Danfoss Bauer GmbH
D-73726 Esslingen

BA 16803 E

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BAUER geared motors

EC manufacturer declaration

(in accordance with Article 4, Para. 2 of the EC Guideline 98/37/EG)

Document no./
Month, Year: **HK 04 - 07/99**

Product designation: **Geared motors from series BG, BF, BK, BS**

The product specified is only intended for installation in another machine. Commissioning of the machine is prohibited until the end product conforms to Guideline 98/37/EG.

We confirm that the product specified above conforms to the following standards, if applicable:

EN 60034-1 / DIN VDE 0530 Part 1 (IEC 60034-1)
EN 60034-5 / DIN VDE 0530 Part 5 (IEC 60034-5)
EN 60529 / DIN VDE 0470 Part 1 (IEC 60529)

In the case of ignition protection type EEx e:	EN 50014	/ VDE 0170/0171 Part 1
	EN 50019	/ VDE 0170/0171 Part 6
In the case of ignition protection type EEx d:	EN 50014	/ VDE 0170/0171 Part 1
	EN 50018	/ VDE 0170/0171 Part 5

Esslingen, 1 July 1999

Danfoss Bauer GmbH

i.V. Fuchs
(Managing director QE)

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(Managing director ED)

This declaration does not cover assurance of properties.

The safety guidelines supplied with the product documentation must be observed.

SAFETY INSTRUCTIONS FOR OPERATION OF GEARED MOTORS
(in accordance with Low-Voltage Directive 73/23/EEC)

General
These safety instructions apply in addition to the respective operating instructions for specific products and for reasons of safety must be carefully observed in all cases.
The safety instructions are intended to protect people and equipment from injury and danger, which could arise with unsuitable installation, incorrect maintenance and inadequate servicing, or other faulty management of electrical drives in industrial installations.
Low-voltage machines possess rotating parts, some of which may also be live at standstill, and their surfaces may be hot.
It is essential to observe warning and information plates on the machine. More information is included in our detailed operating instructions. They are delivered with the machine and can also be requested separately on request if the motor type is specified.

1 Personnel
Any necessary work on electrical drives and particularly planning work, transportation, fitting, installation, commissioning, servicing and repairs should be undertaken only by adequately qualified personnel (e. g. electrical technicians in accordance with EN 50 110-1/DIN VDE 0105; IEC 364). In addition, the respective work must be consistently carried out in accordance with, among others, the supplied operating instructions and further product documentation. Such work must be supervised by responsible specialists.
Qualified staff are persons who, on the basis of their training, experience and instruction, together with their knowledge of relevant standards, regulations, accident prevention rules and working practices, are qualified to be responsible for the safety of the installation when undertaking the necessary activities and hence are able to foresee and avoid possible hazards.
Among other things, a knowledge of First-Aid procedures and of the local method of escape and emergency equipment is also necessary.
Work on geared motors by non-qualified staff must be forbidden.

2 Normal use, observing the relevant technical specifications
These machines are intended for industrial use, unless another purpose has been expressly agreed. They comply with the standards from series EN 60034/DIN VDE 0530. Use in explosion-hazard areas is forbidden, unless these machines have been specifically designed for this purpose (observe additional notes). If there is a need for more stringent requirements (e.g. protection against access by children's fingers) in special cases – use in non-industrial installations – these requirements must be met by the operator of the installation when it is installed or erected.
The machines have been designed for ambient temperatures from 0^{o} C to + 40^{o} C and site altitudes up to 1000 m above sea level. Always observe any deviating data on the rating plate. The conditions at the place of use must conform with all specifications on the rating plate.

Low-voltage machines are components for installations in machines as defined in Machine Directive 89/392/EEC. The final product must not be put into operation until its conformity with this Directive has been established (observe EN 60204-I).
A manufacturer's declaration concerning the Machine Directive is available on request.

3 Shipment, storage
When transporting electrical drives, the eyebolts – where these are provided in the construction – must be firmly tightened into their seatings. They may only be used for moving the drive unit and not for lifting the drive unit together with the driven machine.
Immediately notify the haulage contractor about any damage discovered after delivery; commissioning must be excluded, if necessary.
Drives must be stored in a dry, dust-free and low-vibration (Vrms < 0.2 mm/s) environment (stationary bearing damage). The useful life of the lubricants and seals decreases in the case of an extended storage time.
At very low temperatures (below about -20^{o} C) there is a danger of breakage. When replacing eyebolts, drop-forged eyebolts complying with DIN 580 must be used (tensile strength at least 500 N/mm^2).

4 Fitting
With the IM.. mounting arrangement, the drive must be fixed by its feet or flange. Shaft-mounted drives with hollow shaft are to be pulled onto the driven shaft using suitable tools.

Warning: Geared motors develop considerably higher torques and forces than fast running motors of comparable rating.

Fasteners, foundation and torque reaction support must be dimensioned in accordance with the high forces to be expected in service and must be adequately secured against loosening.
The drive shaft(s) and any second shaft extension, together with any transmission elements mounted on them (couplings, sprocket wheels etc.) must be suitably guarded.

5 Connection
All work must be performed only by qualified staff. The machine must be stationary, isolated from the mains and secured against switching back on. This also applies to auxiliary circuits (e. g. anti-condensation heater). Remove any shipping braces before commissioning.

Check safe isolation from supply voltage!
Terminal boxes may be opened only after it has been made certain that the current has been switched off.
The information regarding voltage and frequency given on the rating plate must correspond to the mains voltage connected to the respective terminals. If the tolerances in accordance with EN 60034/DIN VDE 0530 – i. e. voltages ± 5 %, frequency ± 2 %, curve shape, symmetry – are exceeded, this can lead to increased heating and a shorter service life.
Connection diagrams which are provided must be taken into account. This applies particularly to special designs such as pole changing and thermistor protected machines etc.
The type and size of the mains leads and of the earth connection and of any necessary bonding connection must comply with the general and local installation requirements. For intermittent duties, the starting current must be considered as appropriate. The drive must in principle be protected against over-load and from danger of unintentional restarting due to automatic reclosure of the circuit.
Terminal boxes must be maintained in an enclosed condition in order to prevent electric shock from contact with live parts.

6 Commissioning
Before commissioning, the mechanical coupling to the driven machine must be disconnected where possible and the direction of rotation checked on no-load. For this purpose, shaft drive keys must either be removed or secured so that they cannot be thrown out. Care must then be taken to see that the current consumption in the loaded condition will not exceed the full-load current, as specified on the rating plate, for extensive periods of time. After the initial start-up, the drive must be observed for at least an hour for any exceptional heating or noise.

7 Operation
BWith some designs, including for example: non-ventilated motors, relatively high casing temperatures can occur, although these may lie within the limits specified within the standards. Where such drives may be subject to close physical contact by personnel, suitable protective covers must be fitted by the installer or the operator.

8 Spring-loaded brakes
Attached spring-loaded brakes are safety brakes which operate even when there is a power failure or normal wear. If a manual release bracket is supplied with the equipment, it must be removed before operation. Because of the possibilities of failure of other components which may prevent the brake from operating, suitable safety measures must be applied where unbraked movement could cause danger to persons or equipment.

9 Servicing
In order to avoid faults, hazards and damage, the drives must be regularly checked, depending on the circumstances governing the operating conditions. The periods between relubrication, specified in the respective operating instructions for the bearings and gearing, must be observed. Worn or damaged parts must be replaced using genuine authorised spares or standard parts.
Clean air passages regularly in dusty conditions.
Observe Section 5 and information in the detailed operating instructions when performing any inspection and servicing work.

10 Operation instructions
Due to lack of space, instruction handbooks and safety instructions may not contain information on every type of construction for geared motors and cannot take into account the operation and maintenance for every conceivable design.
The information is limited essentially to that which is necessary for routine work by qualified staff. Any uncertainties must be clarified by consulting Danfoss Bauer.

11 Faults
Changes from normal operation, such as higher temperatures, vibration, noise etc., will indicate that the function of the equipment is impaired. In order to avoid faults which may directly or indirectly lead to injury to personnel or damage to plant, the responsible maintenance staff must be informed. Where there is any doubt, geared motor units must be immediately switched off.

12 Electromagnetic compatibility
In normal use, the low-voltage machine must comply with the protection requirements stipulated by EMC Directive 19/336/EEC during operation.
Proper installation (e. g. screened leads) is the responsibility of the plant or installation installer. More detailed information is given in the operating instructions.
The manufacturer's EMC instructions must also be observed if installations with frequency converters or power converters are used.
When used and installed properly, BAUER geared motors also comply with the EMC Directive in accordance with DIN EN 50081 Part 2 (industrial applications) and DIN EN 55011 (Class A) in combination with Danfoss frequency converters or Danfoss power converters.
The additional information in the operating instructions must be observed when the motors are used in the domestic area, business and commercial area as well as in small plants as defined in DIN EN 50081 – Part 1 – and DIN EN 55011 (Class B).

13 Guarantee and liability
The guarantee obligations of Danfoss Bauer are part of the respective contract of supply and are neither extended nor limited by these safety instructions or other instructions.

These safety instructions must be kept!

Three-phase Squirrel-cage geared motors

Installation

The drive must be assembled and connected by qualified personnel (skilled electrical personnel). The relevant safety and accident prevention regulations must be observed (see Safety-Note-Print-No. 122..).

Geared motors with IP65 protection

Three-phase geared motors designed for IP 65 protection (motor types D/E06 ... to D.28...) and complying with EN 60529 and IEC 34-5/ 529 are totally enclosed, dust-proof and hose proof.

Geared motors installed out of doors should be provided with several durable coats of paint as a protection against corrosion, the condition of this paint finish being inspected and repaired as necessary at regular intervals depending on external influences. The paintwork should be matched to the other components. Paints based on synthetic resin have been found to be most suitable for this application.

Geared motors with IP54 protection

Geared motors designed for IP 54 protection (motor types D/E04... and D/E05...) and complying with EN 60034, Part 5 and IEC 34-5 are protected against dust and occasional splashes of water. Installation out of doors or in rooms with wetness is not permissible without special protective measures.

It is recommended to cover drinking water, food, textiles and similar under the geared motor.

Wherever possible the drive should be installed free from vibrations.

Special instructions must be observed in locations with abnormal operating conditions (for example, prolonged exposure to drip water, high ambient temperatures above 40° C (100° F), explosion hazards).
The intake of fresh air must not be obstructed by unsuitable installation or by any accumulation of dirt.

Flexible couplings which are free of slack should be used if power is transmitted directly from the gear unit to the driven machine or, if there is any danger of blockage, commercial slip clutches should be used.
Power transmission elements must be carefully fitted to the output shaft of the gear unit, which is ground with ISO k 6, m 6 or h 6 limits, by using if at all possible the hole to DIN 332 tapped in the face of the shaft end for this purpose. Heating the drive component to be fitted to approximately 100° C (212° F) has been found to be advantageous.
The bore should be measured in accordance with the following table and must therefore have the following tolerances:

Nominal bore diameter (in mm)	Output shaft k 6 or m 6 Bore H7 with tolerances (in $^{1}/_{1000}$ mm)
above 6 to 10	0 to +15
above 10 to 18	0 to +18
above 18 to 30	0 to +21
above 30 to 50	0 to +25
above 50 to 80	0 to +30
above 80 to 120	0 to +35
above 120 to 140	0 to +40

Where the gear unit is designed with hollow shaft and keyway for high-profile feather keys in accordance with DIN 6885, Page 1, and hollow shaft for shrink-fit coupling, the shafts designed to form the counter part must be dimensioned in accordance with ISO h 6. They must therefore have the following tolerances:

Shaft diameter (in mm)	Nominal tolerance (in $^{1}/_{1000}$ mm)
above 18 to 30	0 to −13
above 30 to 50	0 to −16
above 50 to 80	0 to −19
above 80 to 120	0 to −22
above 120 to 140	0 to −25

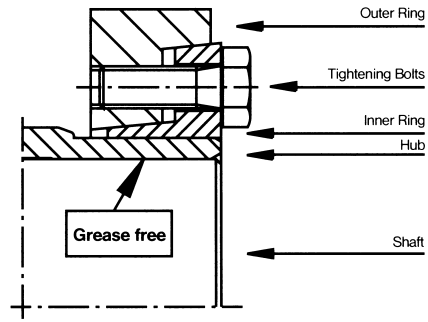
In all cases it is essential that all burrs, swarf etc. are carefully removed prior to fitting and that all fit areas are lightly greased to prevent seizing of the parts. However, if hollow shafts with shrink-fit coupling are to be fitted these should not be greased. The appropriate assembly instructions should be followed.

The eyebolt should be re-tightened if it has worked loose during transportation.

Fitting and removing the shrink disk

The shrink disk is supplied ready fitted, so it should not be dismantled. Do not clamp the shrink disk in place without fitting the shaft!
Fit the shaft or the hub on the shaft in the region of the shrink disk seat. Then tighten the clamping screws evenly in turn until the front lateral surface of the outer and inner ring is flush.
The state of clamping can then be checked visually. In order to remove the disk, undo all the screws evenly in turn. If the outer ring does not come away from the inner ring automatically, remove several clamping screws and then screw them into the neighbouring push-off thread.

If necessary remove any rust prior to removing the shaft or pulling off the hub from the shaft. Only very dirty shrink disks that have been removed need to be dismantled, cleaned and lubricated again prior to clamping in place again. Use a solid lubricant with a friction coefficient of μ =0.04 or better.

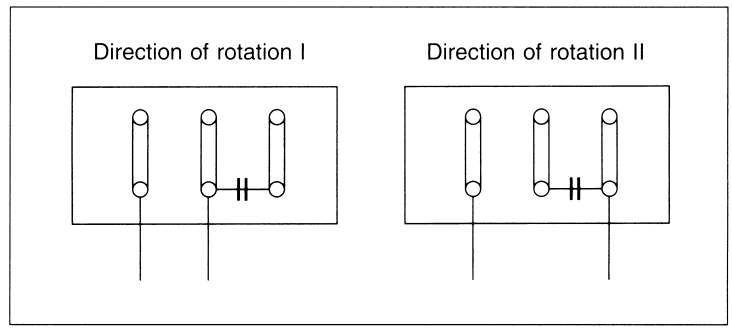


Electrical connection

When connecting the motor the details on the rating plate and the connection diagram as well as the relevant safety regulations and accident prevention regulations should be noted.

Unless otherwise specified, the ratings refer to ± 5 % voltage tolerance, 0 (32° F) to 40° C (100° F) ambient temperature and altitudes up to 1000 mm above sea level.

Low-power motors can be switched on directly (the regulations issued by the local EVU must be observed). The permissible switching frequency depends on the design of the motors, the load torque and the mass moment of inertia.
The direction of rotation of single-phase motors should generally be changed only once the motor has come to a standstill in accordance with the following circuit diagram:



Unless otherwise specified, the three-phase motor is supplied connected for the higher of the two specified rated voltages. If necessary, the motor must be reconnected to the terminal block from star to delta to ensure that it suits the appropriate mains voltage.

Motors of special design (for example, for two rated voltages in the ratio 1:2 or with pole-changing windings) must be connected in accordance with the appropriate circuit diagram.

Two mains leads must be interchanged if the motor rotates in the wrong direction.

Proper sealing must be ensured when the terminal box is closed. For motor sizes D/E04 to D/E09 with cast-on terminal boxes two connections openings each on side A and C are possible.

The cable entry openings required depending on fitting position must be made carefully using an appropriate tool. Care must be taken to ensure that the terminal board is not damaged.

2 locknuts and seals are located in the terminal box for the metric cable connections.
Blind plugs should be screwed into unused cable entry holes.

In order to ensure electromagnetic compatibility (EMC) in accordance with EMC Directive 89/336/EEC all signal wires must be laid with screened cables. The cable sheath must be earthed at both ends.
The operating instructions for the frequency inverter states whether or not the motor lead requires a screened cable. A screened cable is not necessary if connection is to be made to the low-voltage mains or to a frequency inverter with output filter. Signal and power cables should not be laid parallel to one another over relatively long distances.

Overload protection

A motor protection switch must be used to protect the winding from overload and the effects of operation using only 2 mains leads (for example, if only one fuse line blows or in the event of an open circuit in one line).

Example:	Motor winding for 230/400 V; nominal currents	5.7/3.3 A
	Motor protection switch setting for	
	230 V connection (delta):	5.7 A
	400 V connection (star):	3.3 A

The overload relay of the motor protection switch must be adjusted to the correct nominal current for the appropriate rated voltage (see rating plate).

Changing the lubricant

The gear units are supplied ready for use complete with lubricant.

When used under normal operating conditions and with a lubricant temperature of approx. 80° C, the oil should be changed after approx. 15000 operating hours when using CLP220 or after 25000 operating hours when using PGLP220/PGLP460. In case of higher lubricant temperatures, the time between lubricant changes is to be reduced (approx. by halp for every 10K increase in the sump temperature).

The lubricant should be changed at least every 2 to 3 years irrespective of the operating period.

Mid and large size gearboxes are fitted with oil fill and oil drain plugs. These make the lubricant change possible in the standard, ounting position without disassembly. The inner area of the small gearboxes can be made accessible by loosening the connection bolts. Pins and centering make an exact re-assembly possible.

Unlike rolling-contact gears, worm gears produce sliding friction and polish their mating surfaces during the run-in period. Initial duty should therfore be started with partial loads only (max. approximately $^{2}/_{3}$ of rated load) until the full load capacity and optimum efficiency have been reached.
After approximately 200 hours of operation the lubricant should be changed and the gear box housing flushed in order to remove the slight but unavoidable polishing wear by friction.

A flushing of the gearbox is needed if the lubricant type or grade is changed. Should the gear unit only have been used for a short time, it is enough to drain the original lubricant, fill again with the largest quantity of new oil shown for the in the lubricant quantity tables, to run the unit under no load for a short time, drain again this oil filling and re-fill with the correct quantity of oil shown on the name plate or up to the oil fill mark in special cases if available. Should it be necessary, the original lubricant can be drained and the gearbox flushed with petroleum so many times until all residue has been washed from the gear unit. Finally, the same procedure as for short time running must be performed twice before the correct fill quantity according to the name plate or up to the fill mark in special cases can be filled.

It is recommended whilst performing a lubricant change, to check all wear parts (bearings and seals) and to chnage if necessary.

Lubricant grades

For lubricantion of the gearbox, gear oils CLP220, PGLP220 or PGLP460 acc. to DIN 51502 or DIN 51517 are suitable, or in special cases especially soft and long-fibre greases GLP 00f with good EP characteristics.

The lubricant should be suitable for low friction and almost wear free continuous operation. The damagae state in the FZG test acc. to DIN 51354 should be above stage 12 and specific wear should be below 0,27 mg/kWh. The lubricant must not foam, should offer protection against corrosion and should not attack the internal paintwork, the roller bearings, gearwheels or seals.

Different grades of lubricant should not be mixed as this would impair the lubricating properties. A long operating period can only be ensured by using the lubricants listed below or proven equivalent lubricants. The original lubricant can also be supplied from the works in small packs of 5 and 10 kg (11 and 22 lbs) respectively.

Storage

Should gear motors be stored for long periods of time before installation, please observe the comments shown in this manual.

Wear protecting EP gear oils in accordance with the following lubricant tables have proven to be particularly successful:

Lubrificant Manufacturer	Standard oil for gearboxes in the series **BF, BG, BK60 - BK90** Mineral Oil CLP 220	Standard oil for gearboxes in the series **BS02 - BS10, BK10, BM09 - BM10** High temperature oil for gearboxes in the series **BF, BG, BK60 - BK 90** Synthetic Oil PGLP 220	Standard oil for gearboxes in the series **BS20 - BS40, BK20 - BK50** High temperature oil for gearboxes in the series **BS20 - BS40, BK20 - BK50** Synthetic Oil PGLP 460	Low temperature oil for gearboxes in the series **BF, BG, BK, BM, BS** Synthetic Oil PGLP 68	Food & Beverage Industry Oil for gearboxes in the series **BF, BG, BK, BM, BS** USDA H1 Oil
AGIP	Blasia 220				
ARAL	Degol BMB 220 Degol BG 220	Degol GS 220	Degol GS 460		Eural Gear 220
BECHEM RHUS	Staroil SMO 220				
BP	Energol GR-XP 220	Enersyn SG-XP 220	Enersyn SG-XP 460		
CASTROL	Alpha SP 220 Hypoy EP 90	Alphasyn PG 220	Alphasyn PG 460		
DEA	Falcon CLP 220				
ELF	Reductelf SP 220				
ESSO	Spartan EP 220 GP 90				
FINA	Giran 220				
FUCHS	Renolin CLP 220 Renolin CLPF 220 Super	Renolin PG 220	Renolin PG 460	Renolin PG 68	
HOUGHTON	Molygear VG 220				
KLÜBER	Klüberoil GEM 1-220	Syntheso HT 220 Klübersynth GH 6-220	Syntheso HT 460 Klübersynth GH 6-460	Syntheso HT 68 Klübersynth GH 6-80	Klüberoil 4UH1-220N
MOBIL	Mobilgear 630 Mobilube GX 85 W-90A	Glygoyle HE 220 Glygoyle 30	Glygoyle HE 460		
OPTIMOL	Optigear 220	Optiflex 220	Optiflex 460		Optileb 220
SHELL	Omala Oil 220	Tivela WB	Tivela SD		Cassida Fluid GL 220
OEST	Gearoil C-LP 220				
TEXACO	Geartex EP-A SAE 85W-90				
TOTAL	Carter EP 220				

Attention

Synthetic gearbox oils with Polygycol basis (e.g. PGLP...) must be kept separate from mineral oils and disposed of as Special Waste.

Unless the ambient temperature is below approximately – 10° C (14° F) the viscosity grade VG 220 (SAE 90) and AGMA 5 EP in North America to international viscosity classification at 40° C (100° F) ISO 3448 and DIN 51519 is recommended.

For lower ambient temperatures, oils of lower viscosity grade and correspondingly improved starting characteristics should be used, for example VG 68 (SAE 80). These grades may in fact even be necessary in the temperature range around the freezing point if the initial break-away torque of the drive isreduced to give a smooth start or if the motor has a comparatively low output.

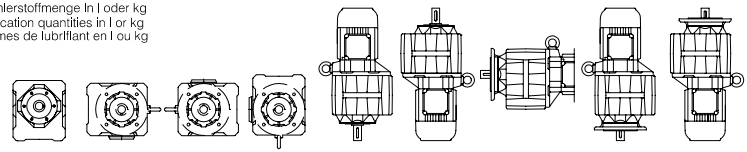
Lubricant quantities

The optimum amount of lubricant for the specified design/mounting position ist stated on the motor rating plate (symbol ). It should be noted that, depending on the gearbox layout, the gearwheels and roller bearings at the top must also be reliably lubricated. In special cases the oil level gauge should be observed. For other layouts enquiries can be made in the works about the required amount of lubricant.

Disposal

The metallic parts of the gearbox or the gear motor can be disposed of as scrap metal, sorted according to steel, cast iron, aluminium and copper.
The mineral based lubricants used can be disposed of as old oil, synthetic based lubricants must be however disposed of as special waste.
Details to the type of lubricant can be found in the lubricant tables in this manual or on the name plate.

Schmierstoffmenge in l oder kg
Lubrication quantities in l or kg
Volumes de lubrifiant en l ou kg



Getriebetyp
Gearbox type
Réducteur Type

BG04-BG100 (Anbaugehäuse mit Flansch- o. Fußbefestigung) (gear-housing with flange or foot) (Carter sans pattes, avec bride - ou avec embase)

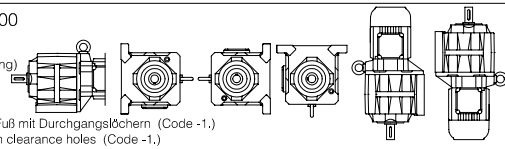
Flansch (Code -2,/Code -3,/Code -4,/Code -7.)
Fuß mit Gewindelöchern (Code -6.)
Fuß mit Durchgangslöchern (Code -9.)
[allseitig bearbeitet (Code -8.)]

Flange (Code-2,/Code-3,/Code-4,/Code-7.)
Foot with threads (Code-6.)
Foot with clearance holes (Code-9.)
[Completely machined (Code -8.)]

Bride (Code-2,/Code-3,/Code-4,/Code-7.)
Embase avec trous taraudés (Code-6.)
Embase à trous lisses (Code-9.)
[Usiné complètement (Code -8.)]

BG04-BG100

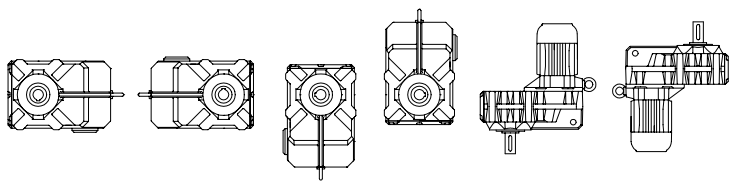
(Fußgehäuse)
(Gearbox housing)
(Carter à patte)



angegossener Fuß mit Durchgangslöchern (Code -1.)
cast-on-foot with clearance holes (Code -1.)
Pieds intégrés au Carter, à trous lisses (Code -1.)

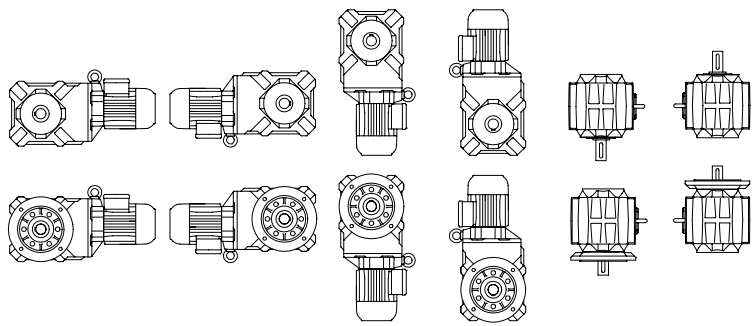
	H4	H1	H2	H3	H5	H6	B5	V1	V3
	B3	B6	B7	B8	V5	V6			
BG04	0.05	0.05	0.05	0.05	0.1	0.05	0.03	0.05	0.05
BG05	0.08	0.08	0.08	0.08	0.16	0.08	0.05	0.08	0.08
BG06	0.12	0.12	0.12	0.12	0.24	0.15	0.08	0.15	0.15
BG10 Anbaugehäuse Attachment housing Carter sans pied	0.65	0.65	0.65	0.85	1.05	0.85	0.65	1.05	0.85
BG10 Fußgehäuse Gearbox housing Carter à patte	0.45	0.45	0.45	0.6	0.75	0.6	-	-	-
BG20 Anbaugehäuse Attachment housing Carter sans pied	0.8	0.8	0.8	1.1	1.4	1.1	0.8	1.4	1.1
BG20 Fußgehäuse Gearbox housing Carter à patte	0.6	0.6	0.6	1.0	1.15	0.9	-	-	-
BG30 Anbaugehäuse Attachment housing Carter sans pied	1.0	1.0	1.0	1.7	2.2	1.6	1.0	2.2	1.6
BG30 Fußgehäuse Gearbox housing Carter à patte	1.0	1.0	1.0	1.7	2.3	1.7	-	-	-
BG40	1.7	1.7	1.7	2.5	3.5	2.1	1.7	3.5	2.1
BG50	3.0	3.0	3.0	4.5	5.5	3.3	3.0	5.5	3.3
BG60	5.5	5.5	5.5	7.0	10.9	6.4	5.5	10.9	6.4
BG70	6.5	6.5	6.5	8.0	13.0	9.0	6.5	13.0	9.0
BG80	11.0	11.0	11.0	11.0	22.5	15.0	11.0	22.5	15.0
BG90	19.0	19.0	19.0	19.0	40.0	26.0	19.0	40.0	26.0
BG100	35.0	35.0	55	50	66.0	50.0	35.0	66.0	50.0

Schmierstoffmenge in l oder kg
Lubrication quantity in l or kg
Quantités de lubrifiant en l ou kg



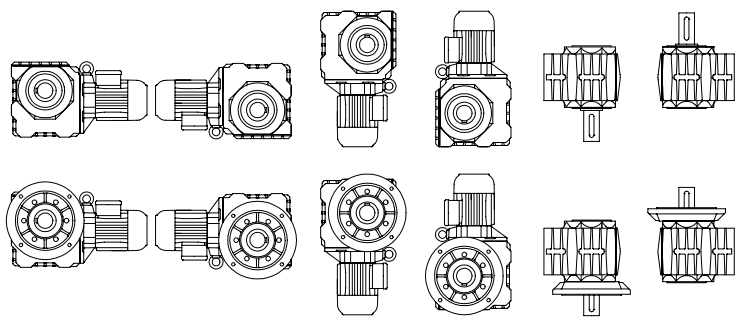
Getriebetyp Gear type Type de réducteur	H1	H2	H3	H4	V1	V2
BF06	0.25	0.25	0.25	0.37	0.35	0.3
BF10	0.85	0.85	0.85	1.1	1.45	1.5
BF20	1.3	1.3	1.3	1.7	2.2	2.25
BF30	1.7	1.7	1.7	2.2	3.2	3.0
BF40	2.7	2.7	2.7	3.5	4.9	4.8
BF50	3.8	3.8	3.8	5.0	6.7	6.7
BF60	6.7	6.7	6.7	9.0	12.3	12.0
BF70	12.2	12.2	12.2	16.0	24.2	21.8
BF80	17.0	17.0	17.0	21.0	32.2	27.5
BF90	32.0	32.0	32.0	41.0	62.0	53.0

Schmierstoffmenge in l oder kg
Lubrication quantity in l or kg
Quantités de lubrifiant en l ou kg



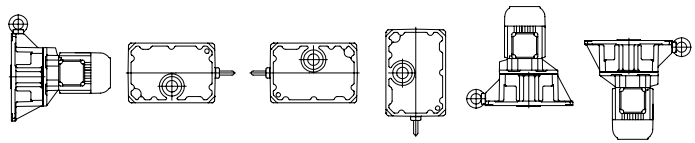
Getriebetyp Gear box type Type de réducteur	H1	H2	H3	H4	V1	V2
BK06	auf Anfrage / on request / sur demande					
BK10	0.83	0.83	0.92	1.65	0.92	0.92
BK20	1.5	1.5	1.6	2.8	1.65	1.65
BK30	2.2	2.2	2.3	4.4	2.4	2.4
BK40	3.5	3.5	3.5	6.7	3.7	3.7
BK50	5.8	5.8	5.8	11.0	6.0	6.0
BK60	6.0	8.7	6.9	12.5	8.6	8.6
BK70	10.2	15.0	11.5	21.2	13.5	14.5
BK80	18.0	25.5	19.0	37.0	23.5	25.5
BK90	33.0	48.0	36.0	70.7	45.0	48.0

Schmierstoffmenge in l oder kg
Lubrication quantity in l or kg
Quantités de lubrifiant en l ou kg



Getriebetyp Gear type Type de réducteur	H1	H2	H3	H4	V1	V2
BS02	0.06	0.06	0.06	0.06	0.06	0.06
BS03	0.17	0.17	0.17	0.17	0.17	0.17
BS04	0.11	0.11	0.11	0.2	0.11	0.11
BS06	0.24	0.24	0.24	0.45	0.24	0.24
BS10	0.9	0.9	0.9	1.6	0.9	0.9
BS20	1.5	1.5	1.5	2.7	1.5	1.5
BS30	2.2	2.2	2.2	3.8	2.2	2.2
BS40	3.5	3.5	3.5	6.0	3.5	3.5

Schmierstoffmenge in l oder kg
Lubrication quantity in l or kg
Quantités de lubrifiant en l ou kg



BG / BF	B3 H4 B5	B6 H1	B7 H2	B8 H3	V5/H5 V1	V6/H6 V3 V2
BK / BS	H1	V1	V2	H2	H4	H3

Getriebetyp Gear type Type de réducteur						
BG10Z BF10Z BK10Z BS10Z	0.10	0.05	0.10	0.07	0.16	0.07
BG20Z BF20Z BK20Z BS20Z	0.15	0.07	0.17	0.17	0.27	0.10
BG30Z BF30Z BK30Z BS30Z BM30Z	0.2*	0.10	0.26	0.22	0.35	0.19
BG40Z BF40Z BK40Z BS40Z BM40Z	0.32*	0.17	0.45	0.37	0.6	0.32
BG50Z BF50Z BK50Z	0.5	0.3	0.8	0.7	1.15	0.5
BG60Z BF60Z BK60Z	0.9	0.5	1.3	1.1	2.0	0.7
BG70Z BF70Z BK70Z BF80Z	1.2	0.6	1.8	1.6	2.4	1.4
BG80Z BF90Z BK80Z BG100Z	3.1	1.3	3.3	2.6	5.2	2.0
BG90Z BK90Z	4.2	1.5	4.9	3.5	7.7	3.0

Definition der KLK-Lage

KLK-Lage für Zwischengetriebe gleich wie Hauptgetriebe d.h.
Hauptgetriebe BG,BF Standard KLK-Lage **I**
-> Vorschaltgetriebe Standard KLK-Lage **I**
Hauptgetriebe BK,BS Standard KLK-Lage **II**
-> Vorschaltgetriebe Standard KLK-Lage **II**

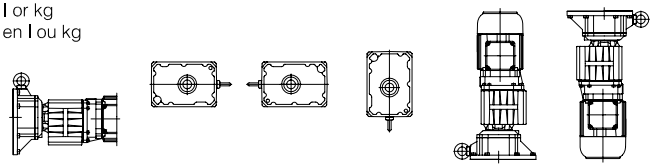
Definition of the terminal box position

Terminal box position for intermediate gear is similar to the main gearbox that means
Main gearbox BG,BF terminal box pos. I
-> intermediate gearbox terminal box pos. **I**
Main gearbox BK,BS terminal box pos. II
-> intermediate gearbox terminal box pos. **II**

Définition de la position de la b.à b.:

La position de la B. à B. pour le réduct. interméd. est identique au princip. c`est à dire:
Réduct. principal BG, BF pos. std B. à B. en I
-> pour le primaire pos. std B. à B. en **I**
Réduct. principal BK, BS pos. std B. à B. en II
-> pour le primaire pos B. à B. en **II**

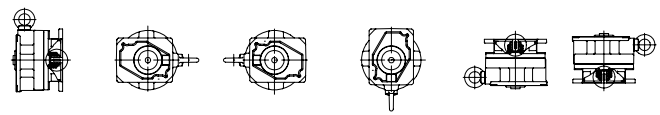
Schmierstoffmenge in l oder kg
Lubrication quantity in l or kg
Quantités de lubrifiant en l ou kg



Baulage des Hauptgetriebes Mounting position of main gearbox Pos. de montage Réducteur principal								
	BG / BF	B3 H4 B5	B6 H1	B7 H2	B8 H3	V5/H5 V1	V6/H6 V3 V2	
	BK / BS	H1	V1	V2	H2	H4	H3	
Standardlage d. KLK Baulage H1,H2,H3,B5,V1,V3 für Anbau mit gegossenem bzw. gegossenem Flansch Standard position of KLK mounting position H1,H2,H3, B5,V1,V3 for mounting with screwed resp. casted flange Pos. std. des KLK Pos. H1,H2,H3,B5,V1,V3 Convient pour montage avec bride		B5	H1	H2	H3	V1	V3	

Typenbezeichnung des Doppelgetriebes	Type designation of double gearbox combination				Désignation des Réducteur douples		
BG06G04 BS06G04 BK06G04	0.03	0.03	0.03	0.03	0.05	0.05	
BG10G06 BF10G06 BK10G06 BS10G06	0.08	0.08	0.08	0.08	0.15	0.15	
BG20G06 BF20G06 BK20G06 BS20G06	0.08	0.08	0.08	0.08	0.15	0.15	
BG30G06 BF30G06 BK30G06 BS30G06	0.08	0.08	0.08	0.08	0.15	0.15	
BG40G10 BF40G10 BK40G10 BS40G10	0.65	0.65	0.65	0.85	1.05	0.85	
BG50G10 BF50G10 BK50G10	0.65	0.65	0.65	0.85	1.05	0.85	
BG60G20 BF60G20 BK60G20	0.8	0.8	0.8	1.1	1.4	1.1	
BG70G20 BF70G20 BK70G20	0.8	0.8	0.8	1.1	1.4	1.1	
BG80G40 BF80G40 BK80G40	1.7	1.7	1.7	2.5	3.3	2.1	
BG90G50 BF90G50 BK90G50 BG100G50	3.0	3.0	3.0	4.5	5.5	3.3	

Schmierstoffmenge in l oder kg
Lubrication quantity in l or kg
Quantités de lubrifiant en l ou kg



BG / BF	B3 H4 B5	B6 H1	B7 H2	B8 H3	V5 V1	V6 V3 V2
BK / BS	H1	V1	V2	H2	H4	H3
Getriebetyp Gear type Type de réducteur						

bis IEC200 oder bis Nema284/286TC
up to IEC200 or up to Nema284/286TC
Jusqu´à IEC 200 ou Nema 284/286TC

BK06-K / BS06-K		
BG10-BG10Z-K BF10-BF10Z-K BK10-BK10Z-K BS10-BS10Z-K	BG20-BG20Z-K BF20-BF20Z-K BK20-BK20Z-K BS20-BS20Z-K	
BG30-BG30Z-K BF30-BF30Z-K BK30-BK30Z-K BS30-BS30Z-K	BG40-BG40Z-K BF40-BF40Z-K BK40-BK40Z-K BS40-BS40Z-K	
BG50-BG50Z-K BF50-BF50Z-K BK50-BK50Z-K	BG60-BG60Z-K BF60-BF60Z-K BK60-BK60Z-K	
BG70-K BF70-K BK70-K	BG80-K BF80-K BK80-K	
BG90-BG90Z-K BF90-K BK90-BK90Z-K	BG100-K	
BG70Z-K BG80Z-K BG100Z-K	BF70Z-K BF80Z-K BF90Z-K	BK70Z-K BK80Z-K

2-Z-Lager mit Fettschmierung nicht nachschmierbar
2-Z-bearing grease lubricated, sealed for life non regreasable
2 roulements - Z - lubrifiés pas de supplément

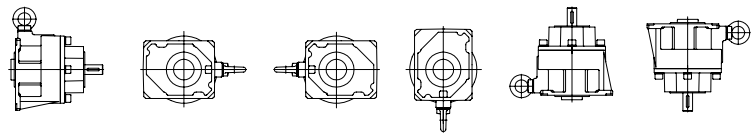
nur ab IEC225
nur ab Nema324/326TC
only from IEC225 up
only from Nema324/326TC up
à parti de IEC 225
à parti de Nema 324/326TC

BG70-K
BK70-K
BF70-K
BG80-K
BK80-K
BF80-K
BG90-BG90Z-K
BK90-BK90Z-K
BF90-K
BG100-K

Fettschmierung nachschmierbar zu verwendendes Fett:
grease lubrication for subsequent lubrication regreasable
Lubrif. à la graisse a renouveler

(PETAMO GHY133N)

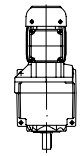
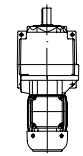
Schmierstoffmenge in l oder kg
Lubrication quantity in l or kg
Quantités de lubrifiant en l ou kg



BG / BF	B3 H4 B5	B6 H1	B7 H2	B8 H3	V5 V1	V6 V3 V2
BK / BS	H1	V1	V2	H2	H4	H3

Getriebetyp Gear type Type de réducteur						
BK06-SN / BS06-SN						
BG10-BG10Z-SN BF10-BF10Z-SN BK10-BK10Z-SN BS10-BS10Z-SN						
BG20-BG20Z-SN BF20-BF20Z-SN BK20-BK20Z-SN BS20-BS20Z-SN						
BG30-BG30Z-SN BF30-BF30Z-SN BK30-BK30Z-SN BS30-BS30Z-SN	2-Z-Lager mit Fettschmierung nicht nachschmierbar		2-Z-bearing grease lubricated, sealed for life non regreasable		2 roulements - Z - lubrifiés pas de supplément	
BG40-BG40Z-SN BF40-BF40Z-SN BK40-BK40Z-SN BS40-BS40Z-SN						
BG50-BG50Z-SN BF50-BF50Z-SN BK50-BK50Z-SN						
BG60-BG60Z-SN BF60-BF60Z-SN BK60-BK60Z-SN						
BG70Z-SN / BF70Z-SN / BK70Z-SN BG80Z-SN / BF80Z-SN / BK80Z-SN BG100Z-SN / BF90Z-SN						
BG70-SN BK70-SN BF70-SN BG80-SN BF80-SN BK80-SN BG90-BG90Z-SN BK90-BK90Z-SN BF90-SN BG100-SN	Fettschmierung nachschmierbar zu verwendendes Fett:		grease lubrication for subsequent lubrication regreasable		Lubrif. à la graisse a renouveler	

(PETAMO GHY133N)

Getriebe-Typ Gearbox type Réducteur Type	Schmierstoffmenge in l oder kg Lubrication quantity in l or kg Quantités de lubrifiant en l ou kg					
						
	H4	H1	H2	H3	V5	V6
BG20-01R	0.8	1.0	0.8	1.4	1.65	1.0

Bearing lubrication for large gears

The regreasing intervals for the roller bearings for the input shaft vary depending on the type of bearing, temperature, speed, load, etc.

In the case of relatively large gears, therefore, the bearings for input components SN70 to SN90 and KB70 to KB90 are provided with a regreasing device for the input shaft bearings. Each bearing has its own lubricating point (lubricating nipple).
The maximum permissible speed is 1800/min, and the required regreasing interval is 2,000 operating hours.
In the case of greasing intervals up to six months the amount of grease in the bearings can be supplemented at intervals of 1,000 operating hours by the periodic addition of fresh grease. However, all the grease must be replaced after the third addition of grease at the latest.
The amount of supplementary grease is approx. 30 g, which means that three times this amount, i.e. approx. 90 g, is required when the grease is completely replaced.
When the grease is completely replaced, the excess, used grease in the grease outlet chamber should also be removed.
KLÜBER PETAMO GHY 133 N is specified as the lubricant.

Bearing lubricant for small gears (motor size less than or equal to IEC 200)

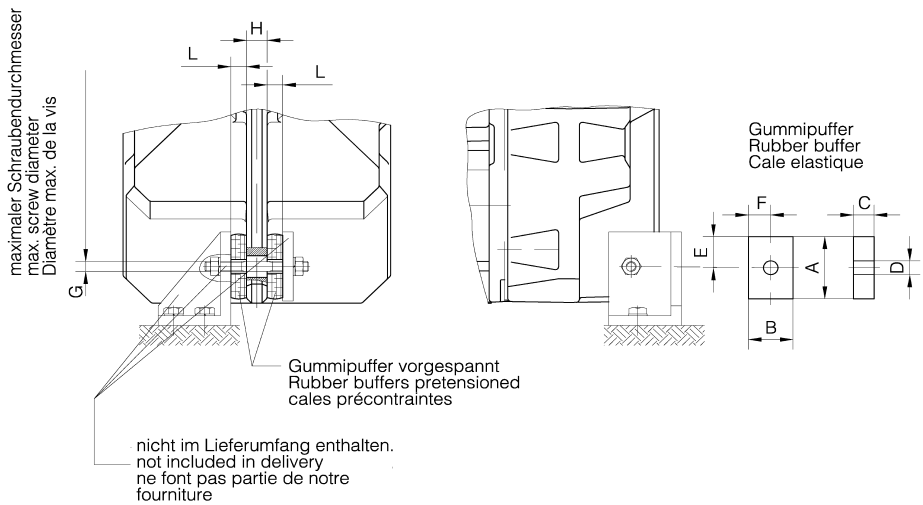
In the case of relatively small and average-sized gears the input components/motors are provided with closed deep groove ball bearings.
If the input speed is 1,500/min the lubricating intervals is therefore 10,000 operating hours at least.
The maximum permissible input speed is 3,600/min, and so the lubricating interval is halved.
The lubricant is changed by replacing the bearings during the servicing/inspection of the radial shaft sealing rings. Cleaning and regreasing the bearings is not recommended due to the risk of contamination.

Gear units with torque arm and rubber buffers

1. Installation of the rubber buffers.
The enclosed rubber buffers are to be assembled and to tension as shown in the drawings N-BF-DST, N-BK-DST or N-BS-DST.
2. The tension and the condition of the rubber buffers is to be checked and changed if necessary as part of the standard service intervals.

Note:

Play in the rubber buffers can lead to damage of the gear wheels and bearings.



Werkstoff: Naturkautschuk
Härte 50 Shore A±5

Material: Natural rubber
Hardness 50 Shore A±5

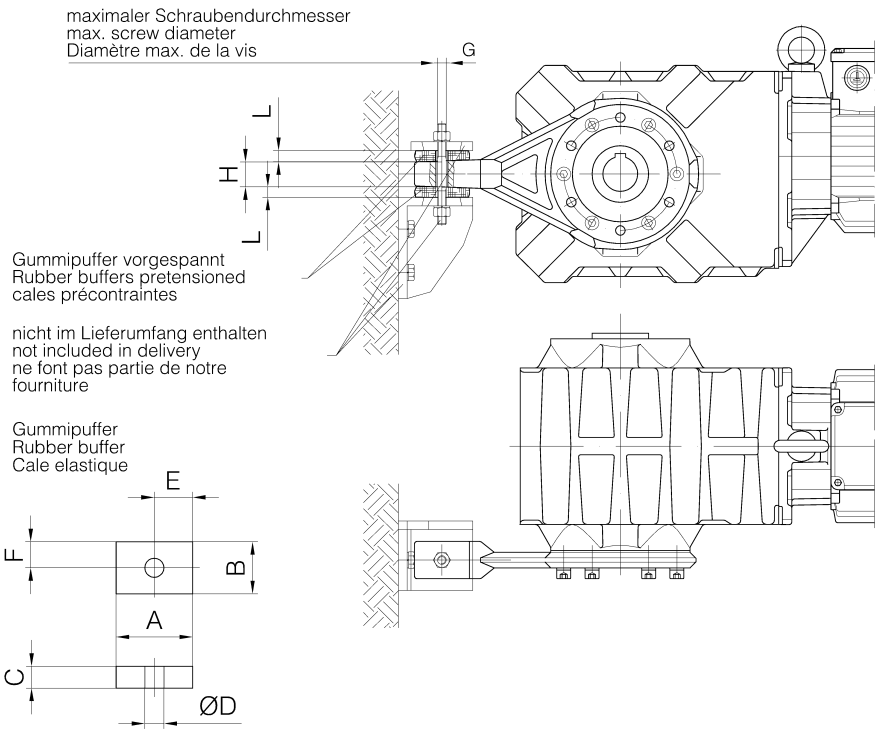
Matière: Caoutchouc naturel
Dureté 50 Shore A±5

Abmessungen des Querlochs:
Siehe Maßbild des jeweiligen Getriebes

Dimensions of the transverse hole:
see dimensioned sketch of the respective shaft mounted gearbox

Dimensiones du trou transversal
consulter les croquis cotés
des réducteurs respectifs

Getriebe Gear Réducteur	Pos.	Maße (mm) Dimensions (mm) Cotes (mm)								
		A	B	C	D	E	F	G	H	L
BF06	Pos.0	30	30	12	12	15	15	M10	16	10
BF10	Pos.1	48	32	15	14	24	16	M10	16	13.5
BF20	Pos.1	48	32	15	14	24	16	M10	18	13
BF30	Pos.2	63	43	20	14	31.5	21.5	M10	18	17
BF40	Pos.2	63	43	20	14	31.5	21.5	M10	20	16.5
BF50	Pos.3	88	60	25	22	44	30	M18	24	21.5
BF60	Pos.3	88	60	25	22	44	30	M18	28	21
BF70	Pos.4	123	88	30	26	61.5	44	M20	30	25.5
BF80	Pos.5	133	103	35	26	66.5	51.5	M20	40	30
BF90	Pos.5	133	103	35	26	66.5	51.5	M20	50	29.5



Werkstoff: Naturkautschuk
Härte 50 ±5 Shore A

Material: Natural rubber
Hardness 50 ±5 Shore A

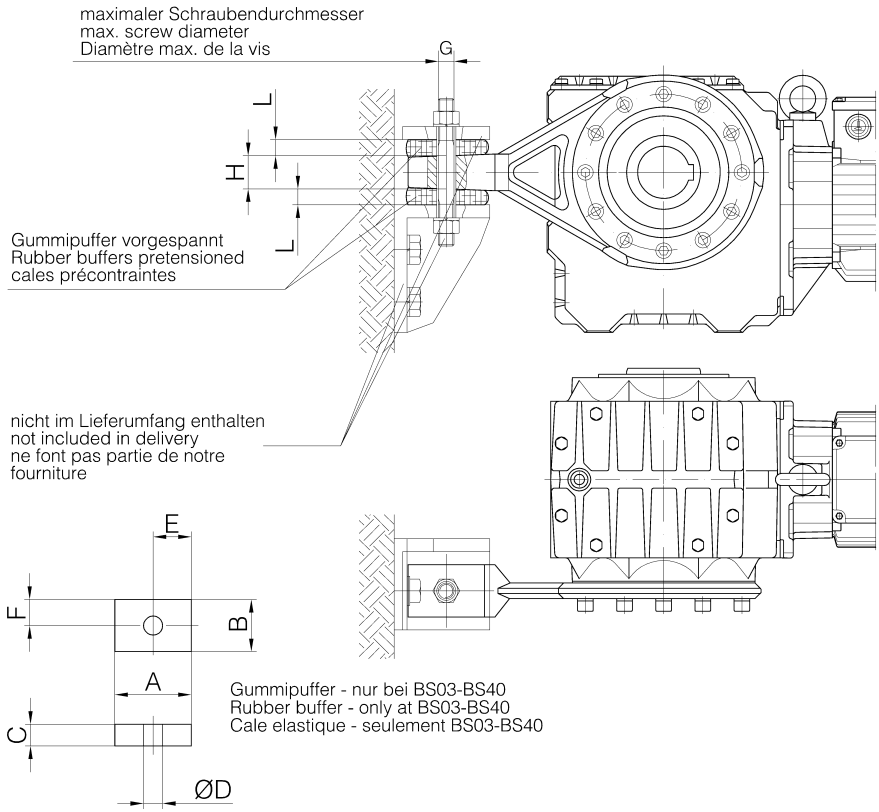
Matière: Caoutchouc naturel
Dureté 50 ±5 Shore A

Abmessungen des Querlochs:
Siehe Maßbild des jeweiligen Getriebes

Dimensions of the transverse hole:
see dimensioned sketch of the respective shaft mounted gearbox

Dimensiones du trou transversal
consulter les croquis cotés

Getriebe Gear Réducteur	Pos.	Maße (mm) Dimensions (mm) Cotes (mm)								
		A	B	C	D	E	F	G	H	L
BK06	Pos.0	30	30	12	12	15	15	M10	10	10
BK10	Pos.1	48	32	15	14	24	16	M10	19	13.5
BK20	Pos.1	48	32	15	14	24	16	M10	19	13
BK30	Pos.2	63	43	20	14	31.5	21.5	M10	30	17
BK40	Pos.2	63	43	20	14	31.5	21.5	M10	30	17
BK50	Pos.3	88	60	25	22	44	30	M18	36	21.5
BK60	Pos.3	88	60	25	22	44	30	M18	38	21
BK70	Pos.4	123	88	30	26	61,5	44	M20	40	25.5
BK80	Pos.5	133	103	35	26	66.5	51.5	M20	45	30
BK90	Pos.5	133	103	35	26	66.5	51.5	M20	45	29.5



Werkstoff: Naturkautschuk
Härte 50 ±5 Shore A

Material: Natural rubber
Hardness 50±5 Shore A

Matière: Caoutchouc naturel
Dureté 50 ±5 Shore A

Abmessungen des Querlochs:
Siehe Maßbild des jeweiligen Getriebes

Dimensions of the transverse hole:
see dimensioned sketch of the respective shaft mounted gearbox

Dimensiones du trou transversal
consulter les croquis cotés
des réducteurs respectifs

Getriebe Gear Réducteur	Pos.	Maße (mm) Dimensions (mm) Cotes (mm)								
		A	B	C	D	E	F	G	H	L
BS02	-	-	-	-	-	-	-	M8	6	-
BS03	Pos.0	30	30	12	12	15	15	M8	10	10.5
BS04	Pos.0	30	30	12	12	15	15	M8	10	10.5
BS06	Pos.0	30	30	12	12	15	15	M10	10	10
BS10	Pos.1	48	32	15	14	24	16	M10	19	13
BS20	Pos.2	63	43	20	14	31.5	21.5	M10	30	17.5
BS30	Pos.2	63	43	20	14	31.5	21.5	M10	30	17
BS40	Pos.3	88	60	25	22	44	30	M18	38	22

Spring-loaded brakes with D.C solenoid release
Types E../Z..008B, Z..015B, E../Z.. 075 B, Z..100B

1 Safety note

Connection, calibration and maintenance work must be carried out in accordance with the safety notes in enclosed Chapter 2.

2 General

In addition to holding loads stationary, the springloaded brake is used to decelerate masses which are moved in rotating and straight-line motions, in order to shorten undesirable overtravel distances and times.
The brake releases electromagnetically. When the solenoid is de-energized, the braking force is generated by the spring pressure. Since this type of system will also result in a braking effect in the event of an unintentional power failure, it is considered a safety brake for the purpose of accident prevention regulations.
During the braking process, the kinetic energy of the mass moments of inertia is converted into heat by the brake discs. The brake discs, which are made from a high-grade, asbestos-free material, are particularly resistant to abrasion and heat. A certain degree of wear, however, is unavoidable. For this reason, the limit values listed in section 10 for working capacity and minimum lining thickness must always be observed.

3 Function

The functional principal is explained in Fig. 1, which shows the double-disc spring-loaded brake (Z.. series).

3.1 Braking

The brake discs (1) are pressed axially by the springs (3) against the backing plate (4) and the centring flange (5) via the thrust plate (2). The parallel pin (6) prevents the thrust plate and the backing plate from moving radially. The braking torque is transferred to the rotor via spline teeth between the brake discs and the carrier (7), which is securely mounted on the shaft. The braking torque can be adjusted in steps by the number of springs (see section 8).

3.2 Brake release

When the coil (8) is supplied with the required DC voltage, the thrust plate is attracted by the solenoid housing (9) magnetic field against the spring force. The rotor can move freely as a result of the consequential removal of the brake discs.
The generous dimensions of the electromagnet mean that an increased air gap $_{L}$, caused by brake disc wear, can also be accommodated. There is no means to make adjustments.

E.. series single-disc spring-loaded brakes have the same basic constructions and operation as the double-disc brake described here. The only difference is that there is no backing plate and one brake disc is omitted.

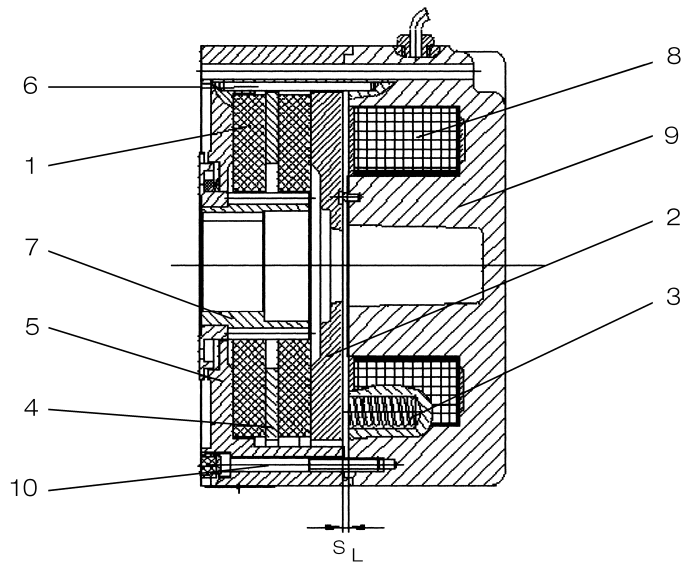


Fig. 1: Z.. series double-disc spring-loaded brake

3.3 Further designs

Starting from the basic version shown in Fig. 1, all the brakes can be additionally equipped with the following:

- Terminal box
  This contains either a rectifier or a terminal strip, depending on whether the supply is from an AC or a DC source.
- Manual release, latching/non-latching
  This allows the brake to be released manually, e.g. in the event of a power failure (see section 7).

4 Electrical connection

4.1 General

There are two basic options for supplying the DC solenoid:
1. Externally from an existing DC control network or from a rectifier in the control cabinet.

2. Via a rectifier which is integrated in the motor or brake terminal box.
This allows the rectifier to be supplied either directly from the motor terminal board or from the mains.
In the following instances, however, the rectifier must not be connected to the motor terminal block:
- Pole-changing motors and three-phase induction motors
- Operation with frequency inverter
- Other designs where the motor voltage is not constant, e.g. operation with soft start equipment, starting transformers, ...

4.1.1 Brake release

If rated voltage is applied to the solenoid, the solenoid current and the magnetic field build up exponentially. Only when the current has reached a certain value ($I_{Release}$) will the spring force be overcome and the brakes released.

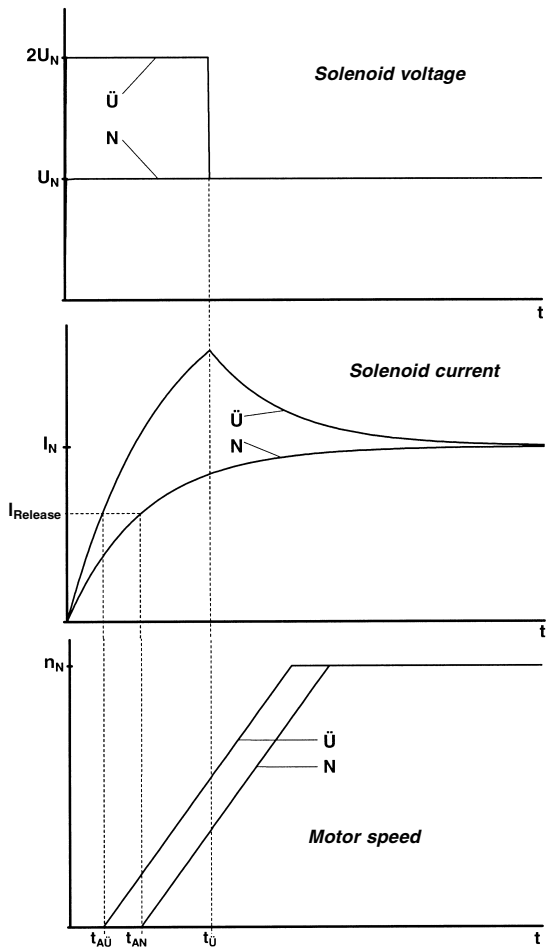


Fig. 2: Solenoid voltage, solenoid current and motor speed pattern development at normal excitation (N) and overexcitation (Ü).
$t_{Ü}$: Overexcitation period; t_{AN}, $t_{AÜ}$: Response times at normal and overexcitation

During response time t_A, two distinct events may occur, provided the motor and brake are simultaneously supplied with voltage:

- Motor blocked – Condition: $M_A < M_L + M_{Br}$
  The motor carries the starting current and is consequently subjected to additional thermal loading. This event is shown in Fig. 2.

- Brake is overdriven – Condition: $M_A > M_L + M_{Br}$
  The brake is also thermally loaded during starting and wears more quickly.

M_A: Motor breakaway torque, M_L: Load torque, M_{Br}: Braking torque

In both events, the motor and brake are therefore subjected to additional loads.
The response time manifests itself more noticeably as the brake size increases. A reduced response time is recommended for medium and large brakes and at higher switching frequencies in particular. Relatively simple implementation by electrical means is possible using the “overexcitation” principle. This means that the solenoid is briefly operated at twice the rated voltage when switched on. The steep current rise associated with this reduces the response time by approximately half compared with “normal excitation”. This overexcitation function is integrated in the MSG model special rectifier (see section 4.5).
As the air gap increases, so too does the release current and along with it the response time. As soon as the release current exceeds the solenoid rated current, the brake ceases to release at normal excitation and the brake disc wear limit is reached.

4.1.2 Braking
The braking torque is not effective immediately the voltage supply to the solenoid is shut off. The magnetic energy must first be reduced until the spring force can overcome the magnetic force. This happens at holding amperage I_{Hold}, which is far smaller than the release current. Response times vary according to circuit design.

4.1.2.1 Switching off the AC supply to the SG standard rectifier

a) Rectifier supply from the motor terminal block (Fig. 3, graph 1)
   Response time t_{A1}: Very long
   Reason: Once the motor voltage has been switched off, a slowly decaying voltage is induced by motor remanence, which then supplies the rectifier and also the brake. In addition, the magnetic energy of the brake solenoid is reduced relatively slowly by the rectifier's free-wheeling circuit.

b) Separate rectifier supply (Fig. 3, graph 2)
   Response time t_{A2}: Long
   Reason: Once the rectifier voltage has been switched off, the magnetic energy of the brake solenoid is reduced relatively slowly by the rectifier's free-wheeling circuit.

If the alternating current is interrupted, no significant switch off voltages occur at the solenoid.

4.1.2.2 Interruption in the solenoid DC switching circuit (Fig. 3, graph 3)

a) By manual circuit breaker
   - With separate supply from a DC control network or
   - At the SG standard rectifier DC switching contacts (A2, A3)

   Response time t_{A3}: Very short
   Reason: The magnetic energy of the brake solenoid is reduced very quickly by the electric arc generated at the circuit breaker.

b) Electronically
Using a special ESG or MSG rectifier
Response time t_{A3}: Short
Reason: The magnetic energy of the brake solenoid is quickly reduced by a varistor which is integrated in the rectifier.

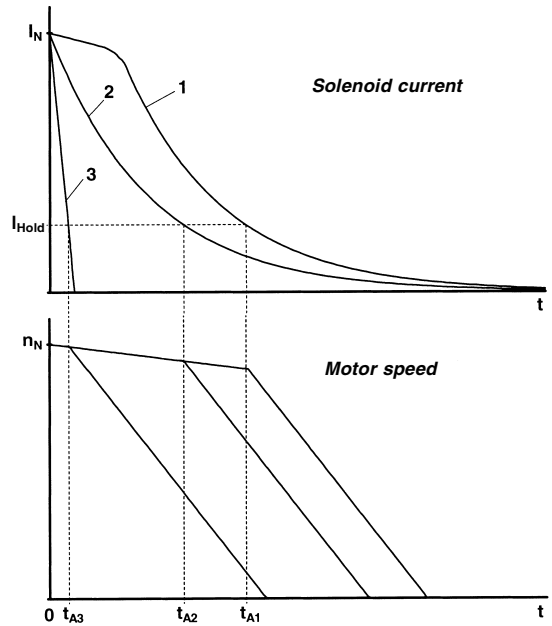


Fig. 3: Solenoid current and motor speed pattern after interruption to the alternating (1, 2) and direct (3) currents

When the direct current is interrupted, the solenoid induces voltage spikes u_q, the height of which depends on the following relationship between the self-inductance L of the solenoid and the switch-off speed di/dt:

$$u_q = L \cdot \frac{di}{dt}$$

Inductance L increases with increasing rated voltage of the solenoids, as a consequence of the winding design. At higher solenoid voltages, therefore, the switch-off voltage spikes can be dangerously high. For this reason, all brakes for use with voltages greater than 24V are fitted with a varistor.
The varistor's sole function is to protect the solenoid, and it does not protect the surrounding electronic components or equipment from EMC interference.
Brakes for use at voltages of 24V or below can also be supplied with a varistor on request.

If the direct current is interrupted by a manual circuit breaker, the electric arc created at the switching contacts also causes significant burn-off. Only special direct-current-relays or modified alternating current relays with AC3 contacts in accordance with EN 60947-4-1 may be used.

4.2 External direct current supply

If the brakes are supplied directly from a DC control network.

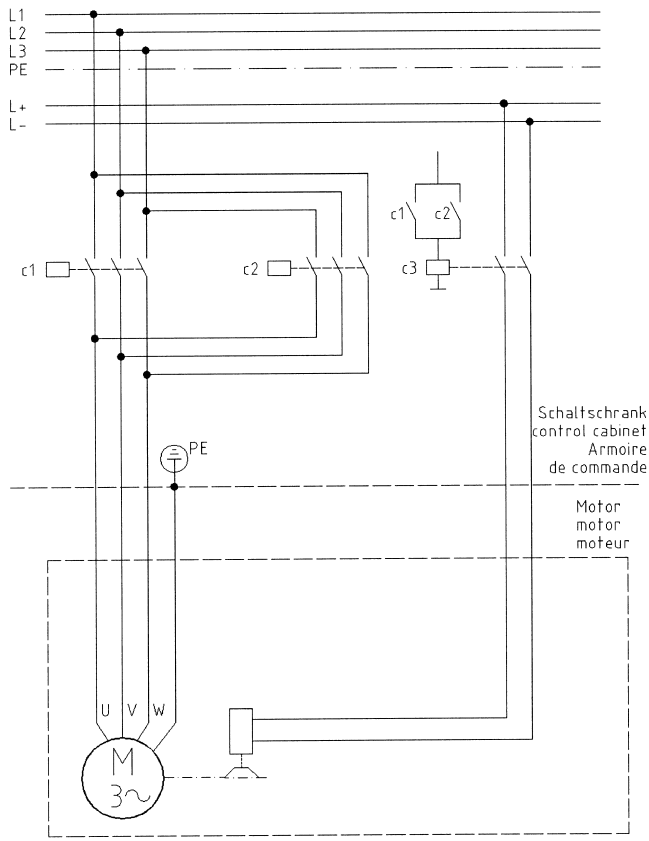


Fig. 4: Direct current supply direct from a control network

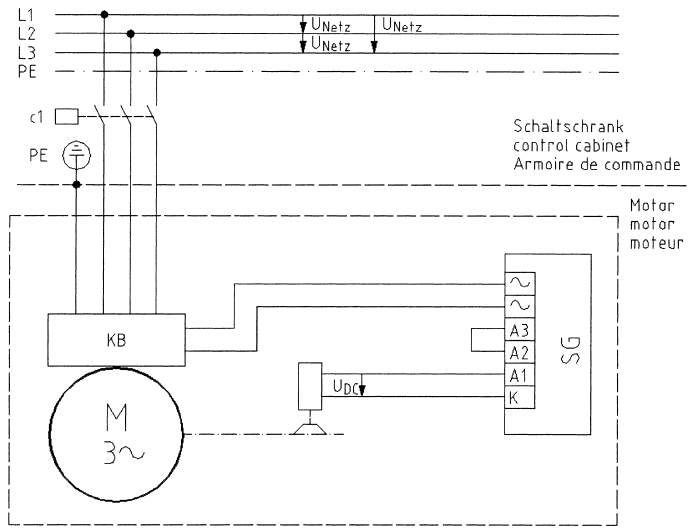
4.3 Via SG 3.575A standard rectifier

Rectifier technical data

Functional principle	Half-wave rectifier
System voltage U_1	max. 575 V AC +5 %, 50/60 Hz
Output voltage	0.45 * U_1 V DC
Max. output current	2 A DC when installed in motor or brake terminal box 2.5 A DC when installed in control cabinet

Ambient temperature	-20° C to 40° C
Conductor cross-section for clamping	Max. 1.5 mm^2

4.3.1 Rectifier voltage supply from the motor terminal block



Connection to the terminal board KB, as a function of the DC rated voltage of the brake U_{DC}

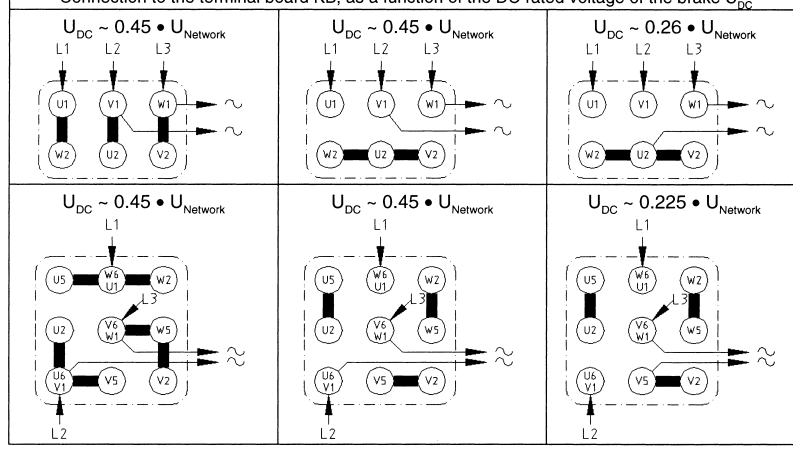
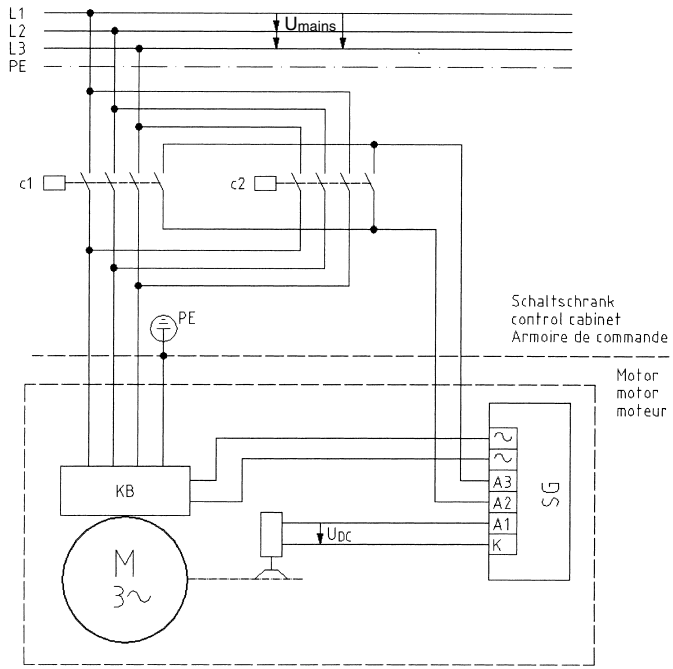


Fig. 5: Alternating current interruption → Terminals A2 and A3 jumpered



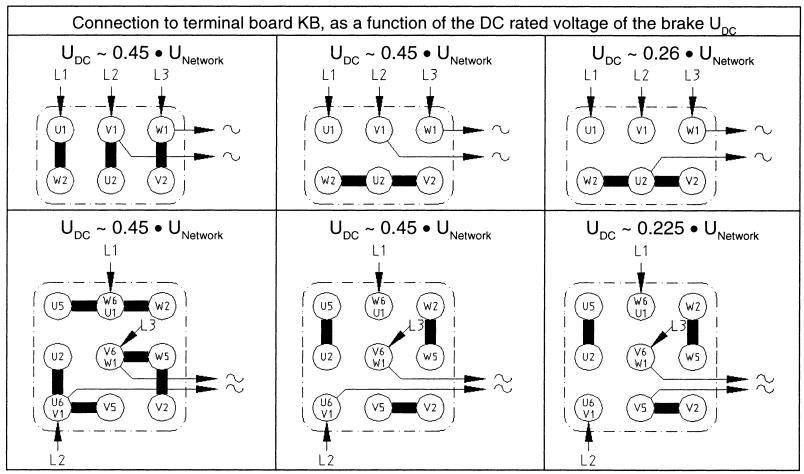


Fig. 6: Direct current interruption at terminals A2 and A3
e.g. via direction of rotation circuit breaker

4.3.2 Rectifier voltage supply via separate contactor

The rectifier input voltage must be connected via a separate circuit breaker. Fig. 7 shows the conversion circuit for operation with frequency inverter.

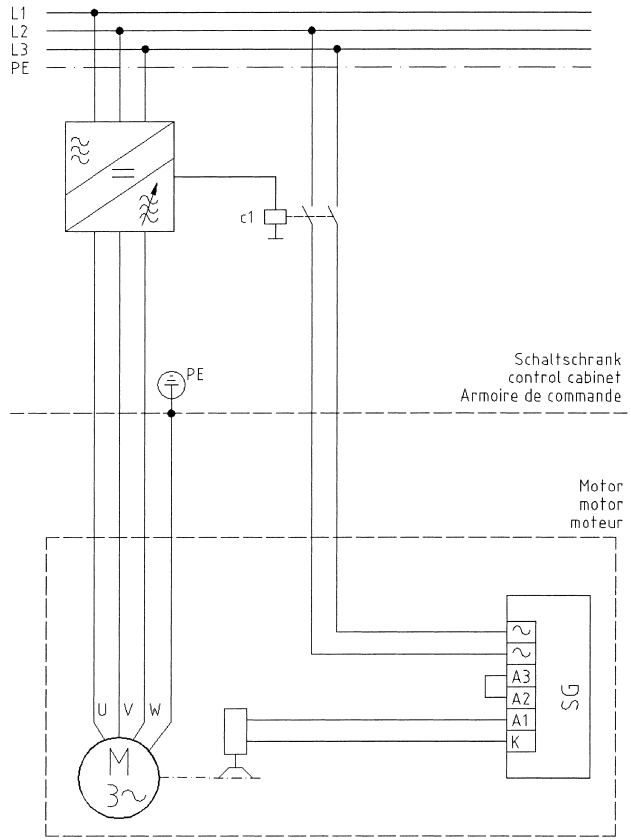


Fig. 7: Operation with frequency inverter.
Alternating current switch-off → Terminals A2 and A3 jumpered

4.4 Via an ESG 1.460A special rectifier

Rectifier technical data

Functional principle	Half-wave rectifier with electronic direct current interruption
System voltage U_1	220 - 460 V AC ±5 %, 50/60 Hz
Output voltage	0.45 * U_1 V DC
Max. output current	1 A DC

Ambient temperature	-20° C to 40° C
Conductor cross-section for clamping	Max. 1.5 mm^2

To activate the integrated rapid switch-off function, the blue conductor must be routed from the housing and connected to the PE.
Since this conductor is coupled to the supply voltage with a high-resistance, leakage currents of up to a maximum of 2 mA are possible, depending on the voltage level..

In the case of operation from an unearthed network, the blue conductor should be connected to the right-hand alternating current contact (N) of the ESG. If, in this case, the rectifier is supplied from the motor terminal block, the response time when the supply is switched off will be increased.

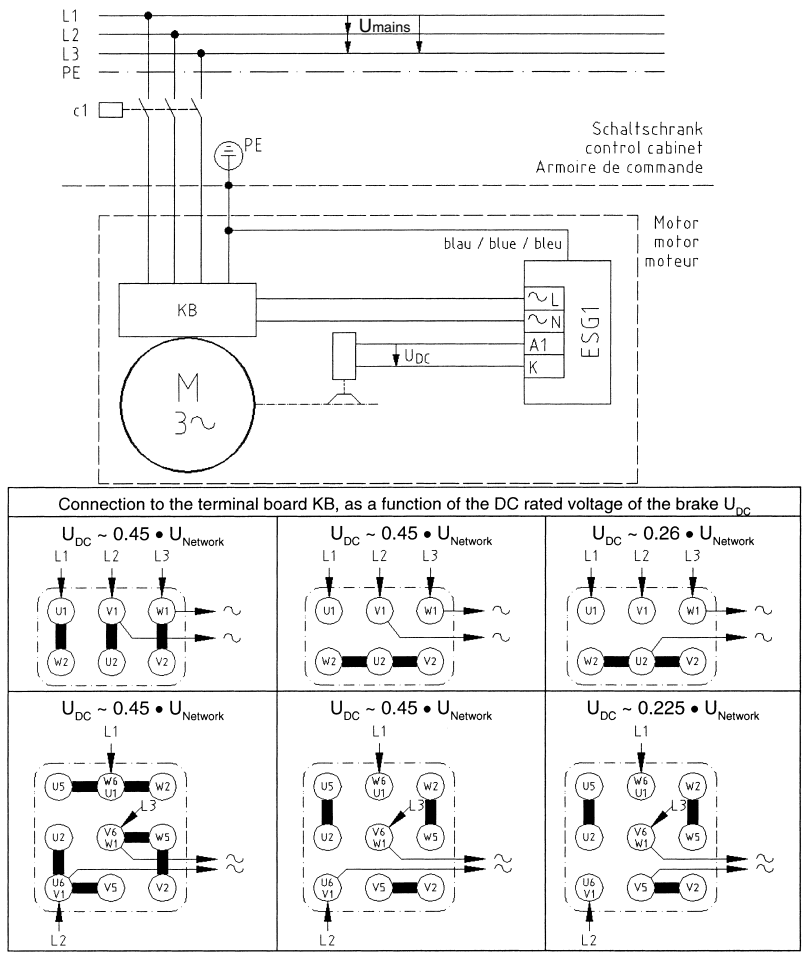


Fig. 8: Rectifier voltage supply from the motor terminal block

4.5 Via an MSG special rectifier

Rectifier technical data

Functional principle	Half-wave rectifier with timed overexcitation and electronic direct current interruption
System voltage U_1	220 - 480 V AC +6/-10 %, 50/60 Hz
Output voltage	0.9 * U_1 V DC during overexcitation 0.45 * U_1 V DC after overexcitation
Overexcitation period	0.3 s
Max. output current	2 A DC
Ambient temperature	-20° C to 40° C
Conductor cross-section for clamping	Max. 1.5 mm^2

There are two MSG special rectifier models, which vary in the way they detect switch-off.

4.5.1 MSG 2.480U

Principle: Rapid switch-off due to insufficient input voltage
This design is used if the voltage is supplied separately.

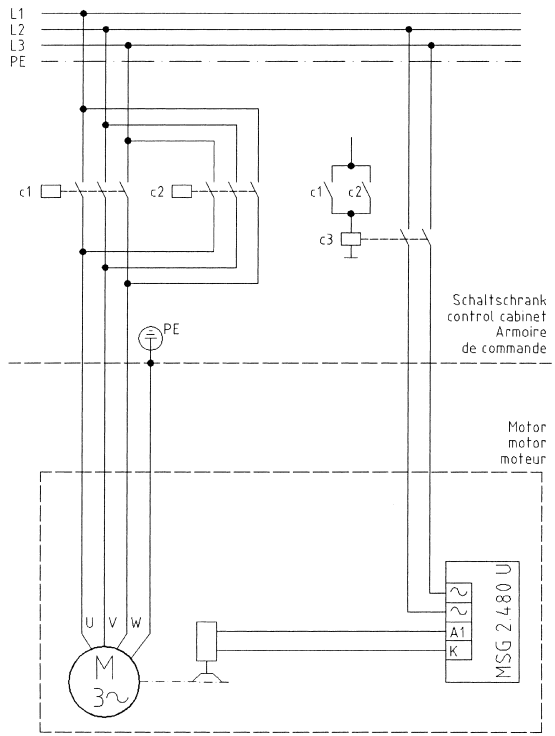
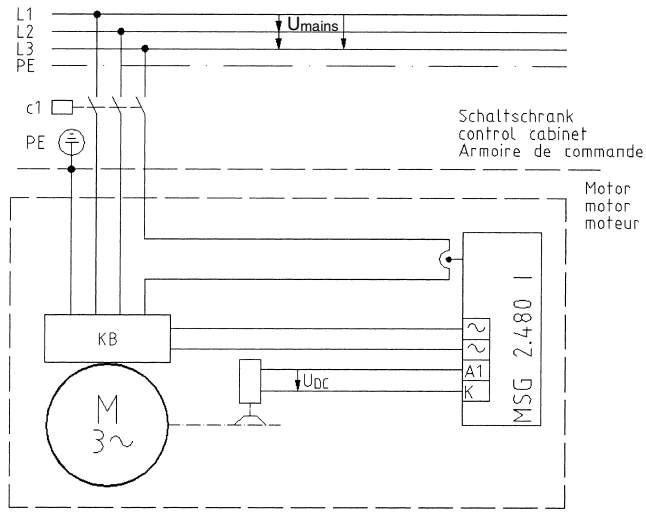


Fig. 9: MSG 2.480U electrical connection

4.5.2 MSG 2.480I

Principle: Rapid switch-off due to insufficient engine current in one phase.
This design is used if the voltage supply comes from the motor terminal board.



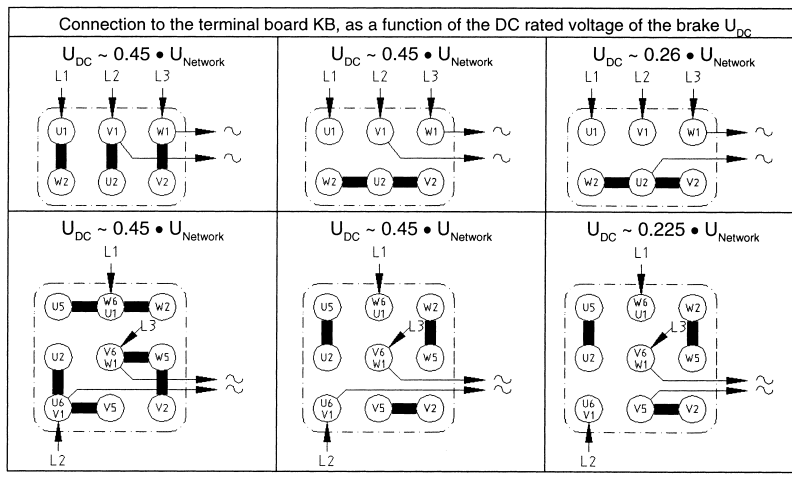


Fig. 10: MSG 2.480I electrical connection

To record the current, one conductor of the connecting cable must be passed through the hoop mounted on the side of the rectifier. Since the current detection has a lower limit, the conductor must be looped in several times at motor idling currents below 0.6 A. In this case, there is a sticker below the hoop on the rectifier which shows the number of conductor passes.

Caution: For the correct function of the rectifier, it is imperative that one of the motor supply cables is fed through the loop. Should this not be done, the rectifier may not function or could be destroyed.

For the most simple installation, follow the procedure detailed in Fig. 11:

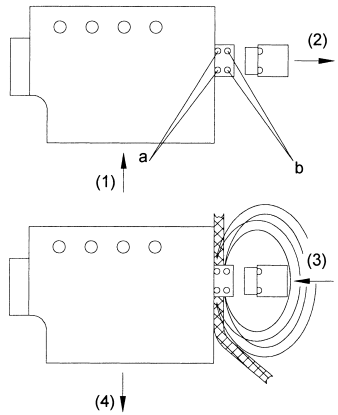


Fig. 11: Securing the conductor to the rectifier
a: Fixing 1, b: Fixing 2

- Pull the rectifier out of the terminal box guides (1)
- Remove the bracket to the side (2)
- Push the conductor or conductor loops through the hoops against the rectifier wall, and attach the bracket again (3)
- Push the rectifier onto the guide again (4)

The hoop can be secured in two fixing positions. Fixing 1 should be selected if fixing 2 is not possible, i.e. due to lack of space with small terminal boxes. Depending on the number of conductor passes, the following conductor cross-sections must not be exceeded in detent 1:
Triple pass: max. 1.5 mm^2
Double pass: max. 2.5 mm^2
Single pass: max. 6 mm^2
In detent 2, a maximum cross-section of 16 mm is^2 permissible.

On motors with nominal currents greater than approximately 25 A, the rectifier's magnetic field sensor goes into saturation as a result of the relatively high starting currents, and it then no longer detects currents below 1 A. This means that a rectifier which has been used on a large motor (I_N > 25 A) can no longer be used for small motors.
The sensor's maximum continuous current loading capacity is 60 A.

Caution: If the drive is to have a high voltage test performed, both of the rectifier connection leads need to be removed.

5 Mounting

In general, the spring-loaded brakes are supplied ready for operation mounted on the motor.
If they are retrofitted, the carrier (7 in Fig. 1) must first be heated to approximately 80° C and pushed onto the shaft extension of the rotor.
Now the brake too can be pushed with gentle taps onto the centring pin on the fan cowl or the motor's end shield, and secured.
The securing bolts must be prevented from working loose by suitable lock washers.
Once the electrical connection is in place, the brake is operational.

6 Air gap

The brake disc wear occurring during operation simply causes the air gap to increase, and does not lead to a significant reduction in braking torque.
As the air gap increases, so too do the response times slightly when the brake releases. In order to ensure problem-free brake function, the maximum air gap/minimum brake disc thickness values given in section 10 must always be observed. At the latest, the brake discs must be replaced when they reach this limit value (see section 9.2).

6.1 Wear monitoring

The degree of wear should be checked regularly.
There are two basic ways of doing this:

6.1.1 Measuring the air gap

- Demount the brake from the motor
- Remove the labyrinth seal from the centring flange (5 in Fig. 1)
- Place the brake and the magnet casing (9 in Fig. 1) on a level surface

The thrust plate (2 in Fig. 1) moves down by the value of the current air gap (s_L) when the brake releases. The air gap can therefore be determined as a differential dimension from

- the distance between the thrust plate and the surface of the centring flange when released (electrically on) and
- the distance between the thrust plate and the surface of the centring flange when the brake is applied (electrically off)

Measurement is carried out using a depth gauge.

On brakes of type E../Z and Z..100 with manual release, the air gap can be calculated without demounting the brake from

- the distance between the manual release ring and the magnet casing when the brake is released (electrically on) and
- the distance between the manual release ring and the magnet casing when the brake is applied (electrically off)

(see Fig. 12). To prevent inaccurate measurement, the top coat around the measuring point should be removed.

6.1.2 Measuring the brake disc thickness
To do this, the brake must be taken apart as detailed in section 9.1.

7 Manual release

If the wear limit is exceeded on brakes with manual release, it can result in a significant reduction in braking torque. You should therefore ensure that wear is monitored regularly and carefully (section 6.1) on this design.

7.1 Types E../Z..008 and Z..015

The manual release lever is pushed into the neutral position by a spring. The brake can be released by axial operation.

7.2 Types E../Z..075 and Z..100

7.2.1 Latching manual release
In accordance with Fig. 12, the axial latching by the cylinder bolt must first be released an a screwdriver should then be inserted in an appropriate bore in the manual release surround and turned clockwise to a noticeable stop. Always count the number of times the manual release ring is turned.

To release the manual release, the manual release ring should be turned back from the stop by the same angle, but by a minimum of 2 rotations (maximum of 3 rotations), and should be locked using the cylinder bolt. To do this, the cylinder bolt must penetrate axially into the magnet casing before.

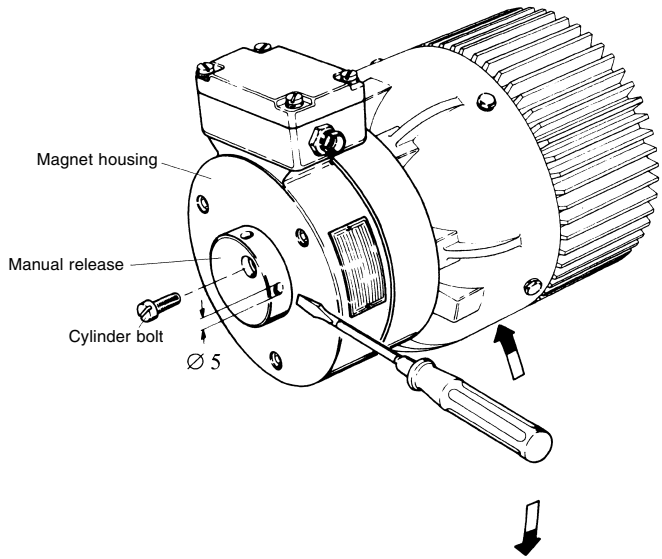


Fig. 12: Brake – Types E../Z..075 and Z..100 – with latching manual release

Only the original cylinder bolt may be used, since otherwise the brake could malfunction (note the bolt length).
The manual release ring is not used adjust the air gap.

7.2.2 Non-latching manual release
The bolts on the U-shaped manual release hoop should be engaged in two diametrically opposed manual release ring bores (see Fig. 13). The hoop should be gently moved axially a short way for release.

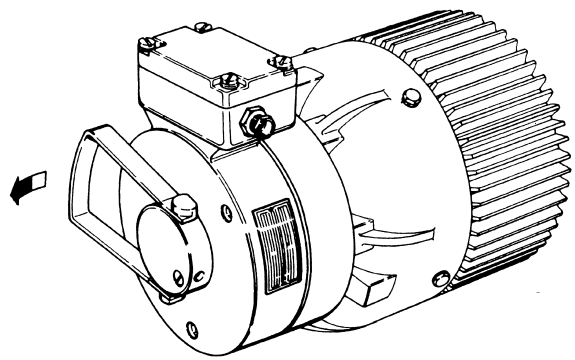


Fig. 13: Brake – Types E../Z..075 and Z..100 – with non-latching manual release

The manual release hoop must be removed once it has been used for normal operation to prevent the release movement from being hindered and to prevent unauthorised use.

8 Setting the braking torque

The braking torque can be adjusted in steps by the number of springs.
To minimize noise when releasing and braking, always arrange the springs asymmetrically as per Fig. 14.
The permissible spring equipment for the individual brake models is listed in section 10 along with the corresponding braking torques.

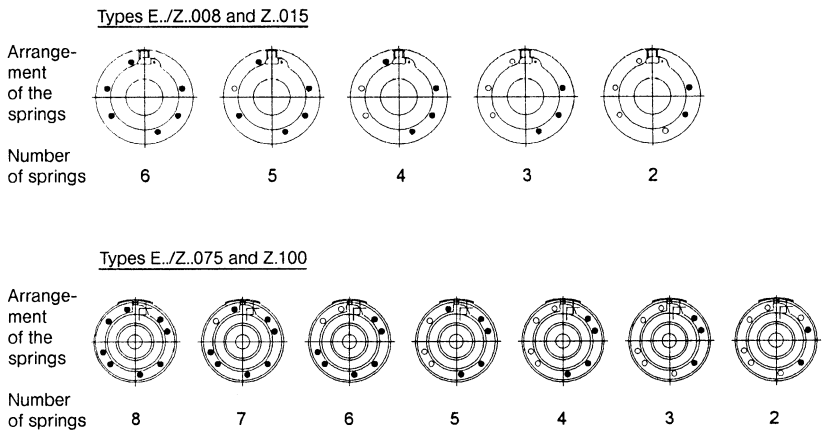


Fig. 14: Arrangement of the springs with partial filling

9 Maintenance

9.1 Measuring the brake disc thickness

As mentioned in section 6.1, the degree of wear may be checked by measuring the brake disc thickness as an alternative to wear monitoring according to the air gap. The brake must be demounted to do this (see also Fig. 1):

a) Isolate the motor and the brake from the mains. Disconnect the brake supply line.
b) Undo the securing bolts between the brake and the motor. Remove the brake from the slot by pushing it lightly.
c) The carrier (7) remains on the motor shaft.
d) Undo the bolts (10). Dismantle the brake.
e) Clean the brake. Remove any abraded matter.
f) Measure the thickness of the brake disc(s) (1). At the latest, the brake discs should be changed (see section 9.2) when the thickness reaches the minimum level set out in section 10.

9.2 Changing the brake discs

See also Fig. 1.
a) as a) – e) in section 9.1.
b) Check the remaining friction partners – the thrust plate (2), centring flange (5) and, with double-disc brakes in the Z.. series, the backing plate (4) – for plane parallelism and wear, and replace them along with the brake discs (1) if necessary.
c) Reassemble the brake in the reverse order to that for disassembly.

With new brake discs or friction partners, the original braking torque is only reached after a certain breaking-in period.

Important:

On brakes of type E../Z..075 and Z..100 with manual release, the manual release ring should not be adjusted during maintenance (see Fig. 12).
If it is necessary to adjust the ring to clean or replace the thrust plate, the axial locking should first be removed using the cheese-head bolt. The manual release ring can then be unscrewed clockwise. On reassembly, turn the manual release ring clockwise to a noticeable stop. The manual release ring must then be turned back from the stop through at least 2, but a maximum of 3, rotations, and locked with the cheese-head bolt in the bore in the magnet casing.
The manual release ring is not used to adjust the air gap.

10 Technical data

Single disc brakes											
Typ	M_N [Nm]	ZF	W_{max} [$*10^3$ J]	W_{th} [$*10^3$ J]	W_L [$*10^6$ J]	t_A [ms]	t_{AC} [ms]	t_{DC} [ms]	s_{Lmax} [mm]	d_{min} [mm]	P_{el} [W]
E..008B9	10	6x blau	50	250	60	90	60	10	1,0	9,5	30
E..008B8	8	5x blau	50	250	100	90	60	10	1,3	9,2	30
E..008B6	6,5	4x blau	50	250	140	85	65	10	1,6	8,9	30
E..008B5	5	3x blau	50	250	180	75	100	15	1,9	8,6	30
E..008B4	3,5	2x blau	50	250	220	60	150	25	2,2	8,3	30
E..008B2	2,5	4x rot	50	250	250	45	190	30	2,4	8,1	30
E..075B9	70	8	100	600	600	200	150	20	1,8	12,9	110
E..075B8	63	7	100	600	950	200	150	20	2,5	12,2	110
E..075B7	50	6	100	600	1200	180	150	20	3,0	11,7	110
E..075B6	42	5	100	600	1500	160	150	20	3,5	11,2	110
E..075B5	33	4	100	600	1500	140	240	20	3,5	11,2	110
E..075B4	25	3	100	600	1500	120	350	20	3,5	11,2	110
E..075B2	19	2	100	600	1500	90	450	25	3,5	11,2	110

Double disc brakes											
Typ	M_N [Nm]	ZF	W_{max} [$*10^3$ J]	W_{th} [$*10^3$ J]	W_L [$*10^6$ J]	t_A [ms]	t_{AC} [ms]	t_{DC} [ms]	s_{Lmax} [mm]	d_{min} [mm]	P_{el} [W]
Z..008B9	20	6x blau	50	250	60	90	60	10	1,0	9,8	30
Z..008B8	16	5x blau	50	250	100	90	60	10	1,3	9,6	30
Z..008B6	13	4x blau	50	250	140	85	65	10	1,6	9,5	30
Z..008B5	10	3x blau	50	250	180	75	100	15	1,9	9,3	30
Z..008B4	7	2x blau	50	250	220	60	150	25	2,2	9,2	30
Z..015B9	40	6	50	350	470	90	80	10	1,8	9,4	45
Z..015B8	34	5	50	350	580	90	80	10	2,1	9,2	45
Z..015B6	27	4	50	350	690	90	100	15	2,4	9,1	45
Z..015B5	22	3	50	350	800	85	120	15	2,7	8,9	45
Z..015B4	16	2	50	350	880	70	140	15	2,9	8,8	45

Double disc brakes												
Typ	M_N [Nm]	ZF	W_{max} [$*10^3$ J]	W_{th} [$*10^3$ J]	W_L [$*10^6$ J]	t_A [ms]	t_{AC} [ms]	t_{DC} [ms]	s_{Lmax} [mm]	d_{min} [mm]	P_{el} [W]
Z..075B9	140	8	100	600	600	200	150	20	1,8	13,5	110
Z..075B8	125	7	100	600	950	200	150	20	2,5	13,2	110
Z..075B7	105	6	100	600	1200	180	150	20	3,0	12,9	110
Z..075B6	85	5	100	600	1500	160	150	20	3,5	12,7	110
Z..075B5	65	4	100	600	1500	140	240	20	3,5	12,7	110
Z..075B4	50	3	100	600	1500	120	350	20	3,5	12,7	110
Z..075B2	38	2	100	600	1500	90	450	25	3,5	12,7	110
Z..100B9	200	8	150	700	1500	290	800	50	3,4	14,7	120
Z..100B8	185	7	150	700	1600	280	800	50	3,5	14,6	120
Z..100B7	150	6	150	700	1600	250	800	50	3,5	14,6	120
Z..100B6	125	5	150	700	1600	230	800	50	3,5	14,6	120
Z..100B5	100	4	150	700	1600	200	900	50	3,5	14,6	120
Z..100B4	80	3	150	700	1600	170	1200	60	3,5	14,6	120
Z..100B2	60	2	150	700	1600	140	1400	80	3,5	14,6	120

Explanation of abbreviations

M_N Nominal braking torque
This value is only achieved after a certain brake disc running-in period, and can vary by approximately +30/-10 % depending on the operating temperature and the degree of wear on the friction partners.

ZF Number of springs
Because different springs can be used for types E../Z..008, the colour of the relevant springs must also be specified here.
If an excessive or insufficient braking torque is attained during the braking torque check performed on the intended spring configuration in the factory, in individual cases the actual number of springs may deviate from the values specified here.

W_{max} Maximum permissible switching energy for a single-braking operation.
The switching energy W_{Br} of a braking operation is calculated as follows:

$$W_{Br} = \frac{J \cdot n^2}{182{,}5}$$

J – mass moment of inertia [kgm²] of the entire system in relation to the motor shaft
n – motor speed [rpm] of the motor which is to be braked

W_{th} Maximum permissible switching energy per hour

W_L Maximum permitted friction work before the brake discs need to be replaced.

t_A Response time with brake release at normal excitation
Overexcitation by the MSG special rectifier results in response times that are approx. half as long.

t_{AC} Response time when braking with alternating current interruption, i.e. through interruption of the voltage supply of a separately supplied standard rectifier

t_{DC} Response time when braking with direct current interruption via a manual switch.
The response times are approximately doubled in the case of electronic direct current interruption via a special rectifier (model ESG or MSG).

Depending on the operating temperature and the degree of wear of the brake discs, the actual response times (t_A, t_{AC}, t_{DC}) may vary from the guide values given here.

s_{Lmax} Maximum permissible air gap

d_{min} Minimum permissible brake disc thickness.
On Z.. series double-disc brakes, this value applies to both brake discs.

HL Manual release

P_{el} Electrical power consumption of the coil at 20° C

Spring-pressure brakes with DC release magnet
Models E003B and E004B

1 Safety instructions

Connection, adjustment and maintenance work may only be carried out in accordance with the safety instructions as per Chapter 2.

2 General

Apart from supporting loads at rest state, the purpose of the spring-pressure brake is to also decelerate masses that rotate or move in a straight line and reduce undesired run-on travel and times.
The brake is released electromagnetically. When conditions are at no-load, the braking force is generated by spring pressure. Because braking is still effective even if an unintentional power failure occurs, it can be considered a safety brake within the context of accident prevention regulations.
During the braking process, the brake disc converts the kinetic energy of the inertia moments into heat. The brake disc, which consists of high-quality, asbestos-free material, is particularly resistant to wear and heat. A certain amount of wear is unavoidable, however. It is therefore essential to observe the limit values for working capacity and minimum brake-lining thickness listed in Section 9.

3 Operating principle

The operating principle is explained by Fig. 1.

3.1 Brakes

The springs (3) press the brake disc (1) axially against the friction plate (4) via the retaining plate (2). The fillister screws (5) prevent radial movement of the retaining plate. The braking torque is transferred to the rotor via toothing between the brake disc and the driver (6) fixed to the shaft. The braking torque can be altered in stages with the number of springs (see Section 7).

3.2 Release

When the coil (7) is supplied with the required DC voltage, the resulting magnetic field from the magnet housing (8) pushes the retaining plate against the force of the springs. This relieves the brake disc and as a result allows the rotor to move freely.
The size of the electromagnet also means that a greater air gap sL can be bridged, depending on the how worn the brake disc is. There is therefore no possibility of readjustment.
All brakes can be optionally fitted with either a lockable or non-lockable manual release, where the brake can be released manually e.g. in the event of a power failure.

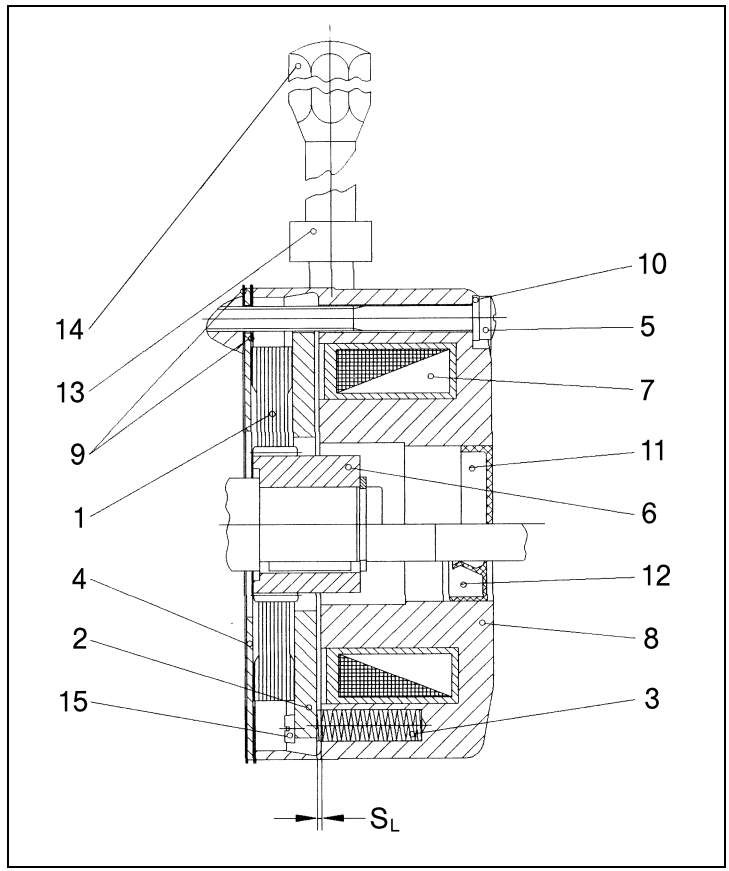


Fig 1: Spring-pressure brake, series E003B and E004B

4 Electrical connection

See Chapter 4, Section 4.

5 Fitting

The spring-pressure brakes are usually fitted to the motor ready for operation.
If the brakes have to be fitted separately, proceed as follows (see Fig. 1):

5.1 Fit driver (6) to the shaft, pay attention to the total supporting length of the fitted keys and fix axially with a retaining ring.

5.2 Push friction plate (4) with both seals (9) and brake disc (1) onto the driver manually. Observe the ease of movement of the toothing. **Do not damage.**
Please observe the correct insertion of the friction plate (4): The side with the inscription “Reibseite” must face the brake disk (1).

5.3 Secure the brake (4) using the fillister screws (5) and the USIT rings (10) above the friction plate and both seals (9) on the end shield of the motor. Observe tightening torque, M_A = 2,5 Nm.

5.4 For motor types without a second shaft end, fit a closure cap (11) and for motor types with a second shaft end, fit a shaft sealing ring (12).

The brake is ready for operation once the electrical connection has been made.

6 Assembly of the hand release

The manual release can only be fitted when the brake is removed.

Procedure (see Figs. 1 and 12):

6.1 Remove brake from the motor end shield.

6.2 Remove stopper plugs from the manual-release holes in the magnet housing (8).

6.3 Push compression springs (16) onto the manual-release bolts (17).

6.4 Push manual-release bolts (17) with compression springs (16) into the manual-release holes on the magnet housing (8) from the inside (in the direction of the coil (7)).

6.5 Push the O-rings (18) onto manual-release bolts (17) and push into the countersinks on the magnet housing (8).

6.6 Push spacer plates (19) onto the manual-release bolts (17).

6.7 Locate manual release bracket (13), push on washer (20) and screw on self-locking nut (21) loosely.

6.8 Tighten both lock nuts (21) until the retaining plate (2) is flush with the magnet housing (8).

6.9 For none latching manual release: Loosen both lock nuts (21) by unscrewing 1.5 revolutions to generate the air gap between the retaining plate (2) and magnet housing (8) or check dimension X (= $0{,}9^{+0{,}1}$ mm).

For latching manual release: Loosen both of the lock nuts (21) by 3 turns to generate the air gap X = 2 mm.

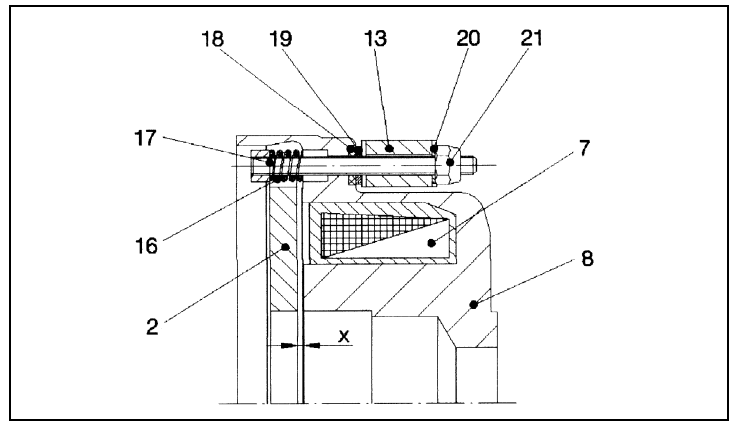


Fig 12: Assembly of the manual release

6.10 After fitting the fan cowl, screw the manual-release rod (14) into manual-release bracket (13) and tighten.

7 Setting the braking torque

Different spring configurations on the magnet housing allow different braking torques to be configured (see Section 9).
Request the relevant set of springs from the factory, specifying the brake type and the required braking torque setting.
Procedure for changing the spring configuration (see Fig. 1):

7.1 Remove brake from the motor end shield.
7.2 Remove fastening screws (5).
7.3 Unscrew the shoulder screws (15) from the magnet housing (8) and remove the retaining plate (2).
Caution: The springs (3) press against the retaining plate. To remove the shoulder screws, the retaining plate must be pressed against the magnet housing to avoid releasing the springs too quickly. Observe the installation position of the retaining plate and make sure that no springs fall out.
7.4 Insert springs (3) in accordance with the required braking torque (see Section 9).
Caution: The springs must be arranged **symmetrically.**
7.5 Lay retaining plate (2) on the magnet housing (8) or springs (3) (observe installation position and if necessary, use fastening screws (5) as a centering reference), press the retaining plate down against the force of the springs and screw in shoulder screws (15) up to the stop.
7.6 Secure the brake using the fastening screws (5) and the USIT rings (10) above the friction plate (4) and both seals (9) on the end shield of the motor. Observe tightening torque, M_A = 2,5 Nm.

8 Maintenance

E003B and E004B brakes are largely maintenance-free because the robust, hardwearing brake discs ensure a very long service life. However, if the brake disc becomes worn due to general friction work and the function of the brake is therefore no longer guaranteed, replacing the brake disc will restore the brake to its original condition.
The state of wear of the brake disc should be checked regularly by measuring the brake disc thickness. Make sure the value does not fall below the limit value specified in Section 9.

Procedure for checking the state of wear and for replacing the brake disc (see Fig. 1):

8.1 Remove brake from the motor end shield.
8.2 Remove fastening screws (5).
8.3 Clean brake. Remove abrasion material by applying compressed air.
8.4 Remove brake disc (1) from the driver (6).
8.5 Measure the thickness of the brake disc. The brake disc should be replaced at the latest when the minimum thickness specified in Section 9 is reached.

8.6 Check the retaining plate (2) for wear and flatness (there should not be any formation of grooves). Replace the retaining plate if necessary (procedure as described in points 7.3 and 7.5).

8.7 Push brake disc (1) onto driver (6) and check for radial play. If there is increased play in the toothing between the driver and brake disc, the driver must be removed from the shaft and replaced.

8.8 Secure the brake using the fastening screws (5) and the USIT rings (10) above the friction plate (4) and both seals (9) on the end shield of the motor. Observe tightening torque, M_A = 2,5 Nm.

9 Technical specifications

Typ	M_N [Nm]	ZF	W_{max} [$*10^3$ J]	W_{th} [$*10^3$ J]	W_L [$*10^6$ J]	t_A [ms]	t_{AC} [ms]	t_{DC} [ms]	d_{min} [mm]	P_{el} [W]
E003B9	3	4	1,5	36	55	35	150	15	5,85	20
E003B7	2,2	3	1,8	36	90	28	210	20	5,75	20
E003B4	1,5	2	2,1	36	140	21	275	30	5,6	20
E004B9	5	4x rot	2,5	60	50	37	125	15	5,87	30
E004B8	4	4x grau	3	60	100	30	160	18	5,75	30
E004B6	2,8	4x gelb	3,6	60	180	23	230	26	5,55	30
E004B4	2	2x grau	4,1	60	235	18	290	37	5,4	30
E004B2	1,4	2x gelb	4,8	60	310	15	340	47	5,2	30

Explanation of abbreviations

M_N Nominal braking torque.
This value is only reached when the brake disc has been broken in for a certain period and may then deviate by approx. – 10 / + 30% depending on the operating temperature and the state of wear of the frictional partner.

NS Number of springs.
Because different springs can be used for the E004B, the colour of the relevant springs must also be specified here.

W_{max} Maximum permitted friction work for a single brake application.
The friction work W_{Br} for one brake application is calculated as follows:

$$W_{Br} = \frac{J \cdot n^2}{182,5}$$

J – Moment of inertia [kgm^2] of the overall system specific to the motor shaft
n – Motor speed [rpm] where braking occurs.

W_{th} Maximum permitted friction work per hour.

W_L Maximum permitted friction work before the brake disc needs to be replaced.

t_A Response time when releasing with normal excitation.
Overexcitation by the MSG special rectifier results in response times that are approx. half as long.

t_{AC} Response time when braking with alternating-current interruption, i.e. by interrupting the power supply of a separately powered standard rectifier.

t_{DC} Response time when braking with a direct-current interruption by way of a manual switch.
Electronic direct-current interruption by a special rectifier (type ESG or MSG) results in response times that are approx. twice as long.

Depending on the operating temperature and the state of wear of the brake disc, the actual response times (t_A, t_{AC}, t_{DC}) may deviate from the guide values specified here.

d_{min} Minimum permitted thickness of the brake disc.

P_{el} Electrical power consumption of the coil at 20° C

Gear motors with built-on backstop

The backstop – model BF with self-lifting locking elements – locks the gear motor in a specified direction of rotation (direction of rotation when looking at end of output shaft).

Construction

The backstop is mounted on the fan cover of the gear motor. On the rotor shaft extension there is a bell-shaped outer ring into which a set of clamping units is fitted. This set of clamping units consists of a cage incorporating individual spring-loaded clamping units. The clamping units rest on the inner ring, which is mounted on the fan cover. The cover protects the unit against accidental contact and against the ingress of foreign bodies.

Method of operation

As the gear motor is started, the clamping units are raised from the inner ring and remain free until the speed of the motor after switching off, or after current failure, falls to between 700 and 400 RPM. The clamping units will then gradually make contact with the inner ring and at the instant of rest, prevent any return motion. When the drive motor is locked, power is transmitted from the rotor shaft through the outer ring to the clamping units and from there via the inner ring and housing to the fan cover and frame of the gear motor.

Mains connection

The standard three-phase motors are normally connected to run anti-clockwise when looking at the end of the shaft at the fan end and in phase sequence R – S – T or L1 – L2 – L3. The actual mains phase sequence is to be selected so that the motor starts up in free running direction.
For the first trial connection it is recommended, particularly with larger motors, that they be connected in star to protect the backstop.
If after a short trial run the motor is found to be connected in locking direction instead of running direction, any two-phase leads should be interchanged to reverse the direction of rotation, in the usual manner.
If the connection is incorrect, the fuses and motor protection switch should be checked and the terminal box connected correctly in accordance with the details given on the motor nameplate.

Safety instructions
Installation, connection, adjustments and maintenance should only be carried out while observing safety instructions, in accordance with accompanying sheet no. 122.

Removing the back stop

1. Loosen the screws on the housing – Remove the housing together with the inner ring.
2. Remove retaining ring (rotor shaft).
3. Withdraw outer ring from the rotor shaft using a pulling device or pulling hooks. The seal carrier is easily removed from the outer ring.

Altering the locking direction

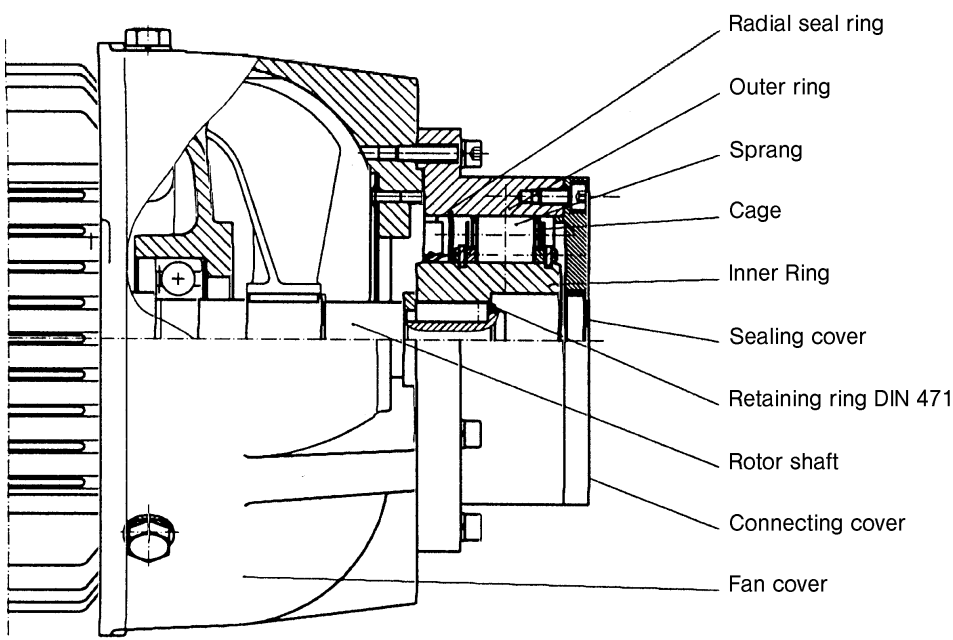
1. Loosen the screws on the housing – Remove the housing together with the inner ring.
2. Loosen the retaining ring in the outer ring.
3. Withdraw the clamping unit with cage, turn through 180° and re-insert, fit the retaining ring, screw the housing with inner ring tightly on to the fan cover.

Re-assembly

As described above, but in reverse sequence. Warm up the outer ring slightly, place the seal carrier on the hub of the outer ring, and then push the outer ring on to the rotor shaft via the feather key.

Maintenance

During assembly at the factory, thin oil is applied to the functional parts to prevent corrosion and also to ensure that they are in a satisfactory condition at start-up. Subsequent lubrication is not necessary. After approximately 8000 working hours, the backstop should be cleaned with trichlorethylene and lubricated with oil (CL 46 or CLP 46) in accordance with DIN 51517 (e.g. SHELL Tullus C 46). Under no circumstances are oils to be used with an additive like molydan-disulfide, graphite etc.



Storage of geared motors with squirrel-cage rotor

If geared motors are stored for a lengthy period before being put into operation, better protection against damage due to corrosion or humidity can be obtained by observing the following notes. Because so much depends on the local conditions, the times indicated should be considered as approximate values only. In any case, they do not indude a prolongation of the warranty period. If, before putting the motor into operation, dismantling should be necessary in accordance with this Information Leaflet it is recommended that the neares approved BAUER service station or agency be called. In all cases the instructions of the service manual should be followed.

1. Conditions of geared motor and storeroom

1.1 The plugs in all openings of the terminal box as delivered by the factory should be checked for damage in transit and tightness. If necessary, they should be replaced.
1.2 Should breather plugs be present, these are to be replaced by a corresponding blind plug.
1.3 Repair any transit damage to outside paint or rust protection of bright shafts, including hollow shafts..
1.4 The storeroom should be dry and aerated. If the room temperature exceeds the normal range of between -20° C (-4° F) and $+40^\circ$ C ($+104^\circ$ F) over a longer period of time or if it fluctuates strongly and frequently it may be necessary, before putting the motor into operation, to take the measures indicated unter 3 even after a short period of storage.

2. Measures during storage

2.1 Space permitting, it is advisable to turn the motors thorugh 180° after an interval of about one year so that the lubricant in the gearbox covers those bearings and gears that were previously at the top. Additionally the output shaft shall be turned by hand several times in order to spread the grease equally within the bearings.
2.2 Inversion of the motor is not necessary if the gearbox has been completely filled with lubricant by special agreement. In this case, the lubricant level must be lowered to the design level in accordance with the operating instructions and the lubrication instruction plate before putting the motor into operation.

3. Measures before putting the motor into operation

3.1 Motor section
3.1.1 Insulation test
Measure insulating resistance of the winding between all phase windings and between winding and housing with a commercial measuring instrument (e. g. a hand generator or megger). Value measured:
over 50 Megohm: Drying not required, state as delivered
under 5 Megohm: Drying recommended
about 1 Megohm: Minimum permissible limit
3.1.2 Drying of winding by heating the stator during standstill without dismantling
3.1.2.1 Connect to an A.C. voltage that can be varied continuously or by steps up to a maximum of approx.

20 % of the nominal voltage. Heating current max. 65 % of nominal current given on rating plate.

3.1.2.2 Watch the temperature rise during the first two to five hours; reduce heating current if necessary.

3.1.2.3 Heat for about 12 to 24 hours until insulating resistance reaches nominal value.

3.1.3 Drying of winding in an oven after dismantling

3.1.3.1 Dismantle motor in the appropriate way

3.1.3.2 Dry stator winding in a well ventilated drying oven at 80° C to 100° C (176° F to 212° F) for about 12 to 24 hours until insulating resistance reaches nominal value.

3.1.4 Lubrication of rotor bearings

If the storage time exceeds approximately 2 to 3 years or if temperatures have been very unfavourable over a short period of storage as per 1.3, the lubricant in the rotor bearings should be checked and replaced if necessary. For checking it is sufficient to dismantle the motor partly on the fan side; the bearing can be inspected after removing the fan cowl, fan and bearing flange (endshield).

3.2 Gear unit

3.2.1 Lubricant

If the storage time is more than about 2 to 3 years or if temperatures have been very unfavourable during a short period of storage as per section 1.3, the lubricant in the gearbox must be changed. For detailed instructions and recommended lubricants refer to section “Three phase Squirrel cage geared motors”, page 5.

3.2.2 Shaft seals

When changing lubricant, the efectiveness of the shaft seals between motor and gear unit and on the output shaft should also be checked. If the shaft seals are found to have changed in shape, colour, hardness or tightness they must be replaced in accordance with the instructions contained in the service manual.

3.2.3 Sealing compound

If lubricant penetrates from the joints of the gearbox, the sealing compound must be renewed in accordance with the instructions contained in the service manual.

3.2.4 Breather plugs

Should a breather plug have been replaced by a blind plug for storage, this must be fitted again in the given position.