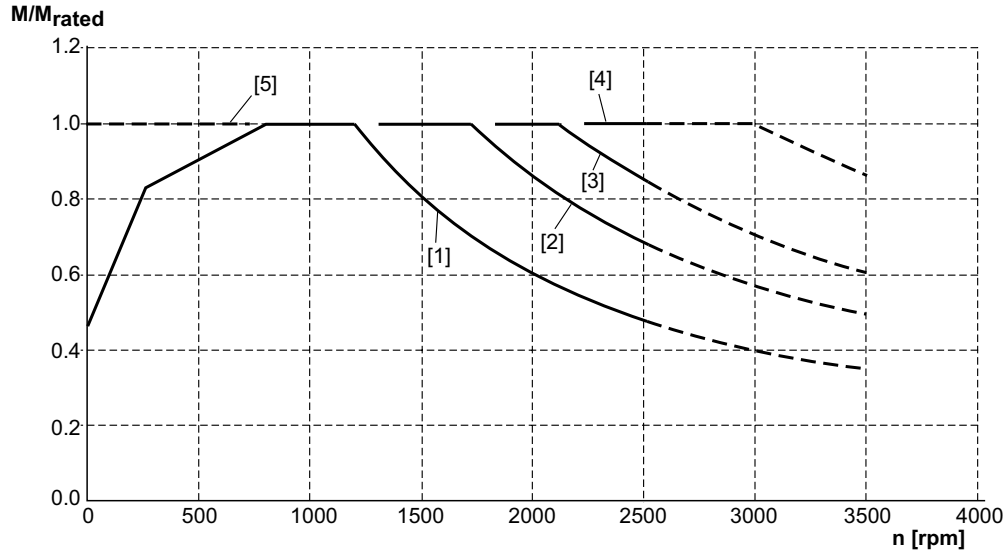


Fig. 5: Thermal torque limit characteristic curves

[1] Speed class 1200 rpm
[2] Speed class 1700 rpm
[3] Speed class 2100 rpm
[4] Speed class 3000 rpm
[5] With VE forced cooling fan

6.8 Asynchronous servomotors: Frequency inverter assignment

6.8.1 General information

Install the frequency inverter outside the potentially explosive atmosphere.

6.8.2 Permitted frequency inverters

The highest dynamic properties and control quality are achieved by using frequency inverters from the MOVIDRIVE® series. The frequency inverters listed in the table "CT/CV.../II3D – MOVIDRIVE® combinations" must be observed.

The use of other types of frequency inverters is permitted. Make sure that the permitted operating data of the motors (see "Asynchronous servomotors: Limits for current and torque" (see page 61)) are not exceeded.

6.8.3 Permitted operating modes for MOVIDRIVE® frequency inverters

To ensure highest dynamic response, frequency inverters of the MOVIDRIVE® series must be started up in a CFC operating mode. VFC operating modes are also permitted.

6.8.4 Supply voltage of the frequency inverter

The supply voltage of the frequency inverter must not fall below the minimum value of 400 V.

The maximum permitted supply voltage must be limited to 500 V. Otherwise, dangerous overvoltages can build up at the motor connection terminals due to the frequency inverter pulsing.

6.8.5 EMC measures

The following components are permitted for the MOVIDRIVE® frequency inverters:

- Line filters of the NF...-... series
- Output chokes of the HD... series

	INFORMATION ABOUT EXPLOSION PROTECTION
Ex	If a differing type of frequency inverter is used, you must ensure that the output wiring of the frequency inverter used to improve the EMC characteristics does not significantly reduce the terminal voltage at the motor (≤ 5%, based on the rated voltage of the motor).

6.8.6 CT/CV.../II3D – MOVIDRIVE® combinations

Recommended combinations

The following table lists the recommended motor/MOVIDRIVE® combinations depending on the speed class. Other combinations should not be used because this could cause an overload in the motors.

INFORMATION ABOUT EXPLOSION PROTECTION

The values specified in the table for maximum current and maximum speed must not be exceeded during operation!

Speed class 1200 rpm

Motor type	M_N [Nm]	M_{max} [Nm]	n_{max} rpm	M_{max} n_{base} [Nm] [rpm]	MOVIDRIVE® 0015	0022	0030	0040	0055	0075	0110
CT71D4../II3D	2.1	6	3500	M_{max} n_{base}	7.5 600						
CT80N4../II3D	4.3	13		M_{max} n_{base}	13.0 540						
CT90L4../II3D	8.5	26		M_{max} n_{base}	18.2 928	25.7 781					
CV100M4../II3D	13	38		M_{max} n_{base}		29.0 883	37.0 781				
CV100L4../II3D	22	66		M_{max} n_{base}			32.6 1062	45.3 947	60 813		
CV132S4../II3D	31	94		M_{max} n_{base}					64 992	84 915	
CV132M4../II3D	43	128		M_{max} n_{base}						82 1011	125 877

Motor type	M_N [Nm]	M_{max} [Nm]	n_{max} [rpm]	M_{max} n_{base} [Nm] [rpm]	MOVIDRIVE® 0110	0150	0220	0300	0370	0450	0550	0750
CV132ML4../II3D	52	156	3500	M_{max} n_{base}	126 922	156 819						
CV160M4../II3D	62	186		M_{max} n_{base}	125 986	169 909						
CV160L4../II3D	81	242		M_{max} n_{base}		163 1043	240 954					
CV180M4../II3D	94	281	2500	M_{max} n_{base}			241 1050	282 986				
CV180L4../II3D	106	319		M_{max} n_{base}			231 1018	308 973				
CV200L4../II3D	170	510		M_{max} n_{base}				326 1011	402 986	494 947	510 940	

Speed class 1700 rpm

Motor type	M_N [Nm]	M_{max} [Nm]	n_{max} [rpm]	M_{max} n_{base} [Nm] [rpm]	MOVIDRIVE® 0015	0022	0030	0040	0055	0075	0110
CT71D4../II3D	2.1	6	3500	M_{max} n_{base}	6.0 1250						
CT80N4../II3D	4.3	13		M_{max} n_{base}	12.6 1150						
CT90L4../II3D	8.5	26		M_{max} n_{base}		18.0 1400	23.5 1280				
CV100M4../II3D	13	38		M_{max} n_{base}			25.7 1402	36.0 1274			
CV100L4../II3D	22	66		M_{max} n_{base}				32.9 1510	44.2 1402	57 1274	
CV132S4../II3D	31	94		M_{max} n_{base}						59 1470	91 1330

Motor type	M_N [Nm]	M_{max} [Nm]	n_{max} [rpm]	M_{max} n_{base} [Nm] [rpm]	MOVIDRIVE® 0110	0150	0220	0300	0370	0450	0550	0750
CV132M4../II3D	41	122	3500	M_{max} n_{base}	89 1440	121 1330						
CV132ML4../II3D	49	148		M_{max} n_{base}	83 1562	114 1485	148 1331					
CV160M4../II3D	60	181		M_{max} n_{base}		120 1420	176 1310					
CV160L4../II3D	76	227		M_{max} n_{base}			170 1470	226 1400				
CV180M4../II3D	89	268	2500	M_{max} n_{base}			168 1550	226 1510	268 1460			
CV180L4../II3D	98	293		M_{max} n_{base}				217 1450	269 1420			
CV200L4../II3D	162	485		M_{max} n_{base}						353 1421	420 1395	485 1344

Speed class 2100 rpm

Motor type	M_N [Nm]	M_{max} [Nm]	n_{max} [rpm]	M_{max} n_{base} [Nm] [rpm]	MOVIDRIVE® 0015	0022	0030	0040	0055	0075	0110
CT71D4../II3D	2.1	6	3500	M_{max} n_{base}	6.0 1280						
CT80N4../II3D	4.3	13		M_{max} n_{base}	9.7 1754	13.0 1510					
CT90L4../II3D	8.5	26		M_{max} n_{base}			18.3 1843	25.5 1677			
CV100M4../II3D	13	38		M_{max} n_{base}				28.0 1760	38.0 1626		
CV100L4../II3D	21	64		M_{max} n_{base}					33.7 2003	44.0 1894	64 1645

Motor type	M_N [Nm]	M_{max} [Nm]	n_{max} [rpm]	M_{max} n_{base} [Nm] [rpm]	MOVIDRIVE® 0110	0150	0220	0300	0370	0450	0550	0750
CV132S4../II3D	31	94	3500	M_{max} n_{base}	72 1850	94 1722						
CV132M4../II3D	41	122		M_{max} n_{base}		95 1850	122 1670					
CV132ML4../II3D	49	148		M_{max} n_{base}			139 1715					
CV160M4../II3D	60	179		M_{max} n_{base}			139 1792	179 1690				
CV160L4../II3D	75	225		M_{max} n_{base}				177 1882	218 1824			
CV180M4../II3D	85	255	2500	M_{max} n_{base}					218 1939	255 1894		
CV180L4../II3D	98	293		M_{max} n_{base}						260 1824	293 1786	
CV200L4../II3D	149	447		M_{max} n_{base}							329 1830	412 1792

Speed class 3000 rpm

Motor type	M_N [Nm]	M_{max} [Nm]	n_{max} [rpm]	M_{max} n_{base} [Nm] [rpm]	MOVIDRIVE® 0015	0022	0030	0040	0055	0075	0110
CT71D4../II3D	2.0	6	3500	M_{max} n_{base}	6.0 2280						
CT80N4../II3D	3.8	11		M_{max} n_{base}		9.7 2560	11.0 2350				
CT90L4../II3D	8.1	24		M_{max} n_{base}			12.7 2790	18.0 2650	24.0 2490		
CV100M4../II3D	13	38		M_{max} n_{base}					26.5 2620	34.6 2490	
CV100L4../II3D	18	54		M_{max} n_{base}						31.8 2800	49.0 2600

Motor type	M_N [Nm]	M_{max} [Nm]	n_{max} [rpm]	M_{max} n_{base} [Nm] [rpm]	MOVIDRIVE® 0110	0150	0220	0300	0370	0450	0550	0750
CV132S4../II3D	30	89	3500	M_{max} n_{base}	51 2740	69 2650						
CV132M4../II3D	38	115		M_{max} n_{base}		67 2750	99 2600	114 2450				
CV132ML4../II3D	44	133		M_{max} n_{base}			94 2765	124 2656	133 2547			
CV160M4../II3D	54	163		M_{max} n_{base}			98 2630	131 2550	161 2470			
CV160L4../II3D	72	217		M_{max} n_{base}				124 2720	155 2680	192 2620	216 2545	
CV180M4../II3D	79	237	2500	M_{max} n_{base}					150 2790	191 2745	228 2700	
CV180L4../II3D	94	281		M_{max} n_{base}						182 2620	220 2580	276 2540
CV200L4../II3D	123	370		M_{max} n_{base}								293 2573

6.9 Soft-start units

Soft-start units are permitted for use with motors in category II3D as long as the motors are fitted with a TF temperature sensor.

7 Startup

7.1 Prerequisites for startup

	TIPS
	Observe the safety notes in section 2 during installation.

7.1.1 Before startup, make sure that:

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

7.1.2 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 (see "Technical Data")

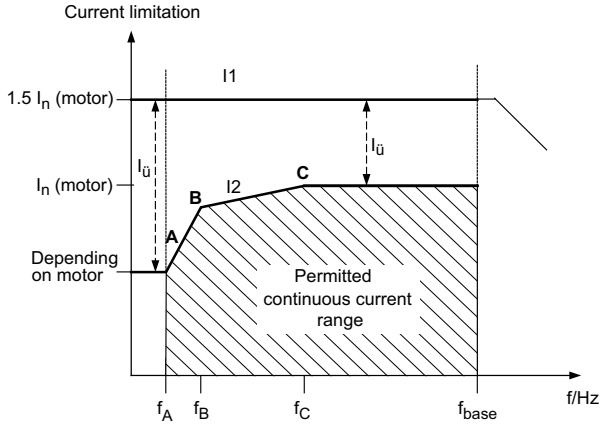
In case of problems, refer to the "Malfunctions" section for more information.

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

7.2 Parameter setting: Frequency inverters for category 2G and 2GD

7.2.1 Parameter setting

The parameters that need to be set for monitoring the current depend on the motor. The exact values are specified in the EC prototype test certificate.



After motor startup, current limitation I1 is active. Current limitation I2 determines the current that is permanently permitted. The current limitation function can be activated during startup or using parameter P560, "Current limitation Ex e motor" (for approved motors).

The characteristic curve is defined by operating points A, B and C. The following parameters are set during startup:

Parameter	Point A	Point B	Point C
Frequency [Hz]	P561	P563	P565
Current limitation in % of I_N	P562	P564	P566

7.2.2 Overload protection

Operation above the permitted current range is permitted for 60 seconds. To prevent a sudden reduction of the current limit and thus torque shocks, after about 50 seconds, the current is reduced to the permitted value along a ramp within 10 seconds. The current can again exceed the permitted range after a recovery time of 10 minutes. Operation below 5 Hz is permitted for 60 seconds. After this time has elapsed, the unit switches off with error F110 "Ex e protection" and performs an emergency stop as a fault response.

The binary inputs P62_ can be parameterized to "Ex e current limitation active".

Preconditions for the output being set ("1" signal):

- Current limit 1 exceeded
- Recovery time not yet elapsed
- Operation < 5 Hz longer than 60 seconds

The current-time monitoring is not reset by an error reset.

The current-time monitoring is active both for mains operation and 24 V backup mode.

TIPS

If the mains is switched off without 24 V backup mode, the monitoring function is reset completely.

Voltage drop across SEW output filters

Filter				Choke	Voltage drop [V]					
					V = 400 V			V = 500 V		
		I_{N400}	I_{N500}	L	50 Hz	60 Hz	87 HZ	50 HZ	60 Hz	87 Hz
Type	BG	(A)	(A)	(mH)	(V)	(V)	(V)	(V)	(V)	(V)
HF 008-503	1	2.5	2	11	15	18	26	12	14	21
HF 015-503	1	4	3	9	20	24	34	15	18	26
HF 022-503	1	6	5	7	23	27	40	19	23	33
HF 030-503	1	8	6	5.5	24	29	42	18	22	31
HF 040-503	2	10	8	4.5	24	29	43	20	24	34
HF 055-503	2	12	10	3.2	21	25	36	17	21	30
HF 075-503	2	16	13	2.4	21	25	36	17	20	30
HF 023-403	3	23	19	1.6	20	24	35	17	20	29
HF 033-403	3	33	26	1.2	22	26	37	17	20	30
HF 047-403	4	47	38	0.8	20	25	36	17	20	29

TIP

The voltage drop is negligible (current-compensated) for SEW output chokes (HD...).

Voltage drop at motor cables

Cable cross section	Load with I [A]																		
	4	6	8	10	13	16	20	25	30	40	50	63	80	100	125	150	200	250	300
Copper	Voltage drop ΔV [V] with length = 100 m and ϑ = 70 °C																		
1.5 mm²	5.3	8	10.6[1]	13.3[1]	17.3[1]	21.3[1]	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]
2.5 mm²	3.2	4.8	6.4	8.1	10.4	12.8[1]	16[1]	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]
4 mm²	1.9	2.8	3.8	4.7	6.5	8.0	10	12.5[1]	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]
6 mm²					4.4	5.3	6.4	8.3	9.9	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]
10 mm²)						3.2	4.0	5.0	6.0	8.2	10.2	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]
16 mm²								3.3	3.9	5.2	6.5	7.9	10.0	[2]	[2]	[2]	[2]	[2]	[2]
25 mm²									2.5	3.3	4.1	5.1	6.4	8.0	[2]	[2]	[2]	[2]	[2]
35 mm²											2.9	3.6	4.6	5.7	7.2	8.6	[2]	[2]	[2]
50 mm²														4.0	5.0	6.0	[2]	[2]	[2]
70 mm²																	4.6	[2]	[2]
95 mm²																	3.4	4.2	[2]
150 mm²																		2.7	3.3
185 mm²																			2.7

1) This value is not recommended by SEW-EURODRIVE.

2) Load not permitted according to IEC 60364-5-52.

7.3 Parameter setting: Frequency inverters for category 3

7.3.1 General information

Use the appropriate operating instructions for starting up the frequency inverter.

Use the guided startup function of the latest MOVITOOLS® MotionStudio software. It is essential to note that the limit of the maximum speed must be reset after each guided startup.

In addition, the following compulsory settings for the frequency inverter must be adhered to for operation of category II3G, II3D and II3GD AC motors.

7.3.2 Setting the maximum frequency or maximum speed

The frequency inverter parameters which limit the maximum motor speed must be set according to the assignment tables for motor/frequency inverter combinations.

7.3.3 Setting the "IxR" and "Boost" parameters

The parameters must be set as described below. The motor may not be at operating temperature, but must have cooled off to ambient temperature.

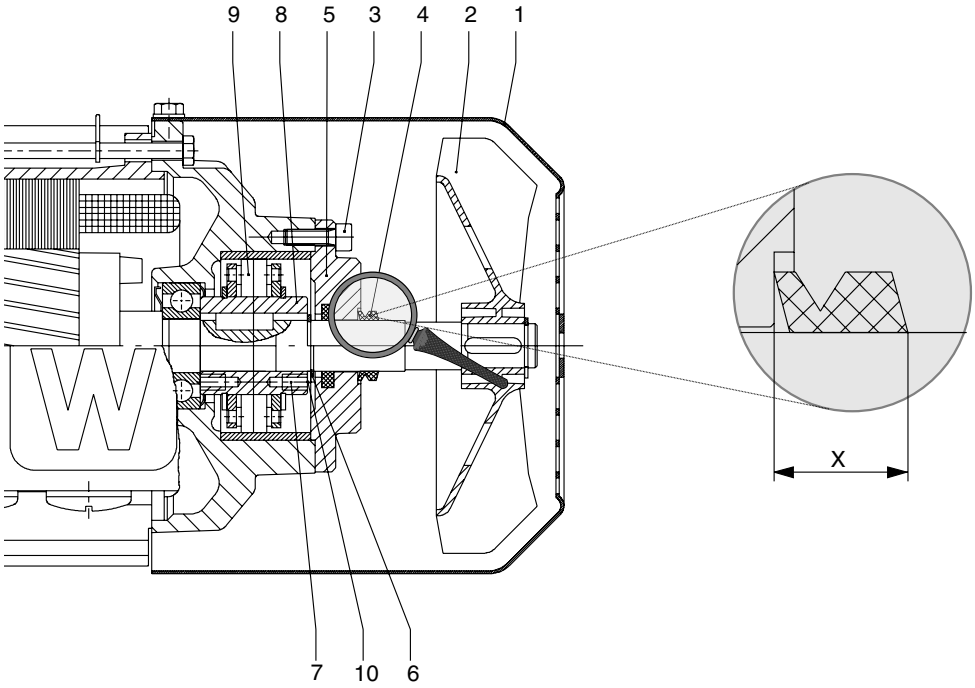
- Use frequency inverters of the MOVIDRIVE® und MOVITRAC® series.

  Set parameter for "Automatic adjustment" to "Yes".

- Permitted operating modes for the frequency inverters from SEW-EURODRIVE.

  Category 3 motors can be operated with frequency inverters from SEW-EURODRIVE in the U/f, VFC und CFC operating modes.

7.4 Altering the blocking direction on motors with a backstop



[1] Fan guard
[2] Fan
[3] Machine screw
[4] V-ring
[5] Felt ring
[6] Circlip
[7] Tapped hole
[8] Driver
[9] Wedge element train
[10] Shim washer

7.4.1 Dimension "x" after assembly

Motor	Dimension "x" after assembly
DT71/80	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
DV(E)250 – 280	13.5 mm

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

⚠ DANGER

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries

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

1. Remove the fan guard [1] and the fan [2]; remove the machine screws [3].
2. Remove the V-ring [4] and sealing flange with felt ring [5]. (Collect the grease for subsequent use).
3. Remove the circlip [6] (not with DT71/80); additionally for DV(E)132M-160M: remove the shim washers [10].
4. Pull the driver [8] and wedge element train [9] completely off using the tapped holes [7], turn them by 180°, and press them back on.
5. Re-fill the grease.
6. **Important: Do not exert pressure on or hit the wedge element train – danger of damaging the material!**
7. While pressing them back on – 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.
8. Install the remaining parts of the backstop by following steps 4 to 2 in reverse order. Observe the assembly dimension "x" for the V-ring [4].

7.5 Anti-condensation heating for motors in category II3D

For category II3D motors, connect the anti-condensation heating to the connection leads marked H1 and H2. Compare the connection voltage with the voltage specified on the nameplate.

Anti-condensation heating for motors in category II3D:

- must not be switched on until the motor has been switched off.
- must not be switched on while the motor is operating.

8 Inspection and Maintenance

Only SEW service staff, or repair workshops or plants that provide the necessary expertise, may repair or modify the motor.

Before starting up the motor again, make sure that all regulations are complied with and document this with a label on the motor or a written test report.

	INFORMATION ABOUT EXPLOSION PROTECTION
	• Maintenance and repair work must always be performed by SEW-EURODRIVE or repair workshops for electrical drives. • Use only original spare parts from the relevant and valid spare parts lists; otherwise, the explosion-poof approval for the motor will become void. • The routine test must be repeated whenever motor parts relating to explosion protection are replaced. • Motors can become very hot during operation – danger of burns! • Isolate the motor and brake from the power supply before starting work, safeguarding them against accidental startup. • Ensure that the motor is assembled correctly and all openings have been plugged after service and maintenance work. • Clean motors in explosion-proof areas regularly. Prevent dust from building up higher than 5 mm. • Clean the optional VE forced cooling fan at regular intervals. Prevent dust from building up higher than 5 mm. Observe the operating instructions of the forced cooling fan. • Check the ignition gaps of the BC brake for damage before assembly. If the ignition gaps are damaged, the housing parts affected must be replaced with genuine parts. • If the ignition gaps are reworked, request the permitted dimensions and tolerances from SEW-EURODRIVE. If the approved dimensions and/or tolerances are not maintained during rework, the Ex-approval for this brake becomes void. • Always keep ignition gaps clean and protect them from corrosion. • Explosion protection is largely dependent on the IP enclosure. Therefore, always check that the seals are fitted correctly and in perfect condition when performing any work on the machine. • Apply a grease depot (Klüber Petamo GHY133N) to the lip of the oil seal before assembly. • Always perform safety and functional tests following all maintenance and repair work (thermal protection, brake). • Explosion protection can only be ensured if motors and brakes are serviced and maintained correctly.

8.1 Inspection and maintenance intervals

Unit/unit part	Time interval	What should be done
Brake BMG02, BR03, BMG05-8, BM15-62	• **If used as a working brake:** At least every 3000 hours of operation[1)]	Inspect the brake • Measure the brake disc thickness • Brake disc, lining • Measure and set working air gap • Pressure plate • Driver/gearing • Pressure rings
	• **If used as a holding brake:** Every 2 to 4 years, depending on operating conditions [1)]	• Vacuum up the abraded matter • Inspect the switch contacts and change if necessary (e.g. in case of burn-out)
BC brake		• Adjust the brake
Motor	• **Every 10,000 hours of operation**	Inspect the motor: • Check ball bearings and change if necessary • Change the oil seal • Clean the cooling air passages
Motor with backstop		• Change the low-viscosity grease of the backstop
Drive	• Varies (depends on external influences)	• Touch up or renew the surface/anticorrosive coating
Air ducts and surfaces of the motor and the forced cooling fan, if applicable	• Varies (depends on external influences)	• Clean air ducts and surfaces

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

8.2 Preliminary work for motor and brake maintenance

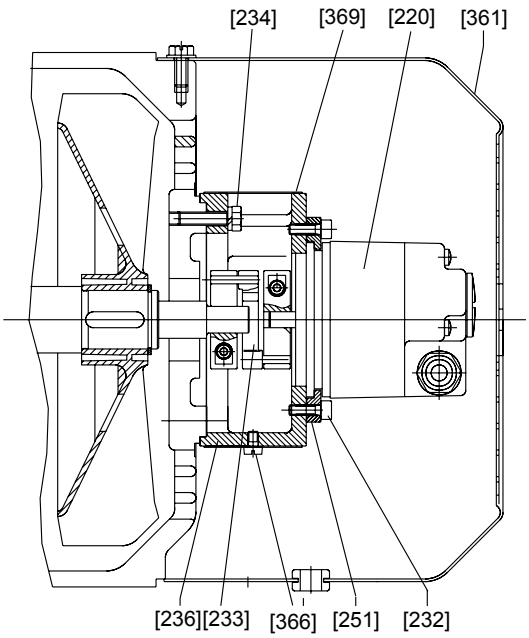
⚠ DANGER

Risk of crushing if the drive starts up unintentionally.

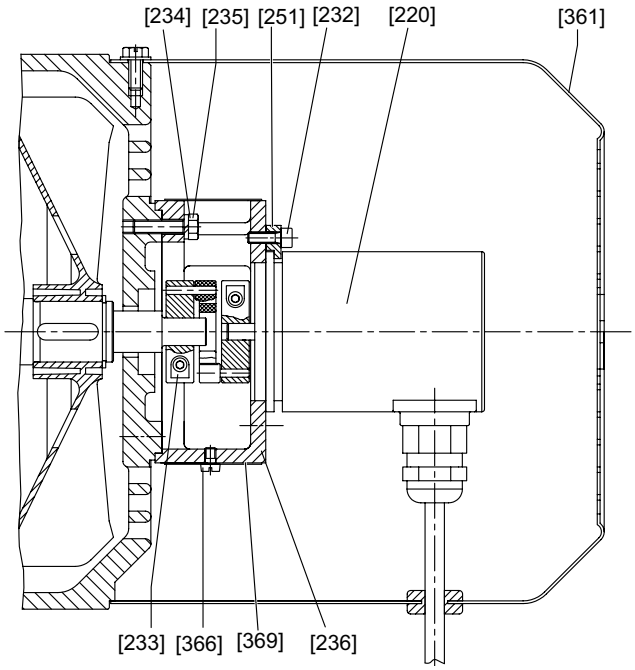
Severe or fatal injuries

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

8.2.1 Removing the incremental encoders EV2. and AV2.



Incremental encoder EV2. up to size 225



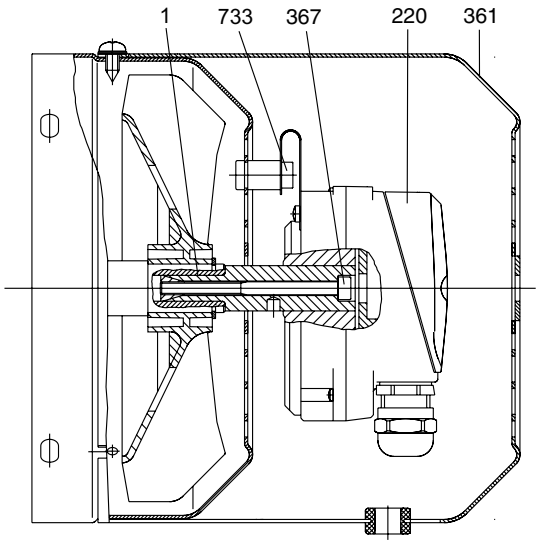
Incremental encoder AV2. up to size 255

[220] Encoder
[232] Machine screw
[233] Coupling
[234] Hex head bolt
[235] Lock washer
[236] Adapter flange
[251] Conical spring washer
[361] Protective cowl/fan guard
[366] Machine screw
[369] Cover plate

1. Remove the protective cowl [361]. Remove forced cooling fan first, if installed.
2. Unscrew the screw [366] from the adapter flange and remove the cover plate [369].
3. Unscrew the clamping hub connection of the coupling.
4. Loosen the retaining screws [232] and turn the conical spring washers [251] outwards.
5. Remove the encoder [220] together with the coupling [233].
6. Pry off the intermediate flange [236] after removing the screws [234], if required.

	TIP
	During re-assembly, make sure the concentricity of the shaft end is ≤ 0.05 mm. Brakes for the encoder mounting (for motor sizes DV250 / 280) must be completely replaced.

8.2.2 Removing the ES1./ES2. incremental encoder



ES1. / ES2.

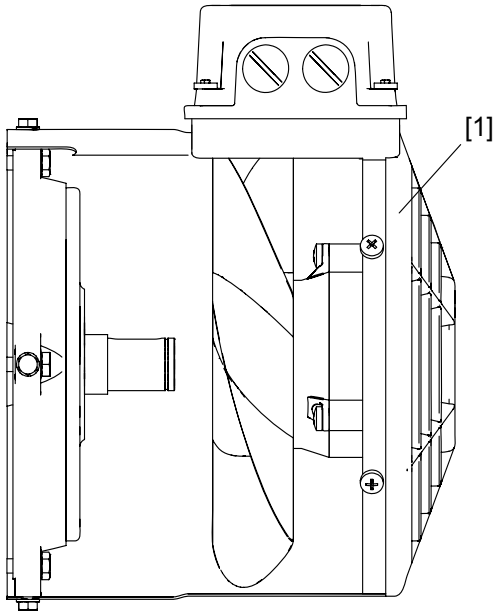
[220] Encoder
[361] Protective cowl
[367] Retaining screw
[733] Retaining screw for the torque arm

1. Remove the protective cowl [361].
2. Unscrew the retaining screws [733] for the torque arm.
3. Open the screw cover at the rear of the incremental encoder [220].
4. Unscrew the central retaining bolt [367] by about two to three turns and loosen the cone by tapping lightly on the head of the bolt. Then unscrew the retaining bolt and remove the incremental encoder.

	TIP
	During re-assembly: – Apply NOCO® FLUID to the encoder spigot. – Tighten the central retaining bolt [367] to 2.9 Nm

	INFORMATION ABOUT EXPLOSION PROTECTION
	During re-assembly, make sure the encoder shaft does not rub against the fan guard.

8.2.3 Removing the VE forced cooling fan

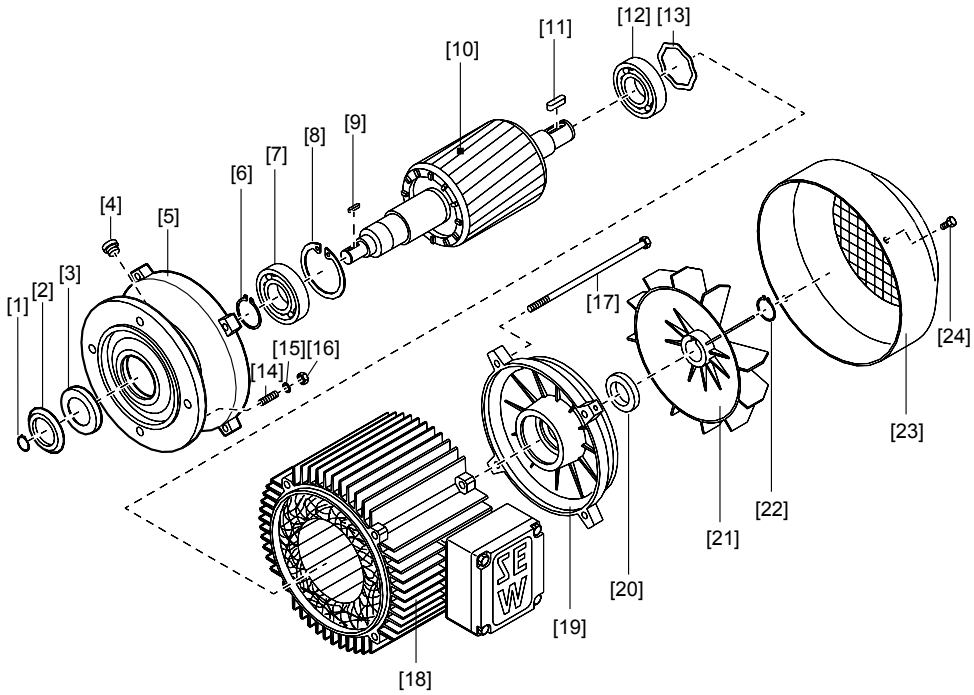


1. Before installing the forced cooling fan [1], check the fan wheel and the fan motor for damage.
2. After assembly, turn the fan wheel to make sure that the fan wheel does not rub in any place. The clearance between the fan wheel and fixed parts must be at least 1 mm.

	TIP
	Observe the operating instructions of the forced cooling fan (see page 126).

8.3 Inspection and maintenance work on the motor

8.3.1 Example: Motor DFT90



9007199514465291

[1] Circlip
[2] Oil flinger
[3] Oil seal
[4] Screw plug
[5] A-side (flanged) endshield
[6] Circlip
[7] Ball bearings
[8] Circlip
[9] Key
[10] Rotor
[11] Key
[12] Ball bearings
[13] Equalizing ring
[14] Stud (4x)
[15] Lock washer (4x)
[16] Hex nut (4x)
[17] Hex head screw (4x)
[18] Stator
[19] B-side endshield
[20] V-ring
[21] Fan
[22] Circlip
[23] Fan guard
[24] Housing screw (4x)

8.3.2 Procedure

⚠ DANGER

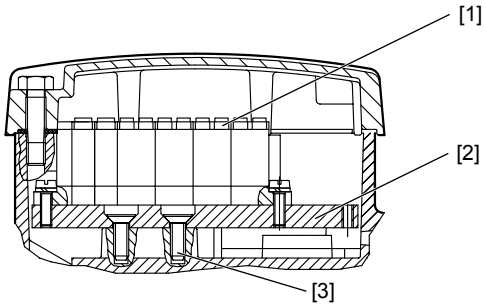
Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries

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

1. Remove the forced cooling fan and incremental encoder, if installed (see "Preliminary work for motor and brake maintenance")
2. Remove the flange cover or fan guard [23] and the fan [21]
3. Remove the hex head bolts [17] from the A-side [5] and the B-side [19] endshields, release the stator [18] from the A-side endshield
4. **Motors with brake BM/BMG:**
   - Open the terminal box, loosen the brake cable from the rectifier
   - Press off the B-side endshield and brake from the stator, lift it off carefully (feed brake cable using the trailing wire)
   - Pull the stator back by approx. 3 to 4 cm
5. Visual inspection: 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
6. If there is condensation inside the stator:
   - With gearmotors: remove the motor from the gear unit
   - With motors without a gear unit: remove the drive-end flange
   - Remove the rotor [9]
7. Clean the winding, dry it and check it electrically (see "Preliminary work")
8. Replace the ball bearings [7], [12] (use only approved ball bearings – see "Approved ball bearing types")
9. Fit a new oil seal [3] in the A-side endshield (apply a grease depot to the oil seals (Klueber Petamo GHY 133N) before assembly)
10. Reseal the stator seat ("Hylomar L Spezial" sealing compound) and grease the V-ring or labyrinth seal (DR63)
11. Install the motor, brake and accessories
12. Check the gear unit (→ gear unit operating instructions)

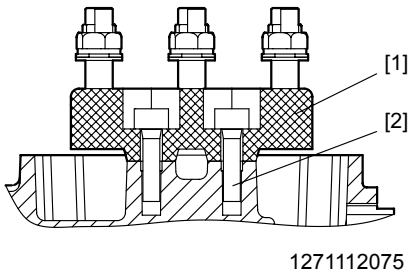
8.3.3 Replacing the adapter plate



[1] Tension spring terminal strip
[2] Adapter plate
[3] Screws

To prevent screws from loosening, secure the screws [3] that are used to attach the adapter plate [1] in size 63 motors using Loctite® or a similar substance.

8.3.4 Changing the terminal board for eDT/eDV motors



[1] Terminal board
[2] Retaining screws

When changing the terminal board [1], secure the retaining screws [2] against loosening using Loctite®.

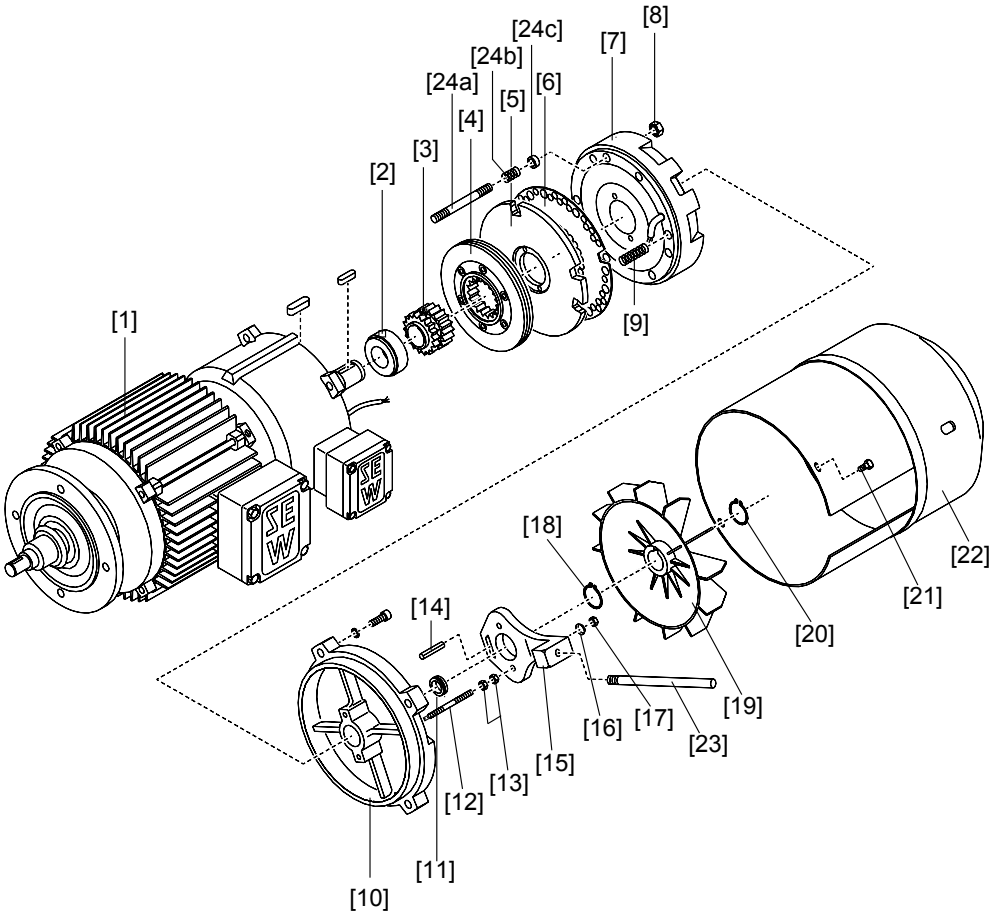
A comparable adhesive can also be used with a temperature resistance ≥ 80 °C as an alternative to Loctite®.

8.3.5 Lubricating the backstop

The backstop is lubricated with Mobil LBZ corrosion protection low-viscosity grease at the factory. 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	112/132	132M/160M	160L/225	250/280
Grease [g]	9	15	15	20	45	80

8.4 Inspection and maintenance of the BC brake



[1] Motor	[10] Housing cover	[19] Fan
[2] Spacer ring	[11] V-ring	[20] Circlip
[3] Driver	[12] Stud (2x)	[21] Housing screw (4x)
[4] Brake disc	[13] Nuts (2x)	[22] Fan guard
[5] Pressure plate	[14] Dowel pin	[23] Hand lever
[6] Damping plate	[15] Release lever	[24a] Stud (3x)
[7] Magnet	[16] Conical coil spring (2x)	[24b] Counter spring (3x)
[8] Hex nut (3x)	[17] Setting nut (2x)	[24c] Pressure ring (3x)
[9] Brake spring	[18] Circlip	

8.4.1 BC brake: setting the working air gap

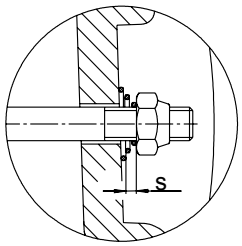
⚠ DANGER

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries

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

1. Remove the following parts (replace in case of wear):
   - Fan guard [22], circlip [20], fan [19], circlip [18], setting nuts [17], conical coil springs [16], release lever [15], nuts [13], studs [12], V-ring [11], housing cover [10]
   - Make sure not to damage the ignition gap when removing the housing cover [10].
2. Vacuum up the abraded matter
3. Carefully tighten the hex nuts [8]
   - evenly until a slight resistance is noticeable (means: working air gap = 0)
4. Turn back the hex nuts
   - by approx 120° (means: working air gap set)
5. Reinstall the following removed parts:
   - Housing cover [10] (Important: During assembly, make sure that the ignition gaps are undamaged, clean and free from rust)
   - V-ring [11], studs [12], nuts [13], release lever [15], conical coil springs [16]
6. With manual brake release: Use setting nuts [17] to set the floating clearance "s" between the conical coil springs [16] (pressed flat) and the setting nuts (→ following figure)



Brake	Floating clearance "s" [mm]
BC05	1.5
BC2	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.

7. Reinstall the fan [19] and fan guard [22].

8.4.2 Changing the braking torque BC

The braking torque can be changed in steps (see "Work done, working air gap, braking torques of brake BMG 05-8, BC"):

- By installing different brake springs
- By changing the number of brake springs

⚠ DANGER

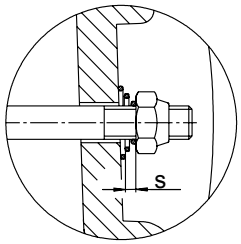
Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries

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

1. Remove the following parts (replace in case of wear):
   – Fan guard [22], circlip [20], fan [19], circlip [18], setting nuts [17], conical coil springs [16], release lever [15], nuts [13], studs [12], V-ring [11], housing cover [10]
   – Make sure not to damage the ignition gap when removing the housing cover [10].
2. Vacuum up the abraded matter
3. Unscrew the hex nuts [8] and pull off the brake coil body [7] by about 70 mm (caution: brake cable)
4. Replace or add brake springs [9]
   – Position the brake springs symmetrically
5. Install the brake coil body and hex nuts
   – Arrange the brake cable in the pressure chamber while doing so
6. Turn back the hex nuts
   – by approx 120° (means: working air gap set)
7. Reinstall the following removed parts:
   – Housing cover [10] (Important: During assembly, make sure that the ignition gaps are undamaged, clean and free from rust)
   – V-ring [11], studs [12], nuts [13], release lever [15], conical coil springs [16]

8. With manual brake release: Use setting nuts [17] to set the floating clearance "s" between the conical coil springs [16] (pressed flat) and the setting nuts (→ following figure)



259730827

Brake	Floating clearance "s" [mm]
BC05	1.5
BC2	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.

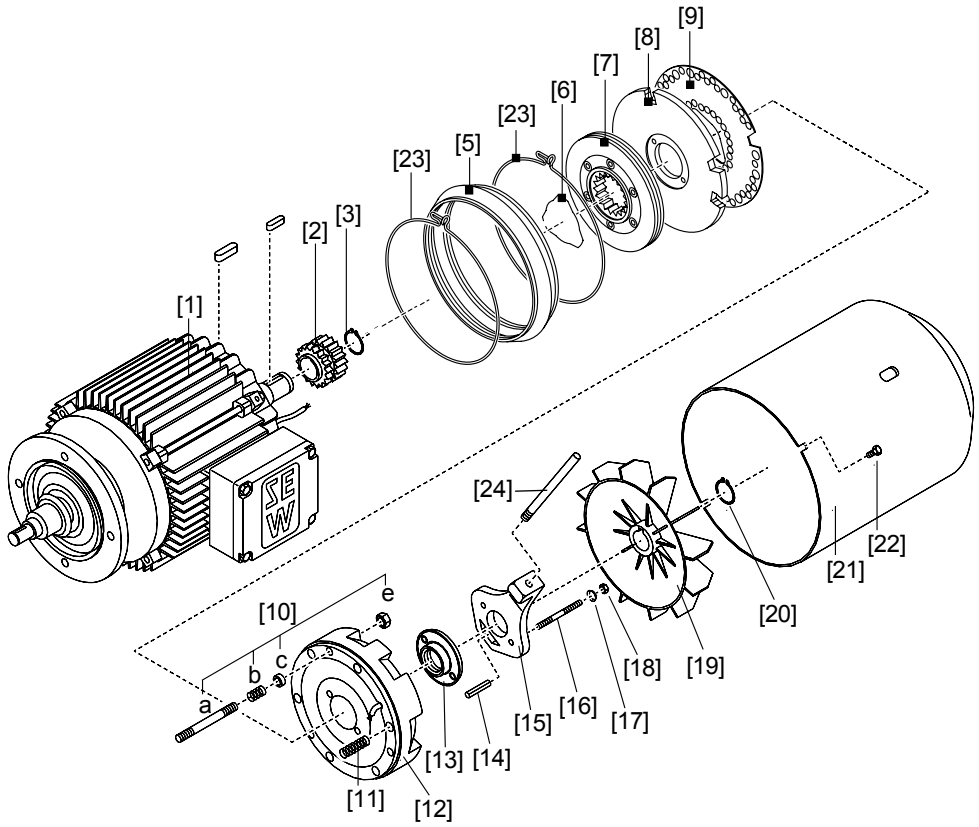
9. Reinstall the fan [19] and fan guard [22].

	TIPS
	• The lockable manual brake release is already released if resistance is encountered when operating the grub screw. • The self-reengaging manual brake release can be opened with normal hand pressure.

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

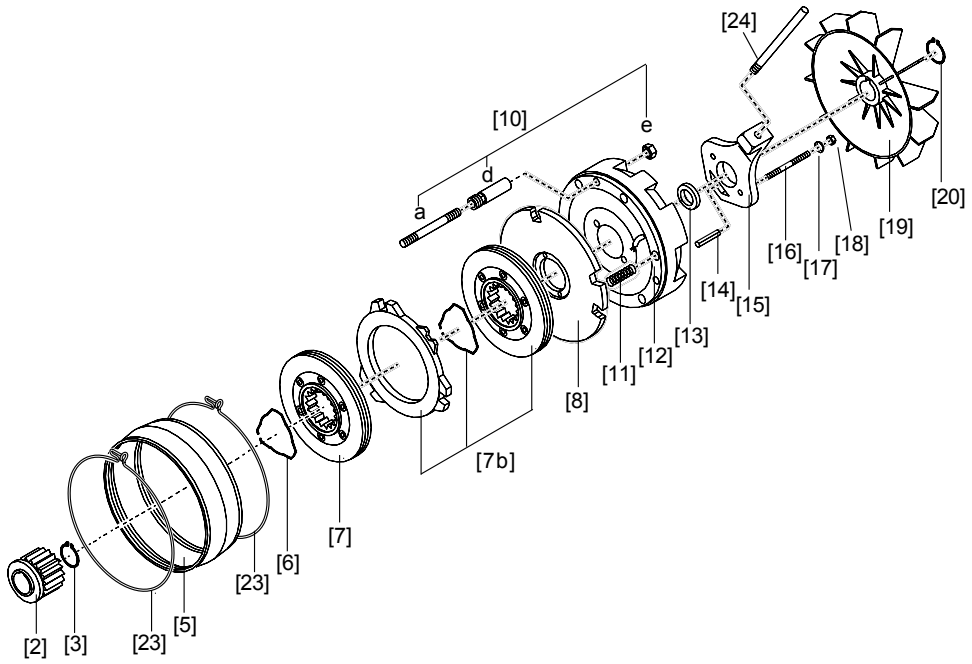
8.4.3 Brakes BMG, BM for category II3G/II3D motors

Brake BMG05-8,
BM15



[1] Motor with brake endshield
[2] Driver
[3] Circlip
[4] Stainless steel disk (BMG 05-4 only)
[5] Rubber sealing collar
[6] Annular spring
[7] Brake disc
[8] Pressure plate
[9] Damping plate (BMG only)
[10a] Stud (3x)
[10b] Counter spring (3x)
[10c] Pressure ring (3x)
[10e] Hex nut (3x)
[11] Brake spring
[12] Magnet
[13] In BMG: Gasket
In BM: V-ring
[14] Dowel pin
[15] Release lever with hand lever
[16] Stud (2x)
[17] Conical coil spring (2x)
[18] Hex nut (2x)
[19] Fans
[20] Circlip
[21] Fan guard
[22] Hex head screw (4x)
[23] Clamping strap
[24] Hand lever

BM30-62 brake



[2] Driver	[8] Pressure plate	[15] Release lever with hand lever
[3] Circlip	[10a] Stud (3x)	[16] Stud (2x)
[5] Rubber sealing collar	[10d] Setting sleeve (3x)	[17] Conical coil spring (2x)
[6] Annular spring	[10e] Hex head nut (3x)	[18] Hex nut (2x)
[7] Brake disc	[11] Brake spring	[19] Fans
[7b] BM32, BM62 only: Brake stationary disk, annular spring, brake disk	[12] Magnet	[20] Circlip
	[13] V-ring	[23] Clamping strap
	[14] Dowel pin	[24] Hand lever

8.4.4 Inspecting the brake, setting the working air gap

⚠ DANGER

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries

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

1. Remove the following:
   - Forced cooling fan and incremental encoder, if installed (see Sec. "Preliminary work for motor and brake maintenance")
   - Flange cover or fan guard [21]
2. Push the rubber sealing collar [5] aside by loosening the clamp, extract the abraded matter

3. Check the brake disc [7, 7b]

   The brake lining is subject to wear. It is essential that its thickness is not less than the specified minimum value. To be able to estimate how much wear has occurred since the last inspection, the thickness of the new brake discs is also given.

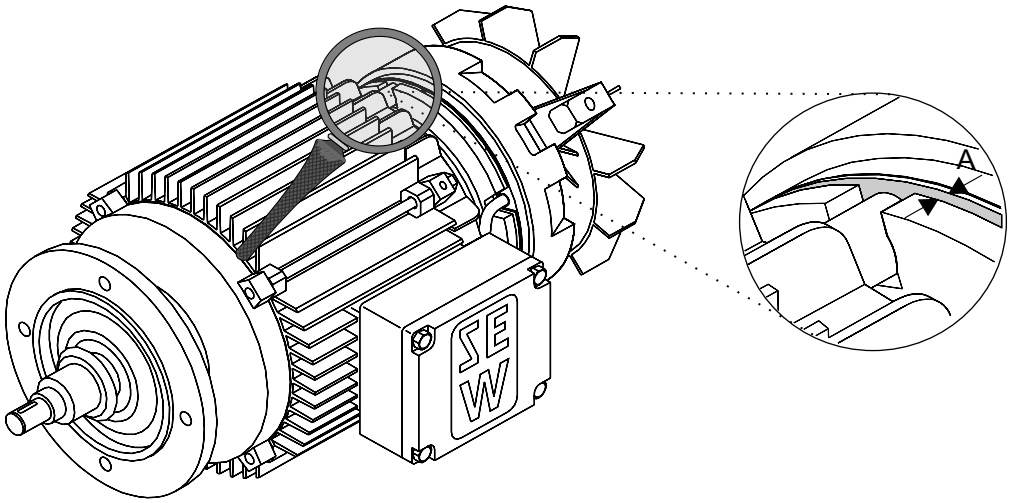
Motor type	Brake type	Minimum disc brake thickness [mm]	New disc brake thickness [mm]
D(F)T71.-D(F)V100.	BMG05-BMG4	9	12.3
D(F)V112M-D(F)V132S	BMG8	10	13.5
D(F)V132M-D(F)V225M	BM15-BM62	10	14.2

   Replace the brake disc when the brake disc thickness is below the minimum (see Sec. "Changing the BMG05 - 8, BM15 - 62 brake disc")

4. **For BM30-62:** Loosen the setting sleeve [10d] by turning it towards the endshield
5. Measure the working air gap A (→ following figure)

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

   – With BM, between the pressure plate [8] and the brake coil body [12]
   – With BMG, between the pressure plate [8] and the damping plate [9]
6. Tighten the hex nuts [10e]
   – Until the working air gap is set correctly (see "Technical Data")
   – With BM30-62, until the working air gap is initially 0.25 mm
7. **For BM30-62:** Tighten the setting sleeves
   – Against the brake coil body
   – Until the working air gap is set correctly (see "Technical Data")
8. Install the rubber sealing collar back in place and re-install the dismantled parts



8.4.5 Replacing the BMG brake disk

When fitting a new brake disk (in BMG05-4 ≤ 9 mm; in BMG8-BMG62 ≤ 10 mm), inspect the other removed parts as well and install new ones if necessary.

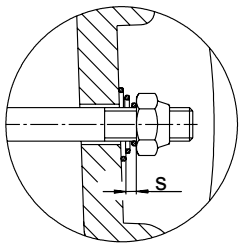
⚠ DANGER

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries

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

1. Remove the following:
   – Forced cooling fan and incremental encoder, if installed (see "Preliminary work for motor and brake maintenance")
   – Flange cover or fan guard [21], circlip [20] and fan [19]
2. Remove the rubber sealing collar [5] and the manual brake release:
   – Setting nuts [18], conical coil springs [17], studs [16], release lever [15]
3. Unscrew hex nuts [10e], carefully pull off the brake coil body [12] (brake cable!) and take out the brake springs [11]
4. Remove the damping plate [9], pressure plate [8] and brake disc [7, 7b] and clean the brake components
5. Install a new lining carrier
6. Re-install the brake components
   – Except for the rubber sealing collar, fan and fan guard, set the working air gap (→ "Inspecting brake BMG05-8, BM30-62, setting the working air gap", items 4 to 7)
7. With manual brake release: Use setting nuts [18] to set the floating clearance "s" between the conical coil springs [17] (pressed flat) and the setting nuts (→ following figure)



Brake	Floating clearance "s" [mm]
BMG05-1	1.5
BMG2-8	2
BM15-62	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. Install the rubber sealing collar back in place and re-install the dismantled parts.

8.4.6 Changing the braking torque

The braking torque can be changed in steps (see "Technical Data")

- By installing different brake springs
- By changing the number of brake springs

⚠ DANGER

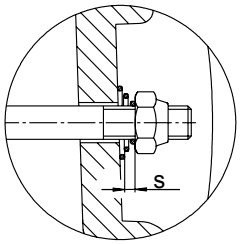
Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries

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

1. Remove the following:
   – Forced cooling fan and incremental encoder, if installed (see "Preliminary work for motor and brake maintenance")
   – Flange cover or fan guard [21], circlip [20] and fan [19]
2. Remove the rubber sealing collar [5] and the manual brake release:
   – Setting nuts [18], conical coil springs [17], studs [16], release lever [15]
3. Unscrew hex nuts [10e], pull off the brake coil body [12]
   – By approx. 50 mm (watch the brake cable!)
4. Change or add brake springs [11]
   – Position the brake springs symmetrically
5. Re-install the brake components
   – Except for the rubber sealing collar, fan and fan guard, set the working air gap (see Sec. "Inspecting brake BMG 05-8, BM 15-62", points 5 to 8)

6. With manual brake release: Use setting nuts [18] to set the floating clearance "s" between the conical coil springs [17] (pressed flat) and the setting nuts (see following figure)



Brake	Floating clearance "s" [mm]
BMG05-1	1.5
BMG2-8	2
BM15-62	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.

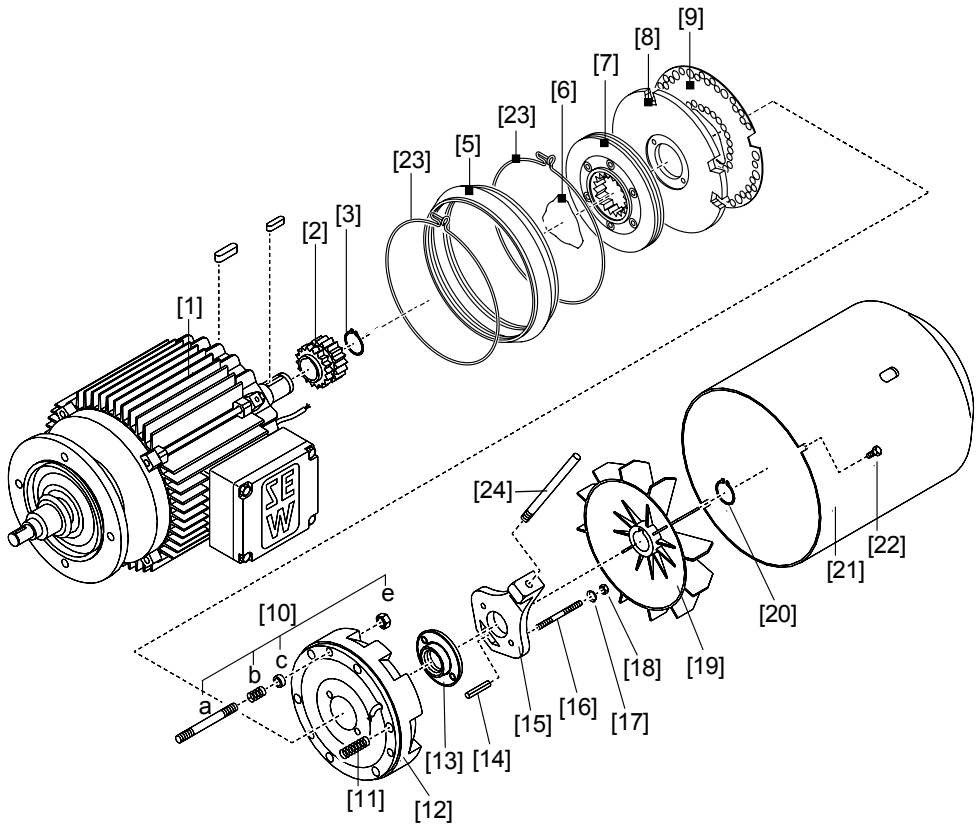
7. Install the rubber sealing collar back in place and re-install the dismantled parts.

	TIPS
	Replace setting nuts [18] and hex nuts [10e] if the removal procedure is repeated!

8.5 Inspection and maintenance of BMG, BM

8.5.1 Brakes BMG, BM for category II3G/II3D motors

Brake BMG05-8,
BM15

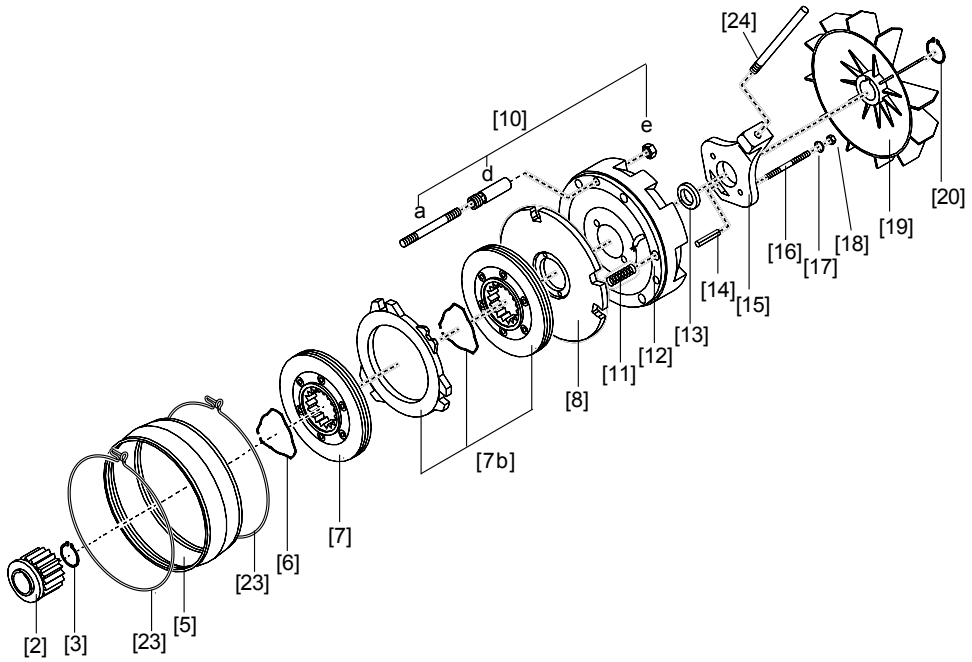


[1] Motor with brake endshield
[2] Driver
[3] Circlip
[5] Rubber sealing collar
[6] Circular spring
[7] Brake disc
[8] Pressure plate
[9] Damping plate (BMG only)

[10a] Stud (3x)
[10b] Counter spring (3x)
[10c] Pressure ring (3x)
[10e] Hex nut (3x)
[11] Brake spring
[12] Brake coil body
[13] In BMG: Sealing ring
In BM: V-ring
[14] Dowel pin

[15] Release lever with hand lever
[16] Stud (2x)
[17] Conical coil spring (2x)
[18] Hex nut (2x)
[19] Fan
[20] Circlip
[21] Fan guard
[22] Hex head screw (4x)
[23] Clamping strap
[24] Hand lever

BM30-62 brake



[2] Driver	[8] Pressure plate	[15] Release lever with hand lever
[3] Circlip	[10a] Stud (3x)	[16] Stud (2x)
[5] Rubber sealing collar	[10d] Setting sleeve (3x)	[17] Conical coil spring (2x)
[6] Circular spring	[10e] Hex nut (3x)	[18] Hex nut (2x)
[7] Brake disc	[11] Brake spring	[19] Fan
[7b] BM32, BM62 only: Brake stationary disk, circular spring, brake disc	[12] Magnet	[20] Circlip
	[13] V-ring	[23] Clamping strap
	[14] Dowel pin	[24] Hand lever

8.5.2 Inspecting the brake, setting the working air gap

⚠ DANGER

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries

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

1. Remove the following:
   - Forced cooling fan and incremental encoder, if installed (see "Preliminary work for motor and brake maintenance")
   - Flange cover or fan guard [21]
2. Push the rubber sealing collar [5] aside by loosening the clamp, vacuum out the abraded matter

3. Check the brake disc [7, 7b]

   The brake lining is subject to wear. It is essential that its thickness is not less than the specified minimum value. To be able to estimate how much wear has occurred since the last inspection, the thickness of the new brake discs is also given.

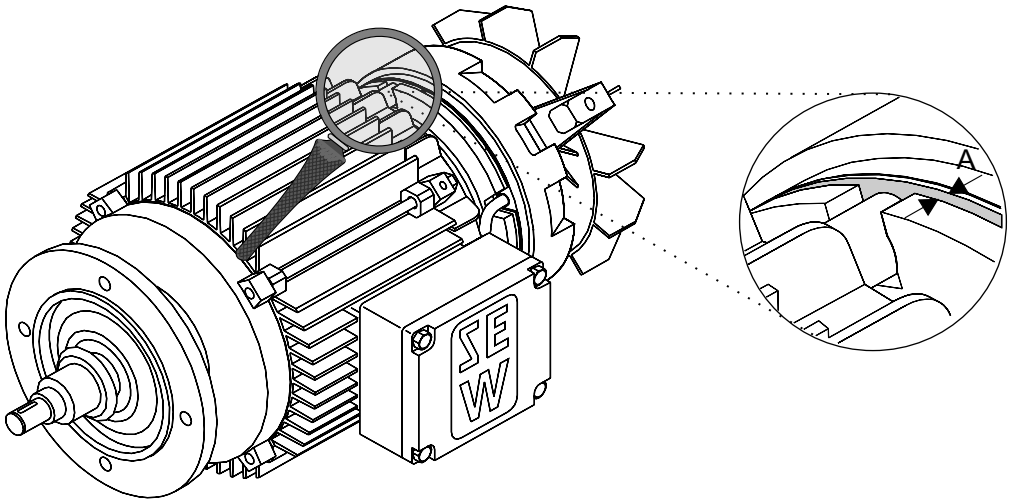
Motor type	Brake type	Minimum disc brake thickness [mm]	New disc brake thickness [mm]
D(F)T71.-D(F)V100.	BMG05-BMG4	9	12.3
D(F)V112M-D(F)V132S	BMG8	10	13.5
D(F)V132M-D(F)V225M	BM15-BM62	10	14.2

   Replace the brake disc when the brake disc thickness is below the minimum (see "Changing the BMG05 - 8, BM15 - 62 brake disc")

4. **For BM30-62:** Loosen the setting sleeve [10d] by turning it towards the endshield
5. Measure the working air gap A (→ following figure)

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

   – With BM, between the pressure plate [8] and the brake coil body [12]
   – With BMG, between the pressure plate [8] and the damping plate [9]
6. Tighten the hex nuts [10e]
   – Until the working air gap is set correctly (see "Technical Data")
   – With BM30-62, until the working air gap is initially 0.25 mm
7. **For BM30-62:** Tighten the setting sleeves
   – Against the brake coil body
   – Until the working air gap is set correctly (see "Technical Data")
8. Install the rubber sealing collar back in place and re-install the dismantled parts



8.5.3 Replacing the BMG brake disk

When fitting a new brake disk (in BMG05-4 ≤ 9 mm; in BMG8- BM62 ≤ 10 mm) inspect the other removed parts as well and install new ones if necessary.

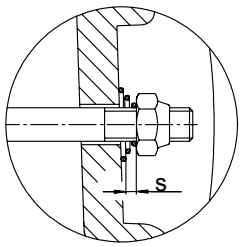
⚠ DANGER

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries

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

1. Remove the following:
   - Forced cooling fan and incremental encoder, if installed (see "Preliminary work for motor and brake maintenance")
   - Flange cover or fan guard [21], circlip [20] and fan [19]
2. 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]
3. Unscrew hex nuts [10e], carefully pull off the brake coil body [12] (brake cable!) and take out the brake springs [11]
4. Remove the damping plate [9], pressure plate [8] and brake disc [7, 7b] and clean the brake components
5. Install a new brake disc
6. Re-install the brake components
   - Except for the rubber sealing collar, fan and fan guard, set the working air gap (→ "Inspecting brake BMG05-8, BM30-62, setting the working air gap", items 4 to 7)
7. With manual brake release: Use setting nuts [18] to set the floating clearance "s" between the conical coil springs [17] (pressed flat) and the setting nuts (→ following figure)



Brake	Floating clearance "s" [mm]
BMG05-1	1.5
BMG2-8	2
BM15-62	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. Install the rubber sealing collar back in place and re-install the dismantled parts.

8.5.4 Changing the braking torque

The braking torque can be changed in steps (see "Technical Data")

- By installing different brake springs
- By changing the number of brake springs

⚠ DANGER

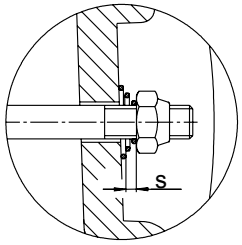
Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries

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

1. Remove the following:
   - Forced cooling fan and incremental encoder, if installed (see "Preliminary work for motor and brake maintenance")
   - Flange cover or fan guard [21], circlip [20] and fan [19]
2. 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]
3. Unscrew hex nuts [10e], pull off the brake coil body [12]
   - By approx. 50 mm (watch the brake cable!)
4. Change or add brake springs [11]
   - Position the brake springs symmetrically
5. Re-install the brake components
   - Except for the rubber sealing collar, fan and fan guard, set the working air gap (see "Inspecting brake BMG 05-8, BM15-62", items 4 to 7)

6. With manual brake release: Use setting nuts [18] to set the floating clearance "s" between the conical coil springs [17] (pressed flat) and the setting nuts (see following figure)



Brake	Floating clearance "s" [mm]
BMG05-1	1.5
BMG2-8	2
BM15-62	2

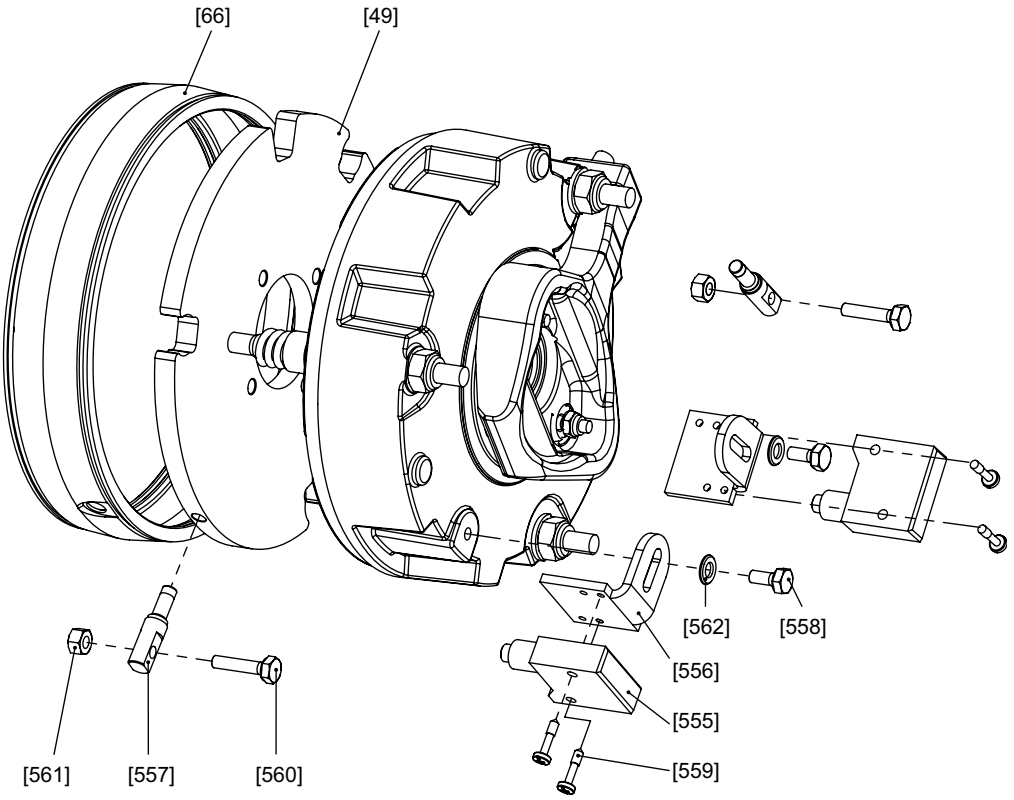
Important: The floating clearance "s" is necessary so that the pressure plate can move up as the brake lining wears. Otherwise, reliable braking is not guaranteed.

7. Install the rubber sealing collar back in place and re-install the dismantled parts.

	TIPS
	Replace setting nuts [18] and hex nuts [10e] if the removal procedure is repeated!

8.6 Inspection/maintenance of the microswitch

8.6.1 Basic design of microswitch at DT(E)90 – DV(E)280 with BM(G)



1529021963

[49]	Pressure plate for microswitch	[557]	Bolt	[560]	Hex head bolt
[66]	Rubber sealing collar for microswitch	[558]	Hex head bolt	[561]	Stud
[555]	Microswitch	[559]	Pan head screw	[562]	Washer
[556]	Angle bracket				

8.6.2 Inspection/maintenance of microswitch for function monitoring

⚠ DANGER

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries

- Disconnect the motor from the power supply before starting work and safeguard against accidental startup.
- Carefully observe the following steps!

1. Check and, if required, adjust the working air gap according to the "Inspecting the brake, setting the working air gap" section (see page 94).
2. Screw hex head bolt [560] against the actuator of the microswitch [555] until it switches over (brown-blue contacts closed).

   While screwing, apply the hex nut [561] to eliminate the longitudinal play from the thread.
3. Turn hex head bolt [560] back until the microswitch [555] switches back (contacts brown-blue open).
4. To ensure operational reliability, turn the hex head bolt [560] further back by one-sixth of a revolution (0.1 mm).
5. Tighten hex nut [561], while doing so, hold the hex head bolt [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. To do this, change the position of the motor shaft manually several times.

8.6.3 Inspection/maintenance of the microswitch for wear monitoring

⚠ DANGER

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries

- Disconnect the motor from the power supply before starting work and safeguard against accidental startup.
- Carefully observe the following steps!

1. Check and, if required, adjust the working air gap according to "Inspecting the brake, setting the working air gap" (see page 94).
2. Screw hex head bolt [560] against the actuator of the microswitch [555] until it switches over (brown-blue contacts closed).

   While screwing, apply the hex nut [561] to eliminate the longitudinal play from the thread.
3. Loosen the hex head bolt [560] towards the microswitch [555] by half a turn.
4. Tighten hex nut [561], while doing so, hold the hex head bolt [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.

8.6.4 Inspection/maintenance of microswitch for function and wear monitoring

If two microswitches are mounted on one brake, both monitoring statuses can be carried out. In this case, set the microswitch for wear monitoring before you set the microswitch for function monitoring.

9 Malfunctions

9.1 Motor problems

Failure	Possible cause	Remedy
Motor does not start up	Break in incoming cable	Check connections, correct if necessary
	Brake does not release	→ see "Brake problems"
	Fuse has blown	Replace fuse
	Motor protection has triggered	Check motor protection for correct setting, correct fault if necessary.
	Motor protection does not switch, fault in control	Check motor protection control, correct fault if necessary
Motor does not start or starts only with difficulty	Motor designed for delta connection but used in star connection.	Correct connection
	Voltage or frequency deviate considerably from setpoint, at least while being switched on.	Provide better power supply system; check cross section of incoming cable
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 design (contact SEW-EURODRIVE).
	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	→ see "Brake problems"
	Winding defective	Send motor to specialist workshop for repair
	Rotor rubbing	
Fuses blow or motor protection trips immediately	Short circuit in cable	Repair short circuit
	Short circuit in motor	Send motor to specialist workshop for repair
	Cables connected incorrectly	Correct connection
	Ground fault on motor	Send motor to specialist workshop for repair
Severe speed loss under load	Overload	Measure power, use larger motor or reduce load if necessary
	Voltage drops	Increase cross section of incoming cable
Motor heats up excessively (measure temperature)	Overload	Measure power, use larger motor or reduce load if necessary
	Insufficient cooling	Correct cooling air supply or clear cooling air passages, retrofit forced cooling fan if necessary
	Ambient temperature is too high	Observe approved temperature range
	Motor in delta connection instead of star connection as provided for	Correct connection
	Loose contact in incoming cable (one phase missing)	Rectify loose contact
	Fuse has blown	Look for and rectify cause (see above); replace fuse
	Supply voltage deviates from the rated motor voltage by more than 5%. A higher voltage has a particularly unfavorable effect in motors with a low-speed winding since, in these, the no-load current is already close to the rated current even when the voltage is normal.	Adjust motor to supply voltage
	Rated operation type (S1 to S10, DIN 57530) exceeded, e.g. through excessive starting frequency	Adjust rated operation type of motor to required operating conditions; if necessary, call in a specialist to determine correct drive
Excessively loud	Ball bearing compressed, dirty or damaged	Realign motor, inspect ball bearing (→ see "Approved ball bearing types"), grease if necessary (→ see "Lubricant table for anti-friction bearings of SEW motors"), replace
	Vibration of rotating parts	Rectify cause, possible imbalance
	Foreign bodies in cooling air passages	Clean the cooling air passages

9.2 Brake problems

Failure	Possible cause	Remedy
Brake does not release	Incorrect voltage on brake control unit	Apply correct voltage
	Brake control unit failed	Install 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 on incoming cable > 10%	Provide for correct supply 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
	Rectifier defective	Replace the rectifier and brake coil
Motor does not brake	Working air gap not correct	Measure and set working air gap
	Brake lining worn down	Replace entire brake disc
	Incorrect braking torque	Change the braking torque (→ "Technical Data") • By the type and number of brake springs • Brake: By installing the same brake coil body design as in brake • Brake: By installing the same brake coil body design as in brake
	BM(G) only: Working air gap so large that setting nuts for the manual brake release device come into contact.	Set the working air gap and floating clearance of the manual brake release device
	BR03, BM(G) only: Manual brake release device not set correctly	Set the floating clearance of the manual brake release device correctly using the 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); observe 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

9.3 Malfunctions when operating with a frequency inverter

The symptoms described in "Motor problems" may also occur when the motor is operated with a frequency inverter. Please refer to the frequency inverter operating instructions for the meaning of the problems that occur and to find information about rectifying the problems.

9.4 Customer service

9.4.1 Customer service

Please have the following information available if you require customer service assistance:

- Nameplate data (complete)
- Nature and extent of the failure
- Time the failure occurred and any accompanying circumstances
- Presumed cause

10 Technical Data

10.1 Work done, working air gap, braking torques of BMG05-8, BR03, BC

Brake type	For motor size	Work done until maintenance	Working air gap [mm]		Braking torque settings				
					Braking torque	Type and number of brake springs		Order numbers for brake springs	
		[10^6 J]	min.[1]	max.	[Nm]	Normal	Red	Normal	Red
BMG05[2]	71 80	60	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 8
BC05	71 80	60	0.25	0.6	7.5 6.0 5.0 4.0 2.5 1.6 1.2	4 3 3 2 - - -	2 3 - 2 6 4 3	135 017 X	135 018 8
BMG1	80	60	0.25	0.6	10 7.5 6.0	6 4 3	- 2 3	135 017 X	135 018 8
BMG2[3]	90 100	130	0.25	0.6	20 16 10 6.6 5.0	3 2 - - -	- 2 6 4 3	135 150 8	135 151 6
BC2	90 100	130	0.25	0.6	30 24 20 16 10 6.6 5.0	4 3 3 2 - - -.	2 3 - 2 6 4 3	135 150 8	135 151 6
BMG4	100	130	0.25	0.6	40 30 24	6 4 3	- 2 3	135 150 8	135 151 6
BMG8	112M 132S	300	0.3	0.9	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.

10.2 Work done, working air gap, braking torques of BM15-62

Brake type	For motor size	Work done until maintenance	Working air gap [mm]		Braking torque settings				
					Braking torque	Type and number of springs		Order number of springs	
		[10^6 J]	min.[1]	max.	[Nm]	Normal	Red	Normal	Red
BM15	132M, ML 160M	500	0.3	0.9	150 125 100 75 50 35 25	6 4 3 3 - - -	- 2 3 - 6 4 3	184 486 5	184 487 3
BM30	160L 180	750			300 250 200 150 125 100 75 50	8 6 4 4 2 - - -	- 2 4 - 4 8 6 4	187 455 1	187 457 8
BM31	200 225	750							
BM32[2]	180	750	0.4	0.9	300 250 200 150 100	4 2 - - -	- 4 8 6 4	187 455 1	187 457 8
BM62[2]	200 225	750			600 500 400 300 250 200 150 100	8 6 4 4 2 - - -	- 2 4 - 4 8 6 4		

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 disc brake

10.3 Permitted work done by the brake

⚠ DANGER

Explosion hazard if the maximum permitted braking work per braking operation is exceeded.

Severe or fatal injuries

- The maximum braking work per brake application shown in the characteristic curves must not be exceeded – not even in the case of emergency brake applications.

If you are using a brake motor, you must to check whether the brake is approved for use with the required starting frequency Z. The following diagrams show the approved work done W_{max} per cycle for the various brakes and rated speeds. The values are given with reference to the required starting frequency Z in cycles/hour (1/h).

For assistance in determining the braking work, refer to "Drive Engineering – Practical Implementation: Drive Planning".

10.3.1 Category II3D (BMG05-BM62) and category II2G (BC05 and BC2)

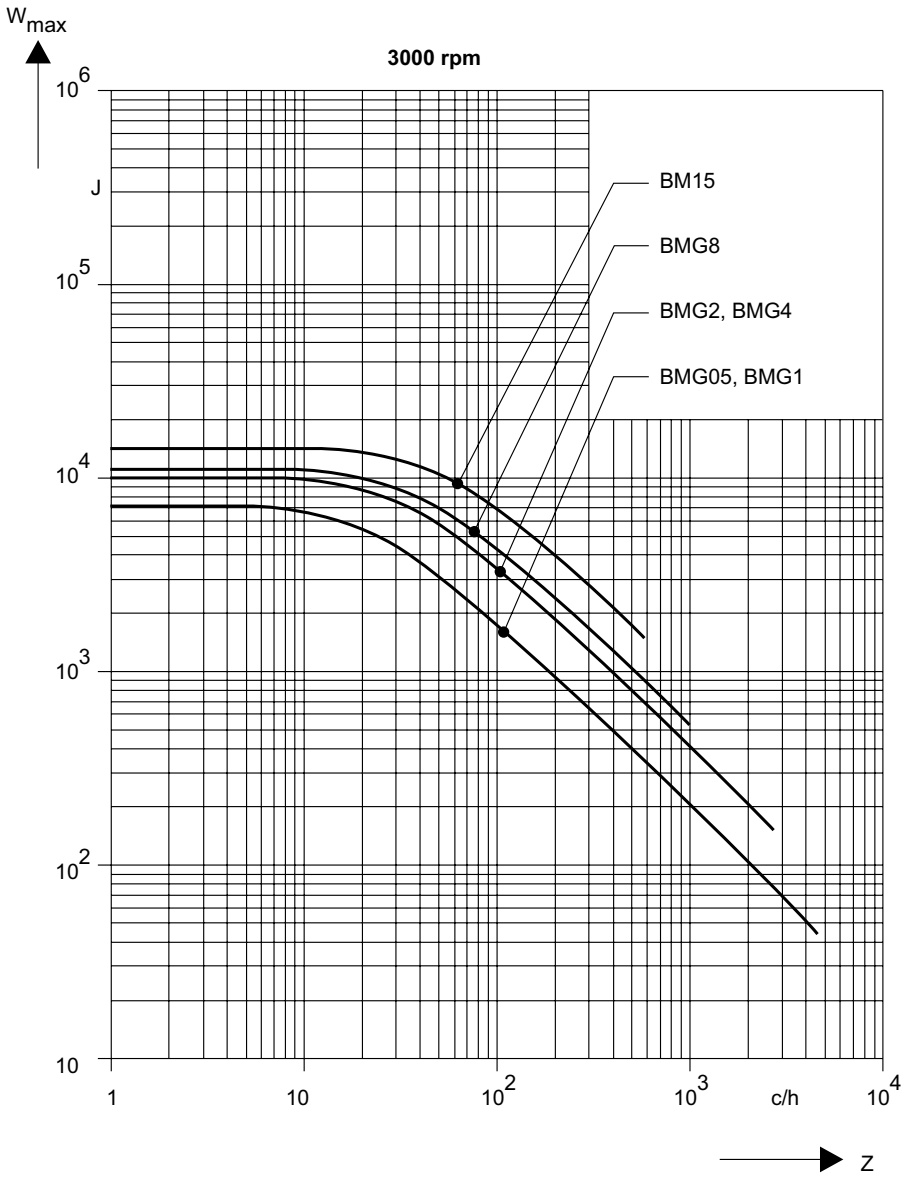


Fig. 6: Maximum permitted work done per cycle at 3000 rpm

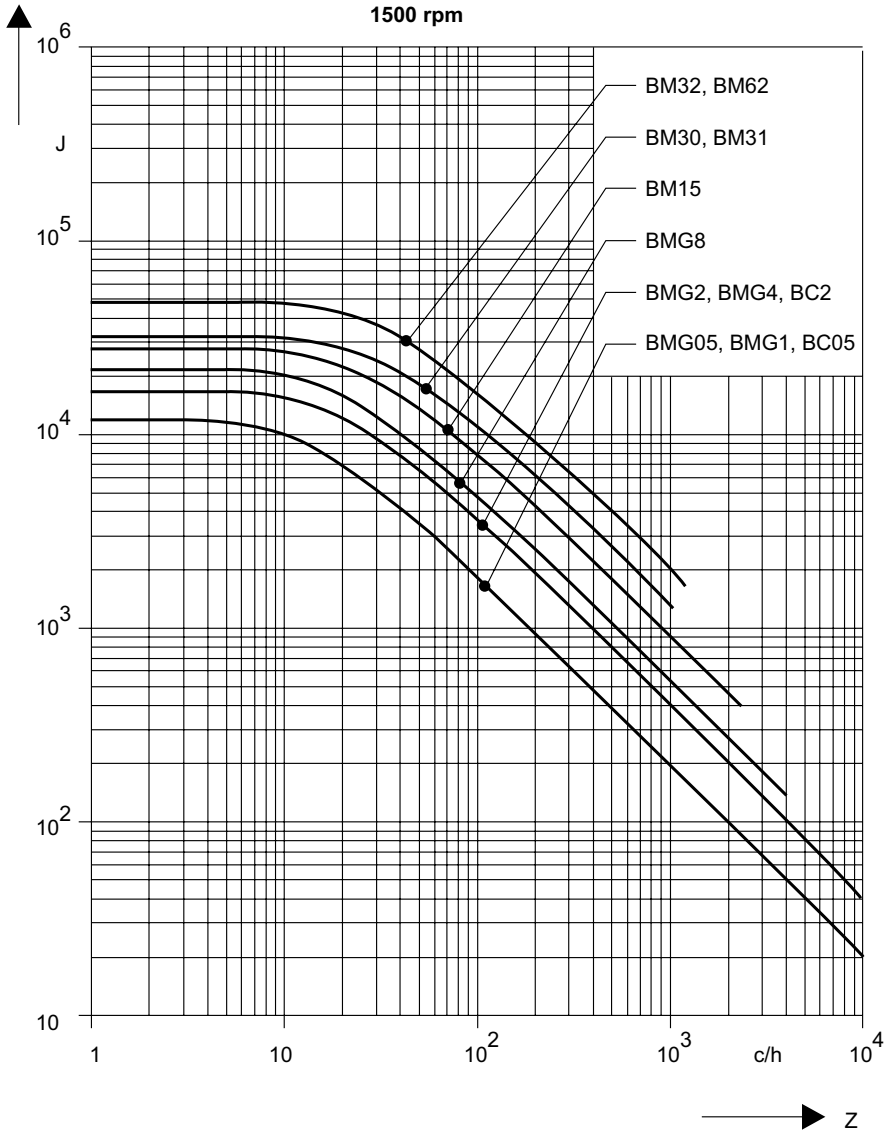


Fig. 7: Maximum permitted work done per cycle at 1500 rpm

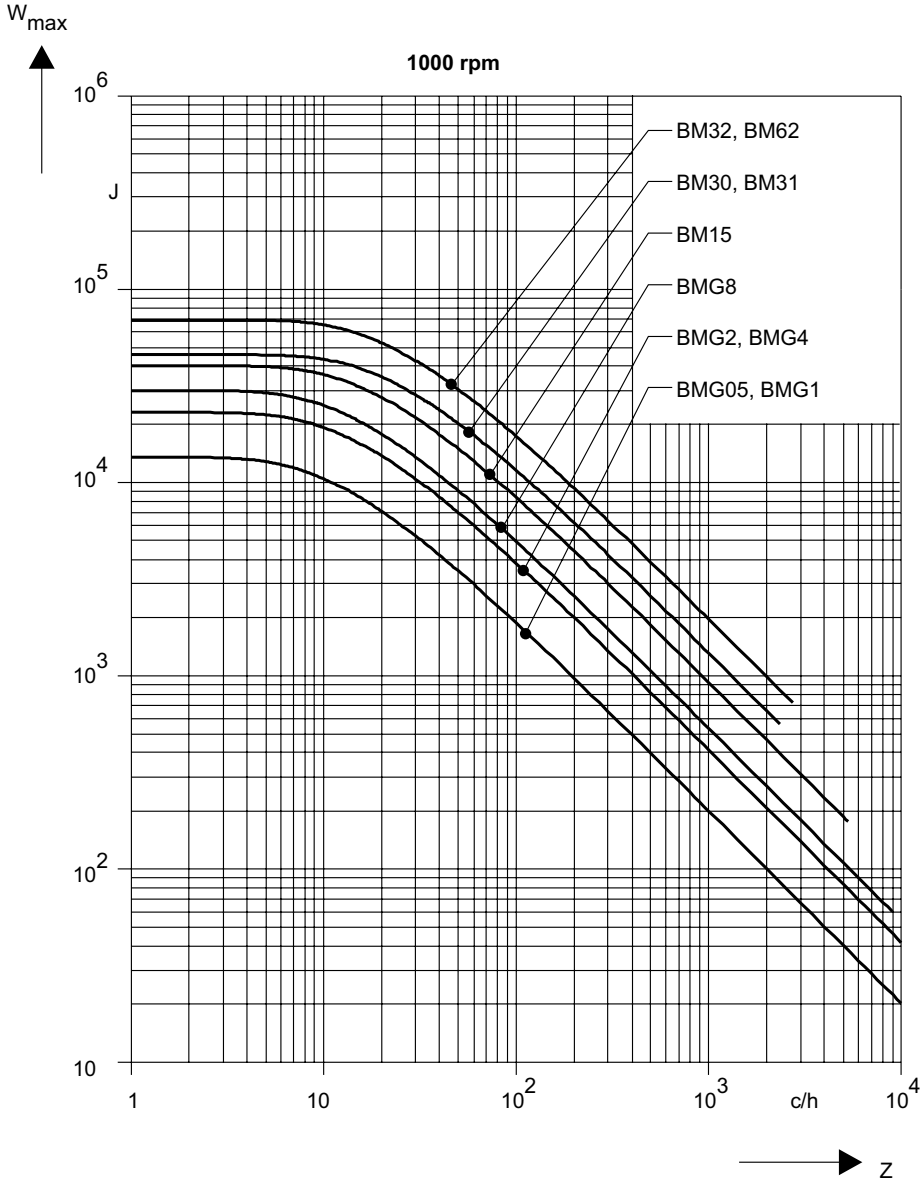


Fig. 8: Maximum permitted work done per cycle at 1000 rpm

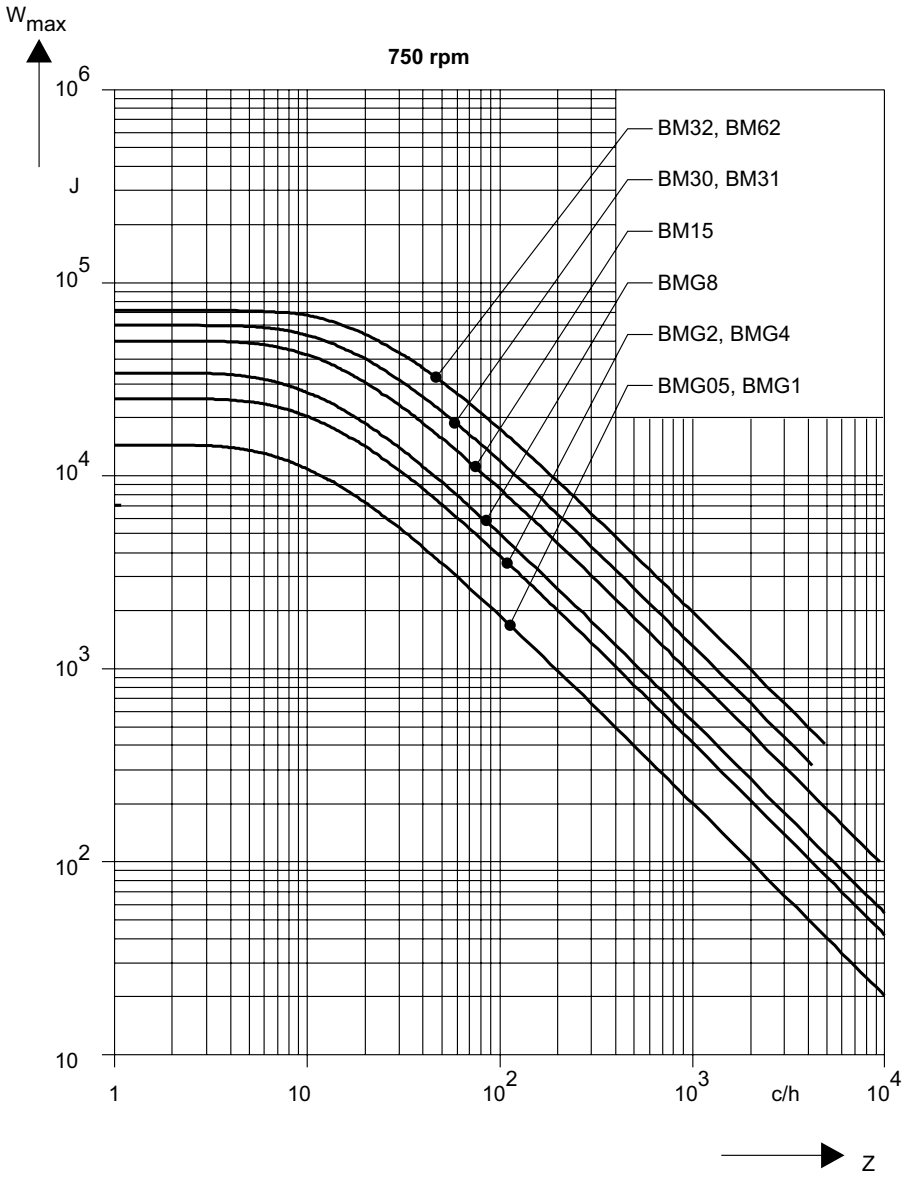


Fig. 9: Maximum permitted work done per cycle at 750 rpm

10.3.2 Category II3G (BMG05-BM62)

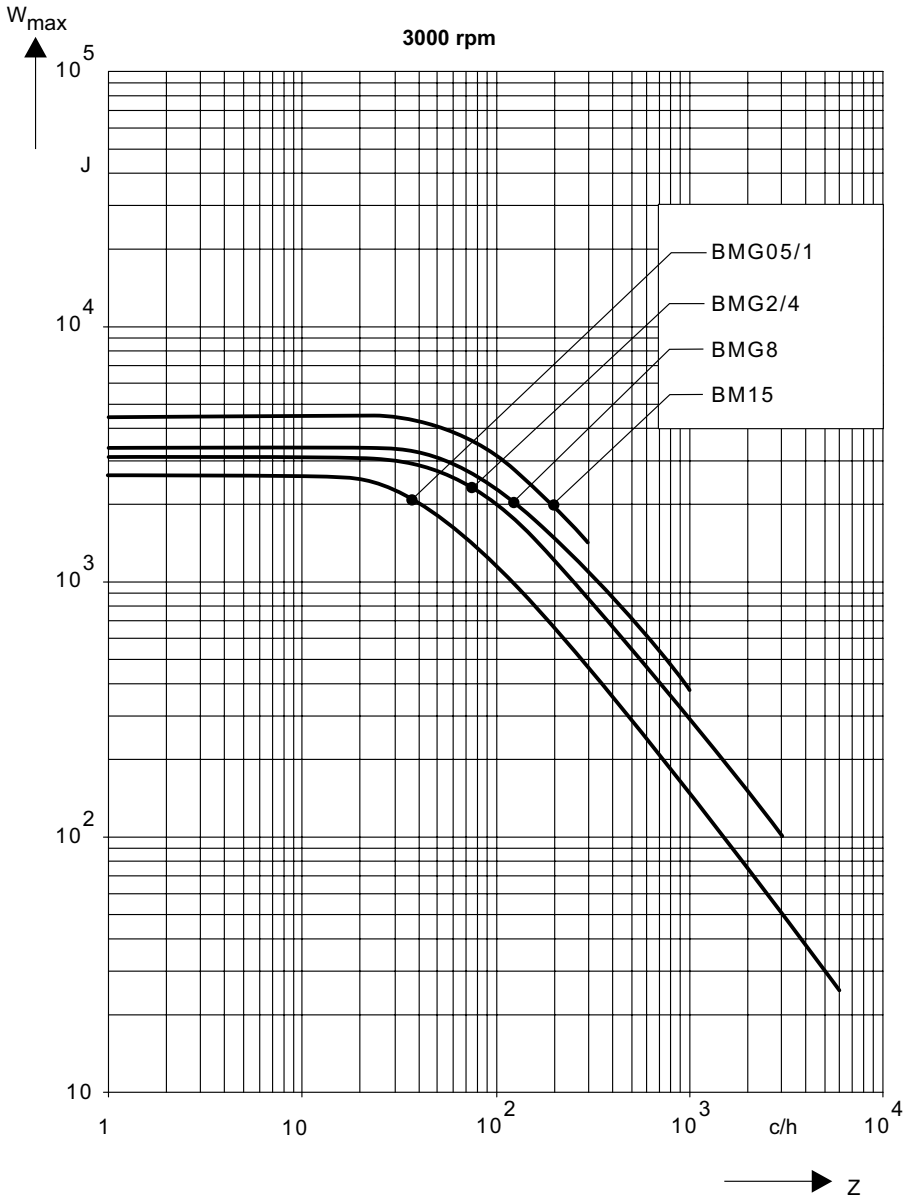


Fig. 10: Maximum permitted work done per cycle at 3000 rpm

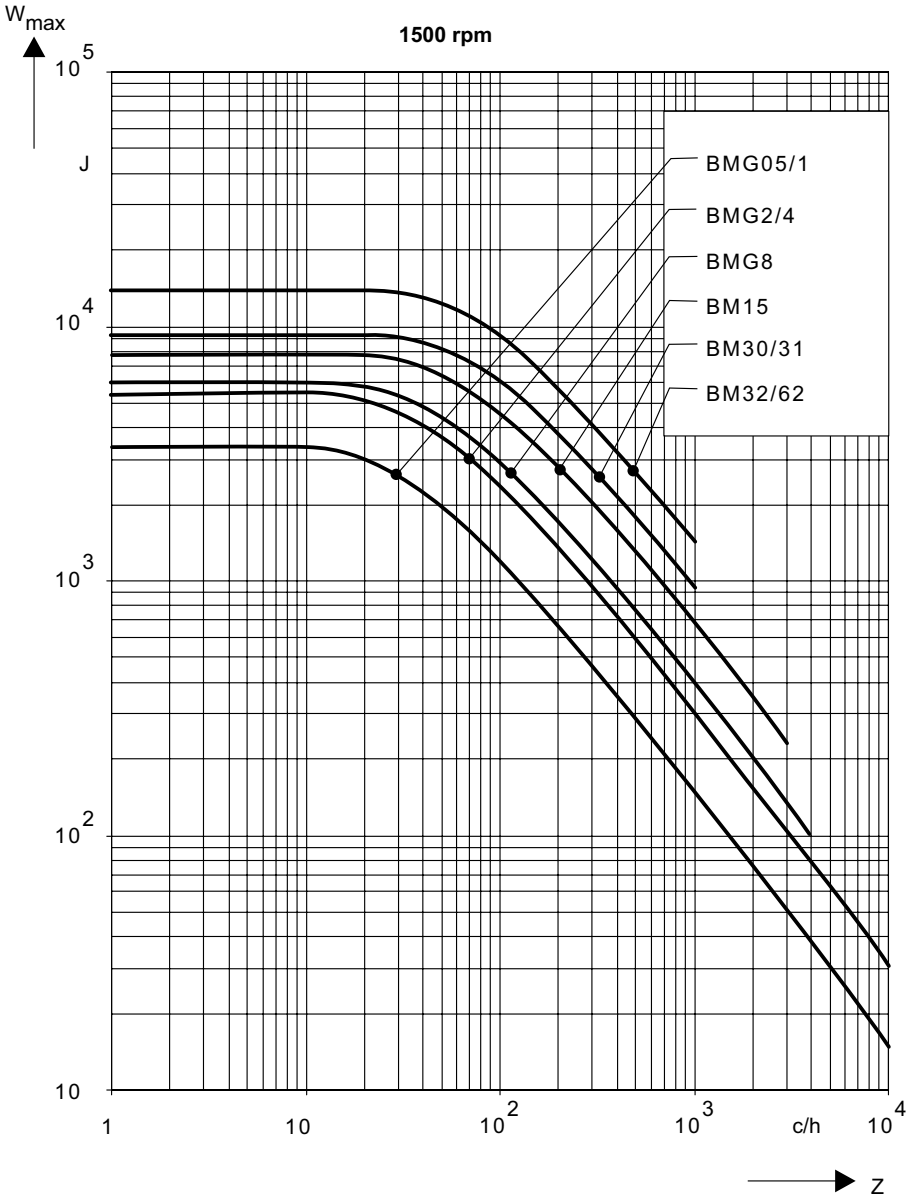


Fig. 11: Maximum permitted work done per cycle at 1500 rpm

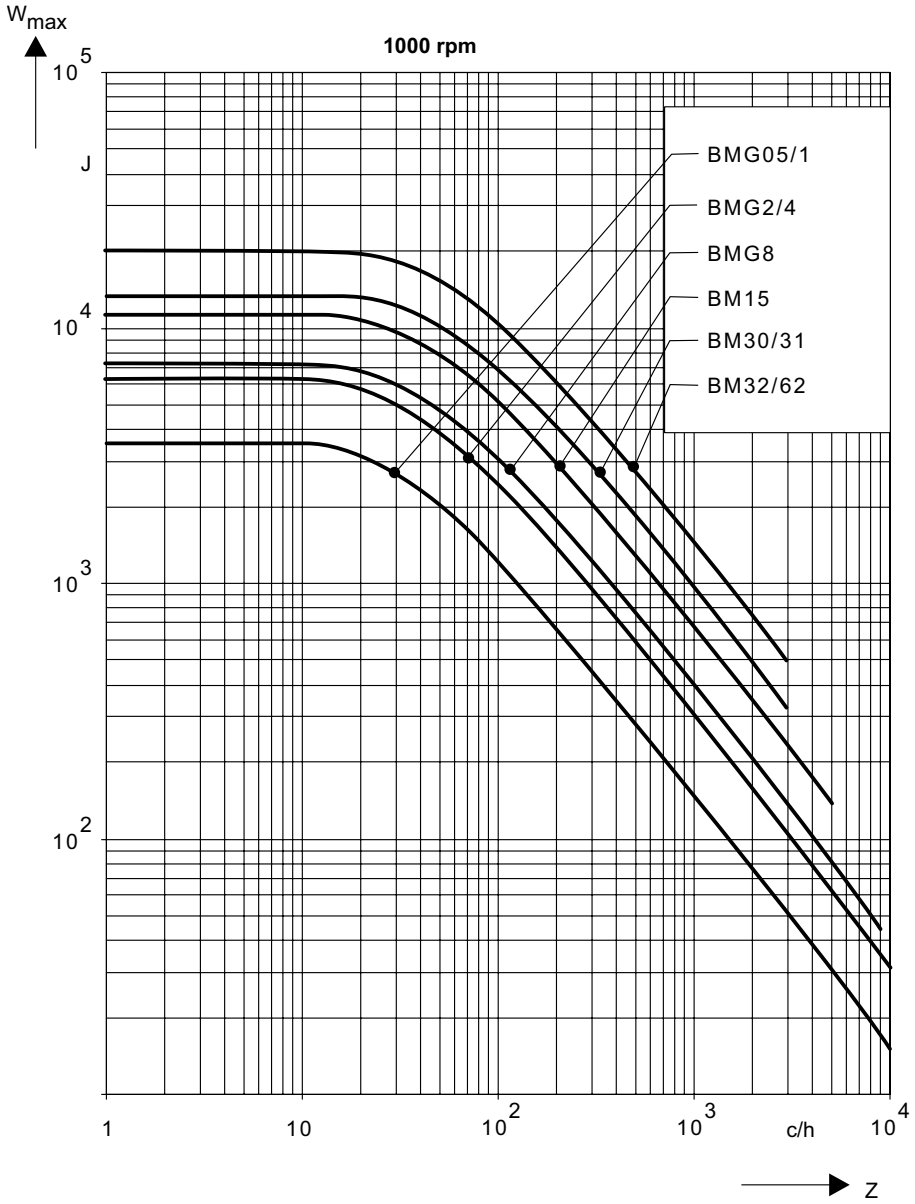


Fig. 12: Maximum permitted work done per cycle at 1000 rpm

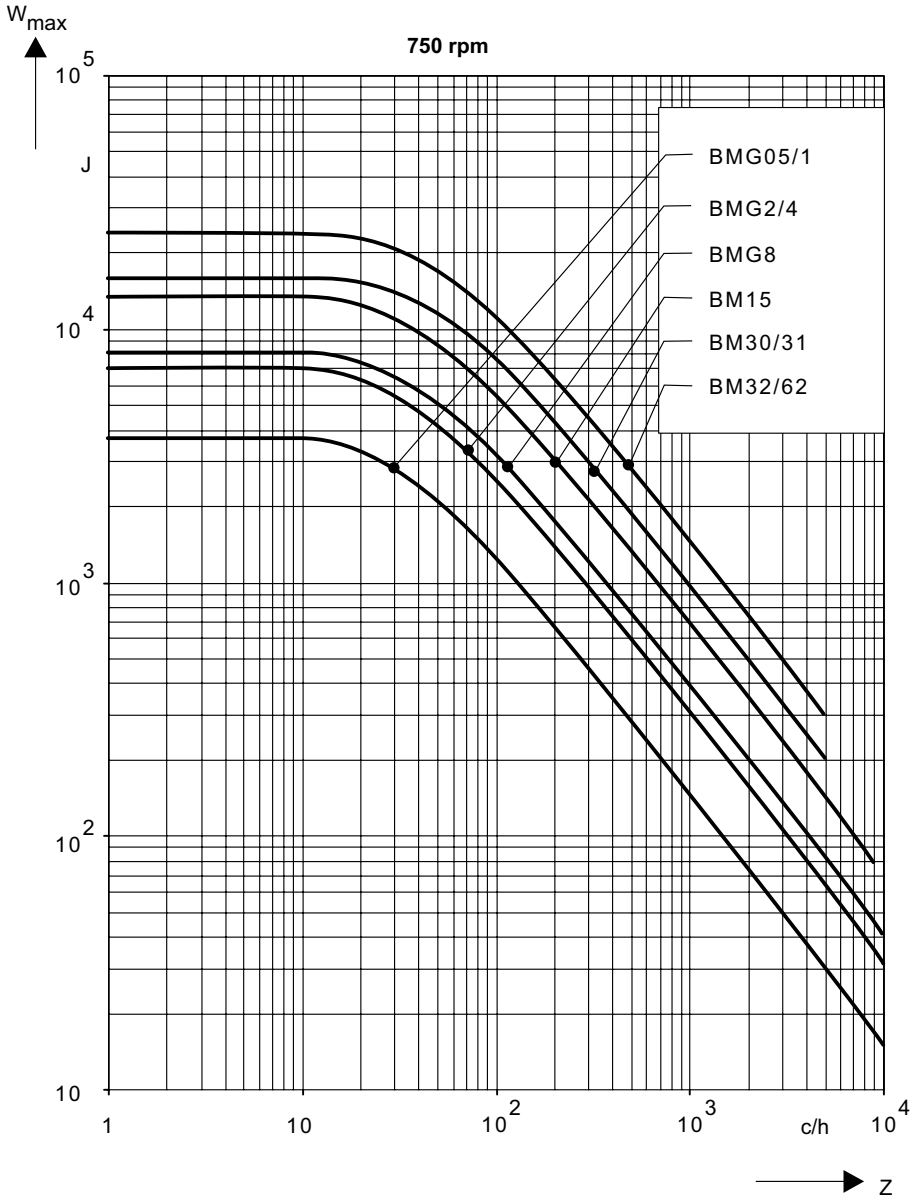


Fig. 13: Maximum permitted work done per cycle at 750 rpm

10.4 Operating currents

The current values I_H (holding current) specified in the tables are r.m.s. values. Measure the r.m.s. values using only the appropriate measuring instruments. The inrush current (acceleration current) I_B only flows for a short time (max. 150 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 only possible with brakes up to motor size BMG4.

10.4.1 BMG05-BMG4 brake

	BMG05	BMG1	BMG2	BMG4
Motor size	71/80	80	90/100	100
Max. braking torque [Nm]	5	10	20	40
Thermal power loss [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

I_B Accelerator current - brief inrush current

I_H Holding current, r.m.s. value in the incoming cable to the SEW brake rectifier

I_G Direct current with direct DC voltage supply

V_N Rated voltage (rated voltage range)

10.4.2 BMG8-BM32/62 brake

	BMG8	BM15	BM30/31; BM32/62
Motor size	112/132S	132M-160M	160L-225
Max. braking torque [Nm]	75	150	600
Thermal power loss [W]	65	95	120
Inrush current ratio I_B/I_H	6.3	7.5	8.5

Rated voltage V_N		BMG8	BM15	BM30/31; BM32/62
V_{AC}	V_{DC}	I_H [A_{AC}]	I_H [A_{AC}]	I_H [A_{AC}]
	24	2.77[1)]	4.15[1)]	4.00[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 for operation with BSG

Key

I_H Holding current, r.m.s. value in the supply cable 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)

10.4.3 BC brake

	BC05	BC2
Motor size	71/80	90/100
Max. braking torque [Nm]	7.5	30
Thermal power loss [W]	29	41
Control factor I_B/I_H	4	4

Rated voltage V_N		BC05		BC2	
V_{AC}	V_{DC}	I_H [A_{AC}]	I_G [A_{DC}]	I_H [A_{AC}]	I_G [A_{DC}]
	24	-	1.22	-	1.74
42 (40-46)	**18**	1.10	1.39	1.42	2.00
48 (47-52)	**20**	0.96	1.23	1.27	1.78
56 (53-58)	**24**	0.86	1.10	1.13	1.57
60 (59-66)	**27**	0.77	0.99	1.00	1.42
73 (67-73)	**30**	0.68	0.87	0.90	1.25
77 (74-82)	**33**	0.60	0.70	0.79	1.12
88 (83-92)	**36**	0.54	0.69	0.71	1.00
97 (93-104)	**40**	0.48	0.62	0.63	0.87
110 (105-116)	**48**	0.42	0.55	0.57	0.79
125 (117-131)	**52**	0.38	0.49	0.50	0.71
139 (132-147)	**60**	0.34	0.43	0.45	0.62
153 (148-164)	**66**	0.31	0.39	0.40	0.56
175 (165-185)	**72**	0.27	0.34	0.35	0.50
200 (186-207)	**80**	0.24	0.31	0.31	0.44
230 (208-233)	**96**	0.21	0.27	0.28	0.40
240 (234-261)	**110**	0.19	0.24	0.25	0.35
290 (262-293)	**117**	0.17	0.22	0.23	0.32
318 (294-329)	**125**	0.15	0.20	0.19	0.28
346 (330-369)	**147**	0.13	0.18	0.18	0.24
400 (370-414)	**167**	0.12	0.15	0.15	0.22
440 (415-464)	**185**	0.11	0.14	0.14	0.20
500 (465-522)	**208**	0.10	0.12	0.12	0.17

Key

I_H Holding current, r.m.s. value in the supply cable to the SEW brake rectifier

I_B Acceleration current – brief inrush current

I_G Direct current with direct DC voltage supply

V_N Rated voltage (rated voltage range)

10.5 Maximum permitted overhung loads

The following table lists the permitted overhung loads (top value) and axial forces (bottom value) of explosion-proof AC motors:

Mounting position	[rpm] Number of poles	Permitted overhung load F_R [N] Permitted axial force F_A [N]; $F_{A\_tensile\ force} = F_{A\_pressure}$ Size													
		63	71	80	90	100	112	132S	132ML 132M	160M	160L	180	200	225	250 280
Foot mounted motor	750 8	- -	680 200	920 240	1280 320	1700 400	1750 480	1900 560	2600 640	3600 960	3800 960	5600 1280	6000 2000	- -	- -
	1000 6	- -	640 160	840 200	1200 240	1520 320	1600 400	1750 480	2400 560	3300 800	3400 800	5000 1120	5500 1900	- -	8000 2500
	1500 4	- -	560 120	720 160	1040 210	1300 270	1400 270	1500 270	2000 400	2600 640	3100 640	4500 940	4700 2400	7000 2400	8000 2500
	3000 2	- -	400 80	520 100	720 145	960 190	980 200	1100 210	1450 320	2000 480	2300 480	3450 800	- -	- -	- -
Flange-mounted motor	750 8	- -	850 250	1150 300	1600 400	2100 500	2200 600	2400 700	3200 800	4600 1200	4800 1200	7000 1600	7500 2500	- -	- -
	1000 6	600 150	800 200	1050 250	1500 300	1900 400	2000 500	2200 600	2900 700	4100 1000	4300 1000	6300 1400	6800 2400	- -	11000 3000
	1500 4	500 110	700 140	900 200	1300 250	1650 350	1750 350	1900 350	2500 500	3200 800	3900 800	5600 1200	5900 3000	8700 3000	9000 2600
	3000 2	400 70	500 100	650 130	900 180	1200 240	1200 250	1300 260	1800 400	2500 600	2900 600	4300 1000	- -	- -	- -

10.5.1 Overhung load conversion for off-center force application

The permitted overhung loads must be calculated using the following formulae in the event that force is not applied at the center of the shaft end. The smaller of the two values F_{xL} (according to bearing service life) and F_{xW} (according to shaft strength) is the permitted value for the overhung load at point x. Note that the calculations apply to $M_{a\ max}$.

FxL based on bearing service life

$$F_{xL} = F_R \times \frac{a}{b + x}[N]$$

FxW based on shaft strength

$$F_{xW} = \frac{c}{f + x}[N]$$

F_R = Permitted overhung load (x = l/2) [N]
x = Distance from the shaft shoulder to the force application point [mm]
a, b, f = Motor constants for overhung load conversion [mm]
c = Motor constant for overhung load conversion [Nmm]

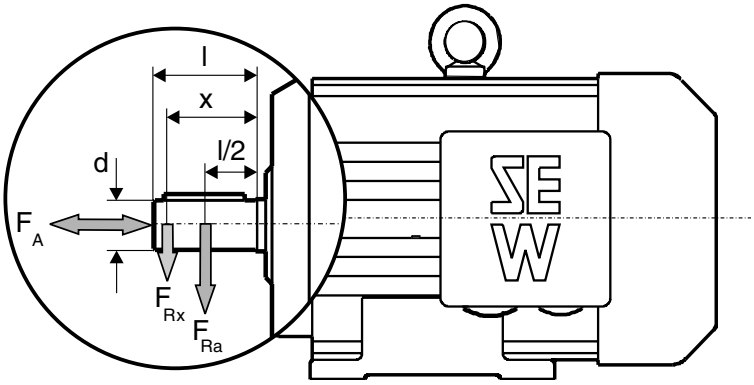


Fig. 14: Overhung load F_X for off-center force application

Motor constants for overhung load conversion

Size	a [mm]	b [mm]	c 2-pole [Nmm]	c 4-pole [Nmm]	c 6-pole [Nmm]	c 8-pole [Nmm]	f [mm]	d [mm]	l [mm]
DFR63	161	146	$11.2 \cdot 10^3$	$16.8 \cdot 10^3$	$19 \cdot 10^3$	-	13	14	30
DT71	158.5	143.8	$11.4 \cdot 10^3$	$16 \cdot 10^3$	$18.3 \cdot 10^3$	$19.5 \cdot 10^3$	13.6	14	30
DT80	213.8	193.8	$17.5 \cdot 10^3$	$24.2 \cdot 10^3$	$28.2 \cdot 10^3$	$31 \cdot 10^3$	13.6	19	40
DT(E)90	227.8	202.8	$27.4 \cdot 10^3$	$39.6 \cdot 10^3$	$45.7 \cdot 10^3$	$48.7 \cdot 10^3$	13.1	24	50
SDT100	270.8	240.8	$42.3 \cdot 10^3$	$57.3 \cdot 10^3$	$67 \cdot 10^3$	$75 \cdot 10^3$	14.1	28	60
DV(E)100	270.8	240.8	$42.3 \cdot 10^3$	$57.3 \cdot 10^3$	$67 \cdot 10^3$	$75 \cdot 10^3$	14.1	28	60
(S)DV(E)112M	286.8	256.8	$53 \cdot 10^3$	$75.7 \cdot 10^3$	$86.5 \cdot 10^3$	$94.6 \cdot 10^3$	24.1	28	60
(S)DV(E)132S	341.8	301.8	$70.5 \cdot 10^3$	$96.1 \cdot 10^3$	$112 \cdot 10^3$	$122 \cdot 10^3$	24.1	38	80
DV(E)132M	344.5	304.5	$87.1 \cdot 10^3$	$120 \cdot 10^3$	$144 \cdot 10^3$	$156 \cdot 10^3$	20.1	38	80
DV(E)132ML	404.5	364.5	$120 \cdot 10^3$	$156 \cdot 10^3$	$198 \cdot 10^3$	$216.5 \cdot 10^3$	20.1	38	80
DV(E)160M	419.5	364.5	$150 \cdot 10^3$	$195.9 \cdot 10^3$	$248 \cdot 10^3$	$270 \cdot 10^3$	20.1	42	110
DV(E)160L	435.5	380.5	$177.5 \cdot 10^3$	$239 \cdot 10^3$	$262.5 \cdot 10^3$	$293 \cdot 10^3$	22.15	42	110
DV(E)180	507.5	452.5	$266 \cdot 10^3$	$347 \cdot 10^3$	$386 \cdot 10^3$	$432 \cdot 10^3$	22.15	48	110
DV(E)200	537.5	482.5	-	$258.5 \cdot 10^3$	$302.5 \cdot 10^3$	$330 \cdot 10^3$	0	55	110
DV(E)225	626.5	556.5	-	$490 \cdot 10^3$	-	-	0	60	140
DV(E)250	658	588	-	$630 \cdot 10^3$	-	-	0	65	140
DV(E)280	658	588	-	$630 \cdot 10^3$	-	-	0	75	140

2nd motor shaft end

Contact SEW-EURODRIVE regarding permitted load for 2nd motor shaft end.

10.6 Approved ball bearing types

10.6.1 Category 2

Motor type	A-side bearing (AC motor, brake motor)		B-side bearing (foot-mounted, flange-mounted, gearmotors)	
	Gearmotor	Flange-mounted and foot-mounted motors	AC motor	Brake motor
eDT71-eDT80	6303 2RS J C3	6204 2RS J C3	6203 2RS J C3	
eDT90-eDV100	6306 2RS J C3		6205 2RS J C3	
eDV112-eDV132S	6307 2RS J C3	6208 2RS J C3	6207 2RS J C3	-
eDV132M-eDV160M	6309 2RS J C3		6209 2RS J C3	-
eDV160L-eDV180L	6312 2RS J C3		6213 2RS J C3	-

10.6.2 Category 3

Motor type	A-side bearing (AC motor, brake motor)		B-side bearing (foot-mounted, flange-mounted, gearmotors)	
	Gearmotor	Flange-mounted and foot-mounted motors	AC motor	Brake motor
DFR63	6303 2RS J C3	6203 2RS J C3	6202 2RS J C3	-
DT71-DT80	6303 2RS J C3	6204 2RS J C3	6203 2RS J C3	
DT(E)90-DV(E)100	6306 2RS J C3		6205 2RS J C3	
DV(E)112-DV(E)132S	6307 2RS J C3	6208 2RS J C3	6207 2RS J C3	
DV(E)132M-DV(E)160M	6309 2RS J C3		6209 2RS J C3	
DV(E)160L-DV(E)180L	6312 2RS J C3		6213 2RS J C3	
DV(E)200LS-DV(E)225M	6314 2RS J C3		6314 2RS J C3	
DV(E)250-DV(E)280M	6316 2RS J C3		6315 2RS J C3	

11 Declaration of Conformity

11.1 Motors in category 3G/3D/3GD, series D(F)T(E)/D(F)V(E)

EG-Konformitätserklärung

EC Declaration of Conformity
Déclaration CE de conformité

SEW EURODRIVE

Nr.*/No./N°* **900130507**

im Sinne der Richtlinie 94/9/EG, Anhang VIII
according to Directive 94/9/EC, Appendix VIII
au sens de la directive 94/9/CE, Annexe VIII

SEW EURODRIVE GmbH & Co KG
Ernst-Blickle-Straße 42, D-76646 Bruchsal

erklärt in alleiniger Verantwortung die Konformität der folgenden Produkte
declares under sole responsibility conformity of the following products
déclare, sous sa seule responsabilité, que les produits suivants

Motoren und Bremsmotoren der Baureihe: *Motors and brake motors of the series:* *Moteurs et moteurs-frein des séries :*	**DR63, DFR63** **DT, DFT, DTE, DFTE** **DV, DFV, DVE, DFVE**
Kategorie: *in category: / Catégories :*	**II 3G & II3D & II 3GD**
Kennzeichnung: *marking: / Codification :*	**II3G Ex nA II T3** **II3D Ex tD A22 IP5X T120°C** **II3D Ex tD A22 IP6X T120°C** **II3D Ex tD A22 IP5X T140°C** **II3D Ex tD A22 IP6X T140°C**
mit der *with the / respectent la*	
Richtlinie *Directive / Directive*	**94/9 EG** *94/9 EC / 94/9/CE*
angewandte harmonisierte Normen: *Applied harmonized standards: / Normes harmonisées appliquées :*	**EN 60079-0:2006** **EN 60079-15:2005** **EN 61241-0:2006** **EN 61241-1:2004** **EN 60034-1:2004**

Ort/Datum
Place/date / Lieu et date

Bruchsal, 21.11.08

Geschäftsführer Vertrieb und Marketing
Managing Director Sales and Marketing
Directeur général international commercial et marketing

H. Sondermann

11.2 Motors/brake motors in categories 2GD/2G, series eD(F)T, eD(F)V and BC

EG-Konformitätserklärung

EC Declaration of Conformity
Déclaration CE de conformité

SEW EURODRIVE

Nr.*/No./N°* **900120407**

im Sinne der Richtlinie 94/9/EG, Anhang VIII
according to Directive 94/9/EC, Appendix VIII
au sens de la directive 94/9/CE, Annexe VIII

SEW EURODRIVE GmbH & Co KG
Ernst-Blickle-Straße 42, D-76646 Bruchsal

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declares under sole responsibility conformity of the following products
déclare, sous sa seule responsabilité, que les produits suivants

Motoren der Baureihe: *Motors of the series:* *Moteurs des séries :*	**eDT, eDFT** **eDV, eDFV** **BC**
Kategorie: *category: / Catégories :*	**II 2G** **II 2GD**
Kennzeichnung: *marking: / Codification :*	**II2G Ex e II T3** **II2G Ex e II T4** **II2G Ex ed IIB T3** **II2D Ex tD A21 IP6X T120°C**

mit der
with the / respectent la

Richtlinie *Directive / Directive*	**94/9 EG** *94/9 EC / 94/9/CE*

angewandte harmonisierte Normen:
Applied harmonized standards: / Normes harmonisées appliquées :

EN 60079-0:2006
EN 60079-7:2003
EN 61241-0:2006
EN 61241-1:2004
EN 60034-1:2004

Ort/Datum
Place/date / Lieu et date

Bruchsal, 21.11.08

Geschäftsführer Vertrieb und Marketing
Managing Director Sales and Marketing
Directeur général international commercial et marketing

H. Sondermann

11.3 Motors/brake motors in category 3D, series C(F)T/C(F)V

EG-Konformitätserklärung

EC Declaration of Conformity
Déclaration CE de conformité

SEW EURODRIVE

Nr./*No./N°* **900140307**

im Sinne der Richtlinie 94/9/EG, Anhang VIII
according to Directive 94/9/EC, Appendix VIII
au sens de la directive 94/9/CE, Annexe VIII

SEW EURODRIVE GmbH & Co KG
Ernst-Blickle-Straße 42, D-76646 Bruchsal

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declares under sole responsibility conformity of the following products
déclare, sous sa seule responsabilité, que les produits suivants

Motoren und Bremsmotoren der Baureihe: *Motors and brake motors of the series:* *Servomoteurs et servomoteurs-frein des séries :*	**CT, CFT** **CV, CFV**
Kategorie: *category: / Catégorie :*	**II 3D**
Kennzeichnung: *marking: / Codification :*	**II3D Ex tD A22 IP5X T140°C** **II3D Ex tD A22 IP6X T140°C**
mit der *with the / respectent la*	
Richtlinie *Directive / Directive*	**94/9 EG** *94/9 EC / 94/9/CE*
angewandte harmonisierte Normen: *Applied harmonized standards: / Normes harmonisées appliquées :*	**EN 61241-0:2006** **EN 61241-1:2004** **EN 60034-1:2004**

Ort/Datum
Place/date / Lieu et date

Bruchsal, 21.11.08

Geschäftsführer Vertrieb und Marketing
Managing Director Sales and Marketing
Directeur général international commercial et marketing

H. Sondermann

11.4 Motors/brake motors in category 2G, series eD(F)R

EG-Konformitätserklärung

EC Declaration of Conformity
Déclaration CE de conformité

SEW EURODRIVE

Nr./*No./N°* **900120108**

im Sinne der Richtlinie 94/9/EG, Anhang VIII
according to Directive 94/9/EC, Appendix VIII
au sens de la directive 94/9/CE, Annexe VIII

SEW EURODRIVE GmbH & Co KG
Ernst-Blickle-Straße 42, D-76646 Bruchsal

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declares under sole responsibility conformity of the following products
déclare, sous sa seule responsabilité, que les produits suivants

Motoren der Baureihe: *Motors of the series:* *Moteurs des séries :*	**eDR, eDFR**
Kategorie: category: / Catégorie :	**2G**
mit der *with the / respectent la*	
Richtlinie *Directive / Directive*	**94/9 EG** *94/9 EC / 94/9/CE*
angewandte harmonisierte Normen: *Applied harmonized standards: / Normes harmonisées appliquées :*	**EN 50014:1999** **EN 50019:2000** **EN 60034-1:2004**

SEW-EURODRIVE hält folgende technische Dokumentationen zur Einsicht bereit:
SEW-EURODRIVE has the following documentation available for review:
SEW-EURODRIVE tient à disposition la documentation technique suivante pour consultation :

- **Vorschriftsmäßige Bedienungsanleitung**
- *Installation and operating instructions in conformance with applicable regulations*
- *Notice d'utilisation conforme aux prescriptions*
- **Technische Bauunterlagen**
- *Technical design documentation*
- *Dossier technique de construction*

Ort/Datum
Place/date / Lieu et date

Bruchsal, 21.11.08

Geschäftsführer Vertrieb und Marketing
Managing Director Sales and Marketing
Directeur général international commercial et marketing

H. Sondermann

11.5 Motors/brake motors in category 2D, series eD(F)T, eD(F)V

EG-Konformitätserklärung

EC Declaration of Conformity
Déclaration CE de conformité

Nr./*No./N°* **900130108**

im Sinne der Richtlinie 94/9/EG, Anhang VIII
according to Directive 94/9/EC, Appendix VIII
au sens de la directive 94/9/CE, Annexe VIII

SEW EURODRIVE GmbH & Co KG
Ernst-Blickle-Straße 42, D-76646 Bruchsal

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declares under sole responsibility conformity of the following products
déclare, sous sa seule responsabilité, que les produits suivants

Motoren der Baureihe: *Motors of the series:* *Moteurs des séries :*	**eDT, eDFT** **eDV, eDFV**
Kategorie: category: / Catégorie :	**2D**
mit der *with the / respectent la*	
Richtlinie *Directive / Directive*	**94/9 EG** *94/9 EC / 94/9/CE*

angewandte harmonisierte Normen:
Applied harmonized standards: / Normes harmonisées appliquées :

EN 50014:1999
EN 50281-1-1:1998 +A1:2002
EN 60034-1:2004

SEW-EURODRIVE hält folgende technische Dokumentationen zur Einsicht bereit:
SEW-EURODRIVE has the following documentation available for review:
SEW-EURODRIVE tient à disposition la documentation technique suivante pour consultation :

- **Vorschriftsmäßige Bedienungsanleitung**
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- *Technical design documentation*
- *Dossier technique de construction*

Ort/Datum
Place/date / Lieu et date

Bruchsal, 21.11.08

Geschäftsführer Vertrieb und Marketing
Managing Director Sales and Marketing
Directeur général international commercial et marketing

H. Sondermann

12 Appendix

12.1 Operating and maintenance instructions for WISTRO forced cooling fan

Proceed as described in the operating and maintenance instructions for WISTRO forced cooling fans:

OPERATING AND MAINTENANCE INSTRUCTIONS

EXPLOSION-PROOF WISTRO FORCED COOLING FANS

SERIES IL 3D

Operating and maintenance instructions.d_ATEX.3D

WISTRO units are normally ready for installation when supplied. The bearings are designed to be maintenance-free for a service life of 40,000 operating hours.

The forced cooling fan must be replaced by a new unit after a longer operating period.

Enclosure IP66 according to EN 60529, max. permitted surface temperature 120°C.

The relevant safety regulations regarding the protection against contact with moving parts (DIN EN 294) are fulfilled.

Before installation, ensure that the fan wheel is running smoothly and the blades of the fan wheel are not deformed or bent. Otherwise, this can generate imbalances that negatively affect the service life.

The electrical connection depends on the operating mode (single phase or three phase) according to the wiring diagram (appendix 1). The wiring diagram is also stamped or glued into the terminal box cover.

The fans should generally be protected by an integrated positive temperature coefficient (PTC) thermistor.

The forced cooling fans may be thermally monitored by the integrated PTC combined with a suitable trip switch as sole protection.

The max. permitted currents are listed in the table "Voltage operating range – Series IL" (appendix 2).

A test run must be performed **after installation**. When this is done, make sure that the direction of rotation of the fan wheel corresponds to the direction arrow on the inside surface of the ventilation grid so that air is blown over the motor that is to be cooled.

Important: If the direction of rotation is incorrect, the cooling performance is considerably lower. There is a risk that the machine part which is to be cooled will overheat.

During operation, be sure that excessive dust does not accumulate on the fan blades, especially in dusty environments, as this generates imbalances that reduce the service life. This also applies to environments containing small particles, e.g. in the wood processing industry or coal mills. A protective canopy is recommended for these or similar applications.

It is also simple to retrofit a protective canopy by loosening the four flange bolts (Instar bolts), inserting the angle bracket, and retightening the screws.

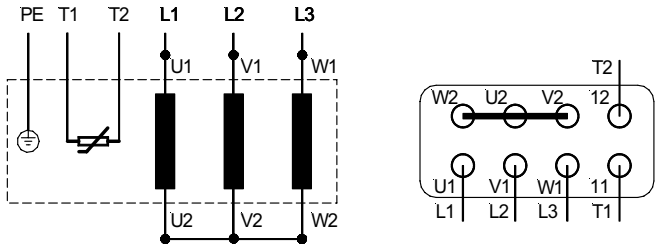
The protective canopy must be retrofitted by a specialist suitable for such work. It must be checked and documented by a competent person.

12.1.1 Wiring diagram for VE forced cooling fan (appendix 1)

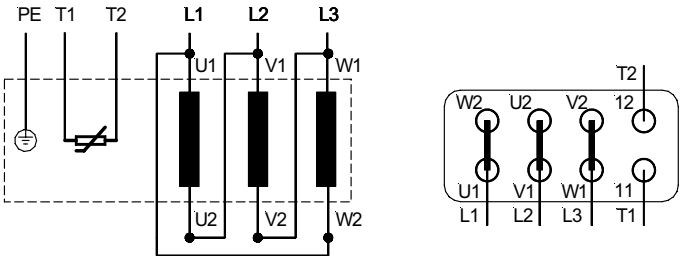
wistro

Electrical connection, series IL 3D

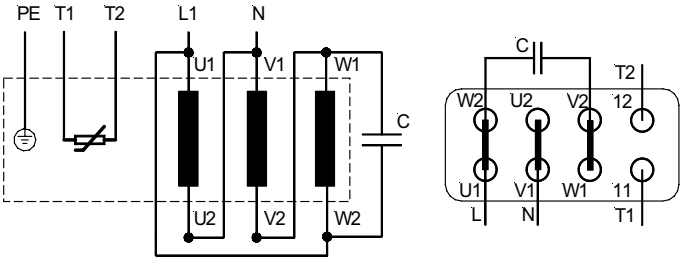
3-phase ⅄
Star connection



3-phase △
Delta connection



3-phase ⊥ (△)
Delta Steinmetz



U1 (T1) = black	V1 (T2) = light blue	W1 (T3) = brown
U2 (T4) = green	V2 (T5) = white	W2 (T6) = yellow

12.1.2 Voltage operating range for VE forced cooling fan (appendix 2)

wistro

Voltage operating range, series IL (acc. to EN 60334)

Operating mode	Bg	Fan diameter	Voltage range		Max. permitted current	Max. power consumption
		(mm)	(V)		(A)	(W)
			50 Hz	60 Hz		
1 ≈ ⊥ (△)	63	118	230 – 277	230 – 277	0.11	38
	71	132	230 277	230 – 277	0.12	41
	80	150	230 – 277	230 – 277	0.13	44
	90	169	230 – 277	230 – 277	0.25	88
	100	187	230 – 277	230 – 277	0.28	88
	112	210	230 – 277	230 – 277	0.31	107
	132	250	230 – 277	230 – 277	0.59	185
	160 – 200	300	230 – 277	———	0.93	225
3 ≈ ⅄	63	118	380 – 500	380 – 575	0.06	32
	71	132	380 – 500	380 – 575	0.06	33
	80	156	380 – 500	380 – 575	0.06	34
	90	169	380 – 500	380 – 575	0.16	90
	100	187	380 – 500	380 – 575	0.16	93
	112	210	380 – 500	380 – 575	0.16	94
	132	250	380 – 500	380 – 575	0.24	148
	160 – 200	300	380 – 500	380 – 575	0.51	280
3 ≈ △	63	118	220 – 290	220 – 332	0.10	32
	71	132	220 – 290	220 – 332	0.10	33
	80	156	220 – 290	220 – 332	0.10	34
	90	169	220 – 290	220 – 332	0.28	90
	100	187	220 – 290	220 – 332	0.28	93
	112	210	220 – 290	220 – 332	0.28	94
	132	250	220 – 290	220 – 332	0.45	148
	160 – 200	300	220 – 290	220 – 332	0.85	280

Two-pole

12.1.3 EC Declaration of Conformity: VE forced cooling fan

wistro

EG-Konformitätserklärung
EC-Declaration of Confirmity
atex_kategorie.3D_20.10.2003

Produkt: Fremdlüftungsaggregate IL 3D der Gerätgruppe II, Kategorie 3D
Typ B20-..-..IL/…… bis Typ C60-..-IL/……

WISTRO erklärt die Übereinstimmung des o.a. Produktes mit
Folgenden Richtlinien: 94/9/EG

Angewandte Normen: EN 60034, EN 50281-1-1, EN 50014

WISTRO trägt für die Ausstellung dieser EG-Konformitätserklärung die alleinige Verantwortung. Die Erklärung ist keine Zusicherung im Sinne der Produkthaftung.

Product: Forced ventilation units IL 3D of group II, category 3D
Typ B20.--.—IL/…… to typ C60-..-.. IL/……

WISTRO herewith declares the conformity of a. m. product with
following directive: 94/9/EC

Applied standards: EN 60034, EN 50281-1-1, EN 50014

WISTRO has the sole responsibility for issuing this EC declaration of conformity.
This declaration is not an assurance as defined by product liability.

Langenhagen, 21.10.2003

Geschäftsführer (W.Strohmeyer)
General Manager

13 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
Service **Competence** **Center**	**Central**	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
	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
	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 Service Hotline / 24 Hour Service		+49 180 5 SEWHELP +49 180 5 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-EUROCOME 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
	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	**Alger**	Réducom 16, rue des Frères Zaghnoun Bellevue El-Harrach 16200 Alger	Tel. +213 21 8222-84 Fax +213 21 8222-84 reducom_sew@yahoo.fr

Argentina			
Assembly **Sales** **Service**	**Buenos Aires**	SEW EURODRIVE ARGENTINA S.A. Centro Industrial Garin, Lote 35 Ruta Panamericana Km 37,5 1619 Garin	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://sew-eurodrive.at sew@sew-eurodrive.at

Belarus			
Sales	**Minsk**	SEW-EURODRIVE BY RybalkoStr. 26 BY-220033 Minsk	Tel.+375 (17) 298 38 50 Fax +375 (17) 29838 50 sales@sew.by

Belgium			
Assembly **Sales** **Service**	**Brüssel**	**SEW Caron-Vector** Avenue Eiffel 5 B-1300 Wavre	Tel. +32 10 231-311 Fax +32 10 231-336 http://www.sew-eurodrive.be info@caron-vector.be
Service Competence Center	**Industrial Gears**	**SEW Caron-Vector** 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
	Antwerp	**SEW Caron-Vector** Glasstraat, 19 BE-2170 Merksem	Tel. +32 3 64 19 333 Fax +32 3 64 19 336 http://www.sew-eurodrive.be service-antwerpen@sew-eurodrive.be

Brazil			
Production **Sales** **Service**	**Sao 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
	Additional addresses for service in Brazil provided on request!		

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

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

Canada			
Assembly **Sales** **Service**	**Toronto**	SEW-EURODRIVE CO. OF CANADA LTD. 210 Walker Drive Bramalea, Ontario L6T3W1	Tel. +1 905 791-1553 Fax +1 905 791-2999 http://www.sew-eurodrive.ca marketing@sew-eurodrive.ca
	Vancouver	SEW-EURODRIVE CO. OF CANADA LTD. 7188 Honeyman Street Delta. B.C. V4G 1 E2	Tel. +1 604 946-5535 Fax +1 604 946-2513 marketing@sew-eurodrive.ca
	Montreal	SEW-EURODRIVE CO. OF CANADA LTD. 2555 Rue Leger LaSalle, Quebec H8N 2V9	Tel. +1 514 367-1124 Fax +1 514 367-3677 marketing@sew-eurodrive.ca
	Additional addresses for service in Canada provided on request!		

Chile			
Assembly **Sales** **Service**	**Santiago de Chile**	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 25322611 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
	Guangzhou	SEW-EURODRIVE (Guangzhou) Co., Ltd. No. 9, JunDa Road East Section of GETDD Guangzhou 510530	Tel. +86 20 82267890 Fax +86 20 82267891 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 84478398 Fax +86 27 84478388
	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 sewcol@sew-eurodrive.com.co

Croatia			
Sales **Service**	**Zagreb**	KOMPEKS d. o. o. PIT Erdödy 4 II HR 10 000 Zagreb	Tel. +385 1 4613-158 Fax +385 1 4613-158 kompeks@inet.hr

Czech Republic			
Sales	**Praha**	SEW-EURODRIVE CZ S.R.O. Business Centrum Praha Lužná 591 CZ-16000 Praha 6 - Vokovice	Tel. +420 255 709 601 Fax +420 220 121 237 http://www.sew-eurodrive.cz sew@sew-eurodrive.cz

Denmark			
Assembly **Sales** **Service**	**Kopenhagen**	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 El 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 sew@sew.fi http://www.sew-eurodrive.fi
Production **Assembly** **Service**	**Karkkila**	SEW Industrial Gears Oy Valurinkatu 6, PL 8 FI-03600 Kakkila, 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 7340-11 Fax +241 7340-12

Great Britain			
Assembly **Sales** **Service**	**Normanton**	SEW-EURODRIVE Ltd. Beckbridge Industrial Estate P.O. Box No.1 GB-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

Greece			
Sales **Service**	**Athen**	Christ. Boznos & Son S.A. 12, 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 office@sew-eurodrive.hu

India			
Registered Office **Assembly** **Sales** **Service**	**Vadodara**	SEW-EURODRIVE India Private Limited Plot No. 4, GIDC PORRamangamdi • Vadodara - 391 243 Gujarat	Tel.+91 265 2831086 Fax +91 265 2831087 http://www.seweurodriveindia.com sales@seweurodriveindia.com subodh.ladwa@seweurodriveindia.com
Assembly **Sales** **Service**	**Chennai**	SEW-EURODRIVE India Private Limited Plot No. K3/1, Sipcot Industrial Park PhaseII Mambakkam Village Sriperumbudur- 602105 Kancheepuram Dist, Tamil Nadu	Tel.+91 44 37188888 Fax +91 44 37188811 c.v.shivkumar@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**	**Milano**	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 Ste industrielle et commerciale pour l'Afrique 165, Bld de Marseille B.P. 2323, Abidjan 08	Tel. +225 2579-44 Fax +225 2584-36

Japan			
Assembly **Sales** **Service**	**Iwata**	SEW-EURODRIVE JAPAN CO., LTD 250-1, Shimoman-no, Iwata Shizuoka 438-0818	Tel. +81 538 373811 Fax +81 538 373814 http://www.sew-eurodrive.co.jp sewjapan@sew-eurodrive.co.jp

Korea			
Assembly **Sales** **Service**	**Ansan-City**	SEW-EURODRIVE KOREA CO., LTD. B 601-4, Banweol Industrial Estate 1048-4, Shingil-Dong Ansan 425-120	Tel. +82 31 492-8051 Fax +82 31 492-8056 http://www.sew-korea.co.kr master@sew-korea.co.kr
	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

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

Lebanon			
Sales	**Beirut**	Gabriel Acar & Fils sarl B. P. 80484 Bourj Hammoud, Beirut	Tel. +961 1 4947-86 +961 1 4982-72 +961 3 2745-39 Fax +961 1 4949-71 ssacar@inco.com.lb

Lithuania			
Sales	**Alytus**	UAB Irseva Naujoji 19 LT-62175 Alytus	Tel. +370 315 79204 Fax +370 315 56175 info@irseva.lt http://www.sew-eurodrive.lt

Luxembourg			
Assembly **Sales** **Service**	**Brüssel**	CARON-VECTOR S.A. Avenue Eiffel 5 B-1300 Wavre	Tel. +32 10 231-311 Fax +32 10 231-336 http://www.sew-eurodrive.lu info@caron-vector.be

Malaysia			
Assembly **Sales** **Service**	**Johore**	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	**Casablanca**	Afit 5, rue Emir Abdelkader MA 20300 Casablanca	Tel. +212 22618372 Fax +212 22618351 ali.alami@premium.net.ma

Netherlands			
Assembly **Sales** **Service**	**Rotterdam**	VECTOR Aandrijftechniek B.V. Industrieweg 175 NL-3044 AS Rotterdam Postbus 10085 NL-3004 AB Rotterdam	Tel. +31 10 4463-700 Fax +31 10 4155-552 http://www.vector.nu info@vector.nu

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

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

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
		24 Hour Service	Tel. +48 602 739 739 (+48 602 SEW SEW) sewis@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**	**Bucureşti**	Sialco Trading SRL str. Madrid nr.4 011785 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 195220 St. Petersburg Russia	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

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

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

Slovakia			
Sales	**Bratislava**	SEW-Eurodrive SK s.r.o. Rybničná 40 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
	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 cfoster@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

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

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 71 4340-64 + 71 4320-29 Fax +216 71 4329-76 tms@tms.com.tn

Turkey			
Assembly **Sales** **Service**	**Istanbul**	SEW-EURODRIVE Hareket Sistemleri San. ve Tic. Ltd. Sti. Bagdat Cad. Koruma Cikmazi No. 3 TR-34846 Maltepe ISTANBUL	Tel. +90 216 4419164, 3838014, 3738015 Fax +90 216 3055867 http://www.sew-eurodrive.com.tr sew@sew-eurodrive.com.tr

Ukraine			
Sales **Service**	**Dnepropetrovsk**	SEW-EURODRIVE Str. Rabochaja 23-B, Office 409 49008 Dnepropetrovsk	Tel. +380 56 370 3211 Fax +380 56 372 2078 http://www.sew-eurodrive.ua sew@sew-eurodrive.ua

USA			
Production **Assembly** **Sales** **Service** **Corporate Offices**	**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 +1 937 440-3799 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

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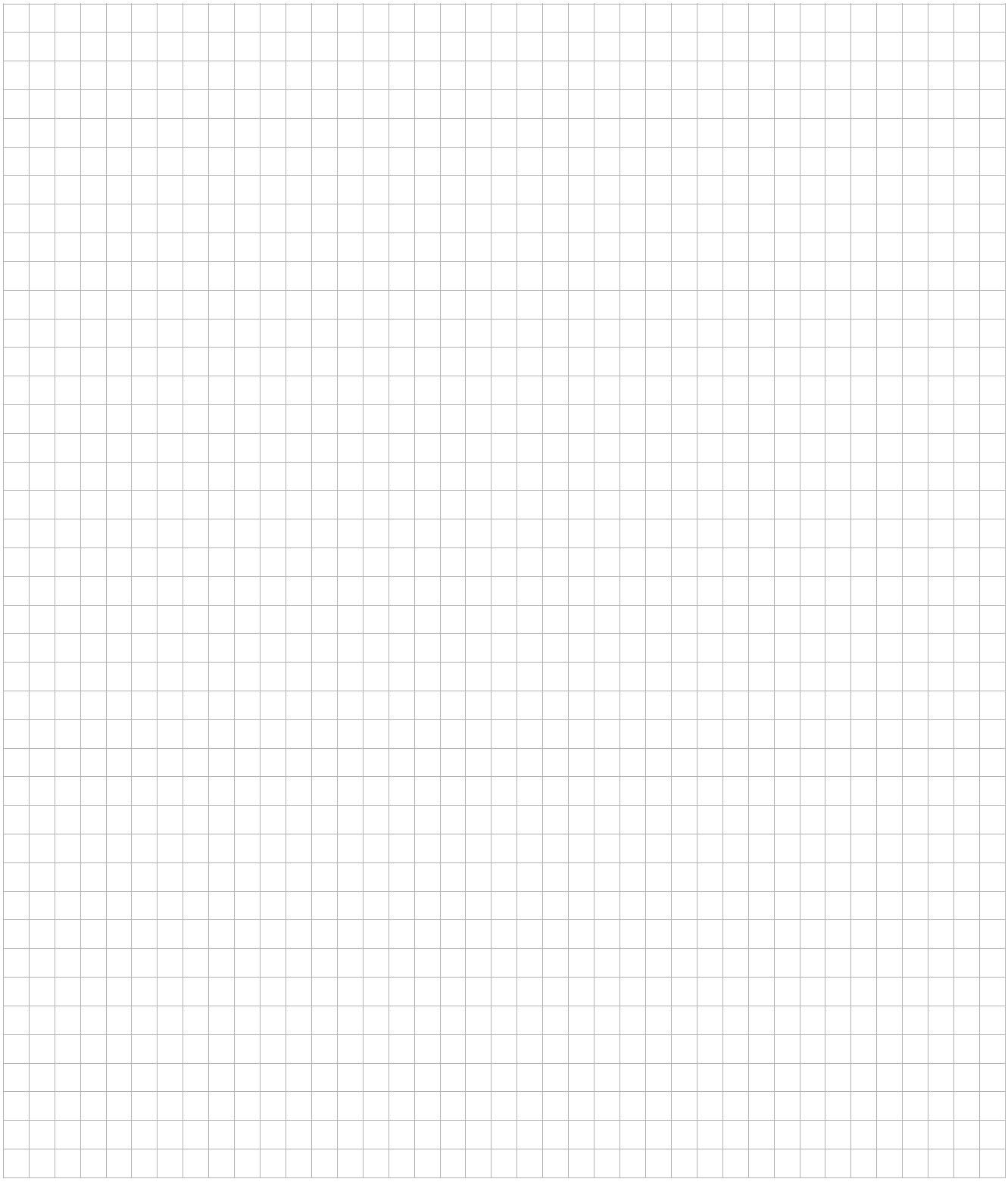

How we're driving the world

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