Operating and Maintenance Instructions
with Dismounting and Mounting Instructions

Eccentric Screw Pumps
Series AE1L, AE.E, AE.N, AE.H, AE.V, AED1E, AED2N

Design ID, ZD

Order No.: Ident No. of Pump:
Machine No.: Pump Type:

Operating data, dimensions and other additional information can be found in the order-specific part of the documentation.

These Operating and Maintenance Instructions contain information from the pump manufacturer. They may need to be supplemented by instructions of the operator company for its personnel. These instructions do not take account of specific information relating to operation and maintenance of the process plant into which the pump is integrated. Such information can only be given by the persons responsible for construction and planning of the plant (plant manufacturer).

Such specific instructions relating to operation and maintenance of the process plant into which the pump is integrated have priority over the instructions of the pump manufacturer. The plant manufacturer must on principle observe the limits of use!

Refer to the operating instructions of the plant manufacturer!

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1. General

1.1 Application and range of utilization
The eccentric screw pumps are self-priming, rotary positive-displacement pumps for handling and dosing low to high-viscosity, neutral or aggressive, pure or abrasive, gaseous liquids or liquids which tend to froth, even with fibre and solids contents.

1.2 Performance data
The exact performance data applying to the pump are to be taken from the order data sheet and are engraved on the name plate.

1.3 Abbreviation
The abbreviation of the eccentric screw pumps is set up according to the following scheme:

Example:

Series AE 1E 100 - ID
AE 1 N 200 - ZD

This abbreviation is embossed on the type plate.

1.4 Warranty
Our liability for shortcomings in the supply is laid down in our delivery conditions. No liability will be undertaken for any damages caused by non-compliance with the operating instructions and service conditions. If at any later date the operating conditions happen to change (e.g. different liquid pumped, speed, viscosity, temperature or pressure conditions), it must be checked by us from case to case and confirmed, if necessary, whether the pump is suited for these purposes. In case no special agreements were made, pumps supplied by us may, during the warranty period, be opened or varied only by us or our authorized contractual service stations; otherwise, our liability for any defects will cease.

1.5 Testing
Prior to leaving our factory, all pumps are subjected to a leakage and performance test. Only properly operating pumps leave the factory achieving the performances assured by us. Thus, compliance with the following operating instructions ensures proper operation.

2. Safety
These operating instructions contain basic hints to be observed in case of installation, operation and maintenance. Therefore, prior to mounting and commissioning, these operating instructions must by all means be read by the fitter as well as the pertinent expert personnel/customer and must always be available at the place of installation of the machine/plant.

Not only are the general safety hints listed under this main item „Safety“ to be observed, but also the special safety hints such as for private use added to the other main items.

2.1 Marking of hints in the operating instructions
The safety hints contained in these operating instructions which, in case of non-compliance, may cause danger to personnel, are particularly marked with the general danger symbol

For safety hints, non-compliance with which may cause dangers to the machine and its functions, the word

is inserted.

Hints directly attached to the machine such as
- directional marker
- signs for fluid connections
must by all means be observed and maintained in completely legible condition.

2.2 Personnel qualification and personnel training
The personnel for operation, maintenance, inspection and mounting must have the corresponding qualification for these operations. Range of liability, competence and the supervision of the personnel must be exactly controlled by the customer. If the personnel do not have the required knowledge, same must be trained and instructed. If required, this may be effected by the manufacturer/supplier on behalf of the machine customer. In addition, it must be ensured by the customer that the contents of the operating instructions are fully understood by the personnel.

2.3 Dangers in case of non-compliance with the safety hints
Non-compliance with the safety hints may result in danger not only to persons, but also to environment and machine. Non-compliance with the safety hints may lead to the loss of any claims for damages. In detail, non-compliance may, for example, entail the following dangers:
- failure of important functions of the machine/plant
- failure of specified methods for maintenance and servicing
- danger to persons by electrical, mechanical and chemical influences
- danger to the environment by leakage of dangerous substances

2.4 Responsible working
The safety hints mentioned in these operating instructions, the current national rules for the prevention of accidents as well as any internal working, operating and safety regulations of the owner must be observed.

2.5 Safety hints for the user/operator
- If hot or cold machine parts lead to dangers, these parts must be protected against accidental contact at the site.
- Protection against accidental contact for moving parts must not be removed when the machine is in operation.
- When operating pump aggregates in a dust-laden environment (e.g. milling, chipboard manufacture, bakeries), the surface of the pumps and motors must be cleaned at regular intervals, depending on local conditions, in order to maintain the cooling effect and eliminate the possibility of spontaneous combustion. Please also see explosion protection regulations (BGR 104).
- Leakages (e.g. of the shaft seal) of dangerous materials to be handled (e.g. explosive, toxic, hot) must be discharged so as not to result in danger to persons and the environment. Legal stipulations are to be observed.
- Dangers by electrical energy are to be excluded (for details with regard hereto, please refer e.g. to the regulations of the VDE and the local energy supply associations).

2.6 Safety hints for maintenance, inspection and mounting operations
The customer shall see to it that all maintenance, inspection and mounting operations are performed by authorized and qualified expert personnel who have sufficiently informed themselves by thoroughly studying the operating instructions. Basically, operations at the machine must be performed during standstill only. The mode of operation for stopping the machine described in the operating instructions must by all means be observed. Pumps or aggregates handling noxious liquids must be decontaminated. Immediately upon completion of the operations, all safety and protective devices must be mounted and made operational again. Prior to restarting, the items listed in Chapter "Preparation for start-up" are to be observed.

2.7 Independent reconstruction and spare parts production
Reconstruction of or changes to the machine are only admissible after consultation with the manufacturer. Original spare parts and accessories authorized by the manufacturer serve safety purposes. The use of other parts may cancel the liability for the consequences resulting therefrom.

2.8 Inadmissible modes of operation
The operating safety of the machine supplied is only ensured with due application according to Chapter 1 “General” of the operating instructions. The limit values given in the data sheet must by no means be exceeded.

2.9 Operation in potentially explosive environments
Observe the instructions of the ATEX additional operating manual when operating the pump respectively aggregate in potentially explosive environments.

3. Transport and intermediate storage

3.1 Packing
The symbols applied to the packing must be observed. During transportation and storage, suction and outlet side and auxiliary connections of the pump must be closed with plugs. During installation of the pump aggregate, the plugs must be removed.

3.2 Transportation
The pump or pump aggregate is to be safely transported to the place of installation, if required by means of lifting gear.

The regulation for lifting loads in accordance with VBG 9a must be observed. Crane and sling equipment must be adequately dimensioned. Sling equipment must not be secured to the lifting eyes of the motor, except as additional protection against overturning in the event of nose-heaviness.

When transporting the pump by crane, place the stopper ropes safely around the suction casing. With complete pump aggregates, an additional rope must be slung around the drive engine. The stopper ropes have to be slung around the pump respectively pump aggregate so that these are exactly balanced when lifted.

Transportation to and at the installation site
Make sure, that the unit is transported safely and in a stable position. Overturning due to nose-heaviness must be prevented.

Transport damages
Check the pump for damage on receipt. Any damage detected must be notified immediately.

3.3 Preservation and storage of eccentric screw pumps
Please refer to our document VM 2102/…
4. Description

4.1 Structural design
Self-priming, one or two-stage eccentric screw pump. The conveyor elements are rotor and stator. The input torque is transmitted via the drive shaft and the joint shaft to the rotor. Pressure casing, stator and suction casing are held together by external casing connection screws (clamp bolts).

The stuffing box or mechanical seal housing is located between the suction casing and the bearing bracket.

4.1.1 Bearing and lubrication
Joint shaft with liquid-proof clad bolt joints. Greasing with joint oil.

Bearing of the drive shaft in the bearing bracket through greased angular contact and groove ball bearings. Bearings protected against water jets.

4.1.2 Shaft seal
Through uncooled or cooled stuffing box or cooled or uncooled, maintenance-free, non-released, singular or double-acting mechanical seal.

4.1.3 Dimensions/branch position/flanges
The dimensions of the pump respectively the pump aggregate, the branch position and flange dimensions are to be taken from the tables of dimensions.

4.2 Sound pressure level
The sound pressure level of the pump is below 70 dB (A).

4.3 Mode of operation
Self-priming, rotating positive-displacement pump. Conveyor elements are the rotating helical rotor and the static stator. Both touch in transection with series AE.E, AE.N, AE.H, AE.V in two points each and with series AE1L, AED1E, AED2N in three points each, which form two sealing lines seen across the length of the conveyor elements with series AE.E, AE.N, AE.H, AE.V and three sealing lines with series AE1L, AED1E, AED2N. The content of the sealed chambers that form with the rotation of the rotor is shifted axially and totally continuously from the suction to the outlet side of the pump. No turbulence occurs despite the rotation of the rotor. The unvarying chamber volume rules out crushing forces and thus guarantees very gentle, low-pulsation conveyance.

4.4 Aggregate construction

4.4.1 Drive
By means of non-explosion-protected or explosion-protected electric motors, geared motors or variable speed gear motors. Other drive variants (e.g. via V-belts) are possible.

4.4.2 Shaft coupling and protection against accidental contact
Shaft coupling according to DIN 740.

A protection against accidental contact according to DIN EN 809 is attached as soon as the scope of supply comprises pump, base plate, shaft coupling and drive.

Warning: According to the rules for the prevention of accidents, the pump must be started only with a protection against accidental contact according to DIN EN 809. If a protection against accidental contact is not supplied, same is to be installed by the operator.

4.4.3 Base plate
The pumps of horizontal installation are, as a rule, mounted with the drive on a common base plate. Base plates are provided of the steel type of construction.

5. Installation/Mounting

5.1 Installation
The pumps can be installed horizontally or vertically with bearing upwards.

5.2 Foundation
The foundation design depends on the size of the pump and/or the pump aggregate and the local installation conditions.

For exact data on the pump and aggregate dimensions, please refer to our tables of dimensions.

The foundation may be designed as concrete foundation or load-carrying foundation frame, for example of the steel type.

All foundation designs are subject to the following:

The foundation must be designed so that it can take the weight of the pump aggregate on the entire surface.

5.2.1 Arrangement of a steel foundation plate
A steel foundation plate must be designed in such a way that the base plate makes full contact and can be secured with bolts or by welding.

Attention: If only some of the areas of the base plate are supported, the plate sags in the center or the pump aggregate can be twisted. This influences the alignment of the pump aggregate can cause high noise emission and damage.

5.2.2 Arrangement of concrete foundations
Concrete foundations must be horizontal, straight and clean and must fully absorb the load exerted on the foundations. Concrete foundations must be designed in such a way that the base plate makes full contact and can be secured with suitable bolts (see our aggregate drawing).

Attention: If only some of the areas of the base plate are supported, the plate sags in the center or the pump aggregate can be twisted. This influences the alignment of the pump aggregate can cause high noise emission and damage.

5.2.3 Fastening of the pump aggregate on the concrete foundations
After aligning the pump aggregate on the concrete foundations the securing bolts are diagonally and evenly tightened.

5.2.4 Arrangement of concrete foundations for poured base plates
When shuttering the concrete foundations it must be observed that a gap for aligning the pump aggregate and applying the mortar compound remains between the top of the finished foundation block and the bottom of the base plate.
5.2.5 Pouring of base plate
After alignment on the concrete foundations, a low-shrinkage mortar compound must be poured over the entire length of the base plate, covering also the anchor holes with the connected foundation bolts. Once the mortar compound has set on the base plate and in the anchor holes, the foundation bolts must be diagonally and evenly tightened.

**Note:** When pouring or adding the mortar compound it must be observed that the base plate makes full contact. Tap the plate to ensure that no cavities have formed underneath.

5.3 Base plate
The base plate must be fixed on the foundation, tension-free.

5.4 Coupling
A pump aggregate supplied complete was carefully mounted at the factory. As the pump and the drive are fixed on the base plate, re-alignment of the coupling is not required.

5.5 Assembling of pump and drive
If the aggregate is first completed on site, you need to assemble the clutch as follows:

1. Thinly coat the pump and drive shafts with molybdenum sulfite (e.g. Molykote) and insert the feather keys.
2. Wind up the pump and the motor-side clutch half with the aid of a windup device so far until the shaft end is aligned with the clutch hub. If no windup device is available, heating the clutch halves to approx. 100°C (without rubber buffers) eases sliding on.
3. Fixate the clutch halves axially with a grub screw (DIN 916).
4. When assembling the pump and the motor, the drive motor respectively variable speed gear, make sure that the clutch halves are exactly aligned and that the distance between the coupling halves is observed (see our aggregate drawings and the details by the clutch manufacturers).
5. Install a contact protection in acc. with DIN EN 809.

**5.6 Drive by V-belt drive**
In case of a V-belt reduction from drive to pump, make sure that two V-belt pulleys are aligned in parallel. The V-belt pulleys must be pushed onto the shaft ends as far as possible. It must be possible to regulate the tension of the V-belts by means of a motor rocker or by means of tensioning rails. They must be slightly retightened after a short running-in period.

**ATTENTION** Excessive tensioning will destroy the rolling bearings of the pump.

Our separate instructions “V-belt drive” (VM 706.0001 GB, Ident No. 133586) must be complied with.

5.7 Space required for maintenance and servicing

**ATTENTION** The pump must be accessible from all sides in order to be able to perform the required sight inspections. There must be enough room for maintenance and service work, especially for the exchange of the conveyor elements. The stator and rotor dismounting dimensions are listed in the pump respectively pump aggregate dimension sheet. Also make sure that all pipelines can be attached/detached without obstacles.

5.8 Installing of pipelines

5.8.1 Nominal widths
The nominal widths of the suction and pressure pipes should be designed according to the nominal widths of the pipe connections. Gross deviations, especially on the suction side, require consultation with the factory.

5.8.2 Supports and flange connections
The pipelines must be connected tension-free to the pump via the flange connectors. They have to be supported near the pipe and should be easy to screw on in order to avoid strains. After loosening the screws, the flanges may neither be slanted nor springy and also not rest on each other under pressure. Possible thermal stress on the pipelines has to be kept away from the pump by means of suitable measures, e.g. the installation of compensators.

5.8.3 Cleaning of pipelines prior to attachment
The pipelines, sliders and valves on the suction side must be rinsed respectively cleaned under all circumstances before installing the pump. Leftover assembly parts like screws, nuts, welding beads, pieces of steel, etc. destroy the inside parts of the pump. Any warranty claim is void when damages are caused by such leftover materials. Flange seals may not protrude to the inside. Blind flanges, stoppers protective foils and/or lacquers on flanges and sealing strips have to be completely removed.

5.9 Installing of auxiliary pipelines for additional facilities
All auxiliary pipelines for supplying the shaft seal and the possible double jacket casing for heating and cooling the pump have to be connected tension-free and sealing.

The pipes for the quenching liquid with single-acting mechanical seals with quench (design: G0Q and G1Q) and the sealing liquid with double-acting mechanical seal (design: G0D/G1D) should be installed with a large flowtrough profile. The quenching respectively sealing liquid discharge takes place at the highest connection of the mechanical seal housing.

The flow direction of the flushing, sealing and quenching liquid is indicated with arrows in the section drawings. In order to ensure self-deairing, the pipes must be installed continuously rising, short and favorable for the flow.

The formation of air pockets and gas bubbles has to be prevented, install deairing connections if required. The heating/cooling liquid discharge must be connected to the highest connection of the possible double-jacket casing.
5.10 Safety and control facilities

5.10.1 Manometer and vacuum meter
A manometer and vacuum meter should be connected to the pressure and suction pipe.

5.10.2 Safety installation in the pressure pipeline
As soon as a stop valve is arranged in the pressure pipeline or if it is possible that the pressure pipeline will be clogged, a safety element must be provided, e.g.: bypass line with installed excess pressure valve, bursting diaphragm, protective motor switch etc.

Eccentric screw pumps are positive-displacement pumps and can theoretically generate an infinitely high pressure.
In case of a closed pressure pipe, e.g. because of clogging or accidental closing of the valve, the pressure generated by the pump may reach a multiple of the admissible plant pressure. This may cause pipes to burst, which must be especially prevented when handling dangerous conveyor substances. Therefore, the corresponding safety equipment (e.g. pressure switches) also has to be installed in the plant.

5.11 Electrical connections
Only an expert may attach the power cables of the coupled drive engine in accordance with the circuit diagram of the engine manufacturer. The valid guidelines of the Electrician’s Association and the public power companies have to be observed. Danger by electrical energy must be excluded.

6. Start-up/Shutdown

6.1 Preparations for start-up

6.1.1 Filling the pump with liquid
**Attention:** The pump may not run dry! For initial start-up and after longer periods of standstill, the pump must be filled with liquid. Even a few rotations without liquid may damage the stator. For that reason, the suction casing must be filled with water or conveyor liquid prior to start-up for lubricating the stator and rotor. After long periods of standstill, meaning when it must be assumed that the residual liquid in the pump has evaporated or after repairs, you have to repeat the filling process. After filling, the pump works in self-priming mode. Deairing is not necessary, as the pump can convey a liquid-gas mixture.

6.1.2 Turning on the additional facilities for shaft seals (if provided)
If the pumps are charged with a flushing/sealing or quenching liquid, the provided shut-off slides must be opened before putting the pump into operation for the first time and set to the following pressure values:

- **Supply of the stuffing box with flushing or sealing liquid** (Design P02, P12, P03, P13, P04 and P14).
  **Note:** Stuffing box with flushing or sealing chamber ring require a flushing respectively sealing liquid for maintaining the function.

6.1.3 Quality and properties of flushing/sealing and quenching liquid
**Attention:** Any liquid may be used as sealing/flushing or quenching liquid under consideration of the corrosion resistance of all touching parts and the compatibility with the medium to be sealed. The liquid must be free from solid substances, may not be prone to deposits, should have a high boiling point as well as a good heat conductivity and low viscosity. Clean and soft water fulfills these requirements to a high degree.

The required flushing respectively sealing liquid pressure for pumps with stuffing box is:

\[
P_{02/P12} = 0.1 \text{ to } 0.5 \text{ bar} \\
P_{03/P13} = 0.5 \text{ bar} \\
P_{04/P14} = 0.0 \text{ to } 0.5 \text{ bar}
\]

(Flush and sealing liquid see Chapter 6.1.3.).

- **Supply of single-acting, non-relieving mechanical seal with throttle ring** (Design G0S/G1S and G0T/G1T)
  **Note:** These mechanical seals require a flushing liquid in order to maintain their function, which carries off the emerging friction heat and limits the penetration of the conveyor liquid into the sealing chamber. The required flushing liquid pressure is 0.1 to 0.5 bar above the inner pressure of the suction casing. The required flushing liquid flow for carrying off the dissipation of the mechanical seal is listed in the table in Chapter 7.1.2.6 (flushing liquid see Chapter 6.1.3).

- **Supply of double-acting, non-relieving mechanical seal** (Design G0D/G1D)
  **Note:** These mechanical seals require a sealing liquid in order to maintain their function, which carries off the emerging friction heat and limits the penetration of the conveyor liquid into the sealing gap.

\[\text{The circulation of the sealing liquid must be secured prior to each start-up.}\]

The sealing liquid pressure must be approx. 1.5 to 2 bar above the pressure on the inside of the suction casing. The flowthrough quantity must be regulated in such a way that the exit temperature does not exceed approx. 60°C and is at least 30 K below the boiling temperature at operating pressure. The temperature difference between input and output may amount to at most 15 K. (Sealing liquid see Chapter 6.1.3).

- **Supply of the single-acting mechanical seal with quench** (Design G0Q and G1Q)
The space between the mechanical seal counter-ring and the shaft seal ring must be charged with quenching liquid. The max. admissible pressure difference between the quenching liquid pressure and the pressure in the suction casing is \(p = 0.5\) bar. The max. quenching liquid pressure is 3 bar. (Quenching liquid see Chapter 6.1.3).
6.1.4 Turning on the additional facility for heating or cooling the stuffing box casing and/or the suction casing (double-jacket casing)
If the pumps are equipped with these additional features, all shut-off devices for heating or cooling systems must be opened. The following pressure and temperature limits must be observed.

- Supply of the cooled or heated stuffing box and/or suction casing (double-jacket casing) with suitable liquid media

Only liquid media may be used as heating or cooling liquid under consideration of the corrosion resistance of all touching parts.

The maximum heating or cooling liquid pressure is 6 bar. The maximum heating temperature may not exceed 150°C and the cooling temperature may not be below -40°C.

Note: The design temperature is listed in the order data sheet.

6.1.5 Breaking away of the pump
When initially starting the pump or after longer periods of standstill, you have to make sure that the drive engine turns the pump effortlessly. Should this not be easily possible due to the high adhesion between the rotor and the stator in new state, use suitable tools on the feather key section of the drive shaft to free the pump.

**ATTENTION** The drive shaft may not be damaged here!

6.1.6 Control of the sense of rotation
The normal rotation direction of the pump seen from the drive against the drive shaft is to the left. Here the suction connection is located on the side of the shaft seal so that the shaft seal is relieved. In special cases, e.g. when sucking from a vacuum or conveying media that do not tolerate gas cavities, the pump rotates to the right. This switches the suction and the outlet side around.

The rotation direction of the pump must correspond to the rotation direction arrow "n" on the pump’s type plate. A wrong rotation direction may cause damages to the pump. In order to control the rotation direction, briefly press the on/off switch of the engine.

6.2 Start-up

6.2.1 Start-up
Prior to starting the pump, all shut-off devices on the suction and outlet side have to be opened.

6.2.2 Drive
Turn the motor on.

**ATTENTION** Observe the product-specific peculiarities of the drive. See operating instructions of the drive manufacturer.

6.2.3 Checking the delivery values
Once the drive has reached its operating speed, check the intake pressure and the pump end pressure via the vacuum meter and the manometer. The motor may not be overloaded. The power intake can be monitored with an ammeter. Check the temperature and the viscosity of the conveyor liquid in this context. The resulting values must be compared with the order data sheet respectively acceptance protocol.

6.2.4 Protection against running dry
When no more conveyor media is sucked in by the pump, the thermal energy emerging in the conveyor elements of the eccentric screw pump through dry friction and milling work is no longer carried off in a sufficient quantity, which thermally destroys the stator elastomer after a short time already. There are different protectors against running dry for protecting the conveyor elements that are adapted to the respective operating conditions (consultation with the factory).

6.3 Shutdown

6.3.1 Shut-off
Turn the motor off.

6.3.2 Measures in case of longer periods of standstill
If longer operational breaks are intended and if there is danger of frost, the pump must be emptied. To do so, unscrew the screw plug (502) from the suction casing (505) and afterwards conserve the pump (see Chapter 3.3).

7. Maintenance/Repair

7.1 Maintenance
- For service and maintenance work, observe the details in Chapter 2 "Safety".
- Regular monitoring and maintenance work on the pump and the drive extends the service life.

7.1.1 General monitoring
1. The pump may not run dry.
2. The drive engine may not be overloaded.
3. Check the suction and pressure pipes for tightness.
4. An installed stuffing box must drip slightly during operation. An installed mechanical seal may not have any strong leaks.
5. Monitor pressure and temperature monitoring devices and compare them with the order data sheet respectively acceptance protocol.
6. Additional installations like flushing, sealing and quenching of the shaft seal must be monitored if provided.
7. Additional equipment for heating or cooling the stuffing box casing and/or suction casing must be monitored, if provided.

7.1.2 Maintenance of components

7.1.2.1 Joints of the joint shaft
The joints of the joint shaft are lubricated with ALLWEILER special joint oil type B or oil ET1510 ISO 460 by Tribol Lubricants GmbH, Mönchengladbach, if the pumps are deployed in the food industry, with ALLWEILER special joint oil type BL or oil 1810/460 by Tribol Lubricants GmbH, Mönchengladbach.

Other lubricants were not tested by us and can therefore not be recommended!

The joints are lubricated for life. We do however recommend checking the joint collar for tightness when opening the pump for other reasons and exchanging the joint oil after 8,000 operating hours. The table in Chapter 7.1.2.6 shows the allocation of the pump size to the oil quantity in cubic centimeters. For changing
the joint oil, refer to the disassembly and assembly instructions.

7.1.2.2 Bearing of the drive shaft and lubrication of the bearings
Bearing of the drive shaft in the bearing bracket through re-greasable angular contact and groove ball bearings.

Note: The groove ball bearing is greased for life with vertical pump installation.

Roller bearing lubricants
We recommend the following roller bearing lubricants or others of a proven similar quality for lubricating the ball bearings. The sequence of manufacturers is no quality rating.

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Brand Name in acc. with DIN 51825</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agip</td>
<td>Agip GR MU3 K3K-20</td>
</tr>
<tr>
<td>ARAL</td>
<td>Aralub HL3 K3K-20</td>
</tr>
<tr>
<td>BP</td>
<td>BP Energrease LS3 K3K-20</td>
</tr>
<tr>
<td>ESSO</td>
<td>BEACON 3 K3N-30</td>
</tr>
<tr>
<td>Fuchs</td>
<td>RENOLIT FWA 220 K3N-20</td>
</tr>
<tr>
<td>Klüber</td>
<td>MICROLUBE GL 263 K3N-20</td>
</tr>
<tr>
<td>Mobil-Oil</td>
<td>Mobilux 3 K3K-20</td>
</tr>
<tr>
<td>Shell</td>
<td>Shell Alvania Grease R3 K3N-30</td>
</tr>
<tr>
<td>SKF</td>
<td>SKF Grease LGMT3 K3K-30</td>
</tr>
</tbody>
</table>

If none of the above roller bearing lubricants are available, we recommend using a multi-purpose lubricant on lithium basis in any case, which corresponds to one of the above DIN names. The mixing of greases with different basic oils and thickeners leads to reduced lubricating properties and should therefore be avoided.

The table in Chapter 7.1.2.6 shows the allocation of the pump sizes to the amount in grease per gram.

Relubrication period
The bearings must be relubricated each 4,000 operating hours.

Relubrication
Relubrication takes place via the lubricating nipple (119) screwed into the bearing bracket (110). Continue regreasing until the old grease emerges from the bearing cover (131). Scrape the old grease off.

7.1.2.3 Shaft sealing
Shaft sealing either takes place via a stuffing box or a mechanical seal.

- Stuffing box
Possibly increased leaks on the stuffing box during the first operating hours normally decrease on their own during the warm-up time.
If necessary, slightly tighten the hexagon nuts (202) on the gland (203).
Please observe that there has to be a slight leak on the stuffing box. This dissipates the friction heat that forms on the sealing surface.
If the leaking losses increase disproportionately and if this cannot be reduced by slightly tightening the hexagon nuts (202) several times, the packing rings have lost their shape elasticity and must be replaced.

- Dismounting the old packing rings and cleaning the stuffing box casing
After relieving the pump from pressure and removing the gland, you can take out the old packing rings. Use a packing puller with elastic shaft. Afterwards, carefully clean the stuffing boxspace and the drive shaft in the area of the packing rings. Used-up drive shafts respectively shaft protection casings must be renewed (see disassembly and assembly instructions).

- Installing the packing rings
ATTENTION As a rule, you may only install packing rings that correspond to the required operating conditions of the pump. The dimensions and required number of pre-pressed packing rings and ring cuts respectively cut lengths are listed in the table in Chapter 7.1.2.6.

With cuts we recommend the straight vertical cut to the shaft. In order to achieve a gap-free, parallel position of the cutting ends when closing the packing ring, the cutting angle should be approx. 20° to both cut ends (see figure 1).

![Figure 1: Cutting packing rings](image)

Pre-pressed packing rings or ring cuts have to be carefully turned open axial and radial so that they can just about be slid across the shaft. Bending the rings may lead to damages.
When installing in the packing space, carefully rebend the packing rings to ring shape. The cutting joints have to be shifted by 90° here. Each ring has to be slid into the Stuffing boxspace individually with the cutting ends facing forward by means of the gland. The sealing chamber ring or flushing ring have to be installed sequentially.

ATTENTION You may never use pointed objects for this work. Danger of damaging the shaft and deforming the packing material!

- Start-up the stuffing box after re-packaging
The stuffing box may only be tightened slightly prior to start-up. When starting the pump, 50 to 200 drops per minute are an admissible leakage quantity.
During the warm-up process of approx. 30 minutes, adjust a minimum leakage of 2 to 20 drops per minute by evenly tightening the gland (203) step by step via the hexagon nuts (202).

ATTENTION The stuffing box temperature may not rise abnormally during this process. Approx. 20° to 60°C above the conveyor liquid temperature are admissible. In case
of a rapid rise in temperature, the gland must be loosened immediately and the warm-up process repeated. The leakage can be carried off via the threaded boring located in the strip tank in the bearing bracket.

Rule out damages to persons and the environment through leakage of dangerous substances!

- Mechanical seal
  Non-relieved mechanical seals in all material pairings and designs are applied. The mechanical seal is maintenance-free. In case of heavy leaks due to wear and tear, you have to exchange the mechanical seal (see disassembly and assembly instructions).

**ATTENTION** As the running dry of the mechanical seals must be avoided, the pump may only be operated in filled state and, if provided, with activated additional installations (see Chapter 6.1.2).

7.1.2.4 V- belt drive
See our maintenance instructions for V-belt operation with tensioning device VM 706.0001, Identity No. 133 586.

7.1.2.5 Drive engines and (variable speed gear) drive
See the operating and maintenance instructions by the manufacturers.
### 7.1.2.6 Packing ring dimensions (for Chapter 7.1.2.3), lubricant quantities for joints (for Chapter 7.1.2.1), bearings (for Chapter 7.1.2.2) and flushing liquid flows (for Chapter 6.1.2)

<table>
<thead>
<tr>
<th>Pump series</th>
<th>Pump size</th>
</tr>
</thead>
<tbody>
<tr>
<td>AE1L</td>
<td>51 101 201 381 551 751 1001 1451 2701 5001 – –</td>
</tr>
<tr>
<td>AE1E</td>
<td>50 100 200 380 550 750 1000 1450 2700 5000 9500</td>
</tr>
<tr>
<td>AED1E</td>
<td>75 150 300 560 1200 2300 4250 7800 15500</td>
</tr>
<tr>
<td>AE2E</td>
<td>50 100 200 380 750 1450 2700 – –</td>
</tr>
<tr>
<td>AE1N</td>
<td>25 50 100 200 380 750 1450 2700 5000</td>
</tr>
<tr>
<td>AE2N</td>
<td>25 50 100 200 380 750 1450 2700 5000</td>
</tr>
<tr>
<td>AE4N</td>
<td>75 150 300 560 1200 2300 4250 7800</td>
</tr>
<tr>
<td>AED2N</td>
<td>38 75 150 300 560 1200 2300 4250 7800</td>
</tr>
<tr>
<td>AE1+1H</td>
<td>– – – – – – – – 2700</td>
</tr>
<tr>
<td>AE2H</td>
<td>– – – 100 200 380 750 1450 –</td>
</tr>
<tr>
<td>AE2+2H</td>
<td>– – – 100 200 380 750 1450 2700</td>
</tr>
<tr>
<td>AE4H</td>
<td>12 25 50 100 200 380 750 1450 –</td>
</tr>
<tr>
<td>AE4+4V</td>
<td>– – 25 50 100 200 380 750 1450</td>
</tr>
<tr>
<td>AE2+2V</td>
<td>– – – 100 200 380 750 1450</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Number of packing rings for design P01/P11</th>
<th>6 6 6 6 6 6 6 6 6</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Dimensions of the packing rings with cut rings</th>
<th>Ø 37 / 25 x 6</th>
<th>Ø 42 / 30 x 6</th>
<th>Ø 51 / 35 x 8</th>
<th>Ø 59 / 43 x 8</th>
<th>Ø 73 / 53 x 10</th>
<th>Ø 80 / 60 x 10</th>
<th>Ø 99 / 75 x 12</th>
<th>Ø 118 / 90 x 14</th>
<th>Ø 142 / 110 x 16</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Dimensions of the packing rings as blank Lₚ x S</th>
<th>104.2 x 6</th>
<th>121 x 6</th>
<th>144.5 x 8</th>
<th>171.4 x 8</th>
<th>211.8 x 10</th>
<th>235.3 x 10</th>
<th>292.5 x 12</th>
<th>349.6 x 14</th>
<th>423.6 x 16</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Oil quantity in cm³ per joint</th>
<th>10 18 37 52 87 169 290 565 885</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Grease quantity in grams per bearing</th>
<th>70 135 225 280 530 680 1270 2050 4070</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Flushing liquid flow water l/min</th>
<th>0.05 0.07 0.09 0.11 0.11 0.15 0.21 0.27 0.78</th>
</tr>
</thead>
</table>

① With shaft seal designs P02/P12, P03/P13 and P04/P14, the quantity is reduced by 1 unit.
7.2 Repair (dismounting and mounting instructions)

General
Qualified customer service fitters are available for assembly and repair work upon request.

Prior to repairs performed by your own personnel or our expert fitters, make sure that the pump is completely empty and clean.
This especially applies to pumps, which are sent to our factory or one of our authorized repair shops for repair.
We will not accept repair orders for pumps filled with conveyor media for reasons of protecting our employees and the environment. Otherwise we will charge the customer/operator the costs for environmentally-conform disposal.

In case of pumps operated with dangerous substances and/or conveyor media that are dangerous to the environment, the customer/operator has to inform his own respectively our fitters on-site in case of repairs or our factory respectively authorized workshop in case of returning the pump about this circumstance. In these cases, you need to submit a conveyor media certificate, e.g. in the shape of a DIN safety data sheet together with your request for a fitter.

Dangerous substances are:
- toxic substances
- substances detrimental to health
- caustic substances
- irritating substances
- explosive materials
- fire-promoting, highly, easily and normally inflamable materials
- carcinogenic substances
- embryo-damaging substances
- substances that damage the genetic material
- substances which are dangerous for human beings in any other way

With all work on-site, the owner’s own respectively our fitters have to be informed about dangers that may arise in connection with repairs.
These instructions contain the most important disassembly and assembly work. The assembly steps described in the individual chapters have to be observed under all circumstances.

7.2.1 Dismounting of the eccentric screw pump
The following work steps have to be performed prior to disassembly:
- Detach the power supply cables to the motor. It must not be possible to turn the motor on.
- All shut-off devices in the feed and pressure pipes have to be closed.
- Drain the conveyor liquid from the suction casing. Unscrew the screw plug for that purpose (502).
  Note: Use a receiver.
- Dismantle the contact protection.
- Deinstall all feed and pressure pipes as well as all auxiliary pipelines.
- Loosen the screws on the pump feet and take them off.

7.2.1.1 Dismounting the stator
- Remove the hexagon nuts (609) and disks (610) from the clamp bolts (611).
- Pull off the pressure casing (504).
- Remove the clamp bolts (611) and supports (612), if provided.
- Pull the stator (402) off the rotor (401).
  Note: In case of difficulties with dismounting, turn the stator (402) with pliers at the same time. To do so, arrest the drive shaft (118).
- In case of stators made of plastic or metal, take off the stator seals (403) and (404).
- Remove the reducing flange (512) and O-ring (513), if provided.

7.2.1.2 Dismounting the rotor and rotor-side joint
Dismounting the rotor and the rotor-side joint takes place after dismounting the stator (402). See Chapter 7.2.1.1.
- Remove the hexagon nuts (607) and serrated lock washers (608) as well as the hexagon screws (606).
- Pull the suction casing (505) across the rotor (401). Make sure that the finely crafted rotor is not damaged.
- Take off the gasket for suction casing (501).
- Saw open the lock on the joint clamp (306) with a metal saw and press it out on both sides with a screwdriver. Take the joint clamp (306) off the joint collar (308) (see figure 2).

Figure 2: Removing the joint clamp
- Lift the joint collar (308) with a screwdriver and pull it off axially towards the joint shaft (307).
- Catch the oil filling in a container.
- Drive the joint collar (304) across the collar of the joint shaft (307). Do not deflect the joint shaft (307) (see figure 3).
Series AE1L, AE.E, AE.N, AE.H, AE.V, AED1E, AED2N
Design ID, ZD

- Push out the joint bolt (301).
- With a brass driver, drive out the two sleeves for the joint bolts halfway (303). Slant the joint shaft (307) for that purpose (see figure 4).

![Brass taper drift](image)

Figure 4: Dismounting the sleeves for joint bolts

- Pull the rotor (401) off the joint shaft (307).
- Press out the joint bush (302) from the joint shaft (307) (n/a with AE1L 51 / AE1L 101 AE1E 50 / AE2E 50 AE1N 25 / AE2N 25 / AE4N 25 AED1E 75 AED2N 38 AE4H 12).
- Drive out the sleeve for the joint bolt (303) all the way out of the rotor (401) with the brass spike.

7.2.1.3 Dismounting the joint shaft and the drive side joint
Disassembly of the joint shaft and the joint of the drive side takes place after dismounting the stator (402) and the rotor (401). See Chapter 7.2.1.1 and 7.2.1.2.
- Dismantle the joint on the drive side as described in Chapter 7.2.1.2.
- Pull the joint shaft (307) off the drive shaft (118).
- Press the joint bush (302) out of the joint shaft (307).
- Completely drive the sleeve for the joint bolt (303) out of the drive shaft (118) with the brass spike.

7.2.1.4 Dismounting the shaft seal and the drive shaft
Note: In case of pumps with shaft sealing by means of stuffing box, you can change the packing rings as described in Chapter 7.1.2.3 without dismounting the drive shaft. Dismounting the drive shaft is required when the pump is equipped with a mechanical seal. In case of damages to the drive shaft or shaft protection sleeve in the area of the shaft seal, the pump must also be dismantled as described in the following.
- Dismantle the stator (402) (see Chapter 7.2.1.1).
- Remove the hexagon nuts (607) and serrated lock washers (608) as well as the hexagon screws (606).
- Pull the suction casing (505) across the rotor (401). Make sure that the finely crafted rotor is not damaged.
- Take off the gasket for suction casing (501).
- Pull of the clutch half respectively pulley and remove the feather key (101).
- Unscrew the hexagon nuts (139) and remove the bearing cover (131) with the seal (132).
- Unscrew the bearing nut (116) from the drive shaft (118).
- Press the drive shaft (118) with the attached rotor (401), the attached joint shaft (307) and the mounted shaft seal out of the bearing bracket (110).
- To do so, apply the press-on device to the bearing bracket (110) (see figure 5).

Note: Guide sleeve and press-off cover serve as assembly aids and can be purchased from us.

![Forcing cover](image)

Figure 5: Pressing out the drive shaft

- Pull off the thrower (114) from the drive shaft (118).

- Dismounting the stuffing box
- Remove the self-locking hexagon nut (202) and take off the gland halves (203).
- Pull the stuffing box casing (204) off the drive shaft (118).
- Take off the stuffing box packing (207) with designs P02 and P12 including the flushing ring (208) and with designs P03, P13 and P04, P14 including the sealing chamber ring (209) from the stuffing box casing (204).
- For the design with shaft protection sleeve, pull off the shaft protection sleeve (206) and the O seal ring (115) from the drive shaft (118).

- Dismounting the single-acting mechanical seal
- Pull off the mechanical seal housing (214) with the counter-ring of the mechanical seal (219) (atmosphere side) off the drive shaft.

Note: Make sure that you pull off the casing with the mechanical seal counter-ring concentric and that it doesn't get jammed in order to prevent damage to the counter-ring.
- Press the mechanical seal counter-ring and the O-ring out of the mechanical seal housing (214). Exert pressure evenly.
- Drive out the locking pin (220).
- Loosen the grub screws in the rotating part of the mechanical seal if provided (219) and pull the mechanical seal off the drive shaft (118).
Prior to loosening the grub screws, mark respectively measure the position of the mechanical seal on the shaft protection sleeve or the drive shaft. Do not slide the O-ring across the pressure spot of the screw!

- With designs with shaft protection sleeve, pull the shaft protection sleeve (206) and the O-ring (115) off the drive shaft (118).

**Dismounting the mechanical seal, single-acting with quench**

- Pull the mechanical seal housing (214) with the counter-ring of the mechanical seal (atmosphere side) (219) off the drive shaft (118).

**Note:** Make sure that you pull off the casing with the mechanical seal counter-ring concentric and that it doesn't get jammed in order to prevent damage to the counter-ring.

- Press the mechanical seal counter-ring and the O-ring out of the mechanical seal housing (214). Exert pressure evenly.
- Drive out the locking pin (220).
- Loosen the grub screws in the rotating part of the mechanical seal if provided (219) and pull the mechanical seal off the drive shaft (118).

**ATTENTION** Prior to loosening the grub screws, mark respectively measure the position of the mechanical seal on the shaft protection sleeve or the drive shaft. Do not slide the O-ring across the pressure spot of the screw!

- With designs with shaft protection sleeve, pull the shaft protection sleeve (206) and the O-ring (115) off the drive shaft (118).
- Press the shaft seal ring (232) out.

**Dismounting the mechanical seal, single-acting with throttle ring**

- Remove the hexagon screws (245).
- Pull the mechanical seal housing (214) with the counter-ring of the mechanical seal (atmosphere side) (219) off the drive shaft (118).

**Note:** Make sure that you pull off the casing with the mechanical seal counter-ring concentric and that it doesn't get jammed in order to prevent damage to the counter-ring.

- Pull off the O-ring (218).
- Loosen the grub screws in the rotating part of the mechanical seal (219) and pull the mechanical seal off the drive shaft (118).

**ATTENTION** Prior to loosening the grub screws, mark respectively measure the position of the mechanical seal on the shaft protection sleeve or the drive shaft. Do not slide the O-ring across the pressure spot of the screw!

- Press the mechanical seal counter-rings and O-rings out of the mechanical seal housing (214) and the mechanical seal cover (215). Exert pressure evenly.
- Remove the locking pins (220) and (236).
- Pull the mechanical seal cover (215) with the counter-ring of the mechanical seal (product side) (219) from the drive shaft (118).

**ATTENTION** Prior to loosening the grub screws, mark respectively measure the position of the mechanical seal on the shaft protection sleeve or the drive shaft. Do not slide the O-ring across the pressure spot of the screw!

- Pull the mechanical seal cover (215) with the counter-ring of the mechanical seal (product side) (219) from the drive shaft (118).

**7.2.1.5 Dismounting the angular contact and the groove ball bearings**

Dismounting the bearings takes place after dismounting the drive shaft. See Chapter 7.2.1.4.

- Move the spacer sleeve (102) radial and drive off the groove ball bearing (103) with a suitable tool (driver) out of the bearing bracket (110) (see figure 6).
- Fill the ball bearings (103) and (104) with roller bearing grease. Apply the grease filling as described in the following.
1. Fill the cavities between the roller bearings approx. 30 to 50% with grease.
2. Strip off excess grease (best with your fingers, do not use any metal objects). For recommended roller bearing greases, see Chapter 7.1.2.2.

- Press the double-row angular contact ball bearing (104) from the drive side with a matching piece of pipe over the outer ball bearing position ring into the bearing bracket (110). Oil bearing position slightly beforehand.

**Note:** The ball filling notch of the angular contact ball bearing must point towards the drive side.

**ATTENTION** The following pump sizes are equipped with two single-row angular contact ball bearings (104):

<table>
<thead>
<tr>
<th>Pump</th>
<th>Sizes</th>
</tr>
</thead>
<tbody>
<tr>
<td>AE1L</td>
<td>2701 / 5001</td>
</tr>
<tr>
<td>AE1E</td>
<td>1450 / 2700 / 5000 / 9500</td>
</tr>
<tr>
<td>AED1E</td>
<td>2300 / 4250 / 7800 / 15500</td>
</tr>
<tr>
<td>AE2E</td>
<td>1450</td>
</tr>
<tr>
<td>AE1N</td>
<td>750 / 1450 / 2700 / 5000</td>
</tr>
<tr>
<td>AE2N / AE4N</td>
<td>750 / 1450</td>
</tr>
<tr>
<td>AED2N</td>
<td>1200 / 2300 / 4250 / 7800</td>
</tr>
<tr>
<td>AE.H</td>
<td>380 / 750 / 1450 / 2700</td>
</tr>
<tr>
<td>AE.V</td>
<td>200 / 380 / 750 / 1450</td>
</tr>
</tbody>
</table>

Both bearings have to be pressed into the bearing bracket (110) in **O-type arrangement** and adjusted without play via the shim rings (129) (see figure 7).

- Drive the angular contact ball bearing (104) out of the bearing bracket (110) with a suitable tool (driver).
- Remove the spacer ring (113) from the bearing bracket (110).
- Press the shaft seal ring (112) out of the bearing bracket (110).

**7.2.2 Mounting the eccentric screw pump**

**General**
Assembly of the individual pump components after careful cleaning takes place in reverse direction.

**7.2.2.1 Installing the angular contact and groove ball bearings**

**Note:** The pumps are equipped with re-greasable ball bearings. For re-assembly, the ball bearings must be greased sufficiently.

- Fill the groove ball bearing with vertical pump design is greased for life.
- If required, clean ball bearings carefully with diesel fuel. If the bearing surfaces are shiny and undamaged, you can reuse the ball bearings (103) and (104). If this is not the case, replace the ball bearings.

- If required, clean ball bearings carefully with diesel fuel. If the bearing surfaces are shiny and undamaged, you can reuse the ball bearings (103) and (104). If this is not the case, replace the ball bearings.

- **Insert the circlip (127) in front of the ball bearing (104) respectively the shim rings (129) into the bearing bracket (110).**

- **Insert the spacer sleeve (102) into the bearing bracket (110).**

- **Fill the space between the bearing bracket (110) and the spacer sleeve (102) approx. 90% with roller bearing grease.**

For recommended roller bearing greases, see Chapter 7.1.2.2.

For filling quantities, see table in Chapter 7.1.2.6.
7.2.2 Installing the shaft seal with dismounted drive shaft

- Press the greased groove roller bearing (103) from the drive side with a matching piece of pipe over the outer bearing ring into the bearing bracket (110). Oil bearing position slightly beforehand.

**ATTENTION** With pumps in horizontal design, the sealing washer inserted in the groove ball bearing must point towards the drive side. Pumps in vertical design with bearing to the top have groove ball bearings with two sealing washers.

- Insert the spacer ring (113) from the pump side into the bearing bracket (110).

**ATTENTION** Please note that the installation has to take place prior to pressing in the shaft seal ring.

- Fill the space of the shaft seal ring (112) with roller bearing grease and smear the sealing lips.

**Note:** The sealing lip with the hose spring of the shaft seal ring must always point towards the sides to be sealed (inwards). Press the ring in with a suitable pressing stamp. Make sure that the pressure force is exerted as close as possible on the outer diameter of the shaft seal ring.

7.2.2.2 Installing the shaft seal with dismounted drive shaft

- For designs with shaft protector sleeve, mount the O-ring (115) into the groove of the drive shaft (118) and smear with lubricant (e.g. silicone oil, polydiol, soft soap). Do not use any normal oil.

**ATTENTION** Slide the shaft protector sleeve (206) with the inner chamfer pointing towards the drive shaft head onto the drive shaft (118).

- **Installing the stuffing box**
  - Slide the stuffing box casing (204) onto the shaft protector sleeve (206) respectively the drive shaft (118).
  - Install the stuffing box (207) with designs P02, P12 including flushing ring (208) and with designs P03, P13 and P04, P14 including sealing chamber ring (209) into the stuffing box casing (204). Also see Chapter 7.1.2.3 “Installing new packing rings”.

- **Installation of the mechanical seal, general**
  Mechanical seals are high-quality precision parts. The assembly instructions of the mechanical seal manufacturers must be observed. During installation, gentle treatment and utmost cleanliness are prerequisites for trouble-free functioning. To ease assembly, you may lubricate the surfaces across which the O-rings glide with lubricants like for example silicon oil, polydiol or soft soap.

**ATTENTION** Do not use any normal oil.

**Note:** Make sure that parts that glide on top of each other are always exchanged in pairs. When using double PTFE-coated O-rings, make sure that the seam of the outer coating points away from the assembly direction. Otherwise the coating may open respectively strip off (see figure 8).

![Assembly direction](Image)

Figure 8: Seam of the outer teflon coating points away from the assembly direction

- **Installing the single-acting mechanical seal**
  - Drive the locking pin (220) into the mechanical seal housing (214).
  - Press the mechanical seal counter-ring (219) with the O-ring into the cleaned mechanical seal housing (214) concentrically.

**Note:** Ensure even distribution of pressure and observe the locking pin. The locking pin (220) may not protrude on the inside.

- Slide the rotating part of the mechanical seal (219) onto the drive shaft (118).

**Note:** Observe the fitting dimension respectively position of the mechanical seal exactly as marked during disassembly.

- Insert grub screws, if provided, into the rotating part of the mechanical seal (219) with the screw fitting agent Loctite No. 241 or similar and tighten.

- Slide the mechanical seal housing (214) with the mechanical seal counter-ring (219) across the drive shaft (118).

**Note:** When sliding the mechanical seal housing onto the drive shaft, make sure that the mechanical seal housing is not jammed in order to avoid damage to the mechanical seal counter-ring.

- **Installation of the mechanical seal, single-acting with quench**
  - Installation of the mechanical seal takes place as described in the Chapter “Installing the single-acting mechanical seal”.
  - Drive in the locking pin (220) with sealing agent (251) Loctite No. 640 or similar.
  - Press the shaft seal ring (232) into the cleaned mechanical seal housing (214). Do not grease the sealing lip.

**Note:** The sealing lip of the shaft seal ring must always point towards the side to be sealed (inwards). Press the ring in with a suitable pressing stamp. Make sure that the pressure force is exerted as close as possible on the outer diameter of the shaft seal ring.

![Attention](Image)

**ATTENTION** In order to widen the sealing lip of the shaft seal ring, the mechanical seal housing (214) with the integrated shaft seal ring (232) must initially be slid onto the drive shaft (118) in reverse direction with the shaft seal ring forward. After widening, pull off the mechanical seal housing (214) from the drive shaft (118) and reinsert it quickly with the flange side pointing forward onto the drive shaft in the correct position.
• Installation of the mechanical seal, single-acting with throttle ring
  - Press the throttle ring (234) with the O-ring (235) concentrically into the mechanical seal cover (215).
  Note: Observe even pressure distribution.
  - Drive in the locking pin (236) with a spike into the mechanical seal cover (215). The locking pin may not protrude on the inside.
  - Slide the mechanical seal cover (215) across the drive shaft (118).
  - The subsequent installation of the mechanical seal takes place as described in Chapter “Installation of the single-acting mechanical seal”.
  - Pull the O-ring (218) onto the mechanical seal housing (214).
  - Slide the mechanical seal housing (214) with the mechanical seal counter-ring (219) across the drive shaft (118) and attach with the hexagon screws (245) on the mechanical seal cover (215).

• Installing the double-acting mechanical seal
  - Drive the locking pin (236) into the mechanical seal cover (215).
  - Press the mechanical seal counter-ring (219) with the O-ring concentrically into the mechanical seal cover (215).
  Note: Observe even pressure distribution and the locking pin. The locking pin may not protrude on the inside.
  - Slide the mechanical seal cover (215) across the drive shaft (118).
  - The subsequent installation of the mechanical seal takes place as described in Chapter “Installation of the single-acting mechanical seal”.
  - Pull the O-ring (218) onto the mechanical seal housing (214).
  - Slide the mechanical seal housing (214) with the mechanical seal counter-ring (219) across the drive shaft (118) and attach with the hexagon screws (245) on the mechanical seal cover (215).

7.2.2.3 Installing the drive shaft with shaft seal
  - Slide the thrower (114) onto the drive shaft (118).
  - Press the drive shaft (118) with the mounted stuffing box casing (204) or mechanical seal housing (214) and installed stuffing box packing (207) respectively mechanical seal (219) through the bearings (104) and (103) into the bearing bracket (110).
  Note: Observe the installation position of the spacer ring (113) and the spacer sleeve (102). When pressing in the inner bearing ring of the groove ball bearing (193), support this with a suitable tool respectively press against.
  Note: With the pump sizes AE1N 380, AE2N 380, AE4N 380, AE1E 750, AE2E 750, AED2N 560, AED1E 1200, AE.H 200 and with all larger pumps, the drive shaft (118) can also be pulled through the bearings (104) and (103) into the bearing bracket (110) with a suitable assembly tool consisting of a guide sleeve, drawing-in sleeve and thread bar with washer and nut. You can purchase the assembly tool from us.

7.2.2.4 Installing the rotor and the rotor-side joint
  - Drive the sleeve for the joint bolt (303) halfway into the rotor (401) with the brass spike.
  - Press the joint bush (302) into the joint shaft (307) in such a way that the longitudinal axis of the oval boring (marked by 2 notches) aligns with the longitudinal axis of the joint shaft and that the joint collar protrudes evenly on both sides of the joint shaft (see figure 10). Joint bush (302) not available with:
    AE1L 51 / AE1L 101
    AE1E 50 / AE2E 50
    AE1N 25 / AE2N 25 / AE4N 25
    AED1E 75
    AED2N 38
    AE4H 12

Figure 9: Drawing in the drive shaft
  - Turn the self-locking bearing nut (116) with a hook spanner onto the drive shaft (118) and tighten. Once the bearing nut is place without fitting tolerance, tighten it with about 1/16 of a turn. Note: In order to ensure the self-locking of the bearing nut, replace this after loosening and tightening it approx. 5 times.
  - With pumps with horizontal alignment, turn the bearing cover (131) with the seal (132) prior to installation in such a way that the grease emergence boring in the bearing bracket is closed (110). With pumps with vertical alignment and bearing to the top, turn the bearing cover (131) with the seal (132) prior to installation in such a way that the grease emergence boring in the bearing bracket (110) is aligned with the spare in the bearing cover (131) and the seal (132).
  - Attach the bearing cover (131) with the seal (132) with the hexagon screws (139) on the bearing bracket (110).
  - Insert the feather key (101) in the drive shaft (118) and secure it at the end with two puncher blows.
- Slide the joint clamps (306), the joint collar (308) and the joint collar (304) onto the shaft of the joint shaft (307).
- Slide the joint shaft (307) into the head of the rotor (401).
- Slide the joint bolt (301) into the joint bush (302) and completely drive in the sleeves for the joint bolts (303).
- Emirize the joint collar (304) until smooth at the outer diameter if required and pull onto the head of the rotor (401).
- After pulling on the joint collar (304), secure this against axial shifting on the head of the rotor (401).

**ATTENTION**

To do so, drive the end of the joint collar (304) with a puncher blow into the groove at the head of the rotor (401) (see figure 11).

- Pull on the joint collar (308) with a screwdriver, lift on top with a screwdriver, guide the spray pipe of the oil bottle underneath the collar and fill the joint cavity with ALLWEILER special joint oil type B or oil ET 1510 ISO 460 by Tribol Lubricants GmbH, Mönchengladbach. For application in the food industry with ALLWEILER special joint oil type BL or oil 1810/460 by Tribol Lubricants GmbH, Mönchengladbach. For the filling quantity, see the table in Chapter 7.1.2.6.
- Check, whether the bent loop of the joint clamp (306) is attached to the joint clamp lock. If not, press down with a common pair of flat-nosed pliers (see figure 12).

- Insert the joint clamps (306) into the circumferential grooves of the joint collar (308) and tighten.

**Note:** Use the following clamping tools for this purpose:

**For pump sizes smaller/equal**

AE1L 751, AE1N 200, AE2N 200, AE4N 200, AED2N 300, AE1E 380, AE2E 380, AED1E 560 AE.H 100, AE.V 50 the clamping tool with the name PoK-It II.

**For pump sizes larger/equal**

AE1L 1001, AE1N 380, AE2N 380, AE4N 380, AED2N 560, AE1E 750, AE2E 750, AED1E 1200, AE.H 200, AE.V 100 the clamping tool with the name Band-It together with the adapter J050.

You can purchase the above named tools from us. When clamping the joint clamps, proceed as follows:

- **Clamping with clamping tool Band-It and adapter J050.**
  - Insert the band end of the joint clamp (306) into the clamping tool with adapter up to the joint clamp lock.
  - Hold down the clamp end with the eccentric lever of the clamping tool and tighten the joint clamp (306) by turning the crank (figure 13).

**Note:** The right tightening of the joint clamps (306) is portrayed in figure 14.
Joint clamp (306) has slightly drawn in the outer collar form and has a tight fit.

Joint clamp (306) is too loose and may slide off.

Joint clamp (306) too tight. Collar is damaged (stripped off).

Figure 14: Tightening the joint clamps

- Check that the joint clamp (306) is positioned in the joint collar (308) across the entire circumference in the collar groove.
- Slowly turn the clamping tool by approx. 60° upwards until the shear hook reaches behind the joint clamp lock (see figure 15).
- Tighten the pressure screws by hand until the joint clamp has a tight fit.

Figure 15: Shearing the joint clamp

- Turn the pressure screw with a spanner or ratchet clockwise until the joint clamp is sheared off.

**ATTENTION** If the joint clamp is lifted up slightly on the sheared off side, adjust this by careful realignment. Do not hammer or hit on the joint clamp lock, otherwise you may damage the collar.

**Note:** Joint clamps made of hastelloy cannot be sheared off with the clamping tool. After canting at the joint clamp lock, shear off the joint clamp with a pair of metal shears and deburr the cutting edges (see figure 16).

- **Clamping with the clamping tool PoK-It II**
  - When using the clamping tool PoK-It II, cant the joint clamp (306) after tightening on the joint clamp lock by swiveling the clamping tool in such a way that the clamp cannot slide back through the joint clamp lock (see figure 16). If this is not the case, remove the joint clamp and replace it with a new one.

**7.2.2.5 Installing the joint shaft and the drive-side joint**

- Attach the drive-side joint to the drive shaft (118) as described in Chapter 7.2.2.4.
- Slide the joint shaft into the joint cup of the drive shaft (118).
- Secure the joint collar (304) as illustrated with a puncher blow.
- Pull on the joint collar (308), fill the joint cavity with joint oil and attach the joint clamps as described.
- Insert the gasket for suction casing (501).
- Slide the suction casing (505) across the rotor (401). Make sure that the finely crafted rotor is not damaged here.
- Attach the suction casing (505) with the hexagon screws (606), the serrated lock washers (608) and the hexagon nuts (607) on the bearing bracket (110).

**Note:** Prior to tightening hexagon nuts (607), align the connection flange of the suction casing (505). Observe the proper position of the connections in the stuffing box (204) respectively mechanical seal housings (214). See our fitting dimension sheets.

**7.2.2.6 Installing the stator**

- Slide the O-ring (513) and reducer flange (512), if provided, into the suction casing (505).
- Prior to pulling on, grease the stator (402) and rotor (401) with lubricant (silicone oil, polydiol, soft soap or similar).

**Do not use any normal oil.**

- With stators made of plastic or metal, insert stator seals (403) and (404).

**Note:** With stators made of plastic, the stator seal (403) with the O-ring must always lie on the outlet side.

- With multi-part stators (402) pull on the stator (402) with the center hole or center groove pointing towards the support (612) onto the rotor (401).

**Note:** In case of difficulty, turn the stator (402) with pliers at the same time. To do so, arrest the drive shaft (118).

- With multi-part stators, turn the stators (402) in such a way that the fixing pieces (631) reach into the groove respectively boring of the stators (402).
- Slide the support (612) (if provided) onto the clamp bolts (611).
- Screw the pressure casing (504), support (612), if provided, stator (402) and suction casing (505) together with the clamp bolts (611) and the hexa-
gon nuts (609). Tighten the hexagon screws evenly.
- Tighten the hexagon nuts (613).

7.3 Replacement parts/spare parts

All stated pumps with the different shaft seal and bearing designs are portrayed in the following sectional drawings with parts list. The replacement parts/spare parts are listed in the parts list.

Recommended replacement parts/spare parts:
R = large repair set
r = small repair set

For reasons of operational safety, you may only stock and install original replacement parts supplied by us. In this context, we refer to the statements in Chapter 2.7.

When ordering replacement parts/spare parts, state the following:

**Machine number**

**Abbreviation of the pump**

**Part number**

**Denomination and part quantity**

or **Ident No. and quantity**

**Note:** The machine number and abbreviation of the pump is embossed on the type plate. The identity number and quantity are indicated in the enclosed separate replacement parts list.
### List of individual parts and recommended replacement/spare parts

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**Recommended spare parts:**

- **R** = large repair set
- **r** = small repair set

- 2 pcs. with: AE1L 2701 / 5001
- AE1E 1450 / 2700 / 5000 / 9500
- AED1E 2300 / 4250 / 7800 / 15500
- AE1N 750 / 1450 / 2700 / 5000
- AE2N 750 / 1450
- AED2N 1200 / 2300 / 4250 / 7800
- AE.H 380 / 750 / 1450 / 2700
- AE.V 200 / 380 / 750 / 1450

- see table page 11
- 2 pcs. with design G.D

- n/a with: AE1L 51 / AE1L 101, AE1E 50 / AE2E 50, AE1N 25 / AE2N 25, AE1H 75, AED2N 38, AE4H 12
Sectional drawing for series AE1L, AE1E, AE2E, AE1N, AE2N, AE4N, AED1E, AED2N; Design ID

- Winding protection on joint shaft
- Worm on joint shaft
- Shaft with shaft sleeve
- Groove ball bearing in case of vertical installation
- Design with two single-row angular contact ball bearings
- Stator with irregular elastomer wall thickness
- Stator of plastic material
- Stator of metal
Series AE1L, AE.E, AE.N, AE.H, AE.V, AED1E, AED2N
Design ID, ZD

Sectional drawing shaft seals

P02  Stuffing box with flushing ring

P03  Stuffing box with internal sealing chamber ring

P04  Stuffing box with external sealing chamber ring

G0K and G0N, mechanical seal, single-acting

G0S and G0T, mechanical seal, single-acting with throttle ring

G0Q mechanical seal, single-acting with quench

G0D mechanical seal, double-acting
7.6  Sectional drawing, series AE1+1H, AE2+2H, AE2+2V, AE4+4V; Design ID

Stator with even elastomer wall thickness

7.7  Sectional drawing, series AE2H, AE4H; Design ID

Stator with even elastomer wall thickness
7.8 Sectional drawing, series AE1N, AE2N; Design ZD
7.9 Sectional drawing, series AE1+1H, AE2+2H; Design ZD

Stator with even elastomer wall thickness

Metal stator
7.10 Sectional drawing, series AE2H, AE4H; Design ZD

Stator with even elastomer wall thickness
## Operating faults, causes and remedial action

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Technical alterations reserved.

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