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Operation and Maintenance Manual

HUBER ROTAMAT® Micro Strainer Ro 9

DONNAN CONSTRUCTIONS Pty Ltd
Lowood STP

HHP2007 Rev. A

NOTICE

This manual is part of the plant and must be available for the operators any time.
The safety instructions must be observed.
In case of selling the plant, the manual must be included.

Table of contents

1 PRODUCT SPECIFICATION

1.1 Intended use

The equipment is intended to separate solids from wastewater, and compact and wash out separated screenings – depending on the equipment version.

For solids separation the machine is **applied**:

- in wastewater treatment plants (municipal and industrial)
- for industrial process and partial flows

The intended use also includes:

- Observance of the start-up, operation and maintenance conditions as set out in these operating instructions
- Taking foreseeable malpractice into account
- Operation by **skilled workers** only (who are familiar with the correct procedures and know the dangers)

⚠WARNING

The machine is intended exclusively for the above specified use.
Any additional use or rebuilding of the equipment without prior written approval by the manufacturer does not comply with the intended use.
The manufacturer will not assume liability for consequential damage. The operator alone will bear the risk.
Do not start up the machine before there has been ensured that all safety devices are completely mounted and operable, and that the plant into which the machine may be incorporated complies with the rules.

The machine is suitable to be used in zone 1 hazardous areas. If only the area inside the channel or tank is zone 1 but not the outside area, the machine identification plate does not specify any EEx data. Any possible and relevant electrical components, such as solenoid valves or probes, have to be fixed outside the channel / tank and do not require the ATEX certification.

If the channel or tank is in a zone 1 hazardous area, the ATEX directive is applicable to this area and special attention must be paid to chapter Maintenance.

Ambient temperature limit for zone 1 ex-protection areas: 50°C

Additional specification on the identification plate:

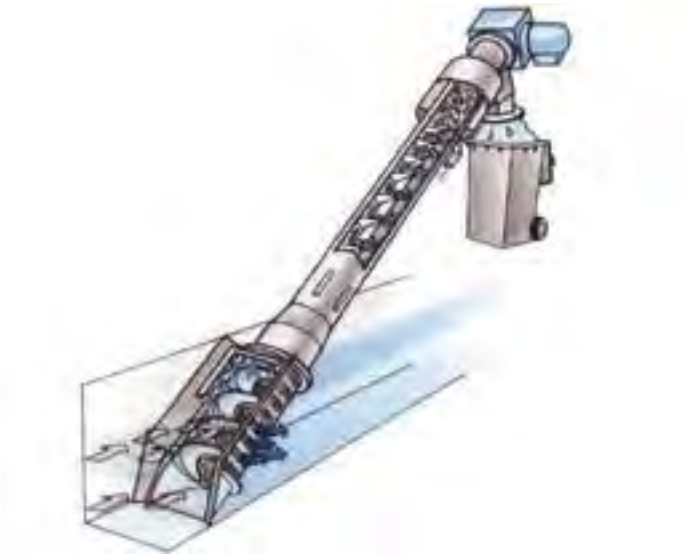
II 2 G c T3

of which : conformity of the rules
II: device group
2: device category 2
G: explosive gas atmosphere
c: for “constructive safety”
T3: temperature class (200 °C)

1.2 Definition of terms for machine components

Definition of terms:

Terms for equipment components according to the following drawing



The stationary part of the screen comprises (from bottom to top):

- Screen basket with rubber sealing surfaces in the channel
- Plastic bearing in the closed rising pipe (on machines > 6 m length or size 700)
- Rising pipe with guide bars
- Support
- Press zone, press liquor collection chamber, press water return
- Screenings discharge
- Gear motor

These components form the machine body, to which optional equipment can be attached.

The rotating part of the screen comprises (from top to bottom):

- Screw with central shaft and flights, upper pivot
- Shaftless flights with a brush attached in the screen basket area

These components form a rotating unit which is driven by a gear motor with hollow shaft fitted at the upper end of the machine.

1.3 Specification of plant components

Components of the stationary equipment and their functions:

Screen basket

The screen basket is a precisely welded construction. The screening surface, which is retaining the screenings, is a self-supported integral part that is supported in its exactly defined form by the welded front plate at the bottom and a flange on top. Rubber sealing lips screwed to the screen basket seal the gap between the basket and channel/tank walls. They consist of wastewater resistant rubber.

It is important not to damage the screening surface during screen installation or operation, respectively immediately repair the damage, if any.

Rising pipe:

The rising pipe is the central and stationary component and therefore has a stable design:

- Internal guide bars prevent that the screenings turn with the screw while the screw transports them out of the trough and conveys them upwards.
- The bottom bearing (only on machines > 6 m or size 700) consist of a plastic bearing strip, which is screwed into the lower end of the rising pipe prior to the flange. The bottom bearing enables exact guiding of the screw, the segments of which are extra thick (strong) in this section and polished.
- The compaction chamber where the screenings are dewatered is positioned at the upper end of the conveyance area prior to the screenings discharge. In this area the rising pipe is perforated and encased by the press water collection chamber.
- A cover in the rising pipe allows access to the compaction chamber. Access to that cover is possible by removing the whole press water collection tank or the inspection cover attached to the press water collection tank.
- The screenings discharge assembly has two safety flaps which prevent that someone unintentionally puts his hand into the discharge.
- The support of the screen is available as a simple leg or an A-frame support, as required, and is clamp-mounted on the rising pipe.

Gear motor:

The gear motor is directly flanged to the top of the rising pipe. The torque is transferred onto the shaft pivot by means of an adjusting spring connection. The gear motor has also the function of the axial and upper radial bearing of the screw.

Components of the rotating screen parts and their functions:

- Auger:
- Central shaft / screw shaft
- Upper shaft pinion with fitting key connections
- Asymmetrically designed shaftless segments with attached brushes

Screw flights:

- The screw flights have a different design and pitch and end in front of the press zone.
- Oppositely directed flight:
- One oppositely directed flight with doctor blade at the upper screw end supports screenings discharge.

1.4 Functional description

The Screen is installed in a tank or the channel at an angle of 35°. Whilst the wastewater is streaming through the screen basket, the solids are retained within the basket. The solids blind the screen surface producing a mat of screenings that has the effect of a filter and retains also smaller solids. Due to the blinded screen the upstream water level rises, the machine is started by level control. Whilst the screw, which is shaftless but equipped with a brush in the screen basket area, is rotating, the screenings are transported out of the channel and the screen basket cleaned. During their transport through the screw the screenings are compacted, washed and dewatered. The dewatered screenings are discharged into a container or any other conveying system. The press liquor collects in the press liquor collection chamber and flows back through the transparent press liquor return hose into channel.

Optional additional equipment:

- A frost protection allows outdoor operation down to -25°C. The rising pipe is equipped with an insulation and/or heating rod and the inlet tank with a heating cable, depending on the individual machine type and size.
- An integrated screenings washing system ensures washing of the screenings and thus return of biologically degradable substances into the clarification process.
- A spray nozzle bar is provided for additional screw cleaning. This reduces the cleaning work required.
- An automatic press zone washing system ensures fully automatic washing of the press liquor collection chamber and reduces cleaning work.
- A screenings bagging unit reduces odour annoyance in the screen building. The screenings bagging unit is attached directly to the screenings discharge. Plastic bags (360 l bags for 120/240 l containers, 1100 l bags for 770/1100 l containers) or a 70 m long sausage-type bag take in the discharged screenings.
- A railing can be supplied if required to meet local safety regulations.

Supply limits:

Mechanical:

- Rubber sealing surfaces in the channel/tank
- Screenings discharge chute
- Lifting eyes on the machine:
- Internal thread on rising pipe for the spray nozzle bar, screenings washing and press zone washing assembly.

Electrical:

- Screws in the terminal box
- Terminal strip inside the control panel

1.5 Functional description of (partly optional) components

1.5.1 Press zone

Press liquor collection chamber:

The screenings are dewatered in the press zone which is located on the upper end of the conveying section prior to the screenings discharge. In this area the rising pipe is perforated and encased by the press water collection chamber.

The press water collected in the press water collection chamber is discharged through the outlet hose into the channel. Along with the water also sludge or faeces are pressed out while the screenings are compacted, which might lead to clogging in the collection chamber and outlet hose. It may therefore become necessary to dismount the press liquor collection chamber.

⚠WARNING

Switch off and lock the mains isolator prior to starting with dismantling! Wear protective gloves!

How to proceed with dismounting/mounting the plastic chamber:

- Dismount the outlet hose.
- Loosen the lateral screws with hexagonal recessed hole. Be careful to prevent that the washers cast into the plastic turn with the screws.
- Carefully remove the plastic half-shells.
- Pay attention to press the sealing strip into the provided groove. Make sure the sealing surfaces of the rising pipe are clean.
- Thoroughly lubricate the front sealing surfaces.
- Hand-screw the fixing screws with a maximum torque of 5 Nm. Attention: Do not use any screw locking mean!

Press zone washing system: Automatic / manual

Activation of the press zone washing systems effects cleansing of the press zone respectively press liquor collection chamber. A spray nozzle is mounted in the bottom front end of the press liquor collection chamber. The machine is supplied with a Geka coupling, a 1" shutoff line to be supplied by the customer.

Manual operation of press zone washing system: Open water supply for approx. 30 s once or twice a week. The connection for water is a quick coupling on the press liquor collection chamber.

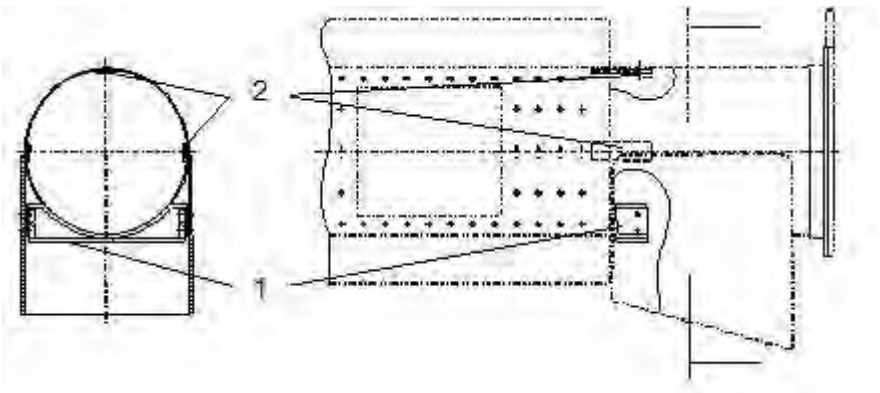
Automatic operation of press zone washing system (optional): Water supply for press zone washing is automatically activated via a solenoid valve. The standard setting is 30 s twice a day. The washing time can be changed independent of the operational conditions to ensure a sufficient cleaning of the collection chamber.

Water supply: See chapter 6.1.2
Operational water pressure: min. 5 bar max. 7 bar

Water quality: below 0.2 mm screened or filtered water

Regulation devices for increased/reduced compaction:

All rising pipe have a 50 mm long detachable extension piece (part 1 in below drawing), which lengthens the press zone at the upper end to increase compaction. This extension piece can be dismounted if the DS content of screenings is too high. The size 700 units has additionally three adjustable flat iron bars (part 2) which can be set inwards from the rising pipe wall towards the shaft to increase the compressive strength and thus the DS content.



Regulation devices for increased/reduced compaction

⚠WARNING

Switch off and padlock the mains isolator prior to starting to work on the press zone.

Attention: Never grip into the machine's discharge while the machine is running! DANGER! Be careful not to get caught!

1.5.2 Bagging unit (option)

The screenings are discharged into a plastic bag fixed at the discharge of the screen. The bagging unit reduces odour annoyance as would be caused by screenings lying in the skip or container.

Design of the bagging unit for individual bags:
The bagging unit comprises a transition piece between the rectangular screenings discharge assembly, a circular fixing device for the bags, and a clamping band to fix the 360 l bags (item no. 706799) or 1100 l plastic bags (item no. 703417).
How to replace the bag: Loosen the clamping band and pull the bag downwards. When attaching the new bag be careful it is pressed tight onto the bagging unit, throughout its full circumference, by the clamping band.

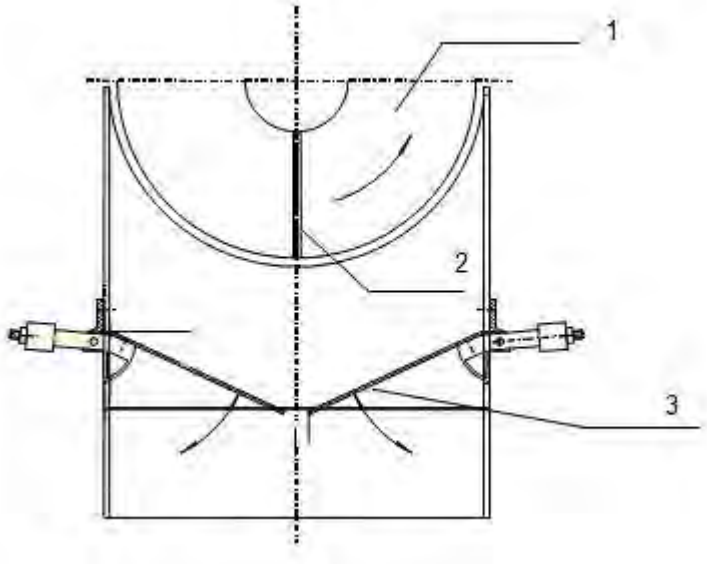
Design of the bagging unit for sausage-type bags:
The bagging unit consists of a transition piece to take up the folded 70 m long plastic bag.
When you replace the skip, pull the bag (Longo-Pack bag, article no. 706880) approx. 30 cm downwards. Lace the bag and cut it through above the knot. Lace also the end that hangs down so that the hose can again be filled with screenings.

Switch off the machine prior to replacing the bags and wear gloves!

1.5.3 Safety flap

The safety flap inside the discharge is installed to prevent that someone grips unintentionally into the discharge. He may get caught between the discharge and the oppositely directed end flight with doctor blades mounted on the screw while the machine is running.

The protecting flap is installed only on machines with a discharge height up to 2.5 that do not have a closed chute with a minimum length of 800 mm.



1 Oppositely directed flight
2 Doctor blade
3 Safety flaps

1.5.4 Integrated screenings washing system IRGA (optional)

Intensive water jets break up the soluble matter contained in the screenings. The soluble matter is led to the biological treatment process together with the wash water. Clean screenings can be dewatered more effectively, their weight is reduced and their disposal less expensive.

IRGA system design:
The 3 washing systems are: preliminary washing, washing with pressure, fine washing

Preliminary washing:	Flat jet nozzle in the spray bar above the screen basket. Water supply via the solenoid valve.
Washing with pressure:	Flat jet nozzle in the spray bar, positioned prior to the flange connection. Water supply via the solenoid valve.
Fine washing:	3 nozzle units on the rising pipe connected with pressure hoses spray in an exactly defined angle onto the screenings while these are conveyed by the screw. Water supply via the solenoid valve.

Working principle:

Preliminary washing:	Most of the faecal matter is flushed down by spot jets within the screen basket. The wash water runs off through the perforations/apertures into the channel.
Washing with pressure:	Residual faeces are broken up by means of a mist of water which the screenings are passed through.
Fine washing:	Removes residual faeces. Three jets spray onto the screenings from different angles creating a vortex. The wash water runs off through the gaps between the wall and screw into the screen basket and further on into the channel.

The IRGA system is activated simultaneously when the screen is switched on.

Preliminary washing and washing with pressure is placed over the screen basket, fine washing on rising pipe

Water supply:	See chapter 6.1.2
Operating water pressure:	min. 5 bar max. 7 bar
Water quality:	below 0.2 mm screened or filtered water

Setting:
The functional process starts with the start of the screen. The impulse/pause times of the solenoid valve are adjusted in the control system:

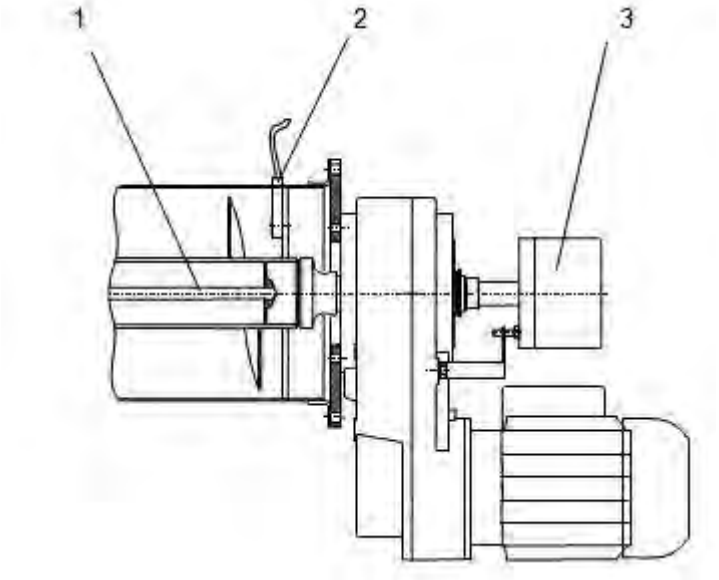
Impulse time: Basic setting: 2 s
Pause time: Basic setting: 6 s

Reduce the pause time to achieve intensified screenings washing, prolong the pause time to achieve a reduced screenings washing efficiency. Intensified washing requires an increased water demand.

It is generally recommended not to change the fine washing intervals. Too long washing intervals involve the danger that screenings are washed back into the rising pipe.

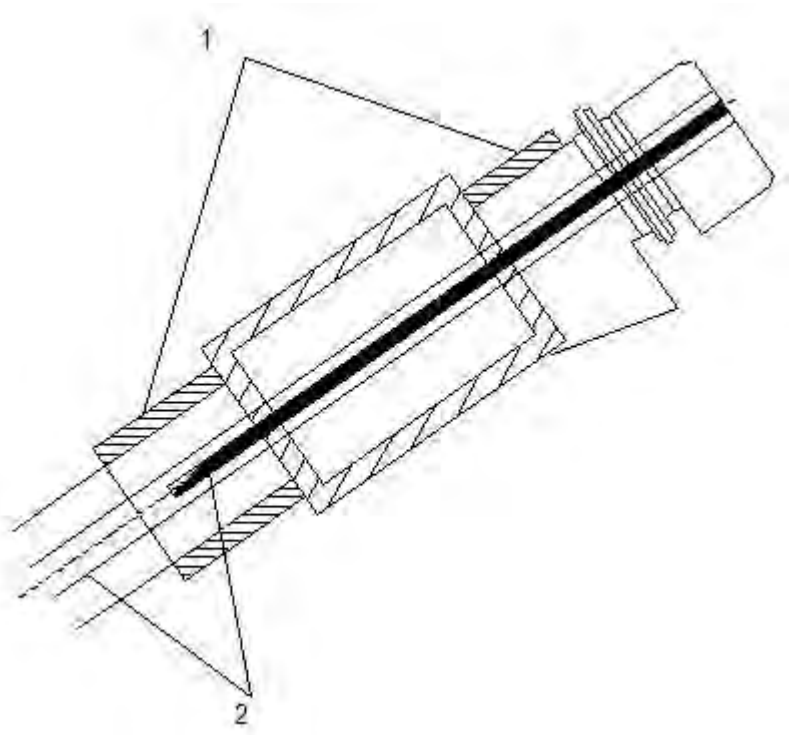
1.5.5 Internal heating or trace heating (optional)

Action principle of internal heating:
A self-regulating heating rod heats the screw shaft effectively down to – 15°C and can be applied in non-explosive areas. Connected wattage: 150 W.



1 Heating rod
2 Temperature probe
3 Slip ring

We offer as an option an additional insulation with covering shells which is effective down to – 25° C.



1 Additional insulation

2 Heating rod in central screw shaft

⚠WARNING

The heating rod must be connected to a mains voltage of 230 V (+20 V). See also the PTB test report attached in the appendix.

Action principle of heating cable:
A self-regulating heating cable is applied in Ex-protection areas which is wrapped around the rising pipe (trace heating). The rising pipe is additionally covered with 60 mm insulation material and a stainless steel plate. Control of the heating is via a temperature probe in the rising pipe, the connected wattage is approx. 33 W per meter of rising pipe heating. This version of heating is also applied for tank heating if the machine is installed outdoors.

1.5.6 Level control system

Since the level control system is part of the electrical switchboard and control panel, it is only part of Huber supply if the machine is ordered complete with the electrical control panel. The following description of the standard Huber level control system is therefore provided to be thoroughly considered if the control panel is customer-supplied.

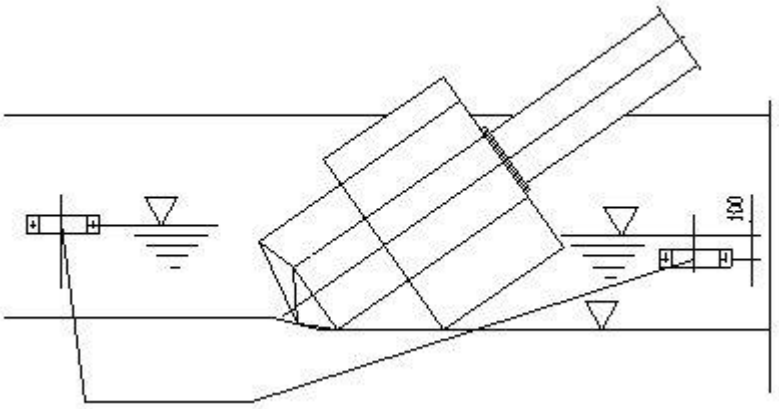
Differential water level control by air injection:

As standard for channel installation we use differential water level control by air injection via 2 submerged pipes; miniature compressor for air supply (voltage: 230 V) integrated in the control panel.

Action principle:

- The pressure air produced by the compressor is distributed into two pipes in front of the pressure switch. The cellulose plugs in the transparent air hoses are used as throttles, so that air comes out of the submerged pipe in front of and behind the screen. Never remove them!
- The compressed air is led to the front and back of the screen via 2 air hoses. The air flows out at the lower edge of these pipes.

- Depending on the depth of immersion of the submerged pipes different air pressure is necessary for the air coming out. The counter pressure has an effect on the membrane on the pressure switch.
- The membrane is supported on one side by a spring.
- When the differential pressure reaches the preset level (10 cm WG) “in front of the screen”, the membrane touches the double-throw switch and actuates it.



Clamp-mounted air sparge pipes

Adjusting the pneumatic differential level control system:

- Differential pressure switch: It is adjusted to 10 cm level difference by the supplier. Please do not change this adjustment!
- Submerged pipe in front of screen: Lower edge 20 cm level below maximum permissible water level in front of the screen
- Submerged pipe behind the screen: Lower edge is on the water surface in case of max. water level behind the screen or 10 cm lower than in front of the machine

If the level difference is smaller the machine starts earlier and the running hours increase. For control of the running hours or setting of the level control system typical annual running hours have been determined ((approx. 1000 – 2000 hr/year with 30 sec. cycle duration).

The data specified above are only basic settings which need to be adjusted to the individual wastewater quality and operational requirements!

NOTICE
Maintenance required after 3 years: Replacement of the miniature compressor membrane and air filter.

Alternatively: Single probe level control by air injection:

As an option for channel installation we use single probe level control by air injection, this single probe level control is standard for tank installation of the machine.

- The compressed air is led to the front of the screen via one air hose. The air flows out at the lower edge of this pipe.
- Depending on the depth of immersion of the submerged pipe different air pressure is necessary for the air coming out. The counter pressure has an effect on the membrane on the pressure switch.
- When the differential pressure reaches the preset level (10 cm WG) “in front of the screen”, the membrane touches the double-throw switch (potential-free) and actuates it.

The starting impulse in automatic mode is caused by the pressure switch, i.e. when the water in front of the screen reaches a certain level (variable), the screen starts.

By setting a certain run-on time of the screen, the transport of screenings out of the screenings trough is ensured.

Other differential level control systems: (Option, e.g. ultrasonic system)
Start-up and adjustment according to the individual manufacturer's operating instructions.

Requirement: Potential-free contact at 10 cm level difference!

The operator is responsible to prevent metallic dry objects from falling onto the dry plant. In explosive areas plant control must be via level control to prevent dry running of the plant.

2 SAFETY

2.1 General safety instructions

DANGER

„DANGER“ indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

„WARNING“ indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

„CAUTION“ indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.

NOTICE

„NOTICE“ indicates a property damage message. Follow notices to avoid material damage!

These operating instructions have to remain attached to the machine. It must be made sure that the operating instructions are ready to hand any time for any person that has to perform work on the machine. In addition to these operating instructions, instructions in the sense of the labour protection law and ordinance regulating the use of tools have to be available.

As these operating instructions contain fundamental instructions to be observed when installing, operating and servicing the machine, the responsible staff must read the instructions prior to machine installation and start-up. The operating instructions must at any time be available ready to hand at the installation place of the machine/plant. Not only the general safety instructions contained in this chapter have to be observed but also the special safety instructions added under the main items.

2.1.1 Operator's duty of care

The plant has been constructed and manufactured taking into consideration a risk analysis and after careful selection of the applicable harmonized standards and other technical specifications. The machine complies with the state-of-the-art technology and offers a maximum amount of safety.

To achieve such safety in practical operation, it is however necessary to take any measures required therefore. It is the operator's duty of care to plan these measures and control their implementation.

The operator must especially ensure that

- The equipment is applied according to its intended use (see chapter Product Specification)
- The equipment is operated only in a perfect ready-to-operate condition and especially the safety devices are regularly controlled.
- Protective gear for the operating, maintenance and repair personnel is available and used.
- These operating instructions are permanently available on site complete and in a legible condition.
- Only sufficiently qualified and authorized personnel are in charge of machine operation, maintenance and repair.

- Such personnel receive regular briefing concerning all questions of safety and environmental protection and know these operating instructions, especially the safety instructions contained.
- Any safety and warning symbols attached to the machine remain there in a legible condition.

2.1.2 Definition of safety symbols

⚠WARNING

Occupational safety symbol
This symbol will accompany all safety instructions that are associated with risks to life and/or limb. Follow these instructions and proceed carefully! At the same time, follow all applicable laws, general safety and accident prevention regulations.

⚠WARNING

Electric current warning
This symbol warns of electric current. Prior to performing any work, switch off mains isolator and make sure that the system is off-circuit.
At the same time, follow all applicable laws, general safety and accident prevention regulations.

⚠WARNING

Be careful not to get caught when starting up, servicing or repairing the machine!

NOTICE

This symbol is found where special attention is required to ensure compliance with instructions concerning correct operating sequences to prevent damage to the machine or its function.

Instructions directly attached to the machine, e.g.

- Instructions and warning signs
- Labels for liquid connections
- Arrow showing the direction of rotation must be strictly followed and kept in absolutely legible condition.
- Signs or labels that have become illegible must be replaced immediately.

3.1.3 Qualification and training of personnel

Only well-trained and briefed persons who know these operating instructions and act according to these instructions are authorized to operate the machine. The individual areas of responsibility of operating staff must be defined clearly. The area of authority, responsibility and control of the personnel must be precisely regulated by the operator. The operator must further ensure that the personnel have fully understood these operating instructions.

Personnel being trained must in the beginning work under the supervision of an experienced person. The completed successful training and briefing must be confirmed in writing.
Any electrical control and safety devices must generally be operated by instructed and authorized persons only.

Any person performing work on the machine must read these operating instructions and confirm by signature that the operating instructions have been understood.

3.1.4 Safety instructions for maintenance, inspection, installation

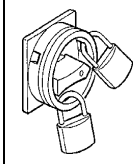
Any maintenance work must be carried out by qualified staff only.
Any inspection and installation work must be carried out by authorized and qualified staff only.

Work on the plant may only be carried out after the plant has been isolated.

Enclosed rooms of wastewater treatment plants that need to be entered for service and maintenance have to be aerated in a way that prevents a dangerous explosive atmosphere, lack of oxygen and presence of harmful concentrations of gas or vapour.

⚠WARNING

Secure the machine against unexpected start in case of open access to the screenings discharge resp. secure the access to this danger area before changing the screenings container or doing maintenance work or disassembling on a downstream machine.



⚠WARNING

Shutdown procedure: Switch off mains isolator and lock it.
Each person who is commissioned to perform maintenance work on the machine must have his own padlock. Starting the machine is only possible when all padlocks on the mains isolator have been removed.

Do not immediately re-start the machine, if the reason why it has stopped is unclear. Somebody could have stopped the machine in order to make a manual adjustment and may have forgotten to secure it against starting. The unexpected start could result in serious injury of personnel.

It is in your own interest to clean the machine prior to working on it to prevent the danger of infections.

⚠CAUTION

Always protect yourself by means of waterproof protective gear, boots, gloves, and, if possible, also by face protection during cleaning of the machine - especially if a high pressure cleaner is being used – to avoid being hit by waste water, organic material, etc.

Re-attach all safety equipment, covers, grates completely to their original place and assure that they are properly and completely reattached.
Use only tools and means that are expressly intended for such work.

Before starting the machine again, check the items mentioned in chapter Start-up.

3.1.5 Other dangers

Other dangers are potential, non-apparent dangers.

Despite all precautions taken, there are other dangers, such as:

- To be caught by unintentional movements of the machine
- To slip on wet or dirty ground
- Danger of falling in front of or onto the machine during maintenance work
- Malfunctioning control
- Danger of electric strike
- Allergies and irritations caused by contact with waste water or screenings
- Infections caused by bacteria or pollution
- Explosions or fire caused by gas or fumes
- Increased water passage after heavy rainfalls for example

3.1.6 Unauthorised rebuilding and production of spare parts

Alterations or changes to the machine:

For safety reasons, it is not permitted to make unauthorized alterations or changes to the machine. This applies also to welding work on bearing components.

Any intended modifications, alterations or changes require the prior written consent of Huber Technology.

Use only original spare parts, original wearing parts and original accessories as these are especially designed for the machine. Components purchased from other sources give no guarantee that they have been designed and manufactured to suit the specific operating and safety requirements.
Components purchased from other sources give no guarantee that they have been designed and manufactured to suit the specific operating and safety requirements.

3.2 Machine identification

Any specifications made in these operating instructions apply to only the type of machine that is named on the title page.
The identification plate is attached to the screenings discharge and specifies the following.

- Name and address of supplier
- CE sign
- Serial name and type, optionally serial number
- Year of manufacture

Always forward the machine type, year of manufacture and order number when inquiring or ordering spare parts to ensure perfect and prompt processing of your queries and orders.

3.3 Incorporated safety systems

The incorporated safety systems are subject to regular checkups (**t** = daily, **w** = weekly, **m** = monthly, **j** = yearly). The following methods are applied:
S = sight inspection, **F** = functional test, **M** = measuring.

Mains isolator
The mains isolator is located on the control panel and disconnects/connects the machine from/with the mains supply.

Padlock the mains isolator after switch-off prior to performing service or repair work.

Checkup	
Interval	**Method**
j	**F**

Emergency cutoff circuit
The machine is equipped with an emergency cutoff circuit. Whenever the emergency cutoff switch (option) is operated, the machine or complete plant including incorporated units will be set into a safe operating state.
The emergency cutoff switch can be released by pulling or turning to the right.

Checkup	
Interval	**Method**
m	**F**

Motor temperature control
The machine is equipped with an indirect motor temperature control with overload protection. The motor of the machine is switched off in the event of too much heat built-up. The overcurrent safety device using a thermic delay must be set to disrupt the drive motor from the power system within the delay t_E.

Checkup	
Interval	**Method**
j	**F, M**

Plant control
Internal plant control includes a 5-conductor feed system, 3 phase, with separate earth line with GREEN/YELLOW line coating. Additionally earth the machine casing for potential equalisation.

Checkup	
Interval	**Method**
m	**S, F, M**

Categories acc. to DIN EN ISO 13849-1
The following categories are used on the plant:

Category	System performance	Component	Inspection interval
1	• A fault may cause the loss of safety function, • Some faults may stay unrecognized	Main switch, water shut-off device with protection against restart	1x per year or acc. to instructions of supplier of components
2	• A fault may cause the loss of safety function between the tests. • The loss of safety function is recognized by the test.	Emergency stop (emergency cut-off relais with push-button and cut-off protection)	1x per year or acc. to instructions of supplier of components

⚠WARNING

Control panels can only be opened by using a special key. The special key may only be handed to an authorized person. Take care that doors of control panels are only opened by skilled staff for maintenance work and fault detection, otherwise the doors must stay locked!

NOTICE

These operating instructions are part of the machine and have to be available for the operating staff at any time.
The safety instructions contained must be observed.
It is strictly prohibited to override any safety instructions or change the mode of action of safety instructions.

3.4 Safety measures

It is the operator's responsibility to instruct his operating and servicing staff concerning:

- Protective devices on the machine,
- Control of observance of safety measures.

This copy of operating instructions has to be stored to be at hand when needed in future. Observe the intervals for inspection and control measures! In these operating instructions, the work is described so that it can be understood by

- an instructed person (referring to chapter Operation and operation modes
- skilled staff (referring to chapters Transport, Installation, Maintenance, Trouble Shooting and Repair).

The chapters Transport, Installation, Maintenance, Trouble Shooting and Repair are intended for skilled staff only. Any work described under these chapters must be performed by skilled staff only.

Instructed person
An instructed person is a person that has been instructed by a skilled person, and trained if necessary, about the assigned jobs and possible risks arising from improper performance and informed about necessary protective devices and protective measures.

Skilled persons
Skilled persons are persons that are able to evaluate assigned jobs and recognize possible risks, due to their professional skills, expertise and experience and knowledge of corresponding standards.
This definition follows EN 60204-1.

3.5 Operator's duty of care

NOTICE

The valid national version of the framework directive 89/391/EWG and corresponding individual directives, especially 89/655/EWG concerning minimum requirements for safety and health protection of staff when using work equipment, are applicable in EEA countries and must be observed.
For Germany, the occupational safety directive of October 2002 is applicable and must be observed.

The operator has to obtain the local operating license and observe the respective requirements.

In addition, the operator has to observe the local laws concerning

- Safety of personnel (accident prevention regulations)
- Safety of work equipment (protective gear and maintenance)
- Product disposal (Waste Management Law)
- Material disposal (Waste Management Law)
- Cleaning (cleaning agent and disposal)
- Environmental compliance

Connections:
The operator has to ensure before start-up of the machine, if installation and start-up are performed by the operator himself, to comply with local standards (such as for electrical connection for instance).

NOTICE

Lighting
The operator has to provide sufficient and equal lighting in all areas of the plant. The recommended illumination level is 300 lux (value for maintenance; in Germany acc. to ASR 7/3).

3.6 Safety tests

Performed by the manufacturer before delivery

1. Airborne sound measurement

- as per rules for machines, appendix 1 (1.7.4/f)

The noise level of the plant lies below 70 dB(A).

2. Test and checkup as per DIN EN 60204-1

- Check of electrical equipment for correspondence with the technical documentation (chapter 18.1)

- Functional tests (chapter 18.1)
  Test of functions of electrical devices, especially those relating to safety and protective measures.

4 HANDLING AND TRANSPORTING

Observe the following points to avoid damage to the machine or persons when handling the equipment:

- Only qualified persons are permitted to perform transport work, observing the safety instructions.
- Lifting and righting of the equipment must be done only by the lifting eyes provided.
- Use only the lifting devices specified hereunder to transport the machine.
- Read also the chapter General Safety Instructions.

4.1 Dimensions and weight

The screen is available from size 300 to 700 mm (screen basket diameter). Standard bar spacings are 0.5 to 2 mm, perforations from 3 to 6 mm. The machine length and arrangement are adjusted to suit specific site requirements (available space, channel width, discharge height). The dimensions are specified in the project-specific installation drawing or general dimension sheet attached to these installation instructions.

The weight of the screen depends on the machine size and length. The weights are specified in the following table.

Length	2800	3500	4000	4400	5100	5400	5800	6200	7000	8000	9000
Size 300	185	225	254	277	308	335	358	430	478	545	593
Size 400	212	250	279	302	322	360	383	457	503	560	618
Size 500	261	300	329	352	372	410	433	517	553	610	668
Size 700									1200		

All weights (kg) apply to machines without extra equipment for outdoor installation or any other optional equipment. The machine size and length are specified in the data sheet. The machines are packed on palettes for trucking, and in sea-water-proof boxes for sea transport.

4.2 Permitted transport devices and auxiliaries

⚠CAUTION

Have transport and unloading done by experienced experts only.

Fork lift or building machine of sufficient lifting capacity to handle the weight and size of the equipment, to be operated by qualified personnel only. Rope slings or straps of required load bearing capacity. Prior to unloading, remove the small parts supplied with the machine, such as supports, from the transport rack.

⚠WARNING

Attachment: Hook shackle, load hook etc. into the lifting eyes on the upper side of the rising pipe. Fixing points are marked with the symbol LIFT HERE (as illustrated here). The ropes of the lifting device must hang freely and must not be attached more than 60° from the vertical. The machine must hang horizontally during unloading.
Never lift at the thicker part of the rising pipe prior to the screenings discharge. This is the press liquor collection chamber which is made of thinner plate or plastic and is unable to bear the machine weight.
Never wrap a chain around the machine as this may slip and cause the machine to tilt over. In addition, the machine will rust on those points where it gets into touch with black steel if it is not re-pickled.

Inspect all materials for damage before and during unloading. Any transport damage found should be noted on the bill of lading and the forwarder and manufacturer/supplier notified immediately.

NOTICE

Make sure the delivery is complete by carefully checking all received materials against the bill of delivery.

4.3 Storage

When selecting the storage place take care that the components cannot be damaged by vehicles or careless working. Make sure the components cannot get dirty due to splashes of concrete or mortar and protect the machine against spark fountains from angle grinders etc.
Cover the motor (in order to avoid ingress of water) on machines stored outdoors, but do not wrap it.
Never expose the control panel to rain (temperature down to - 5°C is permissible).

NOTICE

Do not lay the machine on its thicker part prior to the screenings discharge (press liquor collection chamber) since this will damage the press liquor collection chamber.

4.4 Transport to the installation place

As the situation and possibilities are different on each individual site, we cannot provide exact installation instructions. This work must be carried out by qualified fitters.

You always need lifting equipment for transporting the machine from the intermediate storage place to the installation place because of the machine weight.

As lifting equipment up to the building are used: caterpillars, power shovel, cranes etc. dependent on the access ways. Lifting equipment mostly used in a building is: Polyester slings, tripods, chain tackle block, fork lift, transport rollers, tackles.

⚠CAUTION

Wear safety shoes with steel caps to prevent injuries.

⚠WARNING

Always stand clear off a suspended load!

Unpacking:

Do not loosen the clamping bands or steel ropes before the machine is right in its installation place.

5 INSTALLATION

Observe the following safety instructions when installing the machine to avoid critical injuries, damage to the machine and other damage.

- Only qualified persons are permitted to perform installation work, observing the safety instructions.
- Check the machine for transport damage prior to starting with any installation work.
- Make sure that only authorized persons have access to the working area and that installation work does not endanger any other persons.
- When laying machine connections, make sure that no one can trip over laid cables, hoses, pipelines, etc.
- Observe the prescribed bending radii when laying cables/hoses/pipelines.
- Observe the instructions for operating media, lubricants, auxiliary material used.
- Read also the chapter General Safety Instructions.

5.1 Acceptable environmental conditions

The machine is manufactured for installation in a building, or as a heated version for outdoor installation, as specified by the customer.

⚠CAUTION

Stainless steel parts can get very hot in case of heavy solar radiation, danger of burning.

Frost protection:
Machines without trace heating and insulation and/or casing must not be operated in winter due to the danger of freezing. Appropriate measures must be taken (e.g. complete emptying) to ensure that the machine cannot freeze.

Protection against dust and water:
As the atmosphere in the buildings is permanently humid, the equipment is designed to resist these conditions.

All components in contact with water and solids are made of stainless steel which is insusceptible to moisture and wetness.
The gear motors are made for IP 65 and are therefore protected against permeation of dust and spray water from any direction.
The solenoid coils, if fitted to the machine, also provide IP 65 protection.

Protection against explosion (optional):
The plant and its components are available in the following ex-protected versions:

Gear motor:	E Ex e II T3
Adjacent control box	EEx e II T5/T6 or EEx dem II CT5/T6
Solenoid valves	EEx ed II C T4 or T5

Conformity certificates are attached in the appendix.

Lighting
The lighting must make safe working on each part of the plant possible without any risk.

NOTICE

Lighting

The operator has to provide sufficient and equal lighting in all areas of the plant. The recommended illumination level is 300 lux (value for maintenance; in Germany acc. to ASR 7/3).

5.2 Site requirements

Cover all channel sections which do not need to be accessible for machine installation. Fix a railing along open channel sections. The regulations of DIN EN 294 “Safe distances preventing upper limbs reaching dangerous areas” and corresponding standards must be observed. There must be enough space available around the machine for repair and maintenance work.

Required minimum **distance** to the machine (or railing):

- 1 m at the side
- 1.5 m in front of (e.g. to pivot the machine out of the channel)
- 2.5 m behind the machine (e.g. to dismount the motor)

Recesses in one of the side walls of the channel are required to place the level probes 0.5 – 1.5 m in front of and behind the machine. These recesses must have a length of 150 mm and a depth of 120 mm and reach down to the channel bottom.

Static dimensioning of the points where the machine is supported by legs on the channel bottom and under the rising pipe on the building bottom or top of the channel must be carried out according to the weights specified in the manufacturer's data sheet.

5.3 General instructions for installation

Installation must be carried out in accordance with these instructions if installation is not part of the supply contract with HUBER Technology. If installation is not performed by HUBER Technology, HUBER Technology cannot accept responsibility for incorrect offloading or installation.
Installation must be performed by qualified and experienced personnel.

Prior to installation:

- Completely read these instructions. They contain important information how to prevent damage caused by lack of knowledge.
- Approach roads must be provided so that the machine can be installed either by means of a crane in case of outdoor installation or by a lifting truck and rollers as well as by lifting chain block or hoist in case of installation in a building.
- Electrical power must be provided to be available on site at the installation date.

Preliminary work:

- If a channel cover is to be installed, mount the frame and exactly measure the cover dimensions (see installation drawing).
- If it is an installation in a building, make sure a mounting support is fitted centrally above the machine.
- Prepare a lockable water supply line exiting from the bottom (see installation drawing).
- Prepare sufficiently sized cable ducts for electrical installation from the control panel to the machine and channel for level control (for details see installation drawing).
- Recesses (150 x 120 mm) in the channel wall down to the channel bottom are required to place the level probes in front of and behind the machine (see installation drawing).
  For existing channel configurations baffle plates can be provided as cover for the level probes.

Preparatory work:

- Check all assembly and fixing material making sure it is complete.
- Prepare all material necessary for water connection.
- Prepare all cables according to the cable list (see wiring diagram) and all necessary small components (e.g. air hose for level control).
- Prepare lifting device that is able to lift the load during installation.
- Clean the channel / installation place with a broom before installation in order to prevent injuries caused by slipping.

5.4 Assembly and installation

5.4.1 Mechanical installation

General instructions:

NOTICE

Blow the holes for the stainless steel plugs under pressure after drilling (using bellows, air pump, etc.) to ensure a professional durable adhesive joint.

Use grease for all unlockable screws, thus providing a durable mobility of thread.

How to proceed:

- Fix lifting devices (2 chain hoists or similar) to the prepared installation supports over the channel. If necessary, prepare points of suspension with required load bearing capacity and arrange in such a way that the plant can hang above the installation area without manual moving.
- Fix safety load hooks to the transport eyes, or rope straps to the machine and lifting device.
- Lift the machine on the lifting eyes and lower it slowly from its horizontal position into installation position. (See installation drawing.)
- Place the machine as shown in the installation drawing onto the lower landing point of the screen basket.
- Adjust the installation angle by lifting the plant with the upper lifting eye. (Installation angle details are provided in the installation drawing.)
- Adjust the clamp on the rising pipe. Fix the machine supports. Fix the channel cross beams (if any) with dowels.
- Lock the support with a screw in the support foot (C-profile) against height variation.
- Bolt and screw the screen basket to the channel bottom.
- Check the rubber sealing surface on the screen basket pointing to the channel.
- **For safety:** Mount a cover over the screen basket or provide for a railing along open channel sections or for a channel cover.

5.4.2 Electrical installation

Electrical installation to be carried out by qualified electricians only.

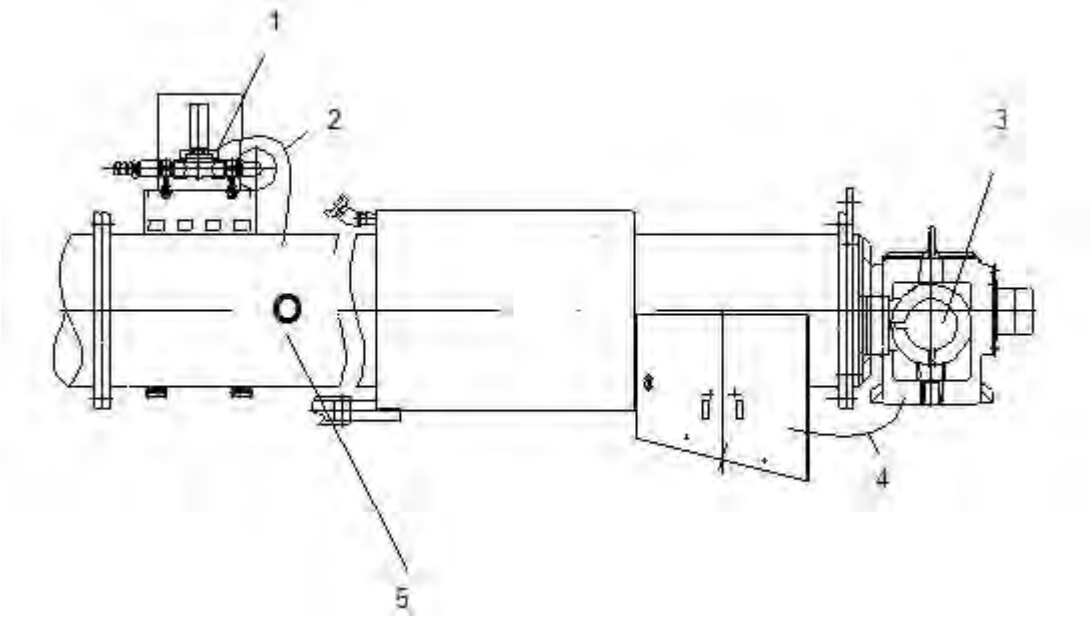
General:
The following instructions are offered for guidance if installation is not included in the supply contract. If installation is not included in the supply contract, HUBER Technology cannot accept responsibility for incorrect installation.

Wiring:

WARNING

Make sure that power supply is disconnected!
Secure this condition by appropriate measures!

- Prepare earth connection to the plant prior to beginning any other work, and earth the gear motor and solenoid valves (optional). The protection system of the terminal sockets and screw connections must correspond to the protection zone in which the machine has been installed.



1 Solenoid valve

2 Earth conductor 6 mm²

3 Gear motor

4 Earth conductor 6 mm²

5 Earth conductor point 10 mm²
The earth point has to be connected with the main voltage equaliser.
Observe local protective measures as per local standards (DIN, VDE, EN, EeEx-Atex 100a).

- Fix the control panel with bolts in its intended position.
- Fix the adjacent control box with dowels next to / onto the machine.
- Prepare all cables between the machine, control panel and adjacent control box and connect the plant to the power supply according to the specifications in the wiring diagram. The wiring diagram and cable list are attached in the appendix, if the electrical switchboard and control panel is part of the Huber supply contract.

If there is a differential water level control system ensure that there are no bends in the air hoses going to the air injection pipes. To avoid condensed water inside the air hose, it must be laid to the channel in a slope.

Install the air injection pipes (or customer's probes) in the section up to 1 m in front of respectively behind the screen basket, if possible in a turbulence-free zone.

Both sides of the pressure switch in the control panel where you must connect the air hoses are clearly marked with "in front of the screen" and "behind the screen".
The exact position of the air pipes is specified under Product Specification.

NOTICE

If the air hoses have to be laid in ducts in the bottom, seal both ends by means of an insulating tape so that they are water-proof, as the ducts may be filled with water if a "bag" has been produced by wrong laying. Water in the air pipe of the inlet (≥ 10 cm water column) may cause continuous operation of the screen in the automatic mode.

Note:
The correct rotation direction of the drive, viewed in flow direction, is anti-clockwise!

Prior to first start resp. prior to recommissioning (e.g. after changing the power supply) check the rotation direction of the motors!

6 START-UP

Observe the following safety instructions for machine start-up to avoid damage to the machine or injuries.

- Only qualified persons are permitted to perform start-up work, observing the safety instructions.
- Check before the first start-up that all tools and foreign objects have been removed.
- Activate all safety devices and emergency cutout switches before start-up.
- Check that the motor running direction is correct. Screw rotation direction: anti-clockwise when viewed in flow direction
- Prior to initial start-up close the water supply hose and flush the pipe network. This will prevent that pollution particles can impair the function of or damage (optional) solenoid valves.
- Read also the chapter General Safety Instructions.

6.1 Customer-supplied connections

All customer-supplied connections must be installed on the marked positions, or at least as close as possible, according to the manufacturer's instructions respectively installation drawing.

6.1.1 Electrical connection

The electrical connections must be laid to the installation place of the control panel.
Supply of 3 x 400 V (or special voltage) with 50 Hz (special: 60 Hz) PEN. The connecting lead must be defined according to local directives, observe the project specific connecting lead. Provision of multi-polar cables for transmission of operation and trouble signals or any other signals to a central control plant.

Pay attention to separately arranged laying of control and load cables, which means a separate laying of cable ducts. They must be laid from the control panel to the installation site. The position of the cable duct ends can be obtained from the installation drawing. The number of the cable ducts depends on the number of functions.

NOTICE

Pay attention that the cable ducts for an optional pneumatic differential level control system protrude laterally from the channel wall and must be laid in a slope to the channel. This is necessary to enable the condensed water in the air hose to run off.

1x ground, 1x screen drive, 2x level control points, 1x adjacent control box switch, min. 1x additional equipment (see equipment list).

6.1.2 Connection for wash water

Required operational water pressure: min. 5 bar max. 7 bar

Water quality:
Use screened or filtered service or used water, with no particles bigger than 0.2 mm grain size. The water should have an as low as possible chloride and ferric oxide content and preferably a pH > 6.5.

If this is disregarded, the servo bores of the solenoid valves will clog and jet intensity reduced respectively the valves not perfectly close any longer.

Water supply line:
Which water supply line is required depends on the individual screen version, which you can take from the data sheet. For connection of a spray nozzle bar a 1" line is required, whereas 1 ¼" is required for the IRGA.

Dimension the supply line one size bigger if the line is longer than 100 m (shock pressure, line loss).
The connection in the support leg area should emerge from an adjacent wall or the floor and should be lockable.
The connection for press zone washing is located either laterally on the stainless steel press liquor collection chamber or in 12-o'clock position on the plastic chamber.
The machine can have additional connections for the integrated screenings washing system IRGA and/or spray nozzle bar, this depends on the order and supply volume.
A water connection (not below ¾") for cleaning work, maintenance etc. is required. For very greasy wastewater a warm water connection or steam jet should be available.
The connection must be made of high-quality rubber fabric hose or a pipe connection.
If fresh water is used, it is necessary to provide a return flow inhibitor complying with EN 1717 to prevent return flow of wastewater into the potable water network.
If solenoid valves are used, a rubber hose is preferably recommended because its elasticity reduces shock pressures when the valve closes.

6.2 Checks prior to initial start-up

Prior to start-up:

Make yourself familiar with the

- operation and control elements of the machine
- machine equipment
- operation principle of the machine
- immediate vicinity of the machine
- safety devices of the machine
- measures to be taken in case of emergency

Perform the following work prior to any start-up:

- Check and make sure that all safety device are attached and in a ready-to-operate condition.
- Check the machine for visible damage and eliminate any damage found immediately or report them to the supervisory staff, as machine operation is only permitted if the machine is in a perfect condition.
- Check and make sure that authorized persons only have access to the operation area of the machine and no other persons are endangered by starting the machine.
- Check and make sure that the protection circuit system is persistently connected.
- Remove any objects or other material from the operation area of the machine, which is not needed for machine operation.

Check that the screw-type cable fitting fits tight and re-tighten the screw, if necessary, to prevent ingress of water into the motor. (See below picture of the screw-type cable fitting.)

Screw-type cable fitting

7 OPERATION

Observe the following instructions when operating the machine to avoid damage to the machine or injuries.

- Never use the machine for any other purpose than the intended use!
- Inform yourself about the correct behaviour in case of a fault prior to switching the machine on.
- Check prior to switching the machine on that the following units are in a ready-to-operate condition:
  - Protective devices
  - Emergency cutoff switch

Read also the chapter General Safety Instructions.

7.1 Control philosophy

The electrical control regulates all automated functions of the plant both in automatic and hand mode. After switching the mains isolator on, the plant works in automatic mode. The control panel must be installed outside the screening room.

If you have the electrical control panel supplied by a third company, pay attention to the control philosophy of HUBER SE. The panel must be completely wired in order to connect the machine. The wiring diagram must lie inside the panel.

7.2 Operation possibilities

Standard ex factory settings as per the following table are enclosed in our control panel:

Operating key	Interval
IRGA	6 sec pause, 2 sec operation
Timer / run-on time	Every 60 min / 20 sec run-on time
Automatic reversal	Every 15 min for: 5 sec at 13 rpm of motor 8 sec at 7,8 – 8,3 rpm of motor

Thus the automatic reversal depends on the running hours of the plant. Please find the actual rpm of motor on the motor data sheet, which is part of this documentation, see table of contents.

7.2.1 Switch possibilities on control display

Operation and fault signals are indicated on the text display, also the individual drives are controlled via the text display. After the plant has been switched on it is in AUTO mode.

The operating keys of the text display, or adjacent control box, allow different manual operation modes.

Position	Action	Condition
Hand	Machine runs forwards	As long as the selector switch remains in this position
Mains isolator OFF	Machine stands still	Even if starting conditions are given
Automatic Mains isolator ON	Machine runs in cycles	When level control or timer actuate
Reverse	Machine stands still or reverses permanently	As long as the 'reverse' key is operated

Operate the reverse button only for a short moment to prevent increased brush wear.

7.2.2 Operation by means of adjacent control switch

The control units are displaced from the main control panel into an adjacent control box if the main control panel is not positioned close to the machine. The machine can for example be installed in an Ex protection zone and operated via an adjacent control box with Ex protection while the main control panel is installed in a room without Ex protection.

Equipment:

- Emergency cutoff button
- Lockable key switch (AUTO – HAND)
- Rotation selector switch

Arrangement:

Directly adjacent to the machine, installation options:

- On standard upright dowelled to the floor
- Clamp-mounted on the rising pipe

Rotation direction selector switch positions on adjacent control box for manual operation:

Position	Action	Condition
HAND (Stop button)	Machine runs forwards	As long as the lockable key switch remains in this position
0	-	-
Reverse (push key)	Machine reverses	As long as the key remains in this position Lockable key switch in HAND position

Lockable key switch positions:

Position	Action	Condition
Automatic (Turn key)	Machine is running	When level control or timer actuate
0 (Insert key)	Machine stands still	Even if starting conditions are given

HAND (Turn + press key)	Machine runs forwards	As long as the rotation selector switch remains in this position

8 TROUBLE SHOOTING AND REPAIR

Symptom	Possible cause	Repair
Screen does not run although the tripped lamp is off.	Mains isolator is in OFF position.	Switch mains isolator ON.
	Selector switch is in "0" or REVERSE position.	Turn selector switch to HAND or AUTO
	PLC-CPU is set to STOP.	Switch to RUN.
	Control fuse has melted.	Replace fuse.
	Membrane of miniature compressor has torn.	Check if the compressor is running. Pull off the hose. Check if it can blow air under pressure. Replace membrane if necessary. Clean the filter, check if air pipes are tight.
Fault lamp is on or the fault is indicated in the text display	Motor overload has tripped.	a) Switch off mains isolator b) Check if something is jammed in the trough area (like a stone or piece of wood) or material is entangled in the discharge. c) Switch on motor protection switch and operate reset key. d) Switch on mains isolator.
	Current relay has tripped.	a) , b) , d) Ditto
	Phase breakdown	Check fuses and preceding fuses in control panel.
Continuous operation in AUTO mode	Level control is permanently activating because: Air escape area on submerged pipes is blocked. Hose is bent somewhere. Condensed water is in the hose.	 Clean recesses for submerged pipes. Remove the bend. Blow the hose, displace it if necessary.
Time-dependent control does not work.	Time has not been set in text display or on timer.	Set the time.
Solenoid valve does not close.	Servo boring is dirty inside. Membrane is torn.	Disassemble and clean the valve. Check dirt trap and insert a filter if required. Replace membranes.

9 MAINTENANCE AND REPAIR

⚠CAUTION

Enclosed rooms of wastewater treatment plants that must be entered for service and maintenance have to be aerated in a way that prevents a dangerous explosive atmosphere, lack of oxygen and presence of harmful concentrations of gas or vapour.

NOTICE

The contents and structure of these maintenance instructions have been made up according to DIN 31 052.

⚠CAUTION

The chapter maintenance and repair is intended for skilled staff only.
Any maintenance or repair work must be performed by skilled staff only.
Skilled staff has to be equipped with personal protective gear (such as gloves, etc.).

Skilled persons
Skilled persons are persons that are able to evaluate assigned jobs and recognize possible risks, due to their professional skills, expertise and experience and knowledge of corresponding standards.
This definition follows EN 60204-1.

Regular cleaning and plant maintenance is required to ensure trouble-free plant operation.

⚠CAUTION

Always wear protective glasses and rubber gloves if harmful materials have been processed by the machine.

The machine is subject to vibrations during operation, which may cause screw and clamp connections to get loose. To prevent damage, regularly check the machine.

⚠CAUTION

It is essential to proceed as described under 3.1.4 when shutting down the machine prior to performing maintenance, repair or cleaning work. Use only tools and means that are expressly intended for such work.

Observe the following instructions when performing maintenance or repair work on the machine to avoid damage to the machine or injuries.

- Prior to performing any repair work, shut off a wide area around the machine.
- Switch off all voltage sources and secure the voltage sources to prevent they are unintentionally switched on again. If the machine is installed in a tank, switch off the mains switch before opening the tank.

- Never use any other than the specified operating media.
- Never use any other than the spare parts specified in the HUBER spare parts lists.
- Read also the chapter General Safety Instructions.

9.1 Cleaning and inspection schedule

NOTICE

Check the potential equalisation regularly, as described in chapter 3.3, Incorporated safety systems!

Daily:

- Check screenings container and replace or empty it if necessary to avoid back-up of screenings into the discharge unit.

Weekly:

- Check air injection pipes of level control (Huber standard or customer's system) and clean the injection pipes and probes with a hose.
- Open the wash water valve for press zone washing and wash until clear water runs off through the transparent hose into the channel. This flushing may be required several times per week.
- Hose down possible deposits or tressings on the screen basket.
- Check the screenings discharge for tressings around the auger, remove tressings.

Monthly:

- Hose down the complete plant including the inside of the tank with a high pressure cleaning device if possible. This prevents sedimentation and chloride accumulation that may lead to corrosion in the long run.
- Check the condition of the brush.
- Remove tressings and textile or fibrous material wrapped around the screw shaft at the discharge end, if any.

⚠CAUTION

Never use a high pressure unit to clean electrical plant equipment!

9.2 Inspection and preventive maintenance

9.2.1 Press zone inspection

The press zone, which is the zone prior to the discharge unit, consists either in a removable plastic shell. A plug of screenings is produced inside the press zone, the press liquor drains off through borings in the inner pipe into the outer chamber and from there back into the inlet. Regular washing of the press zone prevents sedimentation which would clog the borings or press liquor hose.

In case screenings dewatering results becomes insufficient, it is necessary to inspect the press zone. Wet screenings are indicative for clogging of bore holes.

⚠WARNING

Switch off and lock the mains isolator prior to removing the inspection cover!

There is a dangerous zone between the rotating screw and inspection opening where you can get caught!

On machines with a plastic shell, the two half shells can completely be detached after removal of the clamping bands for easier dewatering of the borings from outside.

If required, the inner inspection cover on the rising pipe can be removed. This provides access to and allows removal of e.g. textiles or fibres wrapped around the screw shaft which cannot be accessed from the screenings discharge end.

When reattaching the inspection cover, make sure the fixing screws and straps fit tight since the pressure produced in the press zone is high. When reattaching the plastic chamber, make sure the rising pipe surface is clean and lubricate the sealing points on the end sides.
Read also the chapter Product Specification. This chapter contains details about the press zone.

9.2.2 Operating media and lubricant replacement

Gear motor:

The screen is equipped with a gear motor, the technical data and required lubricant amounts of which can be taken from the attached motor data sheet. The required lubricant amount is additionally specified on the identification plate. If two amounts are specified, the first refers to the main gearing whereas the second refers to the intermediate gearing.

Separate operating instructions for the gear motor are attached in the appendix. They include a list of permissible types of lubricant.

Example: BP gearbox oil: Energol GR-XP220

Under normal operational conditions it is recommended to replace the lubricant after approx. 15000 operation hours. Independent of the operation time, lubricant replacement is recommended after 2-3 years at the latest.

9.3 Repair

9.3.1 Pivoting / Lifting of the machine

The machine can be pivoted around the pivot between pipe clamp and machine support to facilitate maintenance and repair.

- Switch off mains isolator and lock it.
- If required, remove electrical lines and hose connections.
- Loosen the screws of the pivot below the pipe clamp.
- Unlock the screen basket fixing screws in the channel.
- Pivot the machine out of the channel, placing as little load as possible onto the machine support in longitudinal direction, i.e. the traction rope must draw vertically upwards. Too much axial load will bend and break the support.
- When performing maintenance work, secure the machine with cross beams against pivoting downwards.
- After performed maintenance, install the machine proceeding in reverse order.

The manufacturer does not accept any liability if faulty pivoting leads to damage to the machine support.

⚠WARNING

Use suitable lifting devices!
Always stand clear of a suspended load!

9.3.2 Spare parts, components subject to wear

Long life and corrosion resistance against all municipal and most industrial sorts of wastewater as all components which are in contact with water are completely made of stainless steel, acid-treated in a pickling bath and passivated.

a) Components subject to wear

Our guarantee does not include wearing parts that are subject to natural wear during operation. Wearing parts are defined as parts that show increased wear due to their function, the degree of wear depending on operational conditions, running hours and plant maintenance. The life of the brushes depends substantially on the amount of grit contained within the wastewater. With the usual average amounts of grit, the average anticipated brush life is approx. 800 running hours.

Main wearing parts of the plant:

- Brushes on the flights in the screen basket incl. fixing material
- Plastic screw bearing (on machines > 6200 mm or size 700 respectively)
- Screen basket
- Wear protection spiral

b) Spare parts

For other spare parts such as gear motor, solenoid valve, etc. see appendix.

Whenever you order spare parts please specify:
Machine type
Size
Order number = machine number
Year of manufacture
Operational voltage of the corresponding electrical component
Order no. from the spare part list (appendix)
Required quantity
Delivery address
Invoice address

9.3.3 Regular tests of machines subject to ATEX – Recurring tests and permanent control

The regular tests for maintenance of the plant's nominal condition shall include after every 800 respectively 4500 operation hours, at least however after 6 months respectively 3 years, checkup of the components listed below. Replace the components, if they show signs of an unacceptable operating condition.

Operating hours	Interval	Subject	Recommended method
800	6 months	Operating condition: Screw shaft and basket vibrations Wear of screen basket / flights	Check wear of brushes. Brush replacement
4500	3 years	Operating condition: Screw shaft in rising pipe section L > 6200 mm or size 700	Check bearing for wear.

⚠CAUTION

There is a danger of burning in the area of the drive motors

NOTICE

Additionally observe the separate operating instructions for electro motors, drives and bearings for maintenance.

⚠CAUTION

Repair or extensive maintenance work on machines with ex protection should be performed in a separate room on the dismounted machine.

10 SHUTDOWN

Observe the following safety instructions for machine shutdowns to avoid damage to the machine, injuries or environmental damage.

- Qualified staff only is authorized to carry out shutdowns.
- Contact the manufacturer for questions concerning disposal of the machine.
- Take care of environmentally sound disposal of operating media, auxiliary material and lubricants (such as gearbox oil). Observe the regulations for eco-friendly waste disposal!
- Lifting and righting of the equipment must be done only by the lifting eyes provided.
- Use only the lifting devices specified hereunder to transport the machine.
- Read also the chapter Transport.
- Read also the chapter General Safety Instructions.

10.1 Temporary shutdown

- Clean the screen basket with a high-pressure unit prior to a longer shutdown.
- Let the screen operate for approx. 10 minutes. This will empty the machine, screenings are discharged. The emptying process can be accelerated by throwing polystyrene into the screen basket while the machine is running until all screenings have been discharged.
- If the machine is installed outdoors the motor should be covered (in order to avoid ingress of water) but not wrapped. Otherwise, water may ingress into the terminal box.
- It is recommended to change the gearbox oil prior to start-up after a several-year shutdown. Further conservation is not necessary.

10.2 Final shutdown / Disposal

Qualified staff only is authorized to perform electrical and mechanical shutdowns.
Prior to a final shutdown, follow the instructions for a temporary shutdown and the following additional instructions:

- Drain the press zone completely and clean the press liquor collection chamber.
- If the machine has the plastic press liquor collection chamber, remove the plastic shell and dispose of to waste recycling.
- Remove then the inner cover on the rising pipe to have access to the press zone for cleaning.
- Drain the gearbox oil. Disposal of gearbox oil: Observe the regulations for eco-friendly waste disposal!

11 ADDITIONAL INFORMATION

- Data Sheet
- Declaration of Incorporation
- Spare Parts Drawing
- Spare Parts List
- Geared Motor Manual
- Motor Data Sheet BF40-74 – 799900
- Geared Motor: Spare Parts Drawing/-list gear
- Geared Motor: Spare Parts Drawing/-list motor
- Solenoid Valve

For engineering and technical advice, please contact Hydroflux HUBER at

HYDROFLUXHUBER
WATER | SCIENCE | TECHNOLOGY

Level 26
44 Market St
Sydney NSW 2000

Phone: +61 1300 417 697
Fax: +61 2 9089 8830
E-mail: info@hydrofluxhuber.com.au
Web: www.hydrofluxhuber.com.au

For assistance, service and spare please contact Hydroflux Utilities at:

HYDROFLUX
UTILITIES

Level 26
44 Market St
Sydney NSW 2000

Phone: +61 1300 417 697
Fax: +61 2 9089 8830
E-mail: info@hydrofluxutilities.com.au
Web: www.hydrofluxutilities.com.au

Huber Technology

Data sheet

Project:	Somerset STP
Order number:	293759
Machine:	ROTAMAT® Micro Strainer
Type:	Ro 9
Size:	300
Material:	1.4307
Installation variant:	in tank
Bar spacing / Hole diameter:	6 mm
Length:	2827 mm
Geared motor:	BF40-74
Voltage/ Frequency:	415 Y V / 50 Hz
Protection class:	IP66

List of equipment for ROTAMAT® Micro Strainer Ro 9

- Integrated screenings washing (ISW)
- Automatic press zone washing
- Solenoid valve

EC Declaration of Incorporation

in terms of

- **EC directive for machines 2006/42/EC**
- **EC directive EMC 2004/108/EC**

We herewith declare that the design of the

ROTAMAT® Micro Strainer Ro 9

as supplied complies with the above terms and DIN EN standards listed below and the technical documentation was created according to Annex VII, Part B (incomplete machine).

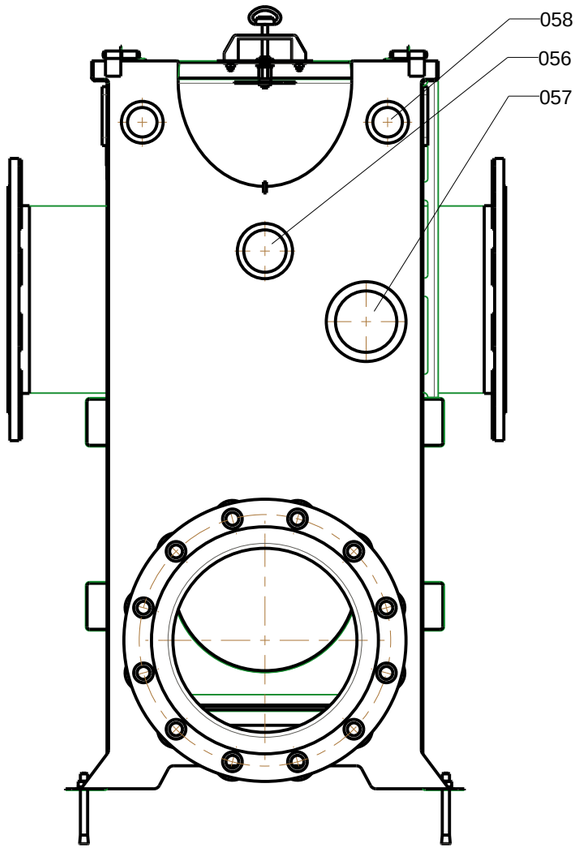
Directive/ Standards	**Title**
62079	Preparation of instructions - Structuring, content and presentation
2006/42/EG	**EC directive for machines 2006/42/EG, valid from 29.12.2009**
	Standards for the Safety of machines:
60204-1	Electrical equipment of machines – part 1: general requirements
ISO 12100	Basic concepts- risk evaluation and reduction
349	Minimum distances to prevent squashing of parts of the body
ISO 13857	Safety distances to prevent hazard zones being reached by the upper and lower limbs
614-1	Ergonomic design principles - Part 1: Terminology and general principles
953	Guards facilities - General requirements for the design and construction of fixed and movable guards
ISO 626-1	Reduction of risks to health from hazardous substances emitted by machinery
1037	Prevention of unexpected start
	Further Standards:
1127-1	Explosive atmospheres - Explosion prevention and protection principles and methodology
ISO 13732-1	Ergonomics of the thermal environment - methods for human responses to contact with surfaces

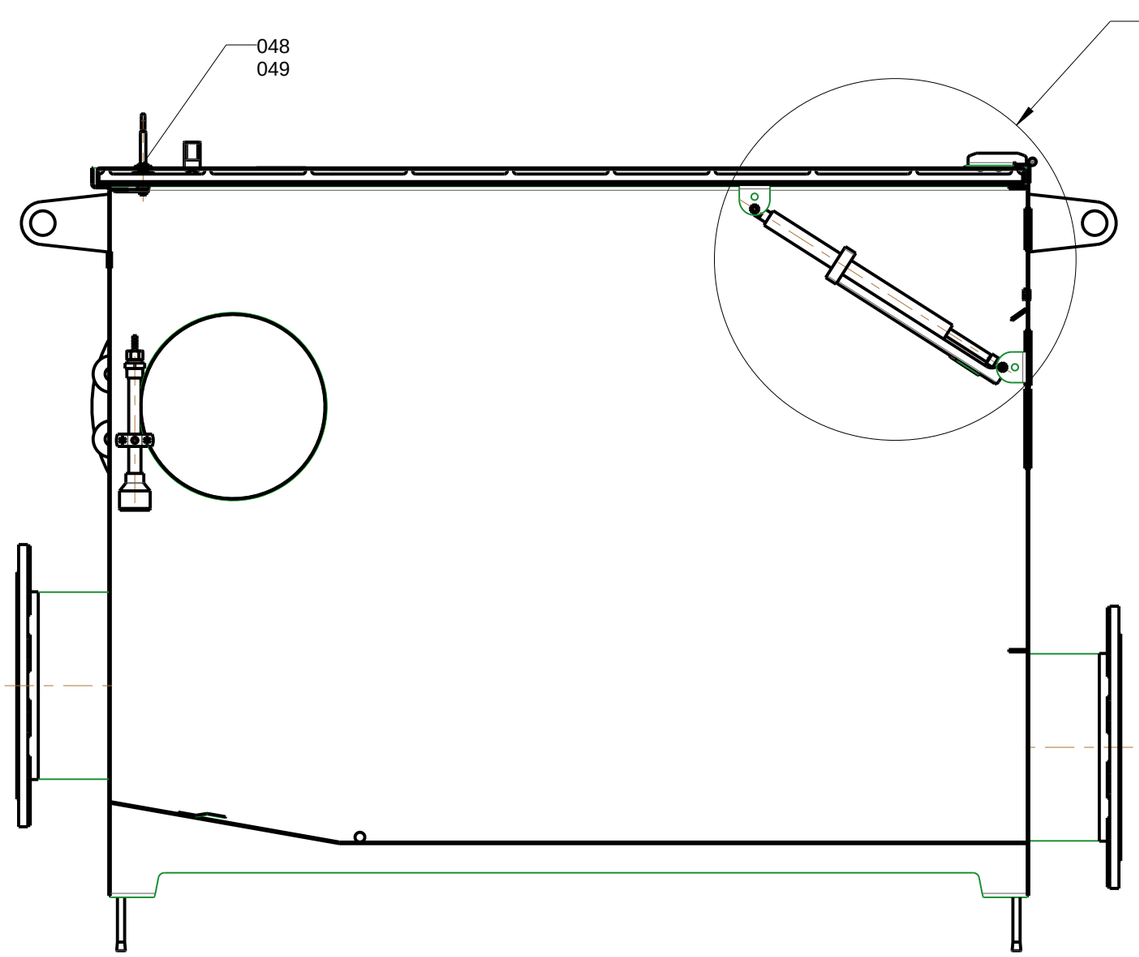
Start-up of the incomplete machine is only allowed after noticing that the machine corresponds to the machinery directive (2006/42/EG). Any modification of the machine without our prior approval will invalidate this declaration. Start-up of the machine is prohibited until the complete plant including the electrical switchboard and control panel is in conformity with the quoted directives.
The installation instructions for the machine are available in German language. On well-founded request of national authorities we provide the technical documentation (electronic form) for the incomplete machine.
Responsible for documentation: HUBER SE, Berching

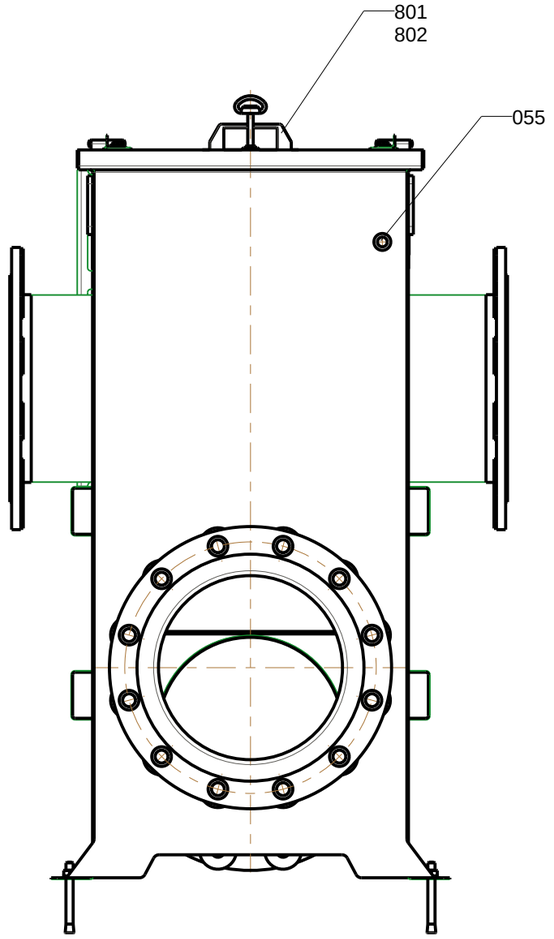
Date: 01.06.2012

Dipl.-Ing. E. Hini
Quality Assurance Engineer
Authorized person

HUBER SE
Industriepark Erasbach A1
D-92334 Berching







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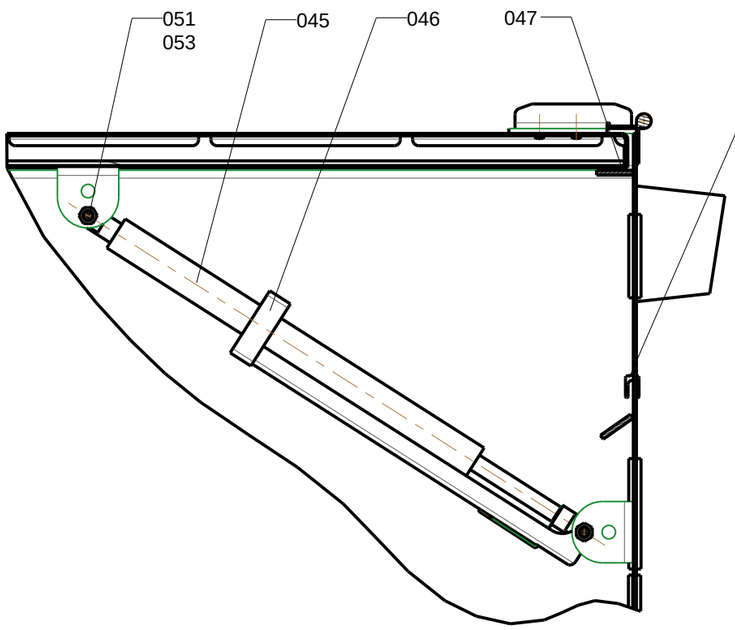

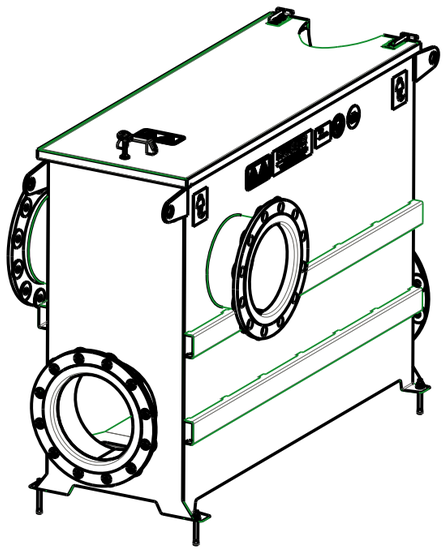

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Pos. Item	Menge Quantity	Bezeichnung Specification				Werkstoff/Lieferant Material/Supplier	Bemerkung Annotations

Technische Aenderungen vorbehalten / Subject to change

ISO 2768-mK

HUBER TECHNOLOGY
D-92334 Berching / Tel.: +49-8462-201-0

					Datum/Date	Name
				Bear./Rev.	06.11.2007	gc
a	Ueberarb.	07.11.11	gc	Gepr./Appr.	II	II
				Norm.		
Revision	Aenderung Modified	Tag Date	Name	Massstab/Scale: 1:10		

Behaelter Ro9

tank for Ro9

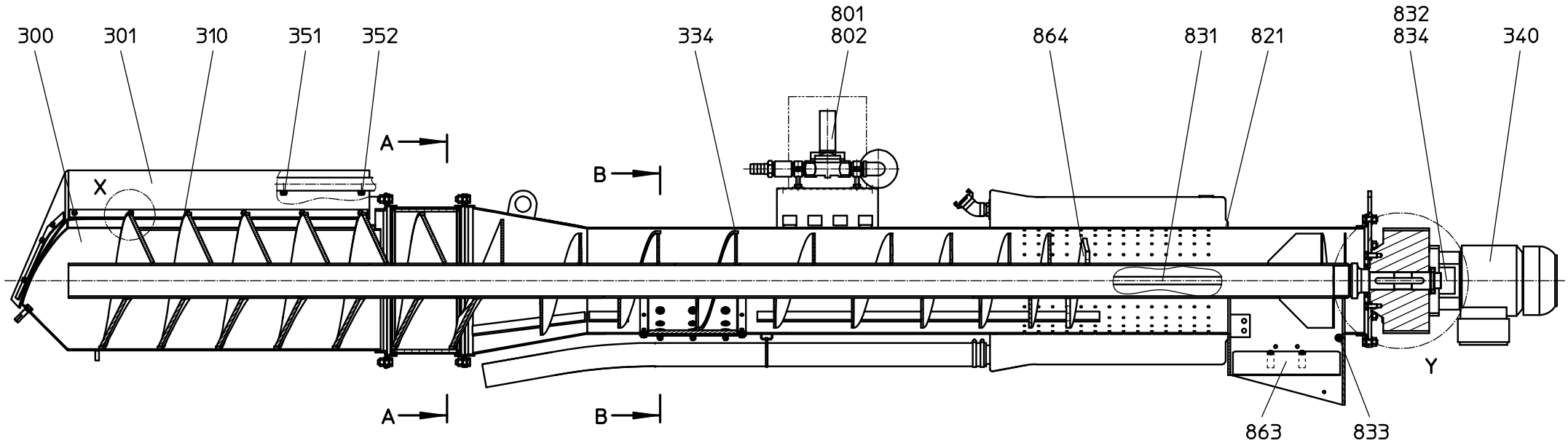
Projektbez.: Project Name: Ersatzteilzeichnung - spare part drawing

Stand.-Art.-Code Standard Item Code	Familie Family			Projekt Project	Art.-Code Item Code	Blatt Sheet
	-				011_000130	1/1

D a
HUBER SE Firma: 100

Projekt : 293759 **Somerset STP, AU** Ersatzteilzeichnung
Artikel : 290930 **Beh B450 L1310 H894 Ro9 300** 011_000130

E-Pos	Bezeichnung	Menge	Eh.	Artikel	A-Art
045	Gasdruckf 200N D14 L687	1,000	st	510792	KU
046	Aufhaltevorr lang 14 Gasdruckf **Artikeltext**: stopper for gas strut	1,000	st	301018	KU
047	Str.dicht 20/ 5 kleb schwarz APTK/EPDM Nr.08000217 **Artikeltext**: strip sealing	2,370	m	703508	ST
048	Drehriegel h 35 068.0537.7 kurzer Dreheinsatz(m.Schraubensich.) **Artikeltext**: turning bolt	1,000	st	706754	ST
049	Schlüssel f. Vorreiber 8mm Vkt Nr. 0.95.0664.0 **Artikeltext**: key for turnbuckle	1,000	st	703321	ST
051	DIN 933 M 8x 40 Skt.Schraube mit Gewinde bis Kopf **Artikeltext**: hexagon head screw, ISO 4017	2,000	st	702774	ST
053	DIN 985 M 8 Skt.-Mut.selb. selbstsich. niedrige Form **Artikeltext**: hexagonal nut	2,000	st	702991	ST
054	Kantenschutz Profil oben s 8 t2,0-5,0 Nr.4000018 PVC/Zellgummi **Artikeltext**: edge protection profile	0,521	m	703533	ST
055	Mem.durchf.tül DG16 Bo.23 t2 Art.-Nr. 1400000865 **Artikeltext**: membrane grommet	2,000	st	702856	ST
056	Mem.durchf.tül DG69 Bo.79 t2,5 Art.-Nr. 1400000910 **Artikeltext**: membrane grommet	1,000	st	706790	ST
057	Mem.durchf.tül Rommel drm 130 x 10 mm **Artikeltext**: membrane grommet	1,000	st	706884	ST
058	Mem.durchf.tül DG48 Bo.60 t2,5 Art.-Nr. 1400000900 **Artikeltext**: membrane grommet	1,000	st	706411	ST
801	Bügelgr. P 225/118 Peco-Polyfull **Artikeltext**: handle	1,000	st	706555	ST
802	Deckel Bügelgriff P 260/118 Peco-Polyfull **Artikeltext**: cover for handle	2,000	st	706556	ST



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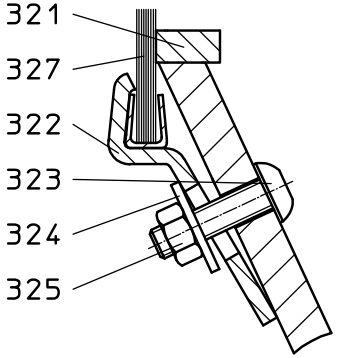

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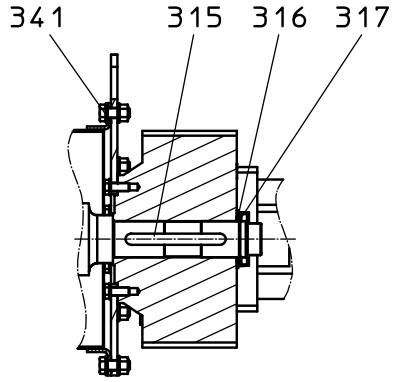

A-A
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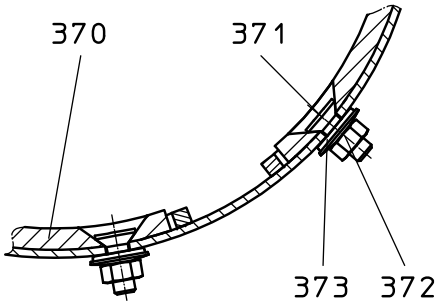
Gleitlager



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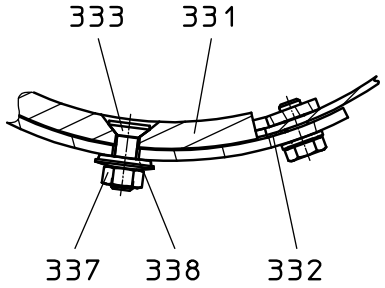

Pos. Item	Menge Quantity	Bezeichnung Specification	Werkstoff/Lieferant Material/Supplier	Bemerkung Annotations

Technische Aenderungen vorbehalten / Subject to modification | ISO 2768-mk

HUBER TECHNOLOGY
D-92334 Berching / Tel.:08462/201-0

					Datum/Date	Name
				Bear./Rev.	22.10.2002	lj
d	ueberarbeitet	28.07.10	ka	Gepr./Appr.	"	"
Ver-sion	Aenderung Modified	Datum Date	Name	Norm.		
				Massstab/Scale: 1:10		

Ro9 300-500 Siebschnecke
Ro9 300-500 micro strainer
Projektbez.: Project Name: Ersatzteilzeichnung - spare part drawing

Stand.-Art.-Code Standard Item Code	Familie Family		Projekt Project	Art.-Code Item Code	Blatt Sheet
-	-			011 0000 18	1

D a
HUBER SE

Firma: 100

Projekt : 293759 **Somerset STP, AU**
Artikel : 290910 **Ro9 300/6 2827 V2A**

Ersatzteilzeichnung
011_000018d1

E-Pos	Bezeichnung	Menge	Eh.	Artikel	A-Art
300	Siebkö Ro9 300/6 45° L 724 B295 RV6/8 **Artikeltext**: basket	1,000	st	302211	ST
301	Dicht Siebk D300 45° 774x253x4, m. Gewebeeinlag **Artikeltext**: sealing for basket	2,000	st	500918	ST
310	Bürste Ro9 /300 e>=1 m.Klemmbl **Artikeltext**: brush with holding plate	1,000	st	301591	ST
315	DIN 6885 A14x 9x125 Paßfe **Artikeltext**: adjusting spring, DIN 6885	1,000	st	711053	ST
316	Ring 45,2/ 58,5x 3 2xM4 Lk 52 **Artikeltext**: disc	1,000	st	510837	ST
317	DIN 471 45x1,75 Sich.Ring **Artikeltext**: guard ring, DIN 471	1,000	st	710537	ST
321	Spirale R 121 12/6 1.4462 1xWi gestr.L 776 aus Fl.12/6 rollen **Artikeltext**: spiral	5,000	Wdg	503970	ST
322	Klemmblech 55/25/3 1xLL 7x20 geneigte Wendel Klemmbereich 8 **Artikeltext**: holding plate	30,000	st	503236	ST
323	DIN 7380 M 6x25 Halbrundsch Innensechskant **Artikeltext**: round head screw	30,000	st	703690	ST
324	DIN 9021 A 6,4 Scheibe Außen-D = 3 x Schrauben-D **Artikeltext**: washer, ISO 7093	30,000	st	703106	ST
325	DIN 934 M 6 Skt.Mut **Artikeltext**: hexagonal nut	30,000	st	702836	ST
327	Str.bü D 262 d 210 d 0,60 b 8 h10 BL 16 GesH 26/Wdg.rechtstei **Artikeltext**: brush	5,000	Wdg	706604	ST
340	Mot BF40 1,1kW 13,0U o.Ex **Artikeltext**: motor	1,000	st	799900	KU
341	Str.dicht 10/ 3 kleb schwarz APTK/EPDM Nr.08000218 **Artikeltext**: plate **EK-Text** : sealing strip	1,100	m	703505	ST
351	Fl.str.d 632.941.5ECC 1/4" 20° 3 bar:27,4 l/min **Artikeltext**: flat jet nozzle	1,000	st	706881	ST
352	Fl.str.d 632.881.5ECC 1/4" 20° 3 bar:19,5 l/min **Artikeltext**: flat jet nozzle	1,000	st	706882	ST
801	Magven 5281 1 " 24V DC o.Ex 2/2 Wege Bürkert-Nr.:179475	2,000	st	707130	ST

Datum : 10.12.13 **ERSATZTEILSTÜCKLISTE** **Seite: 2**
HUBER SE Firma: 100

Projekt : 293759 **Somerset STP, AU** Ersatzteilzeichnung
Artikel : 290910 **Ro9 300/6 2827 V2A** 011_000018d1

E-Pos	Bezeichnung	Menge	Eh.	Artikel	A-Art
	Artikeltext: solenoid valve 5282				
821	Dicht.profil 700x410 ET-N Entwässerungsmantel 11x11,5 -0,5 **Artikeltext**: strip sealing	2,000	st	702303	ST
863	Schutzkl.A 273 m.Gegengew. **Artikeltext**: guard valve	1,000	st	301533	ST
864	Schn.wen FR 2431001 Endwendel d 89,5 D243 Steig100 t10 **Artikeltext**: screw flight	1,000	st	503786	ST

Bauer Gear Motor GmbH
Eberhard-Bauer-Strasse 36-60
73734 Esslingen am Neckar

Operating Instruction
BA 168 EN - Edition 08/12

translation

These documents must be kept with the unit
Further documentation can be found under www.bauergears.com

EC-Declaration of Conformity

acc. to Low Voltage Directive 2006/95/EC
for geared motors for all types of current and gearbox designs

B 010.0800-01 Edition: 11/06
File : KonfErkl_NSR_B010_0800_01_GB.doc

Bauer Gear Motor GmbH
Postfach 10 02 08
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Eberhard-Bauer-Str. 36-60
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Telefon: (0711) 35 18 0
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Homepage: www.bauergears.com

Bauer Gear Motor GmbH
Eberhard-Bauer-Str. 36-60, D-73734 Esslingen

declares in sole responsibility the conformity of the following products:

Electric Motors of the ranges
D..04, D..05, D..06, D..07; D..08, D..09, D..11, D..13, D..16, D..18, D..20, D..22, D..25, D..28
E..04, E..05, E..06, E..07, E..08, E..09
S..06, S..08, S..09, S..11, S..13

where applicable in connection with:

Gearboxes of the ranges:
Helical Gearboxes BG.., Parallel Shaft Gearboxes BF.., Bevel Gearboxes BK.., Worm Gearboxes BS.., Monorail Gearboxes BM..

with the requirements of the European Directive(s) in their latest amended versions
Low Voltage Directive - 2006/95/EG
concerning electrical equipment for use within certain voltage limits

verified through the compliance with the following harmonised standards:

Rotating Electrical Machines:

EN 60034-1:2004	Part 1: Rating and Performance
EN 60034-5:2001	Part 5: Degrees of Protection (IP-Code)
EN 60034-6:1993	Part 6: Methods of Cooling (IC-Code)
EN 60034-8:2002	Part 8: Terminal Markings and Direction of Rotation
EN 60034-9:2005	Part 9: Noise Limits
EN 60 529:1991	Degrees of Protection provided by Enclosures (IP-Code)

Notes:
The safety instructions in the documentation attached to the product (e.g. operating instructions) must be followed.

Esslingen, date of the initial edition 01.07.1999

Bauer Gear Motor GmbH

i.V. Hanel
(Leiter IM)

i.V. Dipl.-Ing. Eiffler
(Leiter EE)

This declaration does not constitute a guarantee of features or performance with regard to product liability. The technical documentation is produced and administered by Bauer Gear Motor GmbH

Safety information for the operation of geared motors

(in accordance with the Low Voltage Directive 2006/95/EC)

General
This safety information applies in addition to the relevant product-specific operating instructions and for safety reasons must be taken into particular consideration in every case.
This safety information is intended to protect persons and objects from injury and hazards which can arise from improper use, incorrect operation, inadequate maintenance or other incorrect handling of electric drive units in industrial installations. Low-voltage machines have rotating parts and may have parts that are live, even when the machine is at rest, and surfaces that may become hot in operation. Warning signs and information signs on the machine are to be observed without exception. Details may be found in our detailed operating instructions. They are provided with the machine when it is supplied and can be requested separately as required by stating the motor model.

1 Personnel
All necessary work on electric drive units, in particular also planning work, transport, assembly, installation, commissioning, maintenance, repair, may only be performed by adequately qualified personnel (e.g. electrical engineers as specified in draft EN 50 110-1/DIN VDE 0105), who have the operating instructions provided and other product documentation available during any corresponding work and who are obliged to abide by the instructions contained therein. This work is to be monitored by a specialist supervisor. Qualified personnel are persons who are authorised due to training, experience and instruction as well as their knowledge of relevant standards, rules, accident prevention regulations and operating conditions by the person responsible for the safety of the installation to perform the activities required in each case and who are able to recognise and avoid possible hazard.
Knowledge of first-aid measures and of the available lifesaving equipment is also required.
Non-qualified personnel shall be forbidden to work on the geared motors.

2 Intended use taking into account the relevant technical regulations
These machines are intended for commercial installations, unless otherwise expressly agreed. They comply with the standards of the series EN 60034/DIN VDE 0530. Use in a potentially explosive atmosphere is forbidden, if not expressly intended for this purpose (refer to additional information). If in a special case --use in non-commercial installations-- Increased safety precautions are required (e.g. protection against access by children's fingers), these conditions are to be ensured when setting up the installation. The machines are designed for ambient temperatures between -20˚C to +40˚C as well as for installation heights up to 1000 m above sea level. Any deviations found on the rating plate must be taken into consideration.
The conditions at the place of work must correspond to all rating plate data.

Low-voltage machines are components for installation in machines in the sense of the Machinery Directive 2006/42/EC.
It is forbidden to use the machine until conformity of the final product with this directive is established (consult EN 60204-01).

3 Transportation, storage
When the electric drive units are being transported, the eye bolts -- where provided in the design-- must be firmly tightened down their bearing surface. They may be used only for transporting the drive unit and not for lifting both the drive unit and the driven machine. Damage sustained after delivery must be reported to the haulage company immediately. Commissioning may have to be suspended.
If drive units are to be stored, ensure a dry, dust free and low vibration (veff < 0,2 mm/s) environment (damage sustained during storage). The life of the lubricants and seals is reduced with longer storage times.
There is a risk of fracture at very low temperatures (under approximately - 20˚ C). If the transport eye bolts are replaced, drop forged eye bolts as specified in DIN 580 are to be used.

4 Mounting arrangement, assembly
The drive unit is to be fastened by its flange or foot if an IM.. mounting arrangement is intended. Gear units with hollow shafts are to be attached on the driven shaft using the means provided.

Caution! Depending on the reduction ratio, geared motors develop substantially higher torques and forces than high-speed motors of similar power.

Mounts, substructure and torque restraint are to be rated for the high forces to be anticipated during operation and secured sufficiently against loosening. The output shaft(s) and any second motor shaft extension present as well as the transmission elements mounted on it (couplings, chain wheels etc.) are to be covered so that they cannot be touched.

5 Connection
All work shall only be carried out by qualified technical personnel on a stationary machine which has been protected against re-starting. This applies also to auxiliary circuits (e.g. stationary heating). Remove any transportation blocks before start-up.

Safety information for the operation of geared motors

Check to ensure safe isolation from the supply!
The terminal box may only be opened once it has been ensured that the power is switched off. The information on voltage and frequency on the rating plate must correspond with the mains voltage under observance of the terminal circuit. Exceeding the tolerances as in EN 60034 / DIN VDE 0530, i.e. voltages ± 5%, frequency ± 2 %, cam form, symmetry, increases heating and reduces service life.
Accompanying connection diagrams, particularly for special equipment (e.g. pole-changing, thermistor protection etc.), are to be observed. Type and cross-section of the main conductors as well the protective conductors and any potential equalization which may become necessary must correspond to the general and local installation regulations. With switching duty, the starting current is to be taken into account.
The drive unit is to be protected against overloading and in dangerous situations against automatic restarting due to inadvertent starting.
The terminal box is to be locked again to protect against contact with live components.

6 Commissioning
Before commissioning, protective films are to be removed, the mechanical connection to the driven machine disconnected as far as possible and the direction of rotation examined in the no-load state. Feather keys are to be removed or secured in such a way that they cannot be ejected as this is done. Ensure that the current draw in the loaded condition does not exceed the rated current indicated on the rating plate for any length of time. Observe the drive unit after first commissioning for at least one hour for any unusual heat or noise.

7 Operation
With certain layouts (e.g. unventilated machines), relatively high temperatures can occur on the motor frame, which are however within the limits specified in the standard. If these drive units are located in a place where they are subject to intensive contact, measures must be taken by the installer or operator to provide protective shielding.

8 Spring-loaded brakes
Spring-loaded brakes are safety brakes which continue to work in the event of power failure or usual wear. If a manual release bracket is provided, it is to be removed when operating. Since other components could also fail, suitable safety precautions are to be taken to avoid any injury to persons or damage to objects cause by un-braked operation.

9 Maintenance
In order to prevent breakdowns, danger and damage, the drive units must be examined at regular intervals depending on the operating conditions. The lubrication intervals for bearings and gear units specified in the respective operating instructions are to be observed. Worn or damaged parts are to be replaced using original spare parts or standard parts. In the event of heavy dust accumulation, clean airways regularly. For all inspection and maintenance work, observe Section 5 and the information provided in the detailed operating instructions.

10 Operating instructions
For reasons of clarity, the operating instructions and safety information do not contain all information relating to all geared motors types and cannot take into account every conceivable case of installation, operation or maintenance. The information is essentially limited to that which is required for qualified personnel in normal working situations. Any unclear points can be clarified by contacting Bauer.

11 Faults
Changes in relation to normal operation, such as higher temperatures, vibrations, noises etc. tend to indicate that the function is impaired. To avoid faults which could lead directly or indirectly to injury to persons or damage to property, the maintenance staff responsible must be informed. If in any doubt, the geared motors are to be switched off immediately.

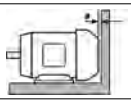
12 Electromagnetic compatibility
The operation of the low-voltage machine in its intended application must meet the protection requirements of the EMC (electromagnetic compatibility) Directive 2004/108/EC.
Correct installation (e.g. screened cables) is the responsibility of the system's installers. Precise information can be taken from the operation instructions. For systems with frequency inverters and rectifiers, the manufacturer's electromagnetic compatibility information is also to be taken into consideration. The electromagnetic compatibility directive in accordance with EN 61000-6-2 and EN 61000-6-4 is complied with given proper use and installation of BAUER geared motors. This is also true in combination with frequency inverters and rectifiers. The additional information provided in the operation instructions is to be taken into consideration when using the motors in the residential, commercial and trade sectors, as well as in small businesses in accordance with EN 61000-6-1 and EN 61000-6-3.

13 Warranty and liability
The warranty obligations of Bauer arise out of the relevant supply contract, which is neither expanded nor restricted by this safety information or other instructions.

This safety information is to be kept in a safe place.

Geared motors with three phase cage rotors

In the standard version the drives are designed for an ambient temperature range of –20°C to +40°C and for installation elevations up to 1000 m above sea level; differing conditions are marked on the nameplate. Exposure to dirt, moisture and the usual outdoor conditions may not exceed the level corresponding to the IP protection rating. The air inlet and outlet must be kept free of obstruction (for example, due to an acoustic cover).

Motor sizes	Minimum clearance *a* at air inlet		
	Up to D .. 16	35 mm	
	D .. 18 to D. 22	85 mm	
	D .. 25 and above	125 mm	

1 Geared motors in degree of protection IP65

(Motor models D/E06... to D.28...) complying with EN 60529 and IEC 34-5/529 are totally enclosed and dust-tight as well as hose proof.

For outdoor installation, the geared motor must be coated with several layers of durable paint to protect against corrosion. The condition of the paint must be checked and repaired at regular intervals, depending on ambient influences. The paint finish must be compatible with the other components. Paints with a synthetic resin base have proved well suited to this purpose.

2 Geared motors in degree of protection IP54

(Motor models D/E04... and D/E05...) complying with EN 60034, part 5 and IEC 34-5 are protected against dust and occasional splashing water. Installation outdoors or in wet areas is not permissible without special protective measures.

3 Mounting arrangement

It is recommended that drinking water, food, textiles etc. beneath the geared motor be covered.

The drive unit should be installed as free from vibration as possible.

Special instructions are to be observed in installation locations with abnormal operating conditions (e.g. prolonged exposure to dripping water, high ambient temperatures above 40°C, explosion hazards). The fresh air intake must not be restricted by unsuitable installation or by fouling.

Flexible couplings with zero play, if possible, are recommended for direct power transmission from the gear unit to the driven machine and commercially available slip clutches are recommended if there is a risk of blocking.

Care must be taken when fitting transmission elements onto the output shaft of the gear unit, which is finished to ISO k 6 or m 6, and the tapped end hole intended for this purpose according to DIN 332 should be used if possible. Warming the machine part to be fitted onto the shaft to approximately 100 °C has proved to be advantageous. The bore must be dimensioned in accordance with following table and must thus exhibit the following tolerances:

Geared motors with three phase cage rotors

Nominal size of bore (in mm)	k 6 or m 6 output shaft Bore H7 with tolerances (in 1/1000 mm)
over 6 to 10	0 to + 15
over 10 to 18	0 to + 18
over 18 to 30	0 to + 21
over 30 to 50	0 to + 25
over 50 to 80	0 to + 30
over 80 to 120	0 to + 40

Where the gear units have a hollow shaft and keyway for high profile feather keys as specified in DIN 6885, Part 1 and hollow shaft for shrink-disc connection, the shafts intended to form the counterpart must be dimensioned to ISO h 6. They must, therefore, exhibit the following tolerances:

Shaft diameter (in mm)	Nominal allowance (in 1/1000] mm)
over 18 to 30	0 to - 13
over 30 to 50	0 to - 16
over 50 to 80	0 to - 19
over 80 to 120	0 to - 22
over 120 to 140	0 to - 25

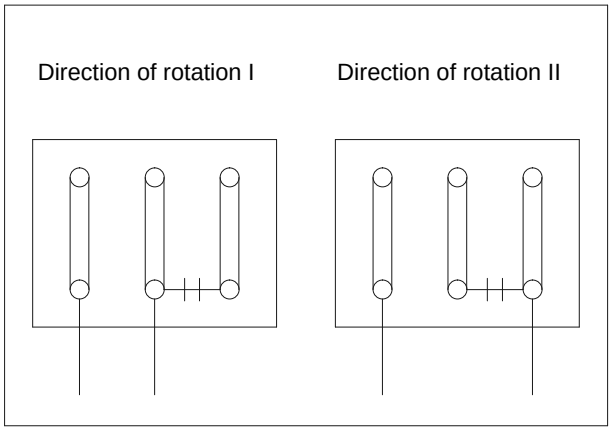
In all cases, particular care shall be taken to ensure that any burring, swarf etc. is carefully removed before assembly. The keyways should be lightly greased to prevent seizing. Hollow shafts to be fitted with shrink-disc connections must not be greased. The following installation instructions are to be noted here.

The eye bolt is to be retightened firmly if it has worked loose during transportation.

4 Electrical connection

When connecting the motor, take note of the rating plate information and the connection diagram as well as the relevant safety regulations and rules for the prevention of accidents.
Unless a special design is concerned, the rating data refer to ± 5% voltage tolerance, -20 to 40°C ambient temperature and altitudes up to 1000 m above sea level.
Small motors can be connected directly (the regulations of the local electricity supply companies are to 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 may generally only be changed after the motor has stopped and in accordance with the following diagram:

Geared motors with three phase cage rotors



Unless otherwise stated, the three phase motor is connected for the higher of the two rated voltages specified. The motor may have to be connected from star to delta at the terminal board, if necessary, to ensure that it complies with the mains voltage.

Specially designed motors (e.g. for two rated voltages in the ratio 1:2 or with pole-changing windings) are to be connected in accordance with the relevant circuit diagram.

Two mains leads must be swapped in the event of incorrect direction of rotation. When closing the terminal box, particular attention must be given to obtaining a perfect seal. With motors in sizes D/E 04 to D/E 09 with moulded terminal boxes, two connection openings each on side A and C are possible.

The cable entry openings required depending on the installation position should carefully pierced with a suitable tool. Take care not to damage the terminal board.

Two lock nuts and seals are provided in the terminal box for the cable glands (metric). Plugs must be screwed into unused cable entry holes.
The maximum spanner opening for the cable glands of the D04 is 24 mm and of the D05 to D09 is 29 mm.
To guarantee electromagnetic compatibility (EMC) as defined in EMC Directive 2004/108/EC, all signal lines must use shielded cables. The cable sheath is to be earthed at both ends. The frequency inverter operating instructions will indicate whether a shielded cable is necessary for the motor supply line. A shielded motor cable is not required when connecting to the low-voltage network or to a frequency inverter with an output filter. Signal cables and power cables should not be laid parallel over long distances.

5 Overload protection

A motor protection switch must be used to protect the winding against overloading and against the consequences of operating on only 2 mains leads (e.g. when only one fuse blows or in the event of a wire breakage)

Example	Motor winding for 230/400 V;	
	Rated currents	5.7/3.3 A
	Setting of the motor protection switch at	
	Connection for 230 V (delta):	5.7 A
	Connection for 400 V (star):	3.3 A

The overcurrent relay of the motor protection switch is to be set to the correct rated current intensity for the rated voltage concerned (see rating plate).

Take note of the relevant circuit diagram for motors with thermally activated winding protection (e.g. thermostats or thermistors).

Automatic restarting after the winding has cooled must be avoided in most applications.
The output of the motors is normally adequately rated, particularly in connection with four and multistage gear units. The rated current does not represent a measure of gear unit utilization in these cases and cannot be used as overload protection for the gear unit. In some cases, the way in which the driven machine is loaded can exclude any overloading as a matter of course. In other cases it is prudent to protect the gear unit by mechanical means (e.g. slip clutch, sliding hub etc.). The maximum permissible limit torque M_2 in continuous running duty specified on the rating plate is decisive here.

6 Lubricant changes

The gear units are supplied with lubricant ready for operation.

In normal operating conditions and with a lubricant temperature of approximately 80° C, the oil should be replaced after approximately 15000 operating hours when using CLP 220, or after 25000 operating hours when using PGLP 220/PGLP 460. The lubrication interval must be reduced at higher temperatures (halve it for each 10 K increase in the lubricant temperature).

The lubricant must be changed after 2 or 3 years at the latest whatever the operating hours.

The medium and larger gear units have filling plugs and drain plugs. In the standard designs, these make it possible to change the lubricant without disassembly.
With smaller gear units, the interior is accessed by unscrewing the connecting bolts. Alignment pins and centrings secure the precise assembly.

Geared motors with three phase cage rotors

Worm-gear units are sliding gear units whose tooth flanks, contrary to rolled gear units, only become smooth once run in. They should therefore initially be run in under partial loading (about $^2/_3$ of the rated load) until the full load capacity of the flanks and the optimal efficiency is achieved. After approximately 200 operating hours, the lubricant should be changed and the gear unit enclosure thoroughly flushed, so that the minimal, but inevitable amount of material removed by smoothing abrasion is cleared.

It is also necessary to flush the gear unit enclosure if the lubricant grade or lubricant type is changed.
If the motor is only used briefly it is sufficient to drain off the original oil and use the original lubricant type to refill the maximum possible amount for the gear unit as defined in the lubricant volume table. Then operate the drive unit briefly under no load, drain this oil off again and refill with the new lubricant as defined on the rating plate. In special cases, refill up to the oil level mark.

If necessary, drain off the original lubricant and flush out the gear unit with petroleum until all traces have been washed out. Then perform the procedure described above for short-term operation twice before filling with the specified volume of new lubricant in accordance with the rating plate, in special cases up to the oil level mark.

It is advisable to inspect and if necessary replace the wear parts (bearings and seals) when changing the lubricant.

7 Lubricant grade

Oils CLP 220, PGLP 220 and PGLP 460 complying with DIN 51502 and DIN 51517 are suitable for lubricating the gear unit, or in special cases use soft flow grease GLP 00f with good EP properties.

The lubricant must permit low-friction, virtually wear-free continuous operation. The damage load level on the FZG test as specified in DIN 51354 shall be in excess of load level 12, and the specific wear below 0.27 mg/kWh. The lubricant should not foam, should protect against corrosion and should not attack the interior paint, the rolling contact bearings, gearwheels and seals.

Lubricants of different types may not be mixed, as otherwise the lubrication characteristics may be impaired. A long service life is only ensured by the use of a lubricant listed below or which is demonstrably equivalent. The original lubricant can also be supplied in small amounts (5 and 10 kg) from the factory.

Should geared motors need to be stored for a longer period of time before installation, please observe the chapter „Information on the storage of geared motors with cage rotors“

Wear-protecting EP gear lubricant oils as listed in the lubricant table below have proved particularly suitable.

Geared motors with three phase cage rotors

	Lubricant type				
	Mineral oil	Synthetic oil			USDA H1 oil
	ISO VG 220	ISO VG 68	ISO VG 220	ISO VG 460	ISO VG 220
Disposal No.	ASN13 02 05	ASN 13 02 06	ASN 13 02 06	ASN 13 02 06	
Lubricant manufacturer	Standard oil for gear units of type series **BF06-BF90 BG04-BG100 BK06-BK90**	Low temperature oil for gear units of type series **BF06-BF90 BG04-BG100 BK60-BK90** **BS02-BS40**	Standard oil for gear units of type series **BS02-BS10 BK06-BK10** High temperature oil for gear units of type series **BS02-BS10 BK06-BK10 BF06-BF90 BG04-BG100 BK60-BK90**	Standard oil for gear units of type series **BS20-BS40 BK20-BK50** High temperature oil for gear units of type series	Foodstuffs industryoil of type series **BF06-BF90 BG04-BG100 BK06-BK90** **BS02-BS40**
AGIP	BLASIA 220				
ARAL	DEGOL BMB220 DEGOL BG220		DEGOL GS220	DEGOL GS460	
BECHEM RHUS	STAROIL SMO220				
BP	ENERGOL GR-XP220		ENERSYN SG-XP 220	ENERSYN SG-XP 460	
CASTROL	ALPHA SP 220 ALPHA BMB 220 OPTIGEAR BM 220 TRIBOL 1100/220		ALPHASYN PG 220 TRIBOL 800/220 ALPHASYN GS 220	ALPHASYN PG 460 TRIBOL 800/460 ALPHASYN 460	CASTROL OPTILEB GT 220 CASTOL TRIBOL FOODFROOF 1800/220
ESSO	see MOBIL				
FUCHS	RENOLIN CLP 220 RENOLIN CLPF 220 SUPER	RENOLIN PG 68	RENOLIN PG 220	RENOLIN PG 460	
KLÜBER	KLÜBEROIL GEM 1-220 N	KLÜBERSYNTH GH6-80	KLÜBERSYNTH GH6-220	KLÜBERSYNTH GH6-460	KLÜBEROIL 4UH1-220N KLÜBERSYNTH UH1 6-220
MOBIL	MOBILGEAR 600 XP 220 MOBILUBE HD PLUS 80W-90		GLYGOYLE 220 GLYGOYLE 30	GLYGOYLE 460	
OEST	Gearol C-LP 220				
OPTIMOL	OPTIGEAR 220		OPTIFLEX A 220	OPTIFLEX A 460	OPTILEB GT 220
SHELL	OMALA S2 G220 FALCON CLP 220		OMALA S4 WE 220	OMALA S4 WE 460	CASSIDA FLUID GL 220
TEXACO	GEARTEX EP-A SAE 85W-90				
TOTAL	CARTER EP 220				NEVASTANE SL220
WINTERSHALL	SRS ERSOLAN 220				

Attention:
Synthetic gear oils with a polyglycol base (e.g. PGLP etc) must be kept separate from mineral oils and disposed of as special waste.

As long as the ambient temperature does not fall below -20° C, ISO viscosity grade VG 220 (SAE 90) is recommended in accordance with the international definition of viscosity grades at 40° C in accordance with ISO 3448 and DIN 51519, and AGMA 5 EP in North America.

Geared motors with three phase cage rotors

For lower ambient temperatures, oils of a lower nominal viscosity, with correspondingly better starting characteristics should be used, such as PGLP with a nominal viscosity of VG 68 (SAE 80) or AGMA 2 EP. These grades may also be required at temperatures around the freezing point if the drive unit's breakaway torque has been reduced with a view to achieving soft starting or if the motor has a relatively low power output.

9 Lubricant volume

The recommended lubricant quantity for the particular style is indicated on the rating plate of the motor (symbol). When filling, make certain that the upper gear unit components, depending upon the installation position, are also well lubricated. The oil level mark should be taken into consideration in special cases. Information about the lubricant volume required for other styles construction can be obtained from the works.

10 Disposal

The metallic parts of the gear unit and the geared motor can be disposed of as scrap, segregated into steel, iron, aluminium and copper.
The lubricants used are to be disposed of as waste oil, and the synthetic oils are to disposed of as special waste.
Information on this can be found on the lubrication chart or the rating plate.

11 Bearing lubrication for large geared motors

The lubrication periods for rolling contact bearings on the input shaft vary depending on type of storage, temperature, speed, loading etc.

On the larger gear units, therefore, input parts SN 70 to SN 90 and KB 70 to KB 90 are provided with a lubrication device for the input shaft. Each bearing has its own lubrication point (lubricating nipple).
The maximum permissible speed is 1800 rpm. The required lubrication period is 2000 operating hours or 6 months whichever is soonest.
With lubrication intervals up to half a year, the grease filling in the bearing can be supplemented at intervals of 1000 operating hours by periodically adding fresh grease. The complete grease filling must, however, be replaced after three grease top-ups at the latest.
The grease top-up is approximately 30 g, however three times this quantity will be required (approximately 90g) when replacing the grease. When this is done, the surplus used grease should also be removed from the grease outlet chamber.
KLÜBER PETAMO GHY 133 N shall be used as the lubricant.

Geared motors with three phase cage rotors

12 Bearing lubrication for small geared motors (motor size less than or equal to IEC 200)

With smaller and middle sized gear units, the input components/motor components are designed with enclosed ball bearings.

An input speed of 1500 rpm results in a lubrication interval of 10000 operating hours. The maximum permissible speed is 3600 rpm. The lubrication interval is halved in this case. The lubricant change is to be carried out here when the bearings are replaced in the context of maintenance/monitoring of the rotary shaft seals. Cleaning and lubrication of the bearings is not recommended due to the risk of contamination.

Operating problems: Gear unit

Failure	Possible causes	Remedy
Oil leakage at: • output shaft sealing • motor shaft sealing • Gearbox cover • Motor flange	• Shaft seal defective • Excess pressure in gear unit	• Change shaft sealing • Excess pressure function check breather valve • Contact Bauer Service
• Gear box output shaft does not turn although motor is switched on.	• Interruption of movement chain	• Contact Bauer Service

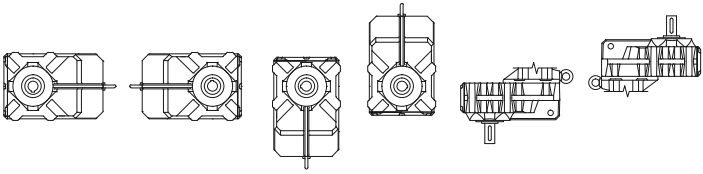
Operating problems: Motor

Failure	Possible causes	Remedy
• Output shaft is turning in the wrong direction	• Motor connection wrong	• Change 2 phases with each other
• Motor gets too hot	• Bad ventilation of the motor • Motor runs against a closed brake	• Check ventilation system • Clean surface of motor (packing of dust) • Check brake function • Contact Bauer Service
• Brake failure	• Brake is not lifting • Friction partner worn out	• Check brake lift voltage • Change friction partner • Contact Bauer Service

Lubricants

Lubrication quantity series BF

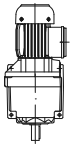
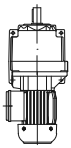
Lubrication quantity in l



Gear type	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

Lubricants

Lubrication quantity for BG20-01R

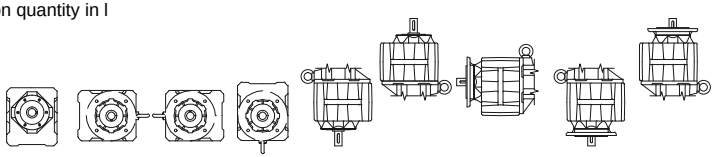
Gear type	Lubrication quantity in l					
						
	H4	H1	H2	H3	V5	V6
BG20-01R	0.8	1.0	0.8	1.4	1.65	1.0

Lubricants

Lubrication quantity series BG

Lubrication quantity in l

Gearbox type



BG04-BG100 (gear-housing with flange or foot)

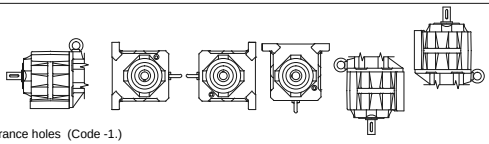
Flange (Code-2./Code-3./Code-4./Code-7.)
Foot with threads (Code-6.)

Foot with clearance holes (Code-9.)
[Completely machined (Code -8.)]

	H4	H1	H2	H3	H5	H6	B5	V1	V3

BG04-BG100

(Gearbox housing)



cast-on-foot with clearance holes (Code -1.)

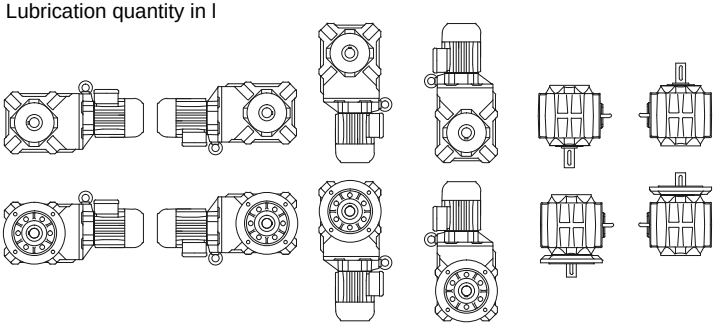
		B3	B6	B7	B8	V5	V6			
BG04	*	-	0.03	0.03	0.03	-	-	0.03	0.05	0.05
	**	0.05	0.05	0.05	0.05	0.1	0.05	-	-	-
BG05	*	-	0.05	0.05	0.05	-	-	0.05	0.08	0.08
	**	0.08	0.08	0.08	0.08	0.16	0.08	-	-	-
BG06	*	-	0.08	0.08	0.08	-	-	0.08	0.15	0.15
	**	0.12	0.12	0.12	0.12	0.24	0.15	-	-	-
BG10	*	0.65	0.65	0.65	0.85	1.05	0.85	0.65	1.05	0.85
	**	0.45	0.45	0.45	0.6	0.75	0.6	-	-	-
BG15	**	0.4	0.4	0.4	0.35	0.62	0.55	-	-	-
BG20	*	0.8	0.8	0.8	1.1	1.4	1.1	0.8	1.4	1.1
	**	0.6	0.6	0.6	1.0	1.15	0.9	-	-	-
BG30	*	1.0	1.0	1.0	1.7	2.2	1.6	1.0	2.2	1.6
	**	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
	**	1.7	1.7	1.7	2.5	3.5	2.1	-	-	-
BG50	*	3.0	3.0	3.0	4.5	5.5	3.3	3.0	5.5	3.3
	**	3.0	3.0	3.0	4.5	5.5	3.3	-	-	-
BG60	*	5.5	5.5	5.5	7.0	10.9	6.4	5.5	10.9	6.4
	**	5.5	5.5	5.5	7.0	10.9	6.4	-	-	-
BG70		6.5	6.5	6.5	8.0	13.5	9.0	6.5	13.5	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	55.0	50.0	66.0	50.0	35.0	66.0	50.0

* Attachment housing ** Gearbox housing

Lubricants

Lubrication quantity series BK

Lubrication quantity in l

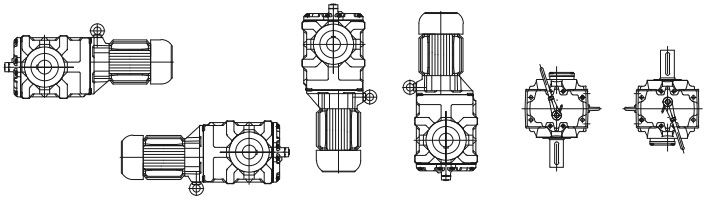


Gear box type	H1	H2	H3	H4	V1	V2
BK06	0.15	0.23	0.29	0.31	0.18	0.23
BK10	0.83	0.83	0.92	1.75	0.92	0.92
BK20	1.5	1.5	1.6	2.9	1.65	1.65
BK30	2.2	2.2	2.3	4.4	2.4	2.4
BK40	3.5	3.5	3.5	6.7	3.7	3.7
BK50	5.8	5.8	5.8	11.5	6.0	6.0
BK60	6.0	8.7	6.9	12.0	8.6	8.6
BK70	10.2	15.0	11.5	20.5	13.5	14.5
BK80	18.0	25.5	19.0	37.0	23.5	25.5
BK90	33.0	48.0	36.0	69.0	45.0	48.0

Lubricants

Lubrication quantity series BM

Lubrication quantity in l



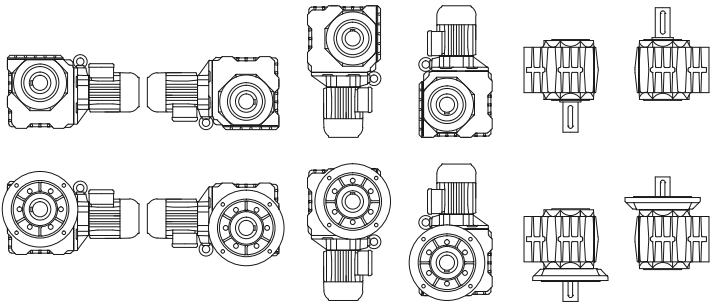
Gearbox type	H1	H2	H3	H4	V1	V2
BM09	0.5				0.45	0.7
BM10	0.65				0.8	1.3
BM20	0.7				1.0	1.4
BM30	1.2 1.8*				2.4	2.4
BM30/S1	1.2 1.8*	on request			2.4	2.4
BM30/S2	1.3 1.9*				2.7	2.4
BM40	2.5 3.2*				3.0	3.5
BM40/S1	2.5 3.2*				3.0	3.5
BM40/S2	2.6 3.3*				3.3	3.5

*: Lubrication quantity für BM30Z/BM40Z
Caution: if * is shown the lubrication quantity of the pre-stage is filled into the main gear.

Lubricants

Lubrication quantity series BS

Lubrication quantity in l

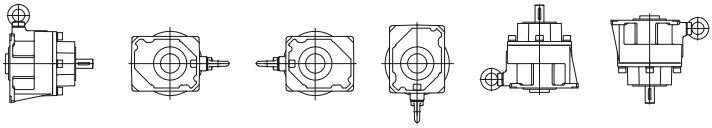


Gear type	H1	H2	H3	H4	V1	V2
BS02	0.06	0.06	0.06	0.06	0.06	0.06
BS03	0.17	0.17	0.17	0.17	0.17	0.17
BS04	0.11	0.17	0.11	0.2	0.11	0.11
BS06	0.24	0.36	0.24	0.45	0.24	0.24
BS10	0.9	1.3	0.9	1.6	0.9	0.9
BS20	1.5	2.1	1.5	2.7	1.5	1.5
BS30	2.2	3.0	2.2	3.8	2.2	2.2
BS40	3.5	4.7	3.5	6.0	3.5	3.5

Lubricants

Lubrication quantity for gear design with free running input shaft

Lubrication quantity in kg



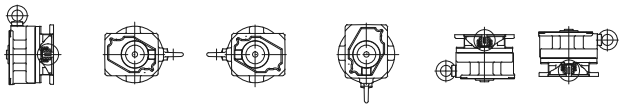
BG / BF	B3 H4 B5	B6 H1	B7 H2	B8 H3	V5 V1	V6 V3 V2
BK / BS	H1	V1	V2	H2	H4	H3

Gear type	
BK06-SN / BS06-SN	2-Z-bearing grease lubricated, sealed for life non regreasable
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	
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	grease lubrication for subsequent lubrication regreasable: (PETAMO GHY133N)

Lubricants

Lubrication quantity for coupling lantern

Lubrication quantity in kg

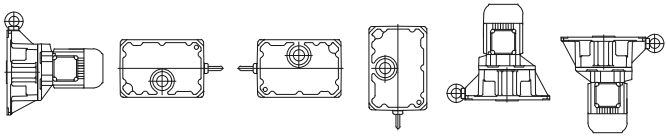


BG / BF	B3 H4 B5	B6 H1	B7 H2	B8 H3	V5 V1	V6 V3 V2
BK / BS	H1	V1	V2	H2	H4	H3
Gear type						
BK06-K / BS06-K BG10-BG10Z-K BG20-BG20Z-K BF10-BF10Z-K BF20-BF20Z-K BK10-BK10Z-K BK20-BK20Z-K BS10-BS10Z-K BS20-BS20Z-K BG30-BG30Z-K BG40-BG40Z-K BF30-BF30Z-K BF40-BF40Z-K BK30-BK30Z-K BK40-BK40Z-K BS30-BS30Z-K BS40-BS40Z-K BG50-BG50Z-K BG60-BG60Z-K BF50-BF50Z-K BF60-BF60Z-K BK50-BK50Z-K BK60-BK60Z-K BG70-K BG80-K BF70-K BF80-K BK70-K BK80-K BG90-BG90Z-K BG100-K BF90-K BK90-BK90Z-K BG70Z-K BF70Z-K BK70Z-K BG80Z-K BF80Z-K BK80Z-K BG100Z-K BF90Z-K up to IEC200 or up to Nema284/286TC	2-Z-bearing grease lubricated, sealed for life non regreasable					
BG70-K BK70-K BF70-K BG80-K BK80-K BF80-K BG90-BG90Z-K BK90-BK90Z-K BF90-K BG100-K only from IEC225 up only from Nema324/326TC up	grease lubrication for subsequent lubrication regreasable: (PETAMO GHY133N)					

Lubricants

Lubrication quantity for pre-stage

Lubrication quantity in l



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

Gear type						
BG10Z BF10Z BK10Z BS10Z	0.10	0.05	0.12	0.07	0.16	0.07
BG20Z BF20Z BK20Z BS20Z	0.15	0.07	0.19	0.17	0.27	0.10
BG30Z BF30Z BK30Z BS30Z BM30Z	0.2*	0.10	0.35	0.22	0.35	0.19
BG40Z BF40Z BK40Z BS40Z BM40Z	0.32*	0.17	0.50	0.37	0.6	0.32
BG50Z BF50Z BK50Z	0.5	0.3	0.92	0.7	1.15	0.5
BG60Z BF60Z BK60Z	0.9	0.5	1.55	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	4.0	2.6	5.2	2.0
BG90Z BK90Z	4.2	1.5	5.4	3.5	7.7	3.0

*: The lubricant of the pre-stage for BM30Z/BM40Z is filled in the main gearbox.

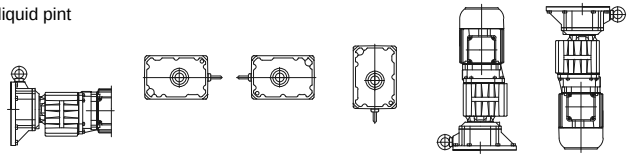
Lubricants

Lubrication quantity for intermediate gear

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

Lubrication quantity in liquid pint



Mounting position of main gearbox								
	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	
Standard position of KLK mounting position H1,H2,H3, B5,V1,V3 for mounting with screwed resp. casted flange		B5	H1	H2	H3	V1	V3	
Type designation of double gearbox combination								
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	

Brakes

Spring-loaded brakes with direct current solenoid release Models E003B and E004B

1 Safety information

Connection, adjusting and maintenance work may only be carried out taking into account the safety information given on pages 3/4.

2 General information

In addition to holding loads in the idle state, the spring-loaded brake slows rotating and linear moving masses, thus reducing unwanted overtravel distances and times.
The brake is released electromagnetically. Under zero-load conditions, braking force is applied by spring pressure. Because braking is still effective even if an accidental power failure occurs, it can be considered a safety brake within the context of accident prevention regulations.
During the braking process, the kinetic energy of the mass moments of inertia is converted into heat via the brake disc. The brake disc, which consists of high-quality, asbestos-free material, is highly resistant to wear and heat. A certain amount of wear is unavoidable, however. For this reason, the limit values specified in paragraph 8 regarding the working capacity and the minimum lining thickness are to be strictly observed.

3 Operating principle

The operating principle is described in Figure 1.

3.1 Brakes

The brake disc (1) is pressed axially through the retaining plate (2) against the friction plate (4) by springs (3). Radial movement of the retaining plate is prevented by the fillister screws (5). The braking torque is transferred to the rotor via gear teeth connecting the brake disc and the carrier (6) fixed to the shaft. The braking torque and the number of springs can be changed in stages (see paragraph 6).

3.2 Brake release

Supplying the coil (7) with the correct DC voltage causes the retaining disc to be attracted by the magnetic field generated in the magnet housing (8) against the spring force. This relieves the brake disc and as a result allows the rotor to move freely.
The increased air gap s_L caused by the wear to the brake discs can be overcome thanks to the generous dimensioning of the electromagnets. No adjustment facility is hence provided.
All brakes can be optionally fitted with either a latching or non-latching manual release, which may be used to release the brake manually e.g. in the event of a power failure.

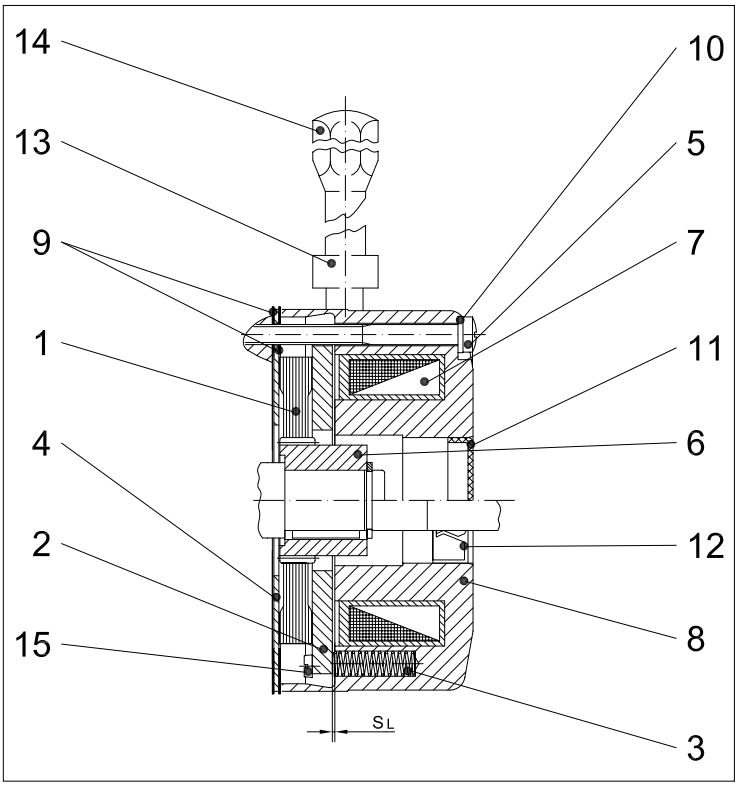


Figure 1: Spring-loaded brake from the series E003B and E004B

4 Electrical connection

4.1 General information

There are 2 different options for the voltage supply of the DC solenoid:
1. Externally from an existing DC control power supply, or from a rectifier in the control cabinet.
2. From a rectifier built into the motor terminal box or brake terminal box.
In this instance, the rectifier can be supplied either directly from the motor terminal board or from the mains.
In the following instances, the rectifier must not however be connected to the motor terminal board:

- Pole-changing motors and wide range motors
- Operation with frequency converter
- Other designs in which the motor voltage is not constant, e.g. operation on smooth-start equipment, starting transformers, ...

4.1.1 Brake release

If the solenoid is energised using nominal voltage, the coil current and the magnetic field build up follow an exponential function. Only when the power has achieved a specific value (I_{Rel}) is the spring force overcome and the brake begins to release.

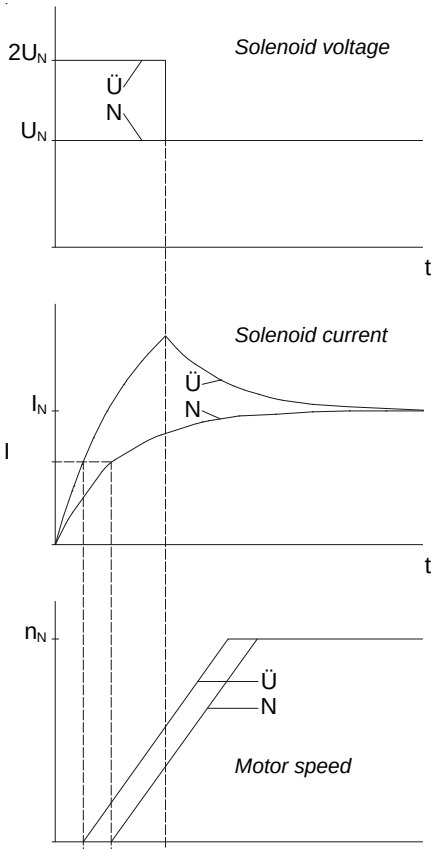


Figure 2: Solenoid voltage, solenoid current and motor speed development at normal excitation (N) and overexcitation (Ü).
$t_Ü$: overexcitation period; t_{AN}, $t_{AÜ}$: response times at normal excitation and overexcitation

Two different cases can occur during response time t_A, assuming the power is supplied to the motor and the brake at the same time:

- Motor is blocked - condition: $M_A < M_L + M_{Br}$
  The motor takes the inrush current and is thereby subjected to additional thermal loading.
  This scenario is shown in Figure 2.
- Motor tears away from brake - condition: $M_A > M_L + M_{Br}$
  At the start, the brake is subject to thermal loading and wears more rapidly.

M_A: starting torque of the motor, M_L: load torque, M_{Br}: braking torque

In both scenarios, the motor and brake are therefore subjected to additional loading. The response time becomes noticeably longer as the size of the brakes increases. A reduction in response time is therefore especially recommended for medium and large-sized brakes as well as with a high frequency of braking operations. A relatively simple electrical solution is possible using the principle of ‚overexcitation'. In this instance, the solenoid is briefly supplied with twice the nominal voltage when switched on.
The response time is decreased to approximately half by comparison with 'normal excitation' as a result of the associated steeper rise of the current. This overexcitation function is integrated in the MSG special rectifier (see section brake connection).
As the air gap gets larger, the release current and therefore the response time increase. As soon as the release current exceeds the nominal coil current, the brake no longer releases during normal excitation and the brake disc wear limit is reached.

4.1.2 Braking

The braking torque is not effective immediately after the power supply to the solenoid is switched off. Firstly, the magnetic energy has to reduce until the spring force can overcome the magnetic force. This occurs at holding amperage I_{Hold} which is far smaller than the release current. Dependent on the circuit design, different response times result.

4.1.2.1 Switching off the AC supply of the standard rectifier SG

a) Rectifier supply from the motor terminal board (Figure 3, graph 1)
   Response time t_{A1}: very long
   Cause: after the motor voltage is switched off, the remanence of the motor induces a slowly decaying voltage which continues to supply the rectifier and thus the brake. The magnetic energy of the brake solenoid declines relatively slowly through the freewheeling circuit of the rectifier.

b) Separate rectifier supply (Figure 3, graph 2)
Response time t_{A2}: long
Cause: after the rectifier voltage is switched off, the magnetic energy of the brake solenoid declines relatively slowly through the freewheeling circuit of the rectifier.

No significant shut-off voltages arise on the solenoid during an AC interruption.

4.1.2.2 Interruption in the DC switching circuit of the solenoid (Figure 3, graph 3)

a) By mechanical switch
- for separate supply from a DC control network or
- at the DC switching contacts (A2, A3) of the standard rectifier
Response time t_{A3}: very short
Cause: The magnetic energy of the brake solenoid is rapidly reduced by the arc developing at the switch.

b) Electronically
By use of a special rectifier, type ESG or MSG
Response time t_{A3}: short
Cause: the magnetic energy of the brake solenoid is reduced rapidly by a varistor integrated in the rectifier.

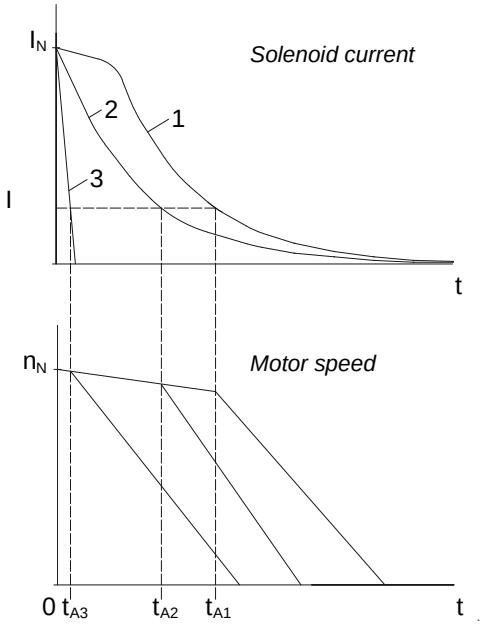


Figure 3: Development of the solenoid current and the motor speed after AC (1, 2) and DC (3) disconnection

With a DC interruption, voltage spikes u_q are induced through the solenoid the height of which depends on the following relationship between the self-inductance L of the coil and the cut-off speed di/dt:

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

As a consequence of the winding design, inductivity L increases as the solenoid rated voltage increases. With higher solenoid voltages, the cut-off voltage spikes may therefore be dangerously high. All brakes for voltages in excess of 24 V are therefore connected with a varistor.
The varistor serves only to protect the solenoid and not as protection for the surrounding electronic components and devices against electromagnetic compatibility interference.
On request, brakes for voltages of less than or equal to 24 V can also be produced with varistors.

If the direct current interruption is produced by a mechanical switch, high levels of burn down are caused by the arc produced on the switch contacts. Only special DC direct current contactors or adapted AC alternating current contactors can be used with contacts of usage category AC3 as defined in EN 60947-4-1.

5 Fitting

Generally, the spring-loaded brakes are mounted ready for operation on the motor. Proceed as follows for retrofitting (see Figure 1):

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

5.2 Push friction plate (4) with both seals (9) and brake disc (1) onto the carrier manually. Ensure that the gearing moves easily.
Do not damage !
Observe the correct installation position of the friction plate (4):Side with engraved marking "Reibseite" (friction side) facing toward brake disc (1).

5.3 Secure the brake (4) using the fillister screws (5) and the USIT rings (10) over the friction plate and both seals (9) on the end shield of the motor. Observe starting 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 Setting the braking torque

Different braking torques can be obtained with a different spring configuration in the magnet housing (see paragraph 8).
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 Figure 1):

6.1 Remove brake from the motor end shield.

6.2 Remove fastening screws (5).

6.3 Unscrew the shoulder screws (15) from the magnet housing (8) and remove the retaining plate (2).

Attention:
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.

6.4 Insert springs (3) according to desired braking torque (see paragraph 8).

Attention:
The springs should be arranged **symmetrically**.

6.5 Place the retaining plate (2) on the magnet housing (8) or springs (3) (observe installation position, if necessary use fastening screws (5) as centring assistance), press the retaining plate down against the spring force and screw in the shoulder screws (15) to the stop.

6.6 Secure the brake using the fastening screws (5) and USIT rings (10) above the friction plate (4) and both seals (9) on the end shield of the motor. Observe starting torque, $M_A = 2.5$ Nm.

7 Maintenance

The E003B and E004B brakes are to a large extent maintenance-free, since a very long service life is obtained by the durable and wear resistant brake discs. However, if the brake disc becomes worn due to high total friction 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. This must not fall below the limit value indicated in paragraph 8.
Procedure for checking the state of wear and for replacing the brake disc (see Figure 1)

7.1 Remove brake from the motor end shield.
7.2 Remove fastening screws (5).
7.3 Clean brake. Remove abrasion material using compressed air.
7.4 Remove brake disc (1) from the carrier (6).
7.5 Measure the thickness of the brake disc. At the latest, the brake disc is to be replaced when it reaches the minimum thickness indicated in paragraph 8
7.6 Check retaining plate (2) for wear and parallelism (there should be no significant grooving). Replace retaining plate if necessary (proceed as described in paragraph 6.3 and 6.5).
7.7 Push brake disc (1) onto carrier (6) and check for radial play. If there is increased play in the gear teeth between the carrier and brake disc, the carrier must be removed from the shaft and replaced.
7.8 Secure the brake using the fastening screws (5) and USIT rings (10) over the friction plate (4) and both seals (9) on the end shield of the motor. Observe starting torque M_A = 2.5 Nm.

8 Technical data

Type	M_N [Nm]	NS	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 red	2,5	60	50	37	125	15	5,87	30
E004B8	4	4x grey	3	60	100	30	160	18	5,75	30
E004B6	2,8	4x yellow	3,6	60	180	23	230	26	5,55	30
E004B4	2	2x grey	4,1	60	235	18	290	37	5,4	30
E004B2	1,4	2x yellow	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 run in for a certain period and may then deviate by approximately -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 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 [kgm ^{2}] of the overall system related to the motor shaft
n - motor speed [rpm] which is to be braked

W_{th} Maximum permissible switching energy per hour

W_L Maximum permissible switching until replacement of the brake disc

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

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

t_{DC} Response time when braking with direct current interruption by mechanical circuit breaker.
Electronic direct-current interruption by a special rectifier (type ESG or MSG) results in response times that are approximately twice as long.

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

d_{min} Minimum permissible thickness of the brake disc

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

1 Safety information

Connection, adjusting and maintenance work may only be carried out taking into account the safety information on pages 3/4.

2 General information

In addition to holding loads in the idle state, the spring-loaded brake slows rotating and linear moving masses, thus reducing unwanted overtravel distances and times.
The brake is released electromagnetically. In the de-energized state, braking force is applied by spring pressure. Because the retardation effect is still effective even if an unforeseen power failure occurs, it can be considered to be a safety brake within the context of accident prevention regulations.
During the braking process, the kinetic energy of the mass moments of inertia is transformed into heat via the brake discs. The brake discs consist of high-quality, asbestos-free material and are particularly resistant to abrasion and heat. A certain amount of wear is, however, unavoidable. For this reason, the limit values specified in paragraph 9 regarding the working capacity and the minimum lining thickness are to be strictly observed.

2.1 Brake mounting

ES and ESX: Brake mounting is under the fan cover
EH and EHX: Brake mounting is on the fan cover

3 Operating principle

The operating principle is explained using the twin-disc spring-loaded brake shown in Figure 1 (series Z).

3.1 Braking

The brake discs (1) are pressed through pressure plate (2) by springs (3) axially against intermediate plate (4) and centring flange (5). A radial movement of the pressure plate and the intermediate plate is prevented by parallel pins (6). The braking torque is transferred to the rotor via gear teeth connecting the brake discs and the carrier (7) fixed to the shaft. The braking torque can be modified in stages by increasing or decreasing the number of springs (see paragraph 7).

3.2 Brake release

Supplying the coil (8) with the correct DC voltage causes the pressure plate to be attracted by the magnetic field generated in the magnet housing (9) against the spring force. The rotor can thus move freely as a result of the force being relieved from the brake discs.
The increased air gap s_L caused by the wear to the brake discs can be overcome thanks to the generous dimensioning of the electromagnets. No adjustment facility is hence provided.
E series single-disc spring-loaded brakes are similar to the double-disc brake described here in their design and function. The absence of the intermediate plate and one brake disc constitute the difference.

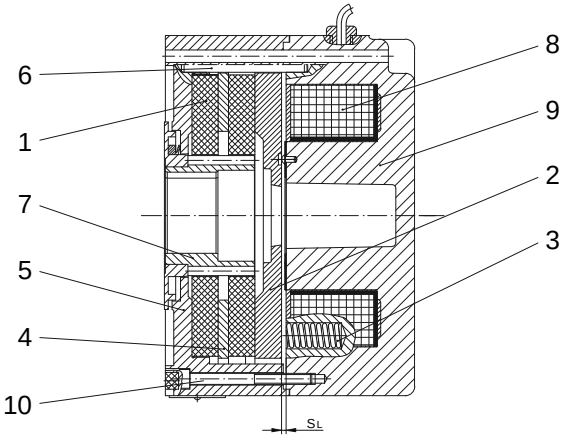


Figure 1: Z.. series double-disc spring-loaded brakes

3.3 Further design options

Starting from the variant shown in Figure 1, all brakes can be additionally equipped with the following options:

- Terminal box
  Contains either a rectifier or a terminal, according to whether the power is supplied from an AC source or directly from a DC source.
- Manual release, latching/non-latching
  Allows the brake to be released mechanically, e.g. in the event of a power failure (see section manual release spring loaded brake with direct current solenoid models E../Z..008B, Z..015B, E../Z..075B,Z100B).

4 Electrical connection

4.1 General information

There are 2 different options for the voltage supply of the DC solenoid:
1. Externally from an existing DC control power supply, or from a rectifier in the control cabinet.
2. From a rectifier built into the motor terminal box or brake terminal box.
In this instance, the rectifier can be supplied either directly from the motor terminal board or from the mains.
In the following instances, the rectifier must not however be connected to the motor terminal board:

- Pole-changing motors and wide range motors
- Operation with frequency converter
- Other designs in which the motor voltage is not constant, e.g. operation on smooth-start equipment, starting transformers, ...

4.1.1 Brake release

If the solenoid is energised using nominal voltage, the coil current and the magnetic field build up follow an exponential function. Only when the power has achieved a specific value (I_{Rel}) is the spring force overcome and the brake begins to release.

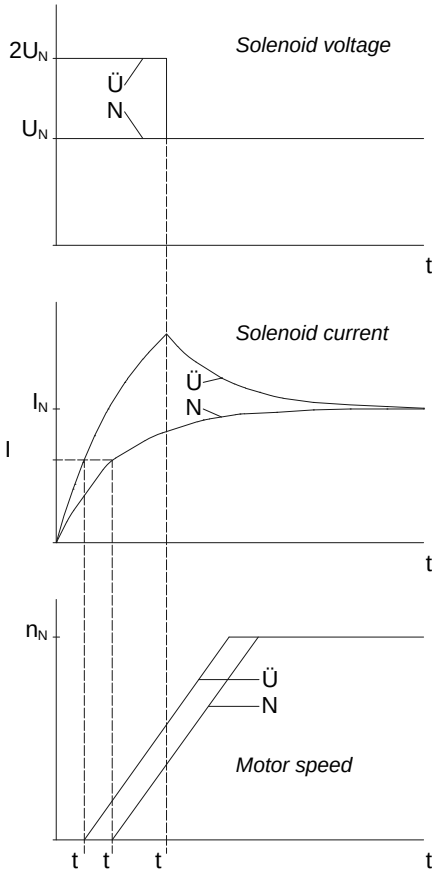


Figure 2: Solenoid voltage, solenoid current and motor speed development at normal excitation (N) and overexcitation (Ü).
$t_Ü$: overexcitation period; t_{AN}, $t_{AÜ}$: response times at normal excitation and overexcitation

Two different cases can occur during response time t_A, assuming the power is supplied to the motor and the brake at the same time:

- Motor is blocked - condition: $M_A < M_L + M_{Br}$
  The motor takes the inrush current and is thereby subjected to additional thermal loading.
  This scenario is shown in Figure 2.
- Motor tears away from brake - condition: $M_A > M_L + M_{Br}$
  At the start, the brake is subject to thermal loading and wears more rapidly.

M_A: starting torque of the motor, M_L: load torque, M_{Br}: braking torque

In both scenarios, the motor and brake are therefore subjected to additional loading. The response time becomes noticeably longer as the size of the brakes increases. A reduction in response time is therefore especially recommended for medium and large-sized brakes as well as with a high frequency of braking operations. A relatively simple electrical solution is possible using the principle of ‚overexcitation'. In this instance, the solenoid is briefly supplied with twice the nominal voltage when switched on.
The response time is decreased to approximately half by comparison with 'normal excitation' as a result of the associated steeper rise of the current. This overexcitation function is integrated in the MSG special rectifier (see brake connection).
As the air gap gets larger, the release current and therefore the response time increase. As soon as the release current exceeds the nominal coil current, the brake no longer releases during normal excitation and the brake disc wear limit is reached.

4.1.2 Braking

The braking torque is not effective immediately after the power supply to the solenoid is switched off. Firstly, the magnetic energy has to reduce until the spring force can overcome the magnetic force. This occurs at holding amperage I_{Hold} which is far smaller than the release current. Dependent on the circuit design, different response times result.

4.1.2.1 Switching off the AC supply of the standard rectifier SG

a) Rectifier supply from the motor terminal board (Figure 3, graph 1)Response time t_{A1}: very long
   Cause: after the motor voltage is switched off, the remanence of the motor induces a slowly decaying voltage which continues to supply the rectifier and thus the brake. The magnetic energy of the brake solenoid declines relatively slowly through the freewheeling circuit of the rectifier.

b) Separate rectifier supply (Figure 3, graph 2)
Response time t_{A2}: long
Cause: after the rectifier voltage is switched off, the magnetic energy of the brake solenoid declines relatively slowly through the freewheeling circuit of the rectifier.

No significant shut-off voltages arise on the solenoid during an AC interruption.

4.1.2.2 Interruption in the DC switching circuit of the solenoid (Figure 3, graph 3)

a) By mechanical switch
- for separate supply from a DC control network or
- at the DC switching contacts (A2, A3) of the standard rectifier
Response time t_{A3}: very short
Cause: The magnetic energy of the brake solenoid is rapidly reduced by the arc developing at the switch.

b) Electronically
By use of a special rectifier, type ESG or MSG
Response time t_{A3}: short
Cause: the magnetic energy of the brake solenoid is reduced rapidly by a varistor integrated in the rectifier.

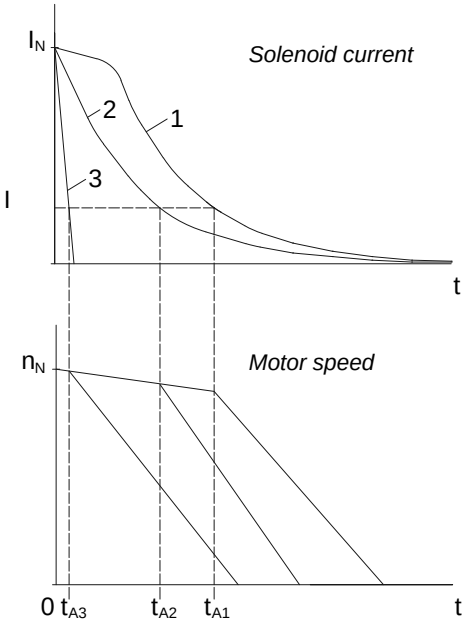


Figure 3: Development of the solenoid current and the motor speed after AC (1, 2) and DC (3) disconnection

With a DC interruption, voltage spikes u_q are induced through the solenoid the height of which depends on the following relationship between the self-inductance L of the coil and the cut-off speed di/dt:

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

As a consequence of the winding design, inductivity L increases as the solenoid rated voltage increases. With higher solenoid voltages, the cut-off voltage spikes may therefore be dangerously high. All brakes for voltages in excess of 24V are therefore connected with a varistor.
The varistor serves only to protect the solenoid and not as protection for the surrounding electronic components and devices against electromagnetic compatibility interference.
On request, brakes for voltages of less than or equal to 24 V can also be produced with varistors.

If the direct current interruption is produced by a mechanical switch, high levels of burn down are caused by the arc produced on the switch contacts. Only special DC direct current contactors or adapted AC alternating current contactors can be used with contacts of usage category AC3 as defined in EN 60947-4-1.

5 Fitting

Generally, the spring-loaded brakes are installed ready for operation on the motor.
If they are to be retrofitted, first heat the carrier (7 in Figure 1) to approximately 80° C and push it onto the extended shaft extension of the rotor.
The brake can now be pushed on and fastened by tapping softly onto the centring carrier on the fan cowl or onto the end shield of the motor. The fastening screws are to be secured against loosening by suitable washers.
The brake is ready for operation once the electrical connection has been made.

6 Air gap

The wear arising in the course of operation on the brake discs only results the air gap increasing and not in any substantial reduction of the braking torque.
When the air gap increases, slightly higher response times are to be expected on brake release.
To ensure the continued perfect function of the brake, the maximum values given in paragraph 9 for the air gap and the minimum values for the brake disc thickness must be maintained. At the latest, the brake discs must be replaced when these limit values are reached (see paragraph 8.2).

6.1 Monitoring wear

The state of wear is to be checked regularly.
There are two different options for doing this:

6.1.1 Measuring the air gap

- Disassemble the brake from the motor
- Remove the labyrinth seals from centring flange (5 in Figure 1).
- Place the brake with the magnet housing (9 in Figure 1) facing down on a smooth surface.

When the brake is released, the pressure plate (2 in Figure 1) moves down by the value of the current air gap (s_L). The air gap can thus be determined as the difference between

- the distance of the pressure plate from the surface of the centring flange in the released state (switched on electrically) and
- the distance of the pressure plate from the surface of the centring flange in the braked state (switched off electrically)

Measurement is to be carried out using a depth gauge.

With model E../Z..075 and Z..100 brakes with manual release, the air gap can also be determined without disassembling the brake by the difference between

- the distance of the manual release ring from the magnet housing in the released state (switched on electrically) and
- the distance of the manual release ring from the magnet housing in the braked state (switched off electrically)

(see Figure 12). In order to avoid incorrect measurements, the final coating in the area of the measuring point should be removed.

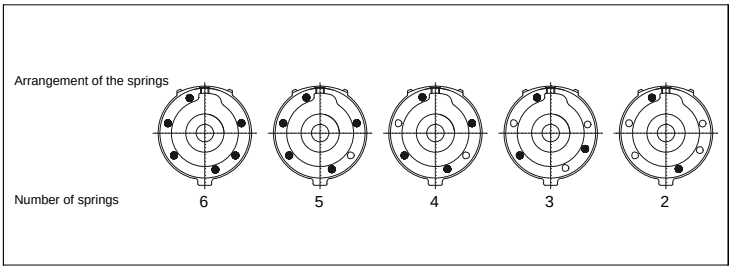
6.1.2 Measuring the brake disc thickness

The brake must be disassembled as described in paragraph 8.1 to allow this.

7 Setting the braking torque

The braking torque can be changed in steps by the number of springs. The springs, as seen in picture 14, must be arranged symmetrically. To reduce the noise level when opening the brake, the springs can be arranged asymmetrically. In this case an increased wear is expected which leads to a reduction in the lifetime of the brake.
The spring configuration permitted dependent on brake type is listed along with the appropriate braking torque in paragraph 9.

Typen E../Z..008 and Z..015



Typen E../Z..075 and Z..100

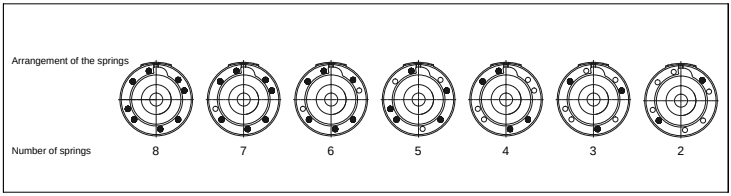


Figure 14: Arrangement of springs in partial assembly

8 Maintenance

8.1 Measuring the brake disc thickness

As indicated in paragraph 6.1, in addition to the option of monitoring wear via the air gap, there is also the option to check the state of wear by measuring the brake disc thickness. To do this, the brake must be dismantled (see also Figure 1):

a) Disconnect motor and brake from the mains. Disconnect supply line on brake.
b) Unscrew fastening screws between brake and motor. Remove brake from fitting by tapping lightly with the hand.
c) The carrier (7) remains on the motor shaft.
d) Unscrew screws (10). Disassemble brake.
e) Clean brake. Remove abrasion material.
f) Measure the thickness of the brake disc(s) (1). At the latest, the brake discs must be replaced (see paragraph 9) when they reach the minimum thickness indicated in paragraph 8.2 .

8.2 Replacing the brake discs

See also Figure 1.

a) as for a) – e) in accordance with paragraph 8.1.
b) Check remaining frictional partners – pressure plate (2), centring flange (5) and on double-disc brakes from the Z series, the intermediate plate (4) for parallelism and wear (slight groove formation may be present), replace, together with the brake discs (1), if necessary.
c) Reassemble brake correspondingly.

With new brake discs and frictional partners, the original braking torque is only achieved after a certain run-in period.

Attention:
With model E../Z..075 and Z..100 brakes with manual release, the manual release ring should not be adjusted during maintenance (see Figure 12).
If this becomes necessary because of cleaning or the replacement of the pressure plate, the axial latch must first be released at the fillister screw. Then the manual release ring can be screwed out anticlockwise. When refitting, the manual release ring is to be turned clockwise until it grips firmly. The manual release ring must then be turned back by at least 2 and no more than 3 turns from the stop and latched using the fillister screw in the bore in the magnet housing.
The manual release ring is not to be used to adjust the air gap.

9 Single-disc brake technical data

Type	M_N [Nm]	NS	W_{max} [*10³J]	W_{th} [*10³J]	W_L [*10⁶J]	t_A [ms]	t_{AC} [ms]	t_{DC} [ms]	s_{Lmax} [mm]	d_{min} [mm]	P_{el} [W]
E..008B9	10	6x blue	50	250	60	90	60	10	1,0	9,5	30
E..008B8	8	5x blue	50	250	100	90	60	10	1,3	9,2	30
E..008B6	6,5	4x blue	50	250	140	85	65	10	1,6	8,9	30
E..008B5	5	3x blue	50	250	180	75	100	15	1,9	8,6	30
E..008B4	3,5	2x blue	50	250	220	60	150	25	2,2	8,3	30
E..008B2	2,5	4x red	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 brake technical data

Type	**MN** [Nm]	**ZF**	W_{max} [*10^3J]	W_{th} [*10^3J]	W_L [*10^6J]	t_A [ms]	t_{AC} [ms]	t_{DC} [ms]	s_{Lmax} [mm]	d_{min} [mm]	P_{el} [W]
Z..008B9	20	6x blue	50	250	60	90	60	10	1,0	9,8	30
Z..008B8	16	5x blue	50	250	100	90	60	10	1,3	9,6	30
Z..008B6	13	4x blue	50	250	140	85	65	10	1,6	9,5	30
Z..008B5	10	3x blue	50	250	180	75	100	15	1,9	9,3	30
Z..008B4	7	2x blue	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
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 reached when the brake disc has been run in for a certain period and may then deviate by approximately -10 / +30% depending on the operating temperature and the state of wear of the frictional partner.

NS Number of springs.
Since different springs can be used with the models E../Z..008, the colour of the relevant spring is also to be indicated here.
If an excessive or overly low braking torque was obtained during the braking torque inspection carried out at the works with the spring assembly, the actual number of springs can deviate in individual cases from the values indicated 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 [kgm^2] of the overall system related to the motor shaft
n – motor speed [rpm] which is braked

W_{th} Maximum permissible switching energy per hour

W_L Maximum permissible switching until replacement of the brake discs

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

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

t_{DC} Response time when braking with direct current interruption by mechanical circuit breaker.
Electronic direct-current interruption by a special rectifier (type ESG or MSG) results in response times that are approximately twice as long.

Dependent on the operating temperature and the state of wear of the brake discs, the actual response times (t_A, t_{AC}, t_{DC}) can deviate from the guide values indicated here.

s_{Lmax} Maximum permissible air gap

d_{min} Minimum permissible thickness of the brake discs.
With Z series double-disc brakes, this value applies for each of the two brake discs.

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

1 Via special rectifier ESG 1.460A

Rectifier technical data

Operating principle	Half-wave rectifier with electronic direct current interruption
Supply voltage U_1	220 - 460 V AC ±5% , 50/60 Hz
Output voltage	0.45 * U_1 V DC
Maximum output current	1 A DC
Ambient temperature	-20°C to 40°C
Possible conductor cross-sections	maximum 1.5 mm^2

The blue conductor routed out of the casing must be connected to PE to activate the integrated high-speed switch-off function.
As this conductor is coupled to the supply voltage with high impedance, leakage currents of up to a maximum of 2 mA may flow, depending on the voltage level.

When operating on unearthed networks, the blue conductor is to be connected with the right alternating current voltage contact (N) of the ESG. If the rectifier is supplied from the motor terminal board in this case, an increase in the response time on shut-down is to be anticipated.

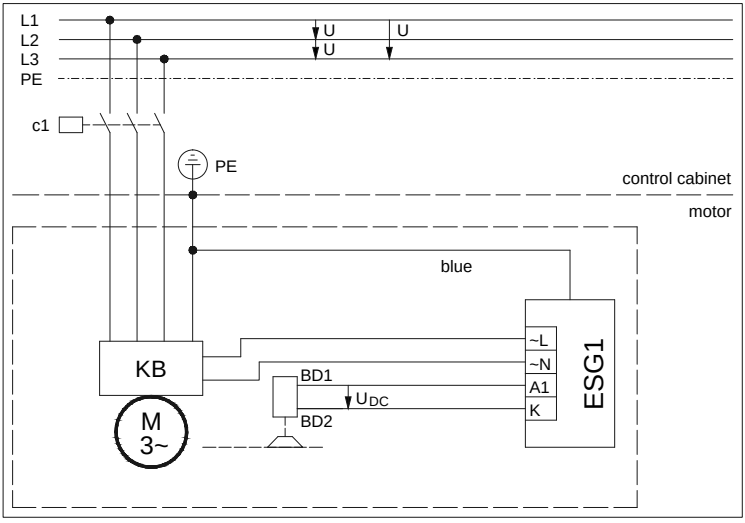
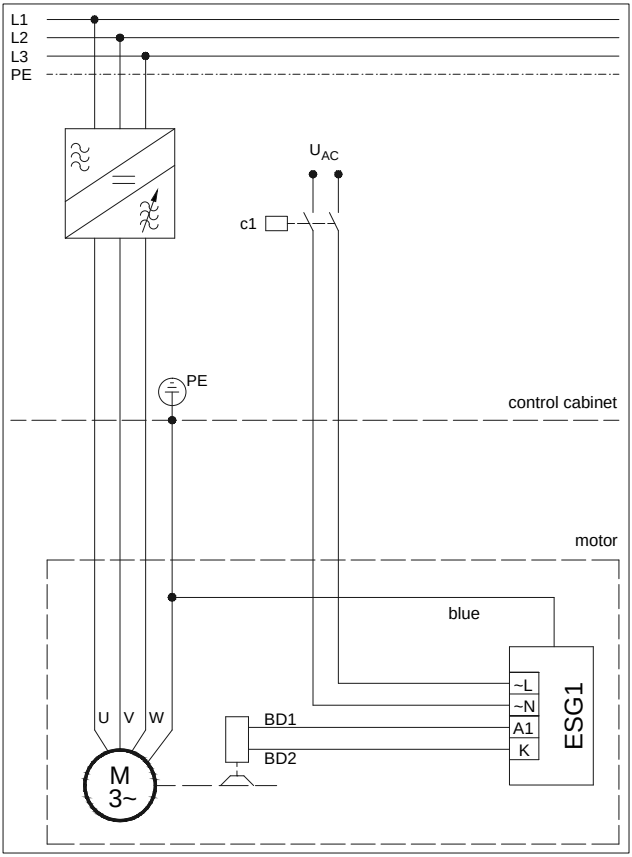


Figure 8: Rectifier voltage supply from the motor terminal board Voltage connection for the rectifier from the motor terminal block or cage clamp (see Rectifier Connection on Motor Terminal Block or Cage Clamp)



Picture 8a: Separate voltage supply of the rectifier, e.g. for usage on frequency inverter

If the brake is supplied directly from a DC control power supply.

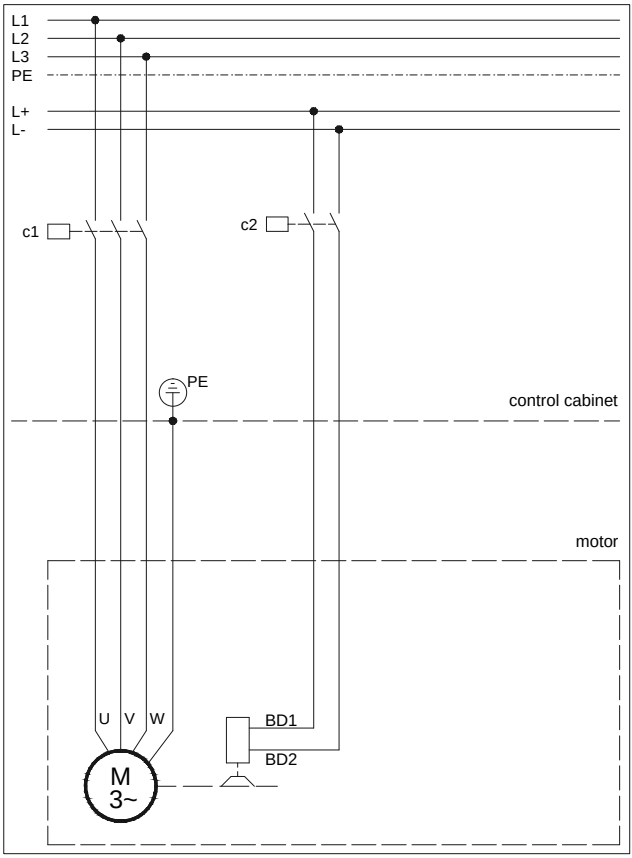


Figure 4: Direct DC power supply from a control network

Rectifier technical data MSG 1.5.480I

Operating principle	Half-wave rectifier with time-limited overexci tation and electronic direct current interruption Quick switch-off due to absence of motor current in a phase.
Operating 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
Maximum output current	1,5 A DC
Ambient temperature	-20°C to 40°C
Possible conductor cross-sections	maximum 1.5 mm^2

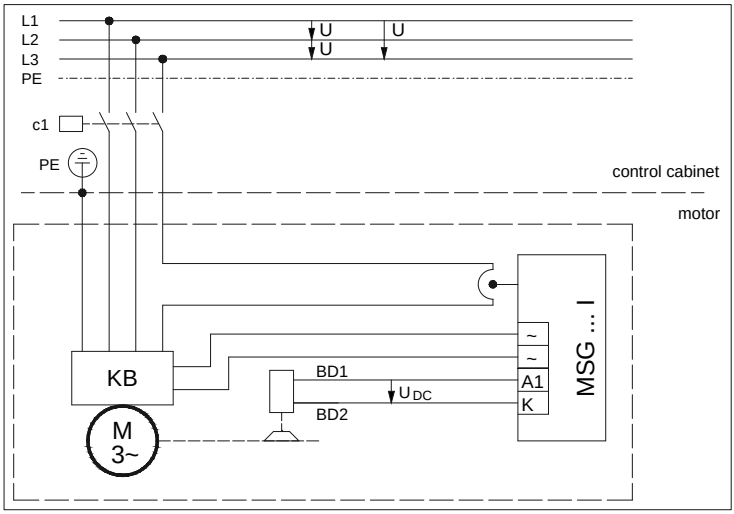
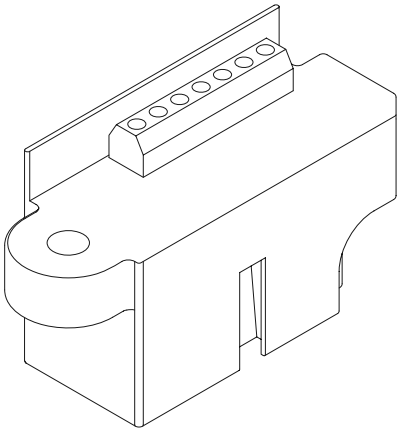


Figure 10: Voltage connection for the rectifier from the motor terminal block or cage clamp (see Rectifier Connection on Motor Terminal Block or Cage Clamp)

To enable the current monitoring, one of the leads of the supply cable must be passed through the current sensor on the side of the rectifier. As the current sensing has a lower threshold, the lead must be passed through the sensor twice if the motor no-load current is lower than 0,4A. In this case a sticker with the number "2" is on the rectifier underneath the sensor itself. The maximum constant current of the sensor is 64A.

Caution:
It is imperative for the correct functioning of the rectifier that a motor lead is passed through the sensor. If not, the rectifier will not switch on and in the worst case can be permenantly damaged.

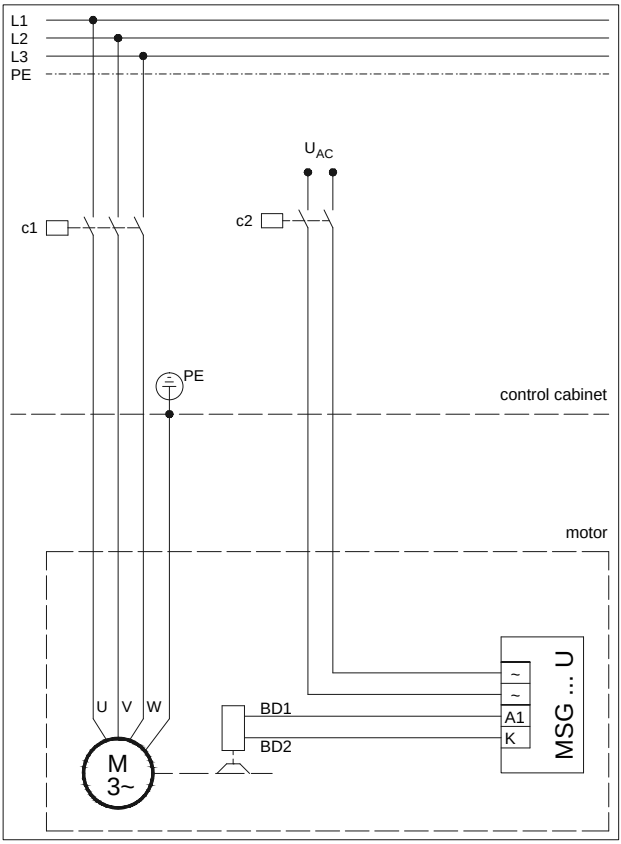


The diameter of the sensor bore for passing the leads through is 7mm. The diameter of the leads of the motor connection cable must therefore not exceed the following values:

max. lead diameter: 6,7 mm for 1 passthrough
3,2 mm for 2 passthroughs

Rectifier technical data MSG 1.5.500U

Operating principle	Half-wave rectifier with time-limited overexci tation and electronic direct current interruption Quick shut-down due to absence of input voltage.
Operating voltage U_1	220 - 500 V AC +/-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
Maximum output current	1,5 A DC
Ambient temperature	-20°C to 40°C
Possible conductor cross-sections	maximum 1.5 mm^2



Picture 9: Separate voltage supply of the rectifier

Rectifier technical data

Operating principle	Half-wave rectifier
Supply voltage U_1	maximum 575 V AC +5%, 50/60 Hz
Output voltage	0.45 * U_1 V DC
Maximum output current	2 A DC when fitted in motor terminal box or brake terminal box 2.5 A DC when fitted in switch cabinet
Ambient temperature	-40°C to 40°C
Possible conductor cross-sections	max. 1.5 mm^2

1 Rectifier voltage supply from the motor terminal board Voltage connection for the rectifier from the motor terminal block or cage clamp (see Rectifier Connection on Motor Terminal Block or Cage Clamp)

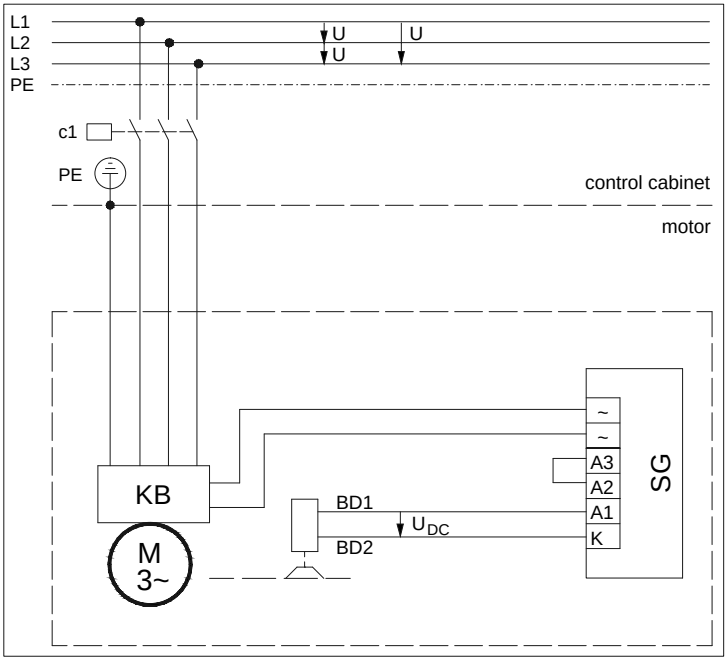


Figure 5: AC disconnection → Terminal A2 and A3 bridged

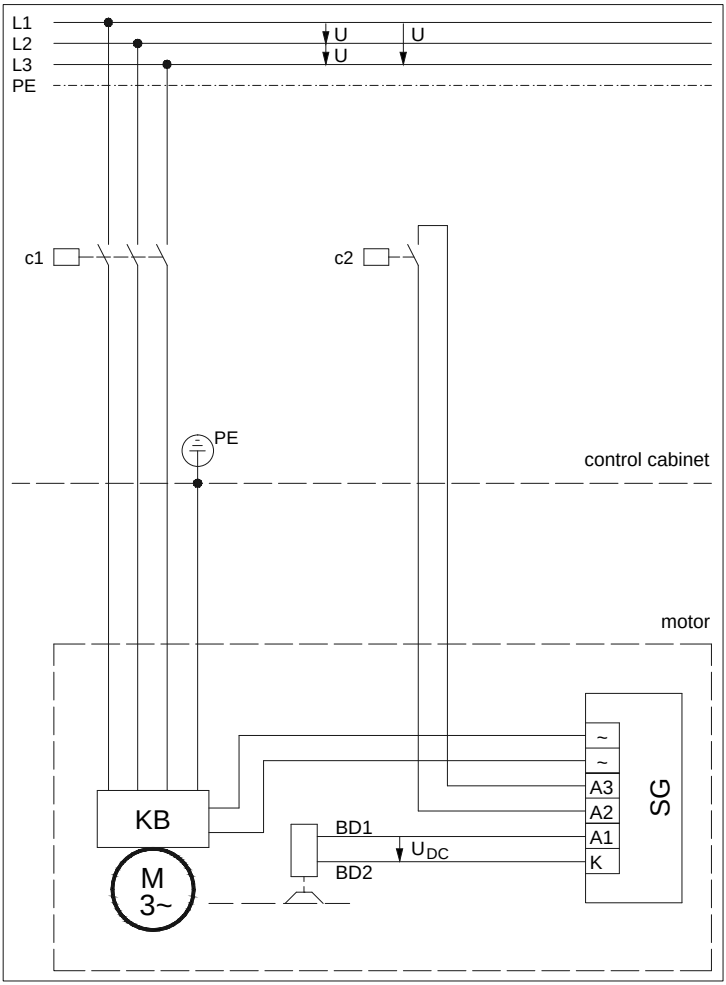


Figure 6: DC disconnection at terminals A2 and A3 e.g. via direction of rotation contactor via relay

2 Rectifier voltage supply via separate contactor

As described in paragraph 4.1, the rectifier may not be connected at the motor terminal board on all models with variable motor voltage or on pole changing motors. Instead, the input voltage of the rectifier must be connected through a separate contactor. The implementation principle when operating on the frequency inverter is shown in Figure 7 and 7a by way of example.

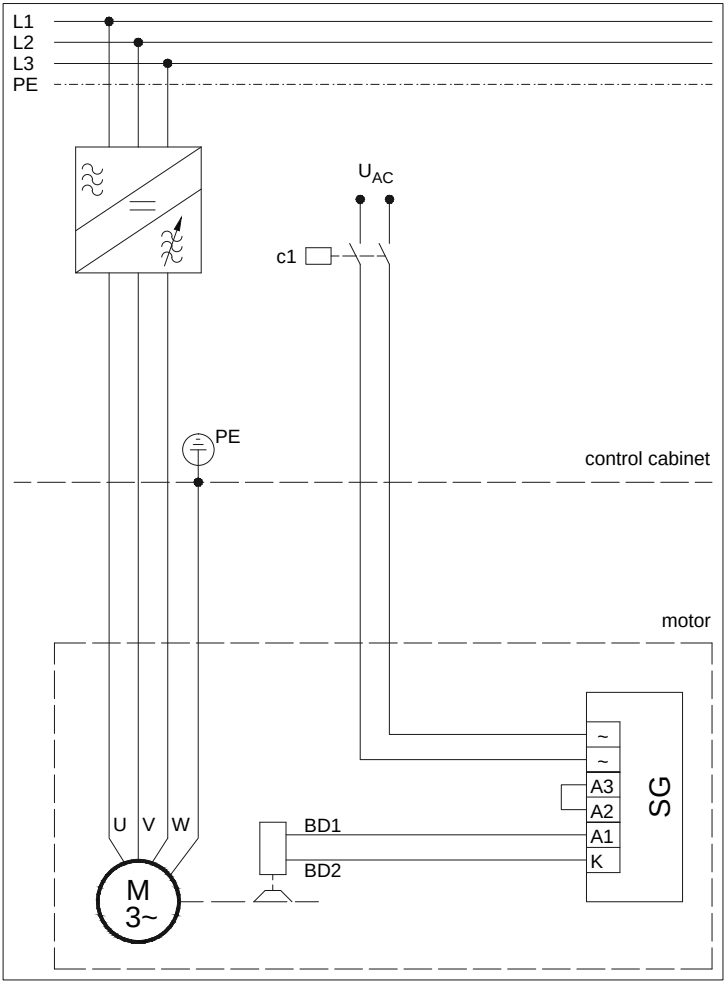
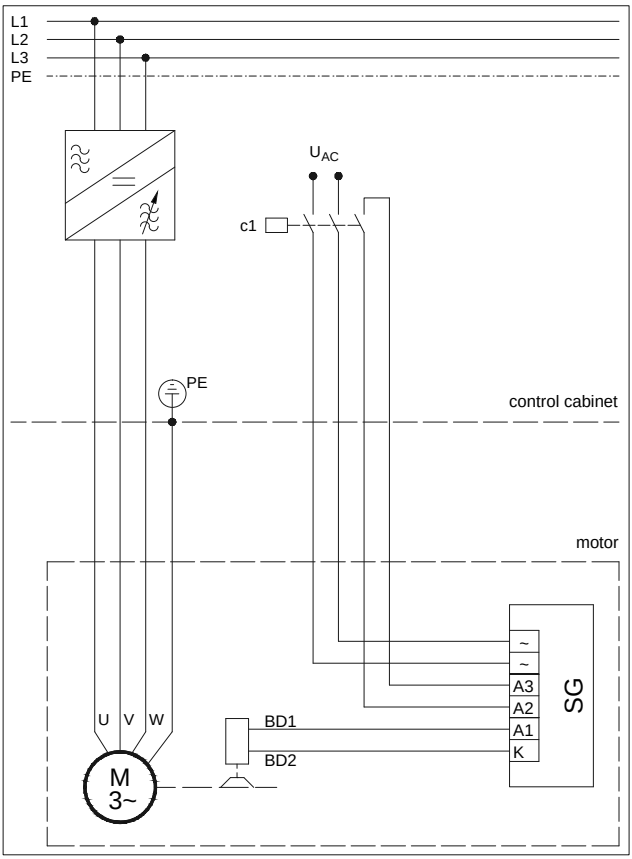
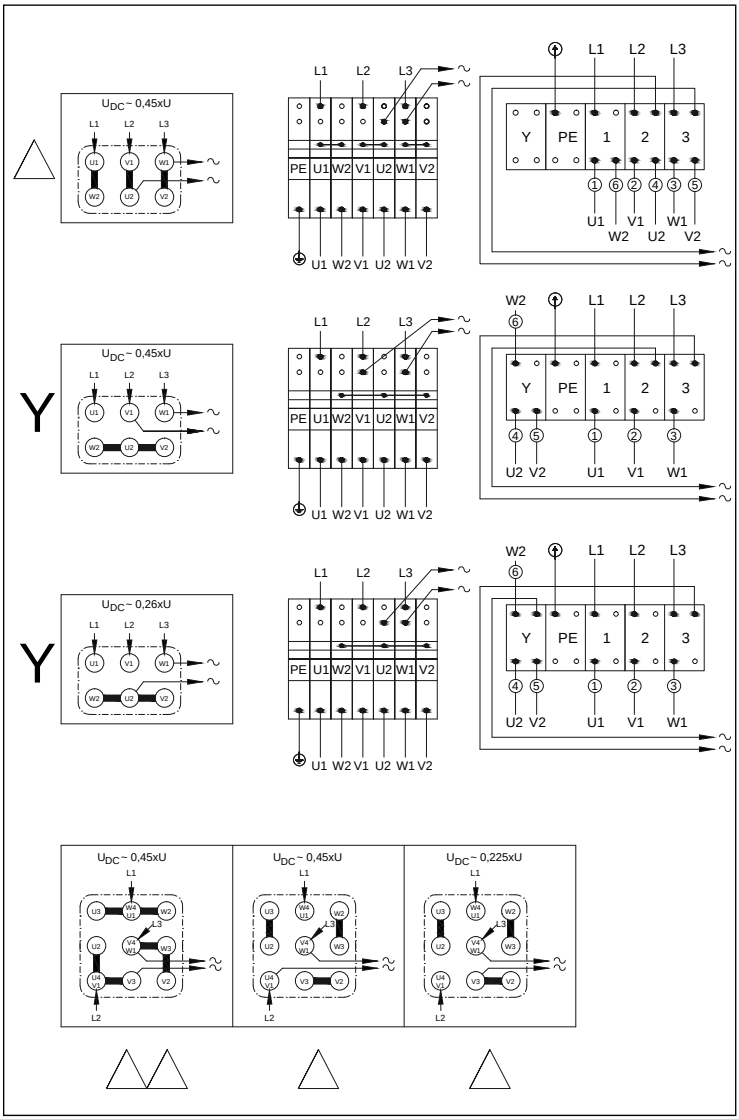


Figure 7: Separate voltage supply of the rectifier.
Alternating current switch-off → Terminals A2 and A3 bridged



Picture 7a: Separate voltage supply of the rectifier. DC side switching on the terminals A2 and A3 via relay.

Rectifier on motor terminal block or cage clamp



1 Assembly

The manual release can only be assembled with the rake removed.
Procedure (see Figures 1 and 12 in section spring loaded E003B and E004B):

1.1 Remove brake from the motor end shield.
1.2 Remove stopper plugs from the manual-release holes in the magnet housing (8).
1.3 Push compression springs (16) onto the manual-release bolts (17).
1.4 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)).
1.5 Push the O-rings (18) onto manual-release bolts (17) and push into the countersinks on the magnet housing (8).
1.6 Push spacer plates (19) onto the manual-release bolts (17).
1.7 Locate manual release bracket (13), push on washer (20) and screw on self-locking nut (21) loosely.
1.8 Tighten both lock nuts (21) until the retaining plate (2) is flush with the magnet housing (8).
1.9 With non-lockable manual release:
Unscrew both lock nuts (21) by 1.5 turns, thereby creating the air gap between the retaining plate (2) and magnet housing (8) and the test dimension X = 0.9 mm.
With latching manual release:
Unscrew both lock nuts (21) by 3 turns, thereby creating the test dimension X = 2 mm.
1.10 After fitting the fan cowl, screw the manual-release rod (14) into manual-release bracket (13) and tighten.

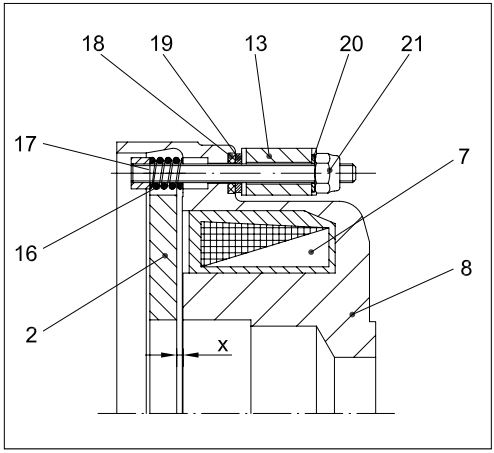


Fig 12: Assembly of the manual release

2 Function

The manual release bracket (13) is pressed by the compression springs (16) into the neutral position. The brake can be released by axial manipulation.
For the model with a latching manual release, the manual release bracket is fixed by screwing the manual release rod (14) into the appropriate bore in the brake housing with the brake released.
To release the latch, turn the manual release rod back again.

On brakes with manual release, exceeding the wear limit results in a clear reduction in braking torque. For this reason, particular attention should be paid to regular and careful monitoring of wear (instruction brake paragraph 6.1) with this model.

1 Models E../Z..008 and Z..015

The manual release lever is pressed by a spring into the neutral position. The brake can be released by axial movement. For models with a latching manual release, the manual release bracket is secured by bracing the lever screw to an opposing surface on the brake housing while the lever screw is tightened when the brake is released.
Unscrew the lever screw to release the latch.

2 Models E../Z..075 and Z..100

2.1 Latching manual release

As shown in Figure 12, first unscrew the axial latch using the fillister screw, then place a screwdriver into a suitable bore on the perimeter of the manual release ring and turn it clockwise until a perceptible stop. The number of turns of the manual release ring must be counted.

To release the manual release, turn the manual release ring back from the stop through the same angle, but by a minimum of 2 turns (maximum 3 turns), and latch using the fillister screw. The filllister-head screw must enter axially into the bore of the magnet housing here.

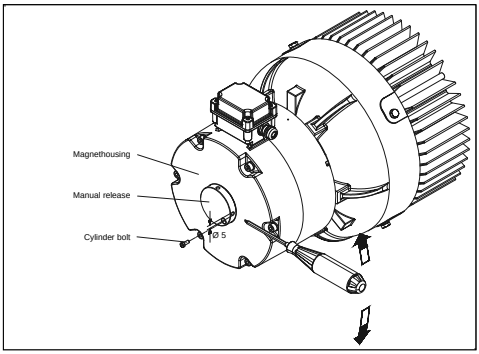


Figure 12: Brakes - models E../Z..075 and Z..100 - with latching manual release

Only the original fillister screw may be used since the brake's function could otherwise be impaired (observe screw length).

The manual release ring cannot be used to readjust the air gap.

2.2 Non-latching manual release

The pins of the U-shaped manual release bracket are to be latched into two diametrically positioned bores on the manual release ring (see Figure 13). To release, the bracket should be moved axially for a short distance without excessive application of force.

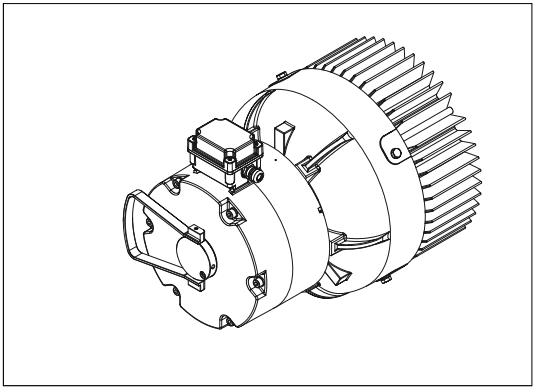


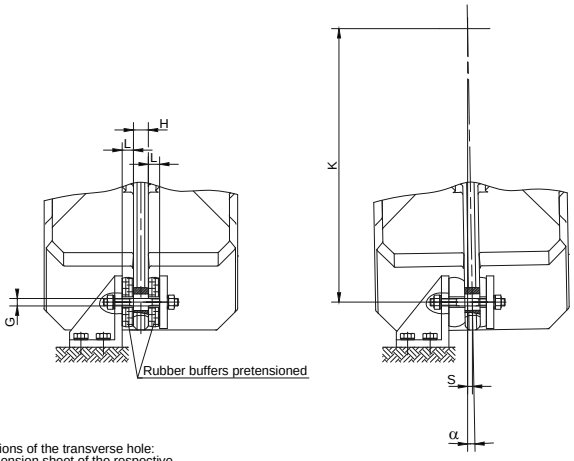
Figure 13: Brakes - models E../Z..075 and Z..100 - with non-latching manual release

The manual release bracket must be removed after use for normal operation in order to prevent obstruction of the release movement and unauthorized activation.

1. Installation of the rubber buffer.
The rubber buffers provided are to be fixed in accordance with the drawings N-BF-DST, N-BK-DST or N-BS-DST and tightened to the pretension required.

2. As part of the specified maintenance intervals, the correct tensioning and conditions of the rubber buffers is to be checked and the same changed should faults be apparent. For dynamic applications, this proceedure must be performed independent from the standard intervals, every 3.000 hours machine usage.

Note:
Play in the rubber buffers can result in damage to the gearwheels and bearings.



Dimensions of the transverse hole:
see dimension sheet of the respective shaft mounted gearbox

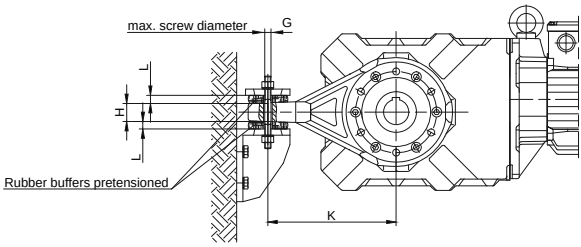
T_2 = assigned gear torque
F = pressing force on the rubber buffers

Gear	Pos. (see T 223)	T_2 (Nm)	K (mm)	F (N)	Pre-tensioning per rubber buffer (mm)	G	H (mm	L (mm)	max.α (Not for rubber buffer)	max. way s (mm)
BF06	Pos.0	95	104	913	2.0	M8	10	10	2.5°	5
BF10	Pos.1	200	155	1290	2.2	M10	16	13.5	2.5°	7
BF20	Pos.1	350	190	1842	3.0	M10	18	13	2.5°	8
BF30	Pos.2	500	210	2381	2.5	M10	18	17	2.5°	9
BF40	Pos.2	780	242	3223	4.0	M10	20	16.5	2.5°	11
BF50	Pos.3	1200	270	4444	4.0	M18	24	21.5	2.5°	12
BF60	Pos.3	2150	340	6324	4.5	M18	28	21	2.5°	15
BF70	Pos.4	5200	377	13793	4.5	M20	30	25.5	2.5°	16
BF80	Pos.5	9500	445	21348	5.5	M20	40	30	2.5°	19
BF90	Pos.5	16800	555	30270	7.0	M20	50	29.5	2.5°	24

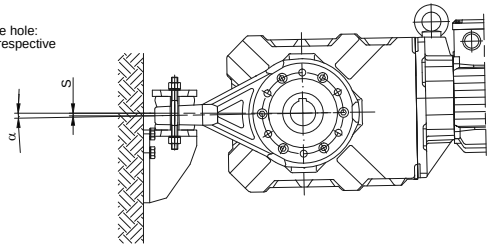
1. Installation of the rubber buffer.
The rubber buffers provided are to be fixed in accordance with the drawings N-BF-DST, N-BK-DST or N-BS-DST and tightened to the pretension required.

2. As part of the specified maintenance intervals, the correct tensioning and conditions of the rubber buffers is to be checked and the same changed should faults be apparent. For dynamic applications, this proceedure must be performed independent from the standard intervals, every 3.000 hours machine usage.

Note:
Play in the rubber buffers can result in damage to the gearwheels and bearings.



Dimensions of the transverse hole:
see dimension sheet of the respective shaft mounted gearbox



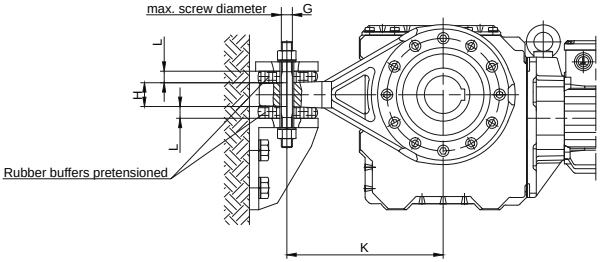
T_2 = assigned gear torque
F = pressing force on the rubber buffers

Gear	Pos. (see T 223)	T_2 (Nm)	K (mm)	F (N)	Pre-tensioning per rubber buffer (mm)	G	H (mm)	L (mm)	max. α (mm) (Not for rubber buffer)	max. way s (mm)
BK06	Pos.0	80	144	555	1.5	M8	10	10.5	2.5°	6
BK10	Pos.1	170	160	1063	1.5	M10	19	13.5	2.5°	7
BK20	Pos.1	280	180	1556	2.0	M10	19	13	2.5°	8
BK30	Pos.2	400	205	1951	3.0	M10	30	17	2.5°	9
BK40	Pos.2	680	250	2720	3.0	M10	30	17	2.5°	11
BK50	Pos.3	950	250	3800	3.5	M18	36	21.5	2.5°	11
BK60	Pos.3	2150	340	6324	4.0	M18	38	21	2.5°	15
BK70	Pos.4	5200	370	14054	4.5	M20	40	25.5	2.5°	16
BK80	Pos.5	10500	470	22340	5.0	M20	45	30	2.5°	21
BK90	Pos.5	16800	570	29474	5.5	M20	45	29.5	2.5°	25

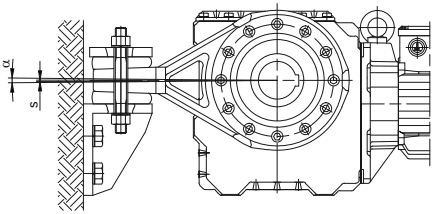
1. Installation of the rubber buffer.
The rubber buffers provided are to be fixed in accordance with the drawings N-BF-DST, N-BK-DST or N-BS-DST and tightened to the pretension required.

2. As part of the specified maintenance intervals, the correct tensioning and conditions of the rubber buffers is to be checked and the same changed should faults be apparent. For dynamic applications, this proceedure must be performed independent from the standard intervals, every 3.000 hours machine usage.

Note:
Play in the rubber buffers can result in damage to the gearwheels and bearings.



Dimensions of the transverse hole:
see dimension sheet of the respective shaft mounted gearbox



T_2 = assigned gear torque
F = pressing force on the rubber buffers

Gear	Pos. (see T 223)	T_2 (Nm)	K (mm)	F (N)	Pre-tensioning per rubber buffer (mm)	G	H (mm)	L (mm)	max. α (Not for rubber buffer)	max. way s (mm)
BS03	Pos.0	55	118	466	1.5	M8	10	10.5	2.5°	5
BS04	Pos.0	45	121	372	1.5	M8	10	10.5	2.5°	5
BS06	Pos.0	110	144	764	2.0	M10	10	10	2.5°	6
BS10	Pos.1	180	160	1125	2.0	M10	19	13	2.5°	7
BS20	Pos.2	290	205	1415	2.5	M10	30	17.5	2.5°	9
BS30	Pos.2	542	250	2096	3.0	M10	30	17	2.5°	11
BS40	Pos.3	980	340	2882	3.0	M18	38	22	2.5°	15

The backstop - non-contact type F - locks the geared motor in a certain direction of rotation (indication of direction with view of the mounted side of the gear unit).

1 Mounting

The backstop is assembled on the fan cowl of self-ventilated motors and on the end shield of unventilated motors.
The inner ring with mounted on clamping part insert is located on the extended rotor shaft. This clamping part insert consists of caging in which the individually spring-loaded clamping parts are guided. The clamping parts lay flush on the outer ring. The end guard protects against contact and the penetration of foreign objects.

2 Operation

When the geared motor is started, the clamping parts disengage and do not make contact until the speed of the motor drops below approximately 700 rpm after disconnection or a power failure. The clamping parts then slowly rise and lock a reversing movement at the moment of rest.
The power transmission in locked state goes from the rotor shaft via the inner ring to the clamping parts and from there via the outer ring to the fan cowl/ end shield and the housing of the geared motor.

3 Supply connection

The standard three phase current motors are normally connected for anti-clockwise rotation when looking at the front of the fan shaft end and with the phase sequence L1 - L2 - L3. The actual phase sequence of the mains is to be selected in such a way that the motor starts in the freewheeling direction. For the first test start, it is advisable to connect particularly larger motors in star connection to protect the backstop as far as possible.
If a brief test connection finds that the motor is not connected in direction of rotation, but in the blocked direction, two mains leads are to be exchanged as with any normal change of direction of rotation. After a wrong connection, check fuses and motor protection switches and check for correct terminal board connection as indicated on the rating plate.

Safety information:
Mounting, connection, adjusting and maintenance work may only be carried out taking into account the safety information given on the accompanying information sheet No. 122 and of the operating instructions for the backstop.

4 Installation and maintenance instructions

Assembly of the freewheeling mechanisms may only be carried out by trained specialist personnel taking into account the installation information.
This information is to be noted fully in order to avoid a failure of the freewheeling mechanism or a malfunction on the machine.
Nonobservance of the information we provide will result in all liability claims against STIEBER becoming null and void.

Description:
The backstops F720-D and F721-D consist of an inner ring, an outer ring with flange, caging which carries the individual, spring-loaded centrifugal force disengaging clamping parts and an end guard.

The freewheeling mechanisms must be used in such a way that the inner ring executes the no-load movement.
The minimum no-load speed should not be undershot to ensure that the clamping parts are able to work surely in the non-contact speed range and that benefit can be derived from the centrifugal force disengagement. Operating below the minimum speed means that the service life of the freewheeling mechanism cannot be achieved, as for operation above the disengagement speed. When operating above the minimum speed, wear only occurs when starting and stopping the driving motor. Frequent starting and stopping reduce the service life. For speeds, see the technical data table below.

Before assembly:
It must be ensured that the radial eccentricity between the inside diameter of the outer ring and the inner ring in the integrated state cannot exceed the values given in the table at the end of the instructions. See the table for the associated centring diameters on the flange of the outer ring.

Before installing the backstop, the no-load direction of rotation is to be checked. A change in direction of rotation can be obtained by turning around the freewheeling cage.

After electrical connection, check whether the desired direction of rotation corresponds with the freewheeling direction. The following cases could occur here:

1. The desired direction of rotation is reached; the freewheeling mechanism does not block: the assembly of the freewheeling mechanism and the electrical connection are correct.
2. The motor starts unimpeded in the wrong direction of rotation: in this case both the freewheeling cage must be turned around and the direction of rotation reversed electrically.
3. The motor does not start. The shaft only vibrates. Since no direction of rotation is recognisable in this case, both the electrical connection and the freewheeling mechanism could be incorrect.
   If this sort of shaking or vibrating is observed, the motor must be switched off IMMEDIATELY, as both the freewheeling mechanism and the motor could be damaged or destroyed.Reversing the motor now results either in the desired result as described in point 1 or in the measures described in point 2 in the event of the incorrect direction of rotation

Assembly:
When assembling, always make certain that no dirt can enter into the freewheeling mechanism.

- Unscrew the end guard.
- Check that the springs located on the sides of the cage are correctly positioned. If necessary, correct this using a small screwdriver.
- Fit the freewheeling mechanism onto the shaft. Observe the key and apply force only over the inner ring.
- Secure the inner ring against axial shifting, e.g. by means of retainer ring.
- Screw the outer ring onto the housing.
- Apply liquid sealant to the end guards and bolt on.

With shaft ends which are longer than the freewheeling mechanism, replace the sealing cap in the end guard with an appropriate radial shaft seal.

Maintenance/modification of the inverse direction and lubrication.
When carrying out maintenance work or a subsequent change of the direction of rotation it may become necessary to remove the caging:

Removal of the caging:
- Unscrew the end guards.
- Remove the retainer ring in front of the freewheel caging.
- In the extractor threads of the caging, screw suitable M3 screws into the caging discs to the same depth as the thickness of the discs.
- Use the screws to pull the cage by hand out of the inner and outer ring while simultaneously turning in the no-load direction.

Installing the caging:
- The surfaces of all parts inside the backstop are to be thinly coated before assembly with grease as listed in the table. The inside diameter of the outer ring must be noted particularly when doing this.
- Brace the freewheeling mechanism on the perimeter using an O-ring or a cable tie. Using a screwdriver, turn the clamping parts in such a way that they are in the disengagement position.
- Ensure that the springs seat perfectly, adjust if necessary.
- While observing the no-load direction of rotation, push the caging onto the inner ring. If the clamping parts are located approximately half way in the outer ring, the o-ring must be removed. Push the cage completely into the outer ring while turning it in the direction of travel. The front carrier screw of the caging must engage in the opening between the ends of the retainer ring.
- Assemble the retainer ring that was previously removed so that its ends cover the front carrier screws of the caging.
- Apply liquid sealant to the end guards and bolt in place.

After installation:
After installation, check whether the freewheeling mechanism can turn empty in the correct direction without excessive use of force. The trailing torque which develops in the freewheeling mechanism is approximately 1/1000 of its torque capacity.

Disassembly:
When assembling, always make certain that no dirt can enter into the freewheeling mechanism.

- Unscrew the screws on the end guard and remove the end guard.
- Unscrew the fastening screws of the outer ring and loosen the outer ring.
- Remove the retainer ring of the inner ring.
- Withdraw the complete freewheeling mechanism from the shaft. Only apply pressure above the inner ring.

or

- Unscrew the end guard screws and remove the end guard.
- Remove the retainer ring (rotor shaft).
- Dismantle the inner ring with caging from the rotor shaft.
- Dismantle outer ring with built-in retainer ring and radial shaft seal.

Lubrication and maintenance:
Store in a dry place for a maximum of 1 year. Re-preservation must be carried out after this time.
For grease lubrication, greases with a grade II or softer consistency, or from the accompanying lubricant chart, are particularly recommended.
Important: It is sufficient for the contact surface of the caging to be covered with a grease film on the outer ring and inner ring. Overgreasing, which limits the mobility of the clamping parts, is to be avoided.
The backstops must be protected in the long term from corrosion.

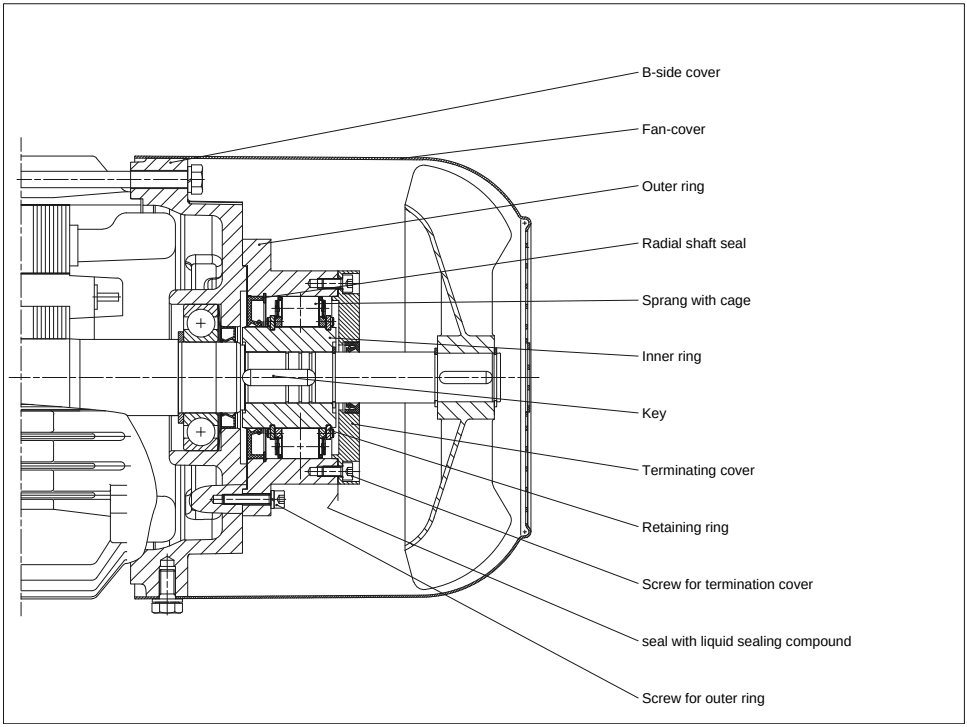
Technical data table:

Type	Max. Torque [Nm]	No-load speed [rpm] min.	No-load speed [rpm] max.	Max. radial eccentricity [mm]	Centring Ø H7 [mm]	Outer ring InnerØ H7 [mm]	Caging extractor thread	Grease volume [g] (max.)
F720D	300	740	10500	0,3	80	80	M3	15
F721D	700	665	6600	0,3	160	95	M3	30

Gearmotors
Geared motors with built-on backstop

Lubrication:

Manufacturer	Grease
ARAL	ARALUB HL2
BP	ENERGREASE LS2
DEA	GLISSANDO 20
ESSO	BEACON 2
FUCHS	RENOLIT LZR2
KLÜBER	POLYLUB WH2
MOBIL	MOBILUX2
SHELL	ALVANIA G2
TOTAL	MULTIS 2



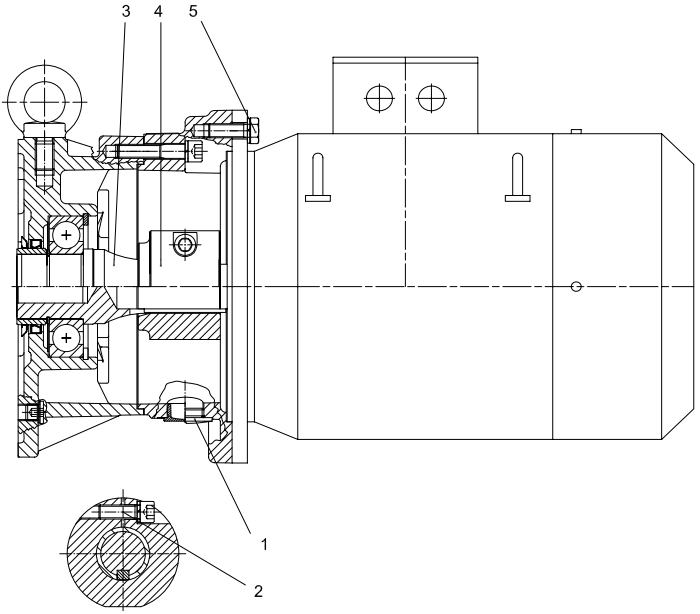
1 Safety Information

Connection and maintenance work may only be carried out taking into account the safety information on pages 3/4.

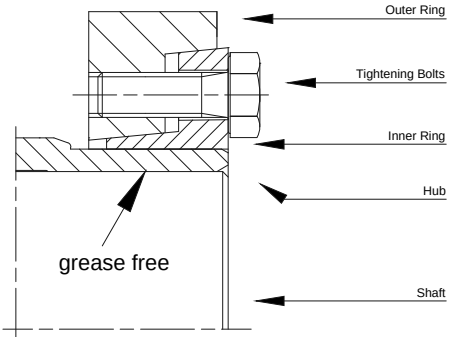
2 Motor Attachment

The assembly of standard motors in the size range IEC 56 to IEC 280 and NEMA 56C to NEMA 405TC using the C-Adapter is to be performed according to the following plan:

I. Remove assembly plug 1
II. Arrange the clamping ring so that the clamping screw 2 is under the assembly hole. Loosen the clamping screw 2 so much that the clamping ring 4 does not tighten on the intermediate shaft 3 anymore.
III. Arrange the motor ans rotor shaft to the gear side mounting face
IV. To make assembly easier, bring the motor and gearbox together in the vertical position (motor pointing upwards)
V. Insert motor shaft into the intermediate shaft without forcing
VI. Tighten clamping screw 2
VII. Tighten motor fitting screws 5
VIII. Insert assembly plug 1



The shrink-disc is supplied ready to be installed and should therefore not be dismantled. The shrink-disc may not be clamped without fitting the shaft.
The shaft must be fitted or the hub pushed onto the shaft in the area of the shrink-disc seat.
The tightening bolts must then be tightened evenly around the circumference until the front side face of the outer ring and inner rings is flush. The state of clamping can thus be monitored visually.
To disassemble, loosen all screws evenly in sequence. If the outer ring does not automatically separate from the inner ring, a number of tightening bolts may be removed and screwed into the neighbouring forcing-off threads.
Any rust on the shaft in front of the hub must be removed before the shaft is removed or the hub is taken from the shaft.
Removed shrink-discs only need to be dismantled, cleaned, and regreased before refitting if they are very dirty. In this event, a solid lubricant with a coefficient of friction of $\mu = 0.04$ or better is to be used.



If geared motors are to be stored for an extended time before start-up, increased protection against damage by corrosion or humidity can be achieved by observing the following information. Since the actual loading depends very strongly on local conditions, the time data can be regarded only as a guide value. It should also be noted that this data does not include any extension of the warranty term. If disassembly is necessary before start-up according to this information, it is recommended that the nearest BAUER franchised workshop or representatives be called in. The instructions contained in the after-sales manual are to be observed in all cases.

1 Geared motor condition and storage space

The plugs supplied by the works in all entry holes on the terminal box are to be checked for damage caused during transportation and for correct positioning and replaced if necessary.

Any vent valves which are present are to be removed and replaced with a suitable cover screw.

Any damage caused during transit to the exterior paint layer or to the rust protection of the bright metal shafts, including hollow shafts, must be repaired.

The storage space should be dry, well-ventilated and vibration-free. If the temperature in the space exceeds the normal range of approximately -20° C to +40°C for an extended period of time or varies strongly frequently, it could even become necessary to employ the measures before start-up specified in section 3 after shorter storage times.

2 Measures during the storage period

Space permitting, it is recommended that the drive units be turned 180° after approximately one year and annually thereafter so that the lubricant in the gear unit covers the bearings and gearwheels which have previously been positioned on top. Also, the output shaft should be turned manually in order to churn the rolling-contact bearing grease and distribute it evenly.

Turning the drive unit does not have to be carried out if the gear unit enclosure is completely filled with lubricant as the result of a special agreement. In this case, the lubricant level before start-up is to be reduced to the desired value as defined in the operating instructions and the lubrication information plate.

3 Measures before start-up

3.1 Motor component

- Insulation measurement
  Measure the insulation resistance of the winding with commercially available measuring apparatus
  (e.g. with a magneto) between all winding parts and between the winding and the enclosure.

- Measured value above 50 megohm: no drying necessary, new condition
  Measured value under 5 megohm: drying advised
  Measured value approximately 1 megohm: lowest permissible threshold
- Drying the winding by standstill stator heating without disassembly
  Connection to stepless or tapped variable alternating current voltage up to approximately 20% maximum of the rated voltage. Heating current max. 65% of the rated current according to the rating plate.Observe heating up for first 2 to 5 hours; reduce heating voltage if necessary.
  Heating duration approximately 12 to 24 hours until insulation resistance rises to desired value.
- Dry the winding in the oven after disassembly
  Dismantle the motor in the appropriate manner
  Dry the stator winding in a well ventilated drying oven at between 80° C and 100° C for approximately 12 to 24 hours until the insulation resistance rises to the desired value.
- Lubricating the rotor position
  If the storage period exceeds approximately 2 to 3 years, or the temperatures were very unfavourable throughout a shorter storage period as described in "Geared motors with three phase cage rotors" paragraph 3, the lubricant in the rotor positions must be checked and refilled if necessary. For checking, a partial assembly on the fan side is sufficient, where the rolling contact bearing becomes visible after removal of the fan cowl, fan and bearing flange (end shield).

3.2 Gear unit component

- Lubricant
  If the storage period exceeds approximately 2 to 3 years, or the temperatures were very unfavourable throughout a shorter storage period as described in "Geared motors with three phase cage rotors" paragraph 3, the lubricant in the gear unit must be changed. For detailed instructions and lubricant recommendations please see chapter lubrication quantity.
- Shaft seals
  When changing the lubricant, the function of the shaft seals between the motor and gear unit as well as on the output shaft must also be checked. If a change in shape, colour, hardness or sealing effect is determined, the shaft seals must be replaced appropriately under observance of the after-sales manual.
- Gaskets
  If lubricant is draining out at the connecting points on the gear unit enclosure, the sealing compound must be replaced as described in the after-sales manual.
- Vent valve
  If a vent valve was replaced with a cover screw when storing, this must be refitted in the correct place.

Notes

Notes

Motor data sheet 799900:

Make:	Danfoss−Bauer		
Gearing type:	BF40−74	Terminal box arrangement:	III/A
Motor type:	DHE09LA4/C3-SP	Model:	H1-H4 0-48° inclination towards V1
Performance (P2) [KW]:	1.1	Ex protection:	
Rotational speed (n1) [1/min]:	1440	Class [IP]:	IP66
Ratio:	111,1	Insulation class:	F
Torque (M2) [Nm]:	800	Power factor cos phi:	0,75
Rotational speed (n2) [1/min]:	13.0	Relative breakdown torque Mk/Mn:	
Voltage [V]:	415 Y	Relative starting torque Ma/Mn:	
Frequency [Hz]:	50	Sound pressure level:	
Nominal power [A]:	2,45	Weight [kg]:	62
Starting current [A]:		Breather:	
No−load current [A]:		Thermistors:	
Paint:	RAL 5015, sky-blue, Coro 3	Lubricant [l]:	4,9 l oil
Brake:		Warm up time TE time [sec]:	
Engine efficiency:		Duty type:	
Engine efficiency class:			
Constructional dimensions [mm]:			
Notes:			

BAUER

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Einzelteilverzeichnis
und Schnittzeichnung

Parts list
and sectional drawing

Liste des pièces
et dessin en coupe

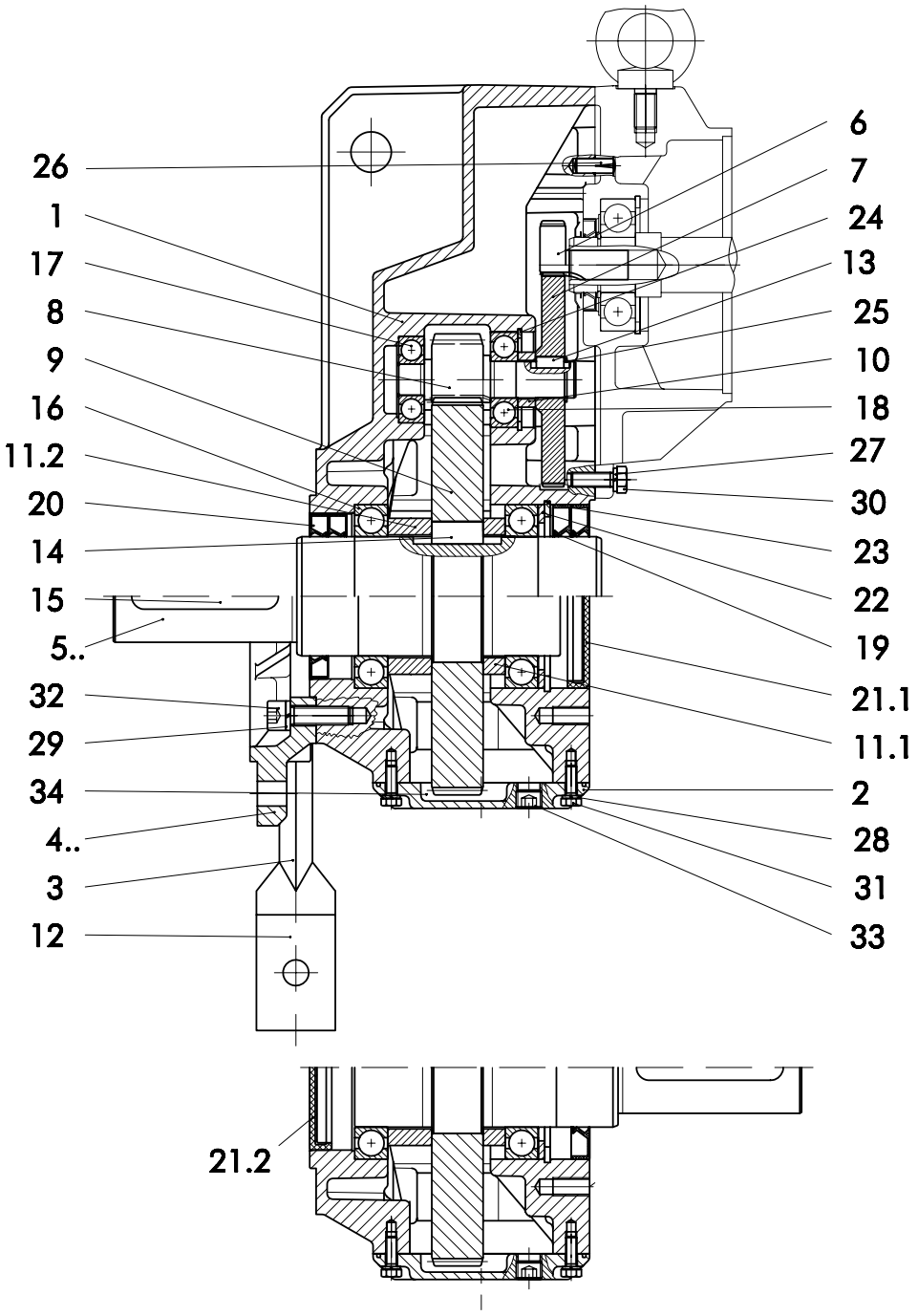
Despiece y sección

СпециФикация деталей
и схема в разрезе

ET-BF 40

Getriebe-Typ
Gear unit type
Réducteur type
Reductor tipo
Редуктор тип

ET-BF 40



Getriebe-Typ / Gear unit type / Réducteur type / Reductor tipo / Редуктор тип ET-BF 40

Teil-Nr. / Part-No. / Pièce No. / Pieza № / Деталь №							
	Bestell-Nr. / Order No. / Comm. No. / Código № / Заказ №						
		Stück / Quantity / Pièces / Cantidad / Шт.					
			Benennung	Designation	Désignation	Designación	Наименование
34	–		Schmierstoff	Lubricant	Lubrifiant	Lubricante	Смазочное средство
33	2506530	2	Verschlußschraube	Cover screw	Vis de fermeture	Tapón roscado	Резьбовая пробка
32	1016121	0/6	Zylinderschraube	Fillister head screw	Vis à tête cylindrique	Tapa intermedia	Винт с цилиндрической головкой
31	1365703	6	Sechskantschraube	Hexagon bolt	Vis à tête hexagonale	Tornillo hexagonal	Винт с шестигранной головкой
30	1316656	8	Sechskantschraube	Hexagon bolt	Vis à tête hexagonale	Tornillo hexagonal	Винт с шестигранной головкой
29	1011626	0/6	Federring	Spring washer	Rondelle ressort	Anillo de muelle	Пружинное кольцо
28	1010484	6	Federring	Spring washer	Rondelle ressort	Anillo de muelle	Пружинное кольцо
27	1010492	8	Federring	Spring washer	Rondelle ressort	Anillo de muelle	Пружинное кольцо
26	1015915	2	Paßkerbstift	Dowel pin	Goupille cannelée	Pasador estriado	Установочный штифт
25	1000179	1	Sicherungsring	Retainer ring	Circlip	Anillo de seguridad	Стопорное кольцо
24	1015966	1	Sicherungsring	Retainer ring	Circlip	Anillo de seguridad	Стопорное кольцо
23	1000306	1	Sicherungsring	Retainer ring	Circlip	Anillo de seguridad	Стопорное кольцо
22	2502569	1	Stützscheibe	Supporting plate	Rondelle d'appui	Disco de apoyo	Упорная шайба
21.2	1448366	0/1	Verschlußkappe	Sealing cover	Couvercle de protection	Caperuza	Запорная крышка
21.1	1448374	0/1	Verschlußkappe	Sealing cover	Couvercle de protection	Caperuza	Запорная крышка
20	2504162	0/1/2	Wellendichtring	Shaft seal	Bague d'étanchéité d'arbre	Retén	Манжета
19	2502861	0/1/2	Wellendichtring	Shaft seal	Bague d'étanchéité d'arbre	Retén	Манжета
18	1015672	1	Rillenkugellager	Ball bearing	Roulement	Rodamiento	Подшипник
17	1010166	1	Rillenkugellager	Ball bearing	Roulement	Rodamiento	Подшипник
16	2502828	2	Rillenkugellager	Ball bearing	Roulement	Rodamiento	Подшипник
15	1164104	0/1	Paßfeder	Key	Clavette	Chaveta	Призматическая шпонка
14	2502992	1	Paßfeder	Key	Clavette	Chaveta	Призматическая шпонка
13	2503000	1	Paßfeder	Key	Clavette	Chaveta	Призматическая шпонка
12	1387481	0/2	Gummipuffer	Rubber buffer	Cales élastiques	Topes de goma	Резиновый компенсатор
11.2	2503948	1	Distanzhülse	Spacer	Douille d'espacement	Casquillo distanciador	Распорная втулка
11.1	2503930	1	Distanzhülse	Spacer	Douille d'espacement	Casquillo distanciador	Распорная втулка
10	2503794	1	Distanzhülse	Spacer	Douille d'espacement	Casquillo distanciador	Распорная втулка
9	*	1	Zahnrad	Gear	Roue dentée	Engranaje	Зубчатое колесо
8	*	1	Zahnrad	Gear	Roue dentée	Engranaje	Зубчатое колесо
7	*	1	Zahnrad	Gear	Roue dentée	Engranaje	Зубчатое колесо
6	*	1	Ritzel	Pinion	Pignon	Piñón	Шестерня
5.3	2503131	0/1	Arbeitswelle	Output shaft	Arbre secondaire	Arbol de salida	Рабочий вал
5.2	2503123	0/1	Arbeitswelle	Output shaft	Arbre secondaire	Arbol de salida	Рабочий вал
5.1	2503115	0/1	Arbeitswelle	Output shaft	Arbre secondaire	Arbol de salida	Рабочий вал
4.2	2503859	0/1	Flansch	Flange	Bride	Brida	Фланец
4.1	2503841	0/1	Flansch	Flange	Bride	Brida	Фланец
3	2503883	0/1	Drehmomentstütze	Torque restraining arm	Appui de couple	Apoyo de par	Упор против проворачивания
2	2503905	1	Gehäusedeckel	System cover	Couvercle de carter	Tapa de la carcasa	Крышка корпуса
1	*	1	Anbaugehäuse	Attachment housing	Boîtier de montage	Carcasa adosada	Приставной корпус

* ACHTUNG
Bei Bestellung unbedingt Motor-Nr. angeben.

* ATTENTION
Please clearly state serial number when ordering these spare parts.

* ATTENTION
En cas de commande veuillez indiquer le numéro du moteur.

* ATENCION
En caso de pedido indicar el número de motor.

* Внимание
При заказе запчастей указывать номер двигателя.

BAUER

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A.5-6/98-ET-D 09 Printed in Germany

BAUER

Einzelteilverzeichnis
und Schnittzeichnung

Parts list
and sectional drawing

Liste des pièces
et dessin en coupe

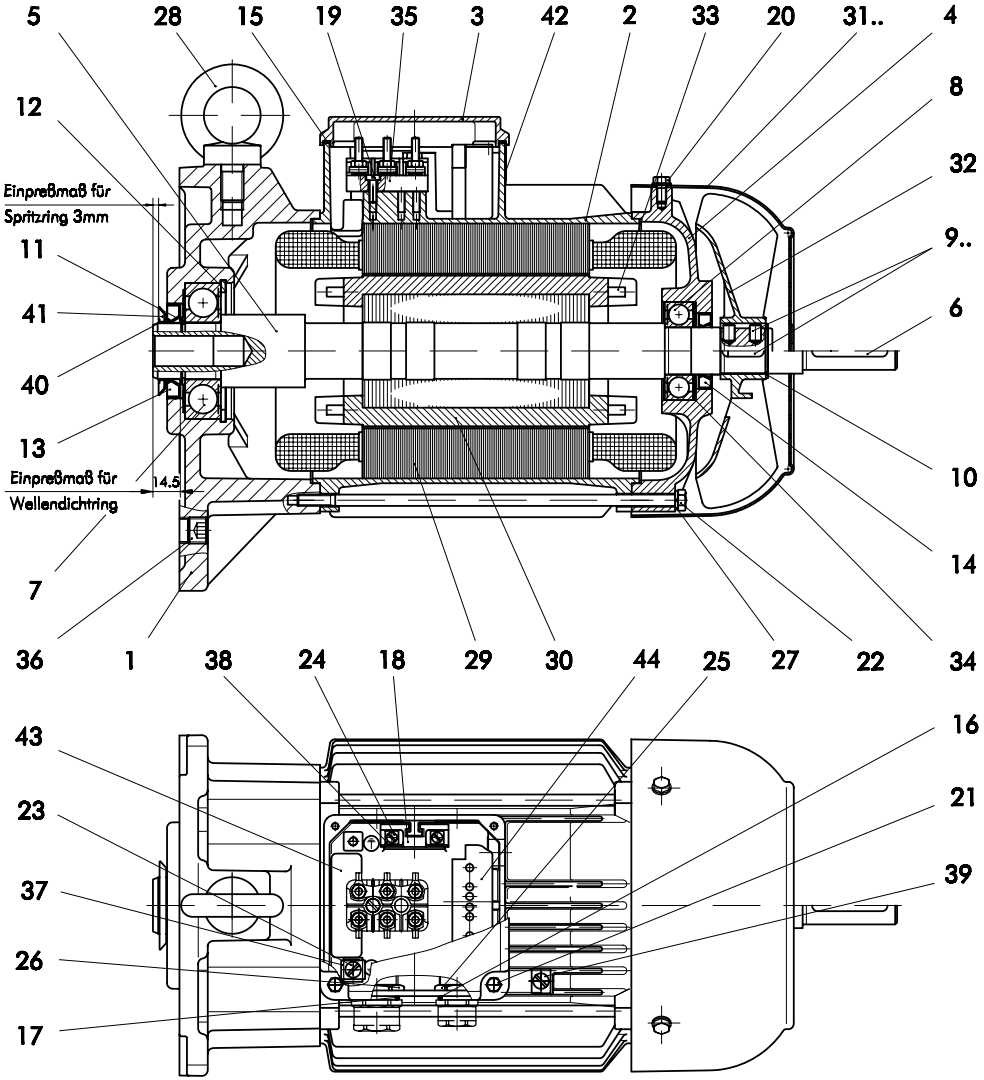
Despiece y sección

СпециФикация деталей
и схема в разрезе

ET-D 09

Motor-Typ
Motor type
Moteur type
Motor tipo
Двигатель тип

ET-D 09



Motor-Typ / Motor type / Moteur type / Motor tipo / Двигатель тип

ET-D 09

Teil-Nr. / Part-No. / Pièce No. / Pieza № / Деталь №	Bestell-Nr. / Order No. / Comm. No. / Código № / Заказ №	Stück / Quantity / Pièces / Cantidad / Шт.	Benennung	Designation	Désignation	Designación	Наименование
44	*	0/1	Gleichrichter, komplett	Rectifier, complete	Redresseur	Rectificador, completo	Выпрямитель пер. напр. в комплекте
43	2515067	1	Füllstück	Packing piece	Joint passe-fils	Relleno	Проставка
42	*	1	Leistungsschild	Rating plate	Plaque signalétique	Placa de características	Шильдик
41	2502267	1	Spritzring	Centrifugal washer	Déflecteur	Aro centrifugador	Маслоотражающее кольцо
40	2513480	1	Speedi-Sleeve-Hülse	Speedi-Sleeve spacer	Douille Speedi-Sleeve	Casquillo Speedi-Sleeve	Втулка „Speedi-Sleeve“
39	1242351*	0/1	Schutzleiterklemme	Stator earth terminal	Borne de masse extérieure	Toma de tierra	Клемма аазвмления
38	1271407*	0/2	Anschlußscheibe	Connection disc	Rondelle de serrage	Arandela	Присоединительная клемма
37	2504197	2	Klemmbügel	Clamping unit	Elément de blocage	Estribo presor	Клеммная скоба
36	*	2	Verschlußschraube	Cover screw	Vis de fermeture	Tapón roscado	Резьбовая пробка
35	*	1	Klemmbrett, vollständig	Terminal board, complete	Plaque à bornes	Regleta, completa	Клеммная колодка в сборе
34	1024205	1	Kula-Ausgleichscheibe	Kula-Shim	Kula-Rondelle de compensation	Kula-Arandela de compensación	Kula-Компенсирующая шайба
33	–		Wuchtgewicht	Balancing weight	Masse d'équilibrage	Contrapeso	Противовес
32	1013921	1	Flügelrad	Fan	Ventilateur	Aspa ventilador	Вентилятор
31.2	1319965*	0/1	Lüfterhaube	Fan cowl	Couverde du ventilateur	Casquete	Колпак вентилятора
31.1	1013971	0/1	Lüfterhaube	Fan cowl	Couverde du ventilateur	Casquete	Колпак вентилятора
30	*	1	Preßgußläufer	Pressure diecast rotor	Toles rotor	Rotor	Запресованный ротор
29	*	1	Statorpaket	Statorpacket	Toles stator	Paquete del estator	Статорный пакет
28	*	1	Ringschraube	Eye bolt	Anneau de levage	Cáncamo	Рым-болт
27	1010484	4	Federring	Spring washer	Rondelle ressort	Anillo de muelle	Пружинное кольцо
26	1491792	1	Sechskantmutter	Hexagon nut	Ecrou hexagonal	Tuerca hexagonal	Шестигранная гайка
25	1307550	1	Sechskantmutter	Hexagon nut	Ecrou hexagonal	Tuerca hexagonal	Шестигранная гайка
24	1232657*	0/2	Zylinderschraube	Allen screw	Vis à tête cylindrique	Tornillo cilíndrico	Винт с цилиндрической головкой
23	1011715	1	Zylinderschraube	Allen screw	Vis à tête cylindrique	Tornillo cilíndrico	Винт с цилиндрической головкой
22	2506611	4	Sechskantschraube	Hexagon bolt	Vis à tête hexagonale	Tornillo hexagonal	Шестигранный болт
21	2519372	4	Gewindeform-Schraube	Thread forming screw	Vis auto-taraudeuse	Tornillo moldeador de rosca	Фасонный болт
20	1397591	4	Gewindeform-Schraube	Thread forming screw	Vis auto-taraudeuse	Tornillo moldeador de rosca	Фасонный болт
19	1397508	1	Gewindeform-Schraube	Thread forming screw	Vis auto-taraudeuse	Tornillo moldeador de rosca	Фасонный болт
18	2506327*	1	Thermistor-Klemme	Thermistor terminal	Bornier pour thermistance	Clema para termistor	Клемма термисторов
17	2513676	1	O-Ring	O-Ring	Joint torique	Junta tórica	Уплотнительное кольцо круглого сечения
16	2513684	1	O-Ring	O-Ring	Joint torique	Junta tórica	Уплотнительное кольцо круглого сечения
15	2506319	1	Dichtung	Gasket	Joint	Junta	Прокподко
14	1329740	1	Wellendichtring	Shaft seal	Bague d'étanchéité d'arbre	Retén	Манжета
13	2505088	1	Wellendichtring	Shaft seal	Bague d'étanchéité d'arbre	Retén	Манжета
12	1000381	1	Sicherungsring	Retainer ring	Circlips	Anillo de seguridad	Стопорное кольцо
11	1011278	1	Sicherungsring	Retainer ring	Circlips	Anillo de seguridad	Стопорное кольцо
10	1011251	1	Sicherungsring	Retainer ring	Circlips	Anillo de seguridad	Стопорное кольцо
9.2	1021541*	0/1	Paßfeder	Key	Clavette	Chaveta	Призматическая шпонка
9.1	2504979	0/2	Zylinderstift	Parallel pin	Goupille	Pasador cilíndrico	Цилиндрический штифт
8	1028961	1	Rillenkugellager	Ball bearing	Roulement	Rodamiento	Подшипник
7	2505096	1	Rillenkugellager	Ball bearing	Roulement	Rodamiento	Подшипник
6	1015788*	0/1	Paßfeder	Key	Clavette	Chaveta	Призматическая шпонка
5	*	1	Läuferwelle	Rotor shaft	Arbre du rotor	Eje del rotor	Вал ротора
4	2504448	1	B-Lagerschild	End shield	Flasque	Escudo del motor	Щит подшипника
3	2506262	1	Klemmenkastendeckel	Terminal box cover	Couvercle de boîte à bornes	Tapa de la caja de bornas	Крышка клеммной коробки
2	2504758	1	Ständergehäuse	Stator housing	Carcasse du stator	Carcasa del estator	Корпус статора
1	*	1	Systemdeckel	System cover	Couvercle intermédiaire	Tapa integral	Передний щит

✳ Diese Teile entfallen bei Anbau an Getriebe BS 03.

✳ These parts are not required when attached to gearbox BS 03.

✳ Ces pièces n'apparaissent pas pour montage du BS 03.

✳ Con el reductor BS 03 se carece de estas piezas.

✳ Эти части не используются при сборке с редуктором BS 03.

* ACHTUNG
Bei Bestellung unbedingt Motor-Nr. angeben.

* ATTENTION
Please clearly state serial number when ordering these spare parts.

* ATTENTION
En cas de commande veuillez indiquer le numéro du moteur.

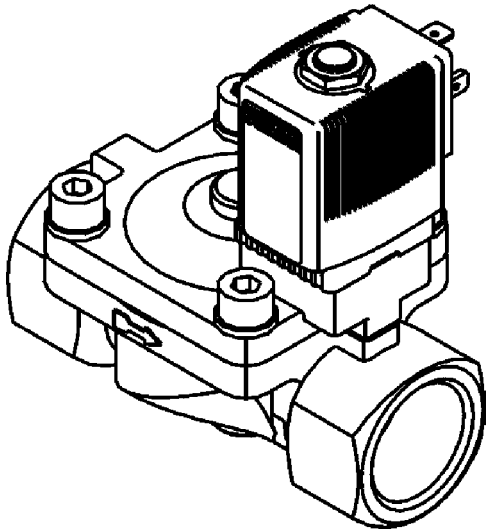
* ATENCION
En caso de pedido indicar el número de motor.

* Внимание
При заказе запасных частей указывать номер двигателя.

Betriebsanleitung Operating instructions
Notice d'utilisation Manual de instrucciones

Type 5281

2/2-Wege-Magnetventil für neutrale Medien
2/2-way solenoid valve for neutral media
Èlectrovanne à 2/2 voies pour fluides neutres
Válvula magnética de 2/2 pasos para medios neutrales



bürkert
Fluid Control Systems

Sicherheit (D)

Bestimmungsgemäße Verwendung

Bitte beachten Sie die Hinweise dieser Betriebsanleitung sowie die Einsatzbedingungen und zulässigen Daten gemäß Datenblatt Typ 5281, damit das Gerät einwandfrei funktioniert und lange einsatzfähig bleibt. Bei Nichtbeachtung dieser Hinweise sowie bei unzulässigen Eingriffen in das Gerät entfällt jegliche Haftung unsererseits, ebenso erlischt die Garantie auf Geräte u. Zubehörteile! Das Gerät dient ausschließlich als 2/2-Wege-Magnetventil für die lt. Datenblatt zulässigen Medien. Eine andere oder darüber hinausgehende Benutzung gilt als ***nicht bestimmungsgemäß***. Für hieraus resultierende Schäden haftet Bürkert nicht. Das Risiko trägt allein der Anwender.

ACHTUNG!

- **Halten Sie sich bei Einsatzplanung und Betrieb des Gerätes an die einschlägigen allgemein anerkannten sicherheitstechnischen Regeln.**
- **Treffen Sie geeignete Maßnahmen, um unbeabsichtigtes Betätigen oder unzulässige Beeinträchtigungen auszuschließen.**
- **Beachten Sie, daß in Systemen, die unter Druck stehen, Leitungen und Ventile nicht gelöst werden dürfen. Schalten Sie vor Eingriffen in das System in jedem Fall die Spannung ab!**
- **Achten Sie auf den einwandfreien Sitz der Dichtung beim Verschrauben der Spule mit der Gerätesteckdose.**
- **Festsitzender Kern bewirkt bei Wechselspannung (AC) Spulenüberhitzung!**
- **Bei Ausführungen mit Explosionsschutz sind zusätzlich die Angaben der Konformitätsbescheinigung PTB Nr. 00ATEX 2129 X zu beachten.**

WARNUNG!

- **Verletzungsgefahr! Bei Dauerbetrieb kann die Spule sehr heiß werden.**

Safety (GB)

Proper Usage

To ensure the proper function of the device and promote long service lift, you must comply with the information in these Operating Instructions and the application conditions and specifications provided in the Type 5281 Data Sheet. Usage of the device in a manner that is contrary to these Operating Instructions or the application conditions and specifications provided in the Type 5281 Data Sheet is improper and will void your warranty. This device serves exclusively as a 2/2-way solenoid valve for the media stated to be permissible on the data sheet. Any other use is considered improper use. ***Bürkert will not be responsible for any improper use of the device.***

ATTENTION!

- **Be sure to observe generally accepted safety rules when planning, installing and using this device. For example, take suitable measures to prevent unintentional operations of the device.**
- **Do not impair the operation of the device.**
- **Do not attemp to detach or unscrew any lines or valves in the system that are under pressure, and always be sure to switch off the voltage supply before working on the system.**
- **When attaching the coil to the plug socket, be sure the seal is properly seated.**
- **Jammed coils can cause coil overheating with AC!**
- **For explosion-proof models, data from the conformity certificate PTB No. 00ATEX 2129 X must also be complied with!**

WARNING!

- **Do not touch the coil during use as it becomes very hot.**

Sécurité (F)

Utilisation conforme aux prescriptions

Afin que l'appareil puisse fonctionner parfaitement et pendant longtemps, veuillez observer les instructions contenues dans cette notice d'utilisation ainsi que les conditions d'utilisation et les données admissibles mentionnées dans la fiche technique du type 5281. En cas d'inobservation de ces instructions et d'interventions non autorisées dans l'appareil, nous déclinons toute responsabilité et la garantie couvrant l'appareil et les accessoires s'éteint! L'appareil sert uniquement d'électrovanne 2/2 voies pour les fluides admis selon la fiche technique. Une autre utilisation ou une utilisation excédant ce contexte sera considérée comme non conforme aux prescriptions. **Pour les dommages qui en résulteraient, le fabricant/fournisseur décline toute responsabilité. L'utilisateur seul en assume le risque.**

ATTENTION!

- **Pour la planification de l'utilisation et l'exploitation de l'appareil, veuillez vous en tenir aux règles applicables et généralement reconnues en matière de technique de sécurité.**
- **Prenez les mesures nécessaires pour exclure tout actionnement involontaire ou des altérations inadmissibles.**
- **Notez qu'il n'est pas permis de desserrer des conduites ou des vannes se trouvant sous pression dans des systèmes! Avant d'intervenir dans le système, coupez l'alimentation électrique dans tous les cas!**
- **Veillez à ce que le joint repose parfaitement lorsque vous visserez la bobine avec le connecteur.**
- **Un noyau bloqué provoque en cas d'alimentation en tension alternative (AC) une surchauffe de la bobine!**
- **Dans les exécutions antidéflagrantes, les indications de l'attestation de conformité PTB N° 00ATEX 2129 X doivent observées en plus.**

AVERTISSEMENT!

- **Risque de blessure! En cas de fonctionnement permanent, la bobine peut devenir très chaude.**

Seguridad (E)

Utilización con arreglo a las disposiciones

Se ruega observar las indicaciones contenidas en este Manual de instrucciones así como las condiciones de uso y datos admisibles con arreglo a la hoja de servicio Tipo 5281, de modo que el aparato funcione impecablemente y permanezca durante largo tiempo apto para el empleo. La inobservancia de estas indicaciones así como las inter-venciones inadmisibles en el aparato suponen la declinación por nuestra parte de toda clase de responsabilidad, además de la extinción de la garan-tía de los aparatos y de las piezas de los accesorios. El aparato sirve ex-clusivamente como válvula magnética de 2/2 pasos para los medios autorizados según la hoja de datos. Cualquier otra utilización que vaya más *ella* no ser*á* conforme a las disposiciones. **El fabricante / suministrador no es responsable de los daños que de ello pudieran resultar. El riesgo corresponde únicamente al usuario.**

¡ATENCIÓN!

- **Para la planificación y operación del aparato atenerse a las correspondientes reglas generales y reconocidas de la técnica de seguridad.**
- **Tomar las medidas apropiadas para excluir accionamien-tos no intencionados o perjuicios inadmisibles; prestar atención a que en el caso de sistemas que se encuentren bajo presión no deben desconec-tarse conducciones y válvulas.**
- **Antes de proceder a intervenciones en el sistema desco-nectar siempre la tensión.**
- **Prestar atención al asiento impecable de la empaquetadura al atornillar la válvula con la caja de enchufe para aparatos eléctricos.**
- **Con tensión alterna (AC), el macho de asiento duro provoca sobrecalentamiento de la bobina!**
- **En las ejecuciones con protección debe tenerse adicio-nalmente en cuenta los datos de la declaración de con-formidad PTB n° 00ATEX 2129 X.**

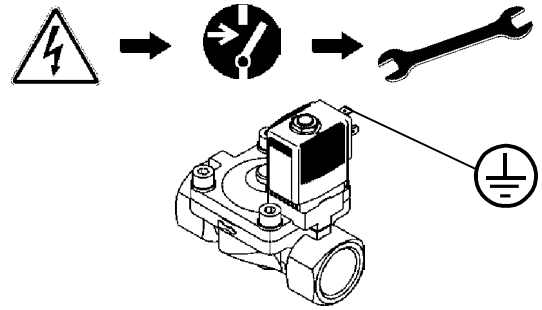
¡AVISO!

- **¡Peligro de lesiones! En estado de operación continua la bobina puede ponerse muy caliente.**

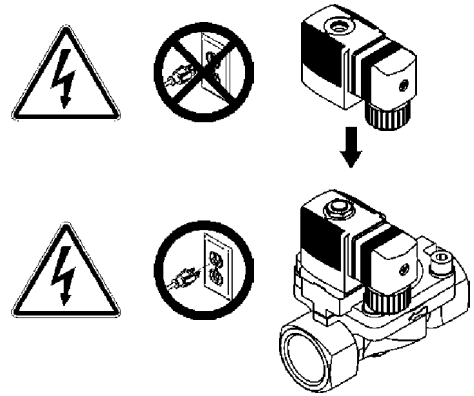
Sicherheit (D) (GB) (F) (E)

Safety / Sécurité / Seguridad

① **Spannungsfreie Montage / Voltage-free assembly**
Montage sans tension / Montaje libre de tensión



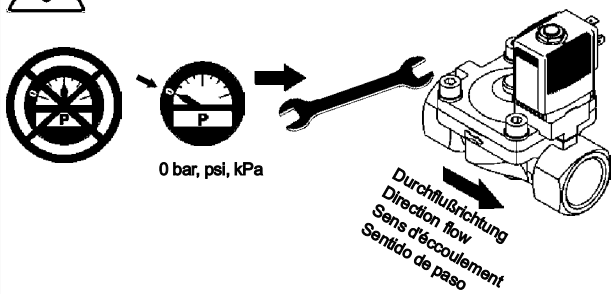
② **Elektrischer Anschluß / Electrical connection**
Raccordement électrique / Conexión eléctrica



Sicherheit (D) (GB) (F) (E)

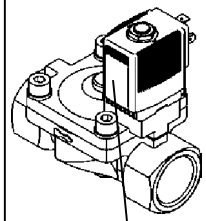
Safety / Sécurité / Seguridad

③ Fluidischer Anschluß / Fluid connection
Raccordement fluidique / Conexión fluídica



Technische Daten (D) (GB)

Technical Data



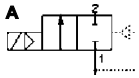
Umgebungstemperatur
Temperature of Surroundings

Gehäuse/Housing
Messing/brass
Edelstahl/Stainless steel

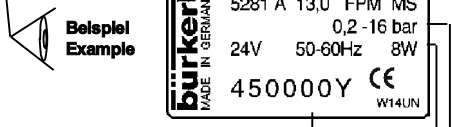
Dichtwerkstoff / Sealing material	Temp. / Medium
NBR	-10 .. +90 °C
EPDM	-40 .. +120 °C
FPM	-10 .. +120 °C

Nennweite/Nominal size

Wirkungsweise
Circuit function



Typ/ Type



Beispiel
Example

Bestell-Nr. / Id. No.

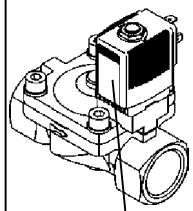
Spannung (±10 %) - Frequenz - Leistung
Voltage (±10 %) - Frequency - Power

Druckbereich/Pressure range

Technische Änderungen vorbehalten
We reserve the right to make technical changes without notice

Technische Daten (F) (E)

Caractéristiques techniques / Datos técnicos



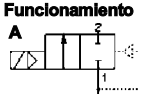
Température d' ambiante
Temperatura de ambiente

Boîtier/Caja
Laiton/Latón
Acier fin/Acero inoxidable

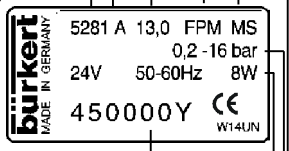
Matériau d'étanchéité / Material de estanqueidad	Temp. Fluide/Medio
NBR	-10 .. +90 °C
EPDM	-40 .. +120 °C
FPM	-10 .. +120 °C

Dimension nominale
Anchura nominal

Fonctionnement
Funcionamiento



Type/Tipo



Exemple
Ejemplo

N° id. / N° de pedido

Tension (±10%) - fréquence - puissance
Tensión (±10 %) - frecuencia - potencia

Plage de pression / Gama de presión

Sous resérve de modification techniques.
Nos reservamos el derecho de llevar a cabo modificaciones tècnicas sin previo aviso.

Niederlassungen / Branch Offices

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Fax (0 79 40) 10-204
www.buerkert.com
info@de.buerkert.com

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Dresden	Ph: (03 59 52) 36 30 - 0
Frankfurt	Ph: (0 61 03) 94 14 - 0
Hannover	Ph: (05 11) 9 02 76 - 0
München	Ph: (0 89) 82 92 28 - 0
Stuttgart	Ph: (07 11) 4 51 10 - 0

BÜRKERT INTERNATIONAL

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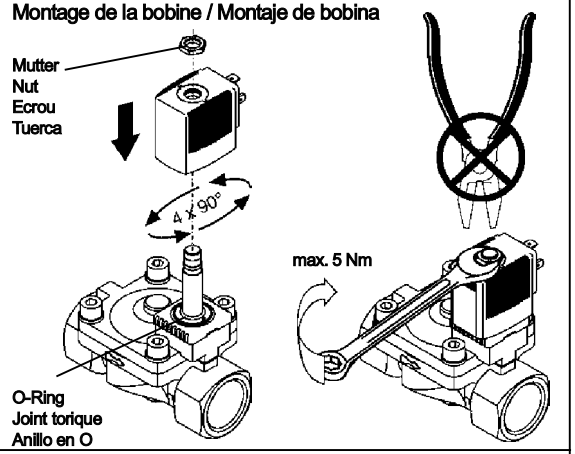
B	Ph.	(03) 325 89 00	Fax	(03) 325 61 61
BRA	Ph.	(011) 51 82 00 11	Fax	(011) 51 82 88 99
CDN	Ph.	(0905) 847 55 66	Fax	(0905) 847 90 06
CH	Ph.	(041) 785 66 66	Fax	(041) 785 66 33
CN	Ph.	(0512) 808 19 16	Fax	(0512) 824 51 06
CZ	Ph.	(0641) 22 61 80	Fax	(0641) 22 61 81
DK	Ph.	(044) 50 75 00	Fax	(044) 50 75 75
E	Ph.	(093) 371 08 58	Fax	(093) 371 77 44
F	Ph.	(01) 48 10 31 10	Fax	(01) 48 43 61 04
GB	Ph.	(01453) 73 13 53	Fax	(01453) 73 13 43
HKG	Ph.	(02) 24 80 12 02	Fax	(02) 24 18 19 45
I	Ph.	(02) 95 90 71	Fax	(02) 95 90 72 51
IRE	Ph.	(021) 486 13 36	Fax	(021) 486 13 37
J	Ph.	(03) 53 05 36 10	Fax	(03) 53 05 36 11
KOR	Ph.	(02) 34 62 55 92	Fax	(02) 34 62 55 94
MAL	Ph.	(0065)383 26 12	Fax	(0065)383 26 11
N	Ph.	(063) 84 44 10	Fax	(063) 84 44 55
NL	Ph.	(0346) 58 10 10	Fax	(0346) 56 37 17
NZ	Ph.	(09) 570 25 39	Fax	(09) 570 25 73
PL	Ph.	(022) 827 29 00	Fax	(022) 6 27 47 20
RC	Ph.	(02) 27 58 31 99	Fax	(02) 27 58 24 99
S	Ph.	(040) 664 51 00	Fax	(040) 664 51 01
SA	Ph.	(011) 397 29 00	Fax	(011) 397 44 28
SF	Ph.	(09) 54 97 06 00	Fax	(09) 503 12 75
SIN	Ph.	383 26 12	Fax	383 26 11
TR	Ph.	(0232) 459 53 95	Fax	(0232) 459 76 94
USA	Ph.	(0949) 223 31 00	Fax	(0949) 223 31 98

Betriebsanleitung-Nr. 803 312 - ind 07/aug01 09/01/10'M

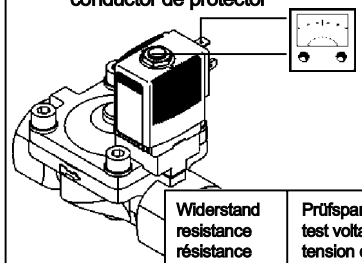
Montage (D) (GB) (F) (E)

Montage / Assembly / Montage / Montaje

① Spulenmontage / Coil assembly /
Montage de la bobine / Montaje de bobina



② Schutzleiterfunktion / Protective conductor function /
Fonctionnement du conducteur de protection / Función del conductor de protector



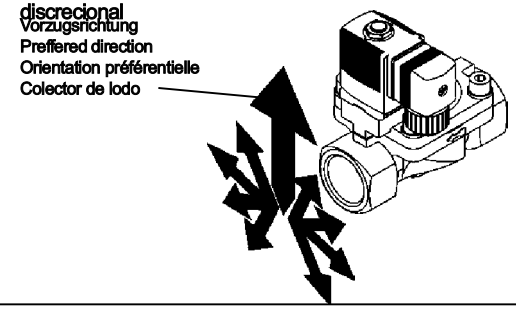
Nach Spulenmontage immer prüfen!
Always test function after assembly of coil!
Toujours vérifier après montage de la bobine!
¡Tras el montaje de bobina pruébese siempre la function¡

Widerstand resistance résistance intensidad	Prüfspannung test voltage tension d'essai tensión de prueba	Prüfstrom test current courant d'essai corriente de prueba
max. 0,1 Ω	12 V	1 A

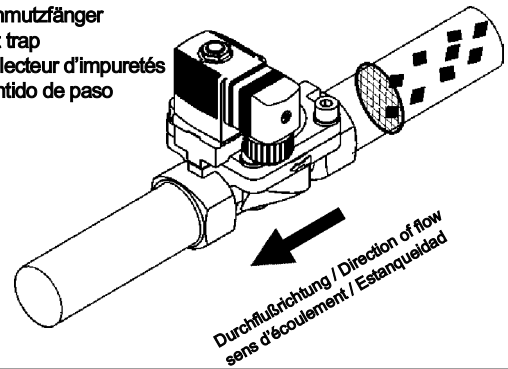
Montage (D) (GB) (F) (E)

Montage / Assembly/ Montage / Montaje

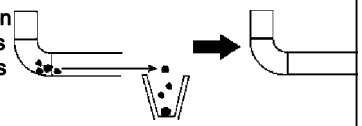
③ Einbaulage beliebig / Any assembly position / Position de montage quelconque / Sentido de montaje discrecional



④ Schmutzfänger
Dirt trap
Collecteur d'impuretés
Sentido de paso



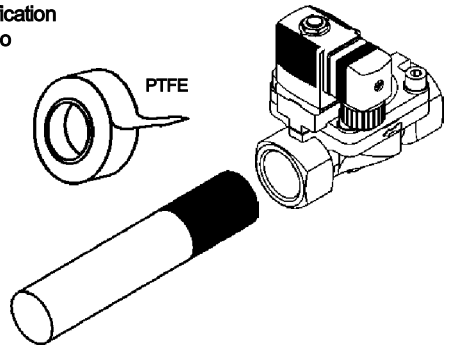
⑤ Rohrleitungen reinigen
Cleaning the piperuns
Nettoyer les conduites
Limpieza tuberías



Montage (D GB F E)

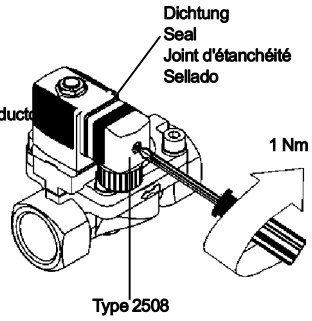
Montage / Assembly / Montage / Montaje

⑥ Abdichtung
Seal
Etanchéification
Atornillado



⑦ Gerätesteckdose / Instrument socket / Connecteur / Caja de enchufe para aparatos eléctricos

Schutzleiter **immer** anschließen!
Always connect the protective conductor!
Raccordez dans **tous les cas** le conducteur de protection!
Conectar **en todo caso** el conductor de puesta a tierra!

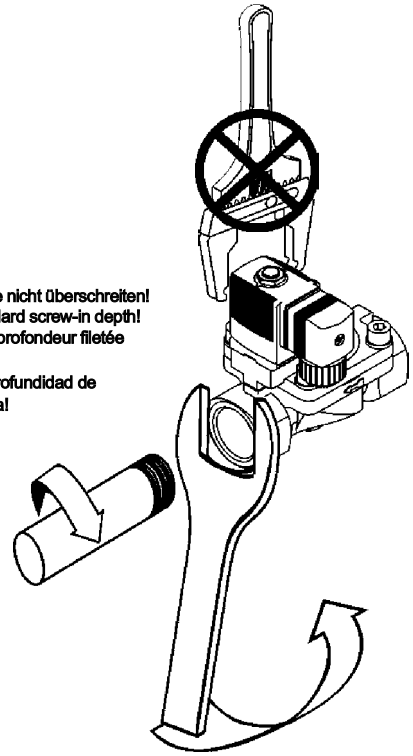


Montage (D GB F E)

Montage / Assembly / Montage / Montaje

⑧ Einschrauben der Rohrleitungen / Screwing in the pipe connections
Vissage les conduites / Averías las tuberías

Normeinschraubtiefe nicht überschreiten!
Do not exceed standard screw-in depth!
Ne pas dépasser la profondeur filetée normalisée!
¡No sobrepasar la profundidad de roscado normalizada!



Störungen (D GB F E)

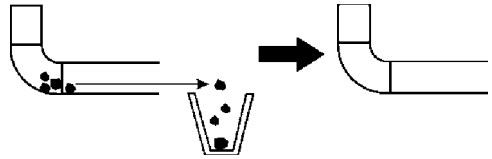
Troubleshooting / Dérangements / Averías

Spannung und Stromart prüfen!
Check the voltage and type of current!
Vérifier la tension et le genre de courant!
Comprobar tensión y clase de corriente!

Druck prüfen! / Check the pressure!
Vérifier la pression! / Comprobar presión!

bar, psi, kPa

Rohrleitungen prüfen! / Check the piperun!
Vérifier les conduites! / Comprobar tuberías!



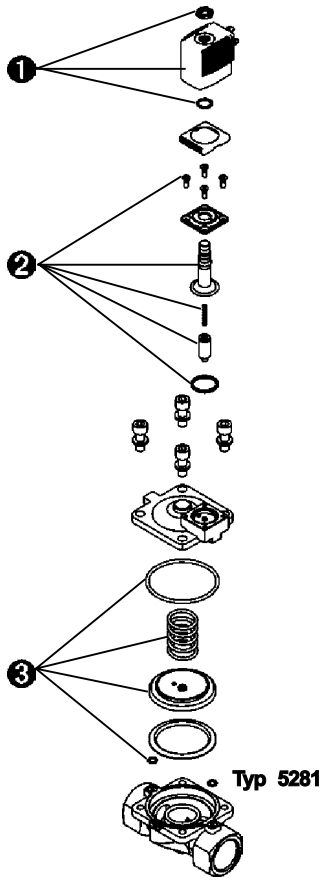
Ersatzteile (D) (GB) (F) (E)

Spare parts / Pièces de rechange / Pieza de repuesto

❶
- (D) Spulensatz
- (GB) Coil kit
- (F) Jeu de bobines
- (E) Juego de bobina

❷
- (D) Verschleißteilsatz
- (GB) Set of Wearing Parts
- (F) Jeu de pièces d'usure
- (E) Juego del piazas de cierre

❸
- (D) Dichtungssatz
- (GB) Set of Seals
- (F) Jeu de joints
- (E) Juego de estanqueidad



Typ 5281

Ersatzteile (D) (GB) (F) (E)

Spare parts / Pièces de rechange / Pieza de repuesto

❶

	Spannung Voltage Tension Tensión [V]	Leistung Power Puissance Potencia [W]	Id-Nr. Id. No. No cde. No de pedito
Europa, Europe	024 / DC	8	126 434 R
	024 / 56	8	645 556 D
	110 / 56	8	645 557 E
	230 / 56	8	645 558 P
N.A.F.T.A.	024 / DC	8	126 434 R
	024 / 56	8	645 556 D
	120 / 60	8	643 802 B
	240 / 60	8	643 803 C
A.P.A.C.	024 / DC	8	126 434 R
	024 / 56	8	645 556 D
	100 / 56	8	645 559 Q
	110 / 56	8	645 557 E
	200 / 56	8	645 560 M
	230 / 56	8	645 558 P

(D) Bitte geben Sie bei der Bestellung von Verschleißteilen zusätzlich zur Bestellnummer der Ersatzteile auch die Bestellnummer Ihres Komplettgerätes an.

(GB) When ordering spare parts, please also quote the order number of your complete appliance in addition to the order number of the replacement parts.

Ersatzteile (D) (GB) (F) (E)

Spare parts/Pièces de rechange/Pieza de repuesto

❷

Nennweite Nominal diameter Diamètre nominal Anchura nominal	Dichtwerkstoff Sealing material Matière de joint Material de estanqueidad	Id-Nr. Id. No. No cde. No de pedito
13 - 65	NBR	645 561 A
	FPM	645 562 B
	EPDM	645 563 C

❸

13	NBR	624 012 J
	FPM	624 013 K
	EPDM	624 014 L
20	NBR	624 015 M
	FPM	624 016 N
	EPDM	624 017 P
25	NBR	624 018 Y
	FPM	624 019 Z
	EPDM	624 020 W
32, 40	NBR	624 021 K
	FPM	624 022 L
	EPDM	624 023 M
50	NBR	624 024 N
	FPM	624 025 P
	EPDM	624 026 Q

(F) Lors de la commande de pièces de rechange, indiquez, en plus de leur numéro de commande, celui de commande de votre appareil complet.

(E) Con ocasión del pedido de las pieza de repuesto, rogamos indicar además del número de pedido de la pieza de requesto también el número de pedido de su aparato completo.

(GB) ATEX Approval

Since 01.07.2003, the new EC Guideline 94/9/EC (ATEX 100a) is being applied. The present Bürkert product complies with the requirements of this Guideline. Compared with the previous approval, only the marking has changed; the devices are technically identical.

The markings will change as follows:

old	new
PTB Ex-95.D.2043X	PTB 00 ATEX 2129 X
EEx m II T4, T5 or T6	II 2G/D EEx m II T4, T5, T6 or II 2G EEx em II T4, T5, T6
CE	CE0102

(D) ATEX-Zulassung

Seit dem 01. 07. 2003 wird die neue EG-Richtlinie 94/9/EG (ATEX 100a) angewendet. Das vorliegende Bürkert-Produkt entspricht den Anforderungen dieser Richtlinie. Im Vergleich zur bisherigen Zulassung hat sich nur die Kennzeichnung geändert, technisch sind die Geräte identisch.

Die Kennzeichnungen unterscheiden sich wie folgt:

alt	neu
PTB Ex-95.D.2043X	PTB 00 ATEX 2129 X
EEx m II T4, T5 oder T6	II 2G/D EEx m II T4, T5, T6 bzw. II 2G EEx em II T4, T5, T6
CE	CE0102

(F) Homologation ATEX

Depuis le 01. 07. 2003 la nouvelle directive CE 94/9/CE (ATEX 100a) est appliquée. Le présent produit Bürkert correspond aux exigences de cette directive. Comparé à l'homologation existante jusqu'à maintenant, seul le marquage a changé, les appareils sont techniquement identiques.

Les identification se différencient comme suit:

ancien	nouveau
PTB Ex-95.D.2043X	PTB 00 ATEX 2129 X
EEx m II T4, T5 ou T6	II 2G/D EEx m II T4, T5, T6 et II 2G EEx em II T4, T5, T6
CE	CE0102

We reserve the right to make technical changes without notice.
Technische Änderungen vorbehalten.
Sous resérve de modification techniques.

Operating Instructions No. 803 970 - ind 10 - nov 03
Bedienungsanleitung No. 803 970 - ind 10 - nov 03
Instructions de service N° 803 970 - ind 10 - nov 03

bürkert

ALLGEMEINE HINWEISE

EG - Konformitätserklärung

Hiermit erklärt die Firma **Bürkert Werke GmbH & Co. KG** als Hersteller, dass diese Erzeugnisse den Anforderungen entsprechen, die in den Richtlinien des Rates zur Angleichung der Rechtsvorschriften der Mitgliedstaaten über

elektrische Betriebsmittel mit Nennspannungen von 50-1000 V AC bzw. 75-1500 V DC (Niederspannungsrichtlinie 73/23/EWG),

die elektromagnetische Verträglichkeit (89/336/EWG)

und für Geräte und Schutzsysteme zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen (ATEX, 94/9EG) festgelegt sind.

deutsch

Zur Beurteilung der Erzeugnisse hinsichtlich Einhaltung der **Niederspannungs-richtlinie** wurden folgende Normen herangezogen:

EN 50178: 04/98	Ausrüstung von Starkstromanlagen mit elektronischen Betriebsmitteln
EN 60730-1: 01/96	Automatische elektrische Regel- und Steuergeräte
DIN VDE 0110-1: 04/97	Isolationskoordinaten für elektrische Betriebsmittel in Niederspannungsanlagen
EN 60529: 11/92	Schutzarten durch Gehäuse (IP-Code)
DIN VDE 60204-1: 06/93	Sicherheit von Maschinen
VDE 0580: 10/94	Elektromagnetische Geräte, Allgemeine Bestimmungen

Zur Beurteilung der Erzeugnisse hinsichtlich der **elektromagnetischen Verträglich-keit** wurden folgende Normen herangezogen:

EN 50081-2: 03/94	Fachgrundnorm Störaussendung; Teil 2: Industriebereich
EN 61000-6-2: 03/00	Fachgrundnorm Störfestigkeit; Teil 2: Industriebereich

Zur Beurteilung der Erzeugnisse hinsichtlich der **ATEX** wurden folgende Normen herangezogen:

EN 50014: 02/00	Elektrische Betriebsmittel für explosionsgefährdete Bereiche, Allgemeine Bestimmungen
EN 50019: 01/00	Elektrische Betriebsmittel für explosionsgefährdete Bereiche, Erhöhte Sicherheit “e”
EN 50028: 07/88	Elektrische Betriebsmittel für explosionsgefährdete Bereiche, Vergußkapselung „m“
EN 50281-1-1: 98	Staubexplosionsschutz

Die EG-Baumusterprüfbescheinigung **PTB 00 ATEX 2129X** wurde von der
Physikalisch Technischen Bundesanstalt
Bundesallee 100
38116 Braunschweig
ausgestellt, die auch die Fertigung auditiert (CE0102).

HINWEIS Die Baumusterprüfbescheinigung **PTB 00 ATEX 2129X** finden Sie im Anhang. Temperaturklassen und elektrische Daten siehe "Technische Daten".

18 - 00 ATEX 2129 X

bürkert

GENERAL INSTRUCTIONS

EC Declaration of conformity

english

As manufacturer, **Bürkert Werke GmbH & Co. KG** herewith declares that these products comply with the requirements of the Directives of the Committee for the Harmonization of the Legal Regulations of Member States concerning

electrical equipment with rated voltages of 50-1000 V AC respectively 75-1500 V DC (Low Voltage Directive 73/23/EC),

electromagnetic compatibility (89/336/EC)

equipment and protective systems intended for use in potentially explosive atmospheres (ATEX, 94/9/EU).

The following standards were consulted with respect to the compliance with the Low Voltage Directive:

EN 50178: 04/98	Power current equipment with electronic devices
EN 60730-1: 01/96	Automatic electrical controlling and regulating equipment
DIN VDE 0110-1:04/97	Insulation coordinates for electrical equipment in low voltage installations
EN 60529: 11/92	Methods of protection through the enclosure (IP code)
DIN VDE 60204-1: 06/93	Safety of machines
VDE 0580: 10/94	Electromagnetic devices, general requirements

The following standards were consulted for assessing the devices with respect to electromagnetic compatibility:

EN 50081-2: 03/94	Basic specification interference transmission; Part 2: Industry
EN 61000-6-2: 03/00	Basic specification interference immunity; Part 2: Industry

The following standards were consulted with resprect to the compliance with the ATEX:

EN 50014: 02/00	Electrical apparatus for potentially explosive atmospheres. General requirements
EN 50019: 01/00	Electrical apparatus for potentially explosive atmospheres. Increased safety „e“
EN 50028: 07/88	Electrical apparatus for potentially explosive atmospheres. Encapsulation „m“
EN 50281-1-1: 98	Dust explosion protection

The EC prototype test certificate **PTB 00 ATEX 2129X** was issued by the
Physikalisch Technischen Bundesanstalt
Bundesallee 100
38116 Brunswick
who also audited the production (CEO102)

NOTE || For EC Design Test Certificate **PTB 00 ATEX 2129X**, see annex. For temperature classes and electrical data see "Technical Data".

2 - 00 ATEX 2129 X