

**Operating and Maintenance Instructions
with Dismounting and
Mounting Instructions**

VM No.: 760.0002 GB
Edition: 02.04
Ident No.: 150 500

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

**Retain
for future
use!**

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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Important note:

This operating manual is to be supplemented by the order-related information.

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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.

ATTENTION The range of utilization is to be taken from the order data sheet.

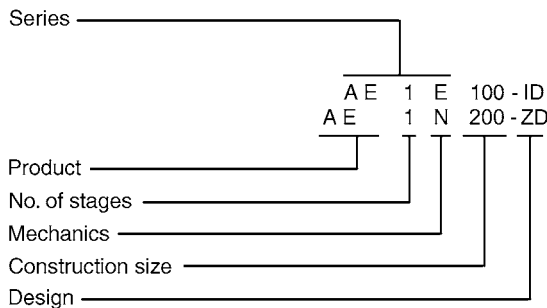
1.2 Performance data

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:



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



Safety sign according to DIN 4844-W9

in case of warning against electric voltage with



Safety sign according to DIN 4844-W8

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

ATTENTION 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.



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 and 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 and 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.

The set concrete foundations must be straight, even and clean. Any traces of oil must be removed from the foundations. The recessed anchor holes for the foundation bolts must be cleaned and removed and cleaned out with air. Prior to the installation of the pump aggregate the surface of the concrete foundations must be roughened and cleaned to ensure a good bonding between the foundation block and the mortar compound.

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 vacuumeter

A manometer and vacuumeter have to 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.: by-pass 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.

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

- P02/P12 = 0.1 to 0.5 bar
(above inner pressure of the suction casing)
- P03/P13 = 0.5 bar
(above inner pressure of the suction casing)
- P04/P14 = 0 to 0.5 bar

(Flushing 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.

ATTENTION 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).

6.1.3 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 fulfils these requirements to a high degree.

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.

ATTENTION 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 vacuumeter 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 Shutoff

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.

ATTENTION 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.

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

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).

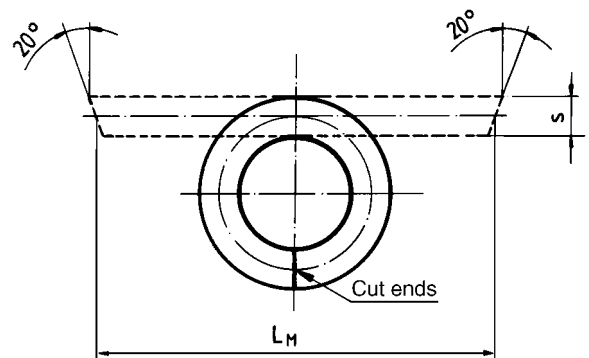


Figure 1: Cutting packing rings

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)

	Pump size								
	51 101	201	381	551 751	1001 1451	2701	5001	–	–
AE1L	51 101	201	381	551 751	1001 1451	2701	5001	–	–
AE1E	50	100	200	380 550	750 1000	1450	2700	5000	9500
AED1E	75	150	300	560	1200	2300	4250	7800	15500
AE2E	50	100	200	380	750	1450	2700	–	–
AE1N	25	50	100	200	380	750	1450	2700	5000
AE2N	25	50	100	200	380	750	1450	2700	5000
AE4N	25	50	100	200	380	750	1450	–	–
AED2N	38	75	150	300	560	1200	2300	4250	7800
AE1+1H	–	–	–	–	–	–	–	–	2700
AE2H	–	–	–	100	200	380	750	1450	–
AE2+2H	–	–	–	100	200	380	750	1450	2700
AE4H	12	25	50	100	200	380	750	1450	–
AE4+4V	–	–	25	50	100	200	380	750	1450
AE2+2V	–	–	–	–	100	200	380	750	1450
Number of packing rings for design P01/P11 ①	6	6	6	6	6	6	6	6	6
Dimensions of the packing rings with cut rings	Ø 37 / 25 x 6	Ø 42 / 30 x 6	Ø 51 / 35 x 8	Ø 59 / 43 x 8	Ø 73 / 53 x 10	Ø 80 / 60 x 10	Ø 99 / 75 x 12	Ø 118 / 90 x 14	Ø 142 / 110 x 16
Dimensions of the packing rings as blank L _M x S	104,2 x 6	121 x 6	144,5 x 8	171,4 x 8	211,8 x 10	235,3 x 10	292,5 x 12	349,6 x 14	423,6 x 16
Oil quantity in cm ³ per joint	10	18	37	52	87	169	290	565	885
Grease quantity in grams per bearing	70	135	225	280	530	680	1270	2050	4070
Flushing liquid flow water l/min	0,05	0,07	0,09	0,11	0,11	0,15	0,21	0,27	0,78

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 ① 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.

① Dangerous substances are:

- toxic substances
- substances detrimental to health
- caustic substances
- irritating substances
- explosive materials
- fire-promoting, highly, easily and normally inflammable 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).

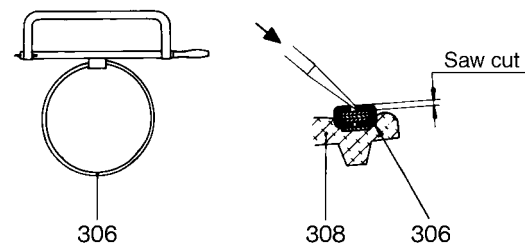


Figure 2: Removing the joint clamp

- 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).

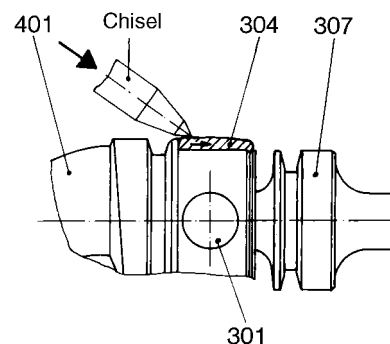


Figure 3: Dismounting the joint collar

- 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).

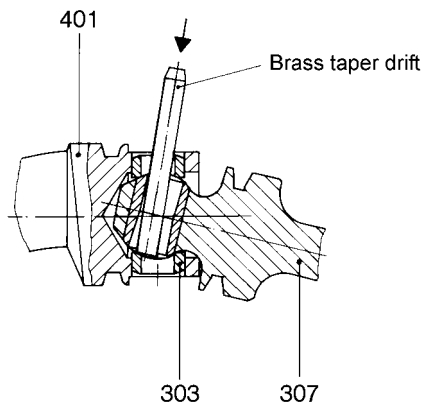


Figure 4: Dismounting the sleeves for joint bolts

- 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 dismounted 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.

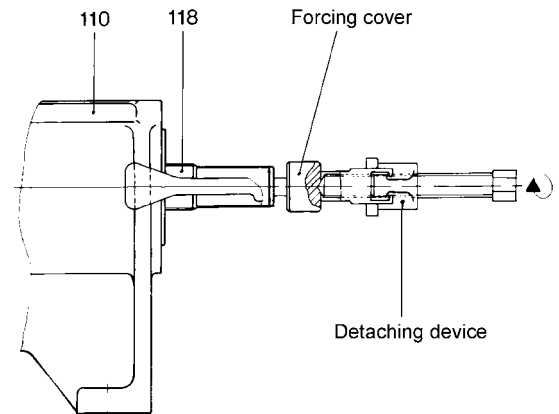


Figure 5: Pressing out the drive shaft

- 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).

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).
 - **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).
 - 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 (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!

- Pull the mechanical seal cover (215) with the throttle ring (234) off the drive shaft (118).
- Open the throttle ring (234) and remove it with the O-ring (235).
- Pull the locking pins (236) out of the mechanical seal cover (215).

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

- **Dismounting the mechanical seal, double-acting**

- 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!

- Pull the mechanical seal cover (215) with the counter-ring of the mechanical seal (product side) (219) from 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-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).
 - With designs with shaft protection sleeve, pull the shaft protection sleeve (206) and the O-ring (115) from the drive shaft (118).

7.2.1.5 Dismounting the angular contact and the groove ball bearings

Dismounting the bearings takes place after dismantling 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).

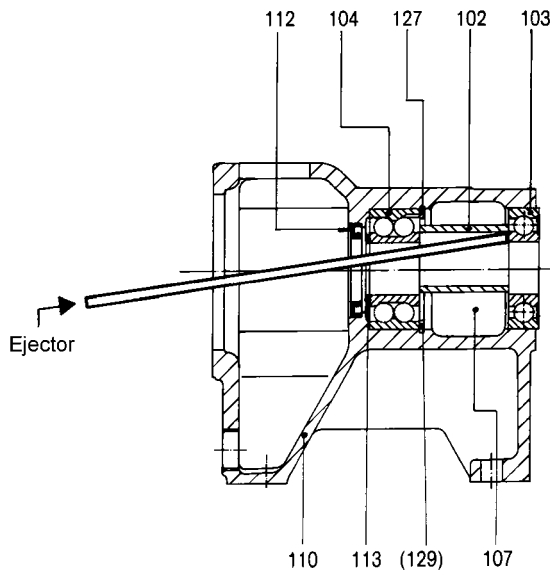


Figure 6: Dismounting the bearings

- Remove spacer sleeve (102) and bearing grease (107).
- Remove the circlip (127) from the bearing bracket (110).
- Remove the shim rings (129).

Note: Only valid for sizes

AE1L	2701 / 5001
AE1E	1450 / 2700 / 5000 / 9500
AED1E	2300 / 4250 / 7800 / 15500
AE2E	1450
AE1N	750 / 1450 / 2700 / 5000
AE2N / AE4N	750 / 1450
AED2N	1200 / 2300 / 4250 / 7800
AE.H	380 / 750 / 1450 / 2700
AE.V	200 / 380 / 750 / 1450

- 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.

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.

- 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):

AE1L	2701 / 5001
AE1E	1450 / 2700 / 5000 / 9500
AED1E	2300 / 4250 / 7800 / 15500
AE2E	1450
AE1N	750 / 1450 / 2700 / 5000
AE2N / AE4N	750 / 1450
AED2N	1200 / 2300 / 4250 / 7800
AE.H	380 / 750 / 1450 / 2700
AE.V	200 / 380 / 750 / 1450

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).

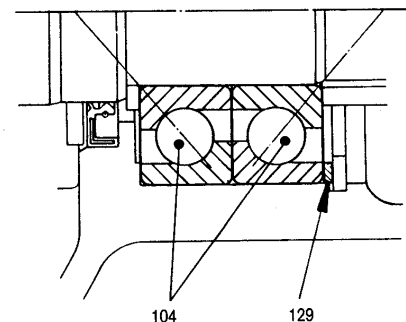


Figure 7: Two single-row angular contact ball bearings with shim rings

- 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.

- 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.
- Press the shaft seal ring (112) into the cleaned seat of the bearing bracket (110).

Note: The sealing lip with the hose spring 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.

7.2.2.2 Installing the shaft seal with dismantled 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).

ATTENTION Do not use any normal oil.

- 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).

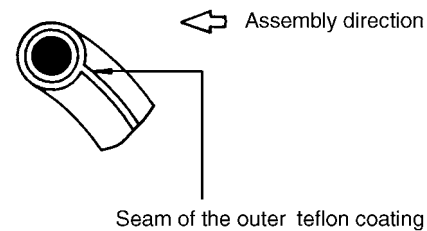


Figure 8: Seam of the outer coating points away from the assembly direction

• 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 ring.

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 the 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.

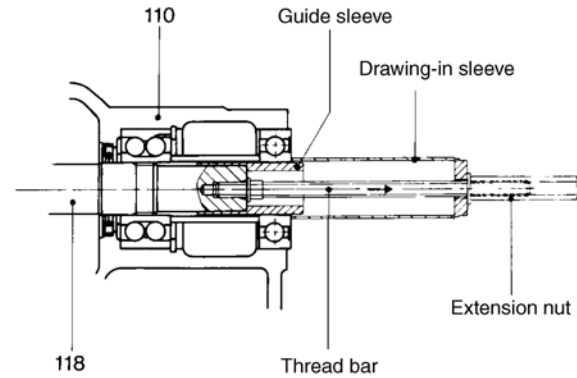


Figure 9: Drawing in the drive shaft

- 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.

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

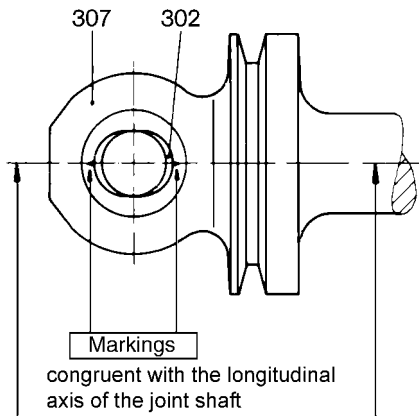


Figure 10: Pressing in the joint collar

- 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).
- Emerize 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).

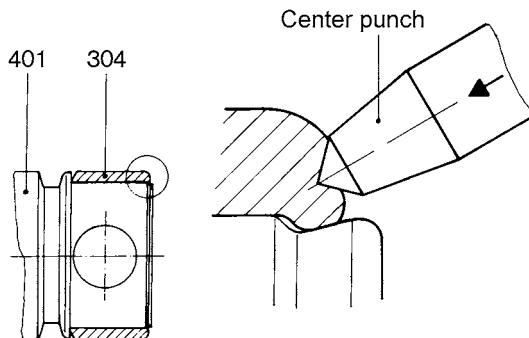


Figure 11: Securing the joint collar

- 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).

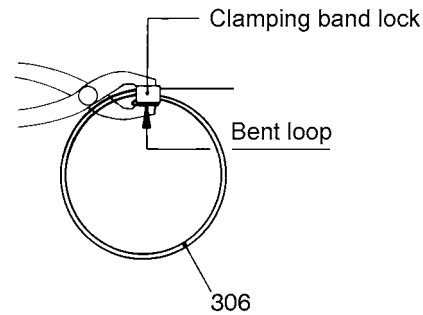


Figure 12: Press down joint clamp loop onto joint clamp lock

- 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).

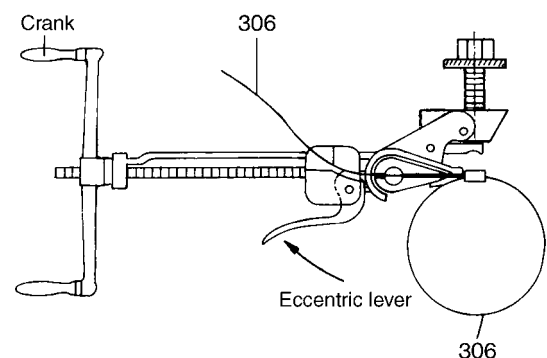


Figure 13: Tighten the joint clamp with the clamping tool Band-It and adapter J050

Note: The right tightening of the joint clamps (306) is portrayed in figure 14.

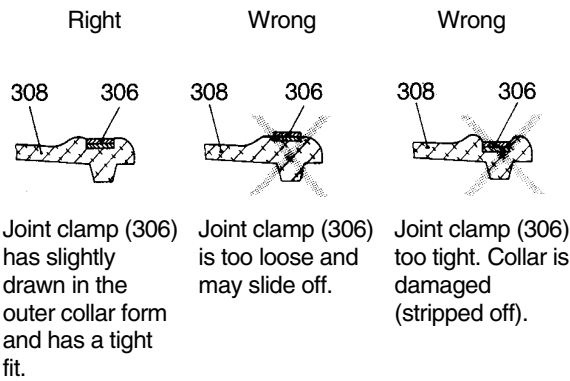


Figure 14: Tightening the joint clamps

- 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.

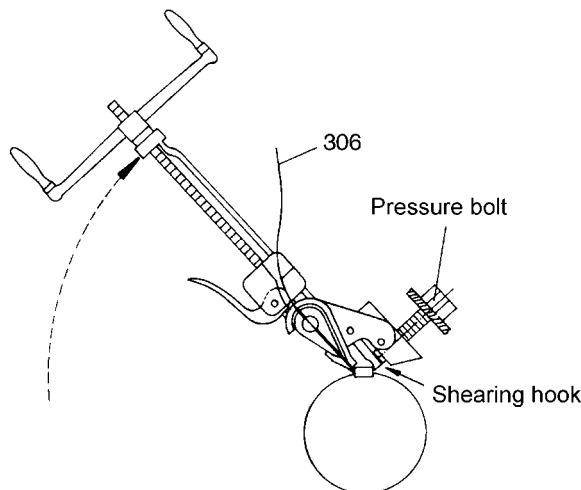


Figure 15: Shearing the joint clamp

- 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 lock. 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).

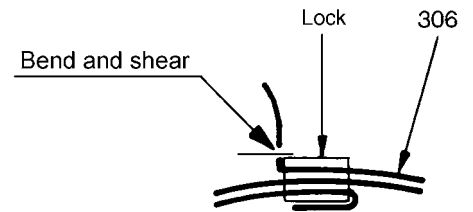


Figure 16: Canting and shearing the joint clamp

ATTENTION Check whether the joint clamp is bent in such a way that it 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).

ATTENTION 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**

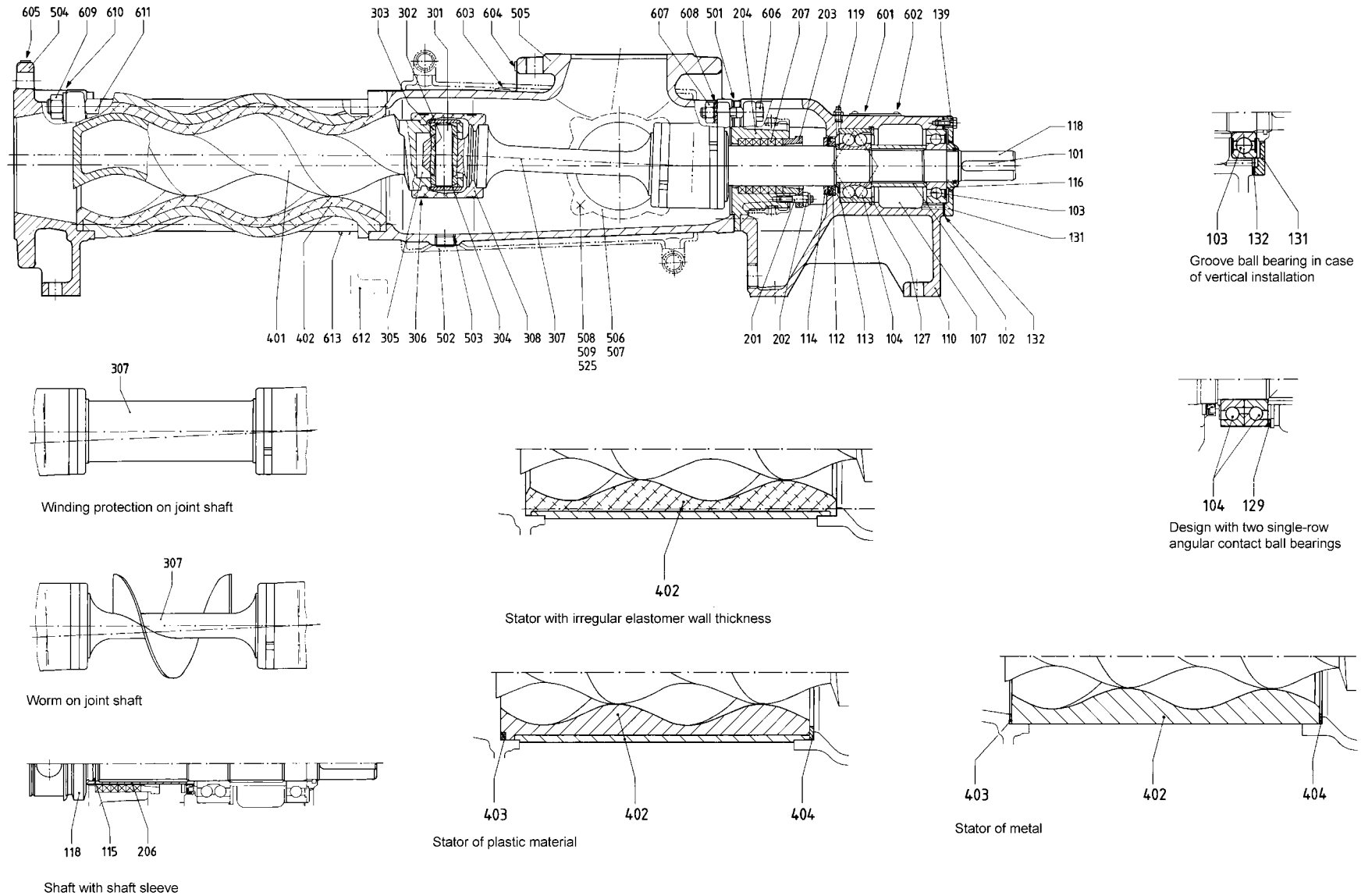
Note: The machine number and abbreviation of the pump is embossed on the type plate.

The identity number and quantity are indicated in the enclosed separate replacement parts list.

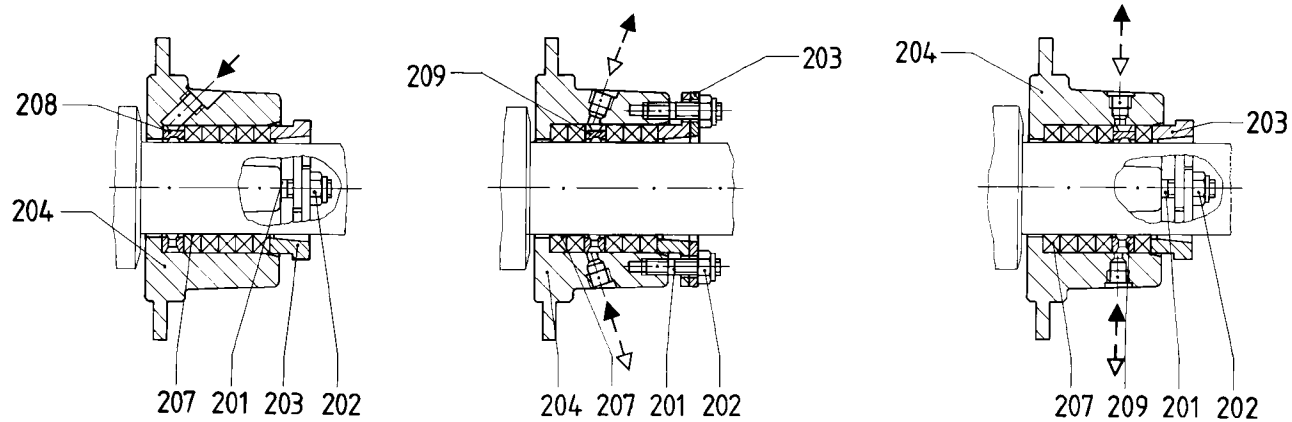
7.4 List of individual parts and recommended replacement/spare parts

Part No.	Denomination	Pcs.	Part No.	Denomination	Pcs.	Part No.	Denomination	Pcs.
101	Feather key	1	220	Locking pin	1 ③	602	Half-round head grooved pin	4
102	Spacer sleeve	1	232	Shaft seal ring	R 1	603	Information plate "Start-up"	1
103	Groove ball bearing	R 1	234	Throttle ring	R 1	604	Information plate "Suction"	1
104	Angular contact ball bearing	R 1 ①	235	O-ring	R 1	605	Information plate "Pressure"	1
107	Bearing grease	R ②	236	Locking pin	R 2	606	Hexagon screw	4
110	Bearing bracket	1	245	Hexagon screw	3	607	Hexagon nut	4
112	Shaft seal ring	R 1	251	Sealing material	1	608	Serrated lock washer	4
113	Spacer ring	1	301	Joint bolt	R, r 2	609	Hexagon nut	4
114	Thrower	1	302	Joint bush	R, r 2 ④	610	Washer	4
115	O-ring	R 1	303	Bush for joint bolt	R, r 4	611	Clamp bolt	4
116	Bearing nut	R 1	304	Joint collar	R, r 2	612	Support	1
118	Drive shaft	R 1	305	Joint oil	R, r ②	613	Hexagon screw	2
119	Lubricating nipple	1	306	Joint clamp	R, r 4	631	Fixing piece	2
127	Circlip	1	307	Joint shaft	R, r 1	632	Hexagon nut	2
129	Shim ring	4	308	Joint collar	R, r 2	633	Spacer	4
131	Bearing cover	1	401	Rotor	R, r 1	Recommended spare parts:		
132	Seal	R 1	402	Stator	R, r 1	R = large repair set		
139	Hexagon screw	4	403	Stator gasket, outlet-side	R, r 1	r = small repair set		
201	Stud bolt	2	404	Stator gasket, suction-side	R, r 1	① 2 pcs. with:		
202	Self-locking nut	2	501	Gasket for suction casing	R, r 1	AE1L 2701 / 5001		
203	Gland half	2	502	Screw plug	1	AE1E 1450 / 2700 / 5000 / 9500		
204	Stuffing box casing	1	503	Joint tape	1	AED1E 2300 / 4250 / 7800 / 15500		
206	Shaft protection sleeve	R 1	504	Pressure casing	1	AE1N 750 / 1450 / 2700 / 5000		
207	Stuffing box packing	R, r ②	505	Suction casing	1	AE2N 750 / 1450		
208	Flushing ring	1	506	Suction casing cover	2	AED2N 1200 / 2300 / 4250 / 7800		
209	Sealing chamber ring	1	507	Gasket	R 2	AE.H 380 / 750 / 1450 / 2700		
212	Screw plug	1	508	Stud bolt	8	AE.V 200 / 380 / 750 / 1450		
213	Joint tape	1	509	Hexagon nut	8	② see table page 11		
214	Mechanical seal housing	1	512	Reducing flange	1	③ 2 pcs. with design G.D		
215	Mechanical seal cover	1	513	O-ring	1	④ n/a with:		
218	O-ring	R 1	525	Washer	8	AE1L 51 / AE1L 101, AE1E 50 /		
219	Mechanical seal	R 1	601	Type plate	1	AE2E 50, AE1N 25 / AE2N 25,		
						AED1E 75, AED2N 38, AE4H 12		

7.5 Sectional drawing for series AE1L, AE1E, AE2E, AE1N, AE2N, AE4N, AED1E, AED2N; Design ID



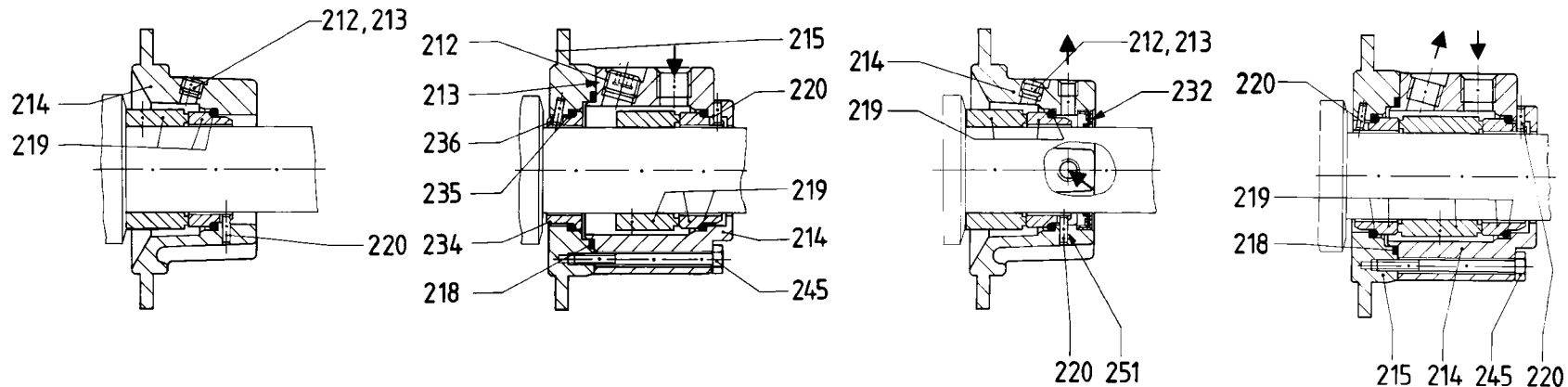
Sectional drawing shaft seals



P02 Stuffing box with flushing ring

P03 Stuffing box with internal sealing chamber ring

P04 Stuffing box with external sealing chamber ring



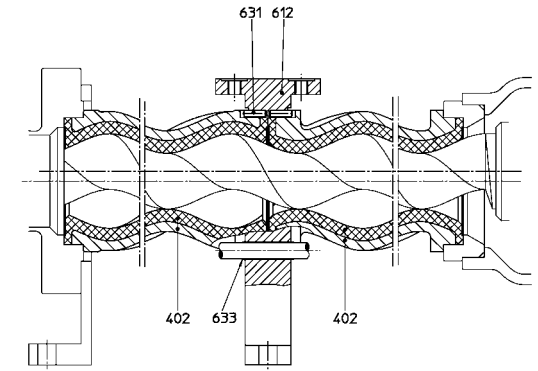
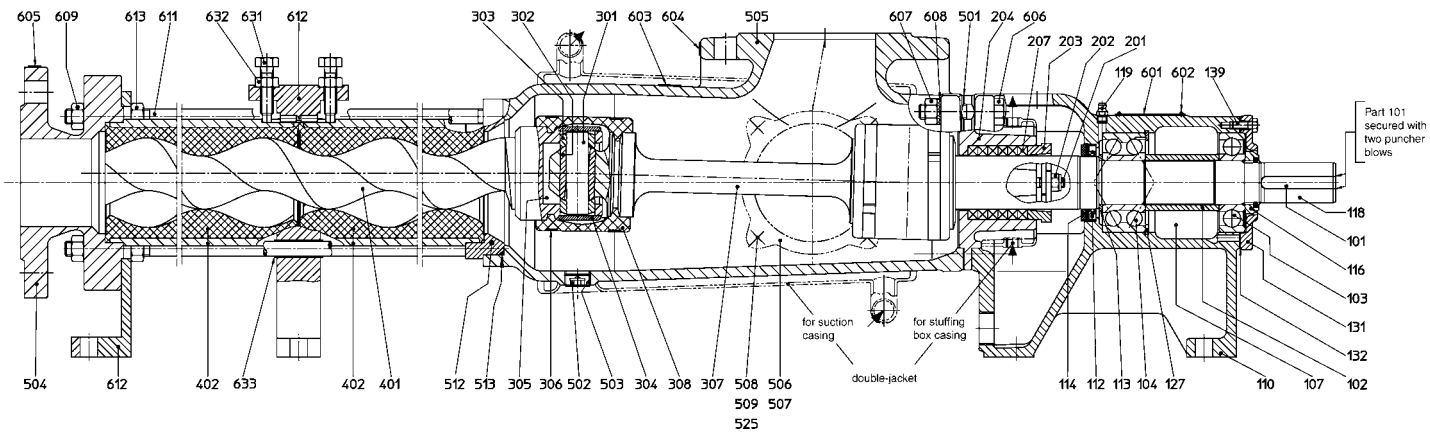
G0K and **G0N**, mechanical seal, single-acting

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

G0Q mechanical seal, single-acting with quench

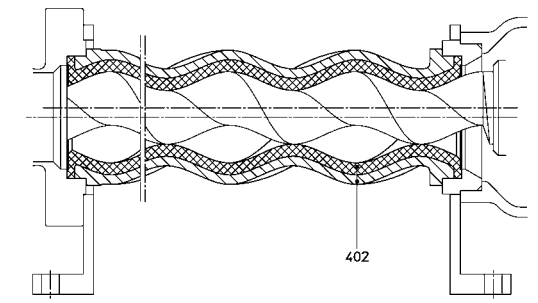
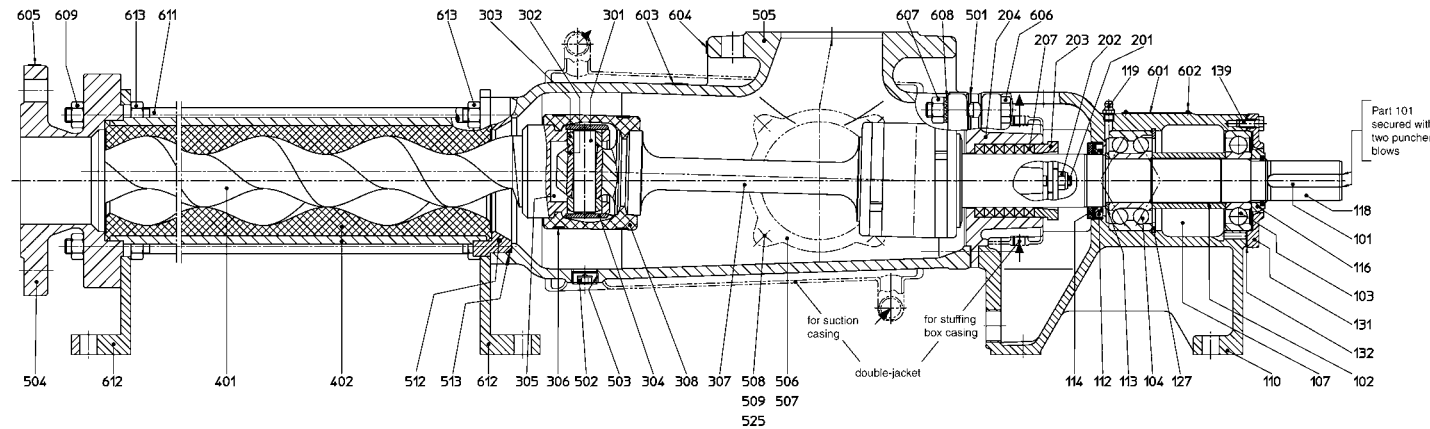
G0D mechanical seal, double-acting

7.6 Sectional drawing, series AE1+1H, AE2+2H, AE2+2V, AE4+4V; Design ID



Stator with even elastomer wall thickness

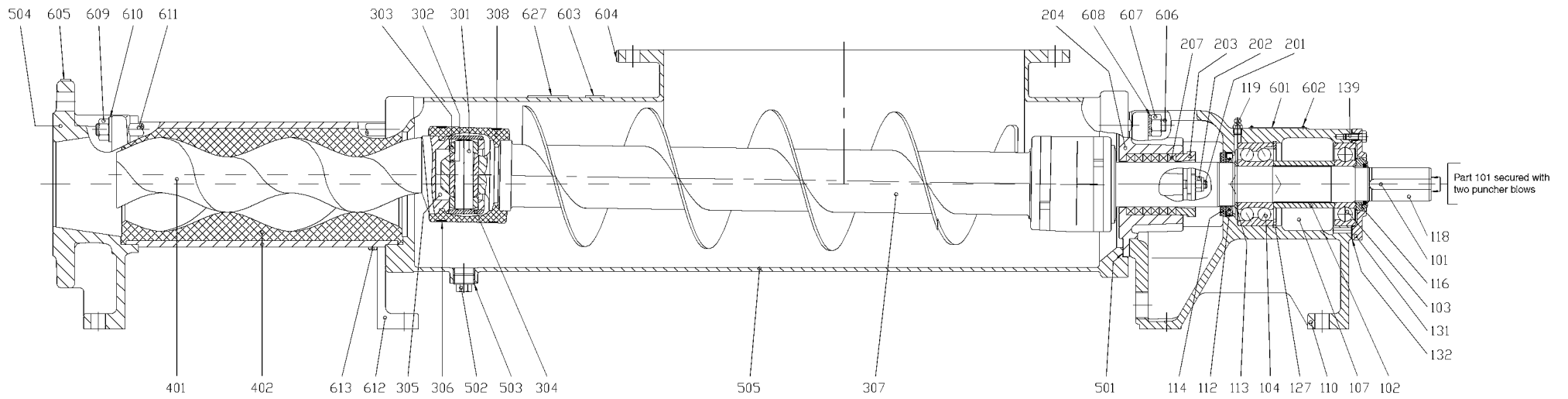
7.7 Sectional drawing, series AE2H, AE4H; Design ID



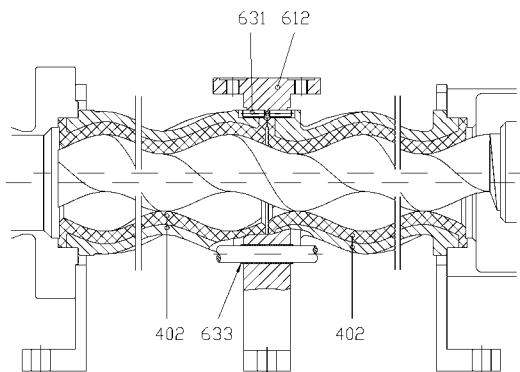
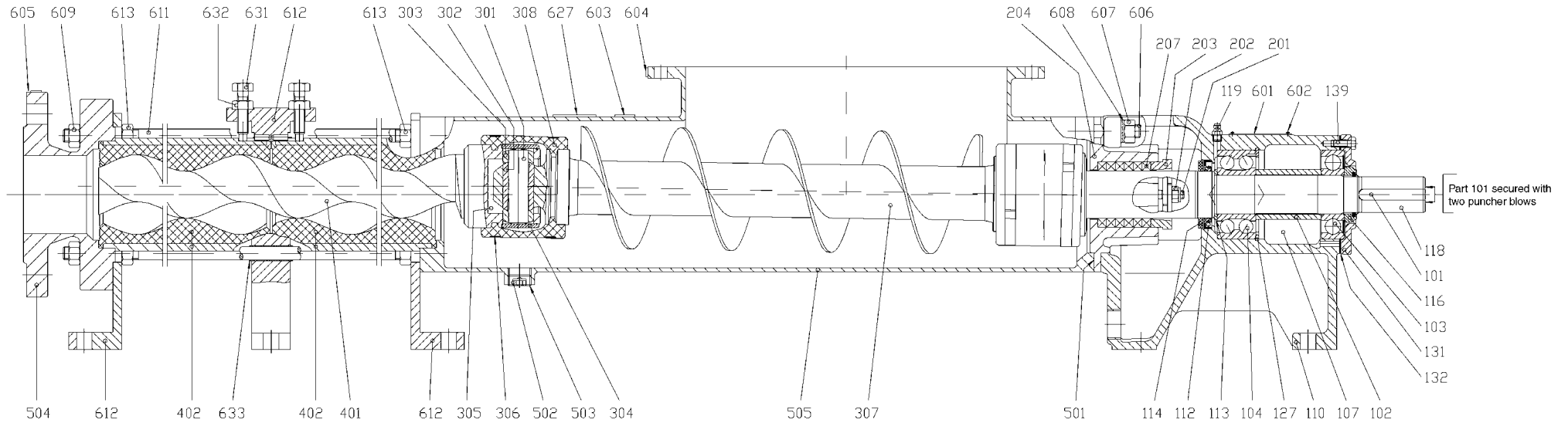
Stator with even elastomer wall thickness

Series AE1L, AE.E, AE.N, AE.H, AE.V, AED1E, AED2N
Design ID, ZD

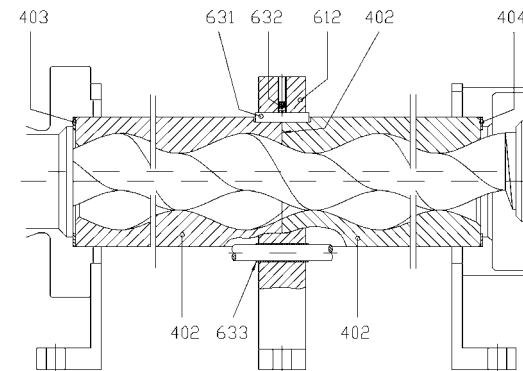
7.8 Sectional drawing, series AE1N, AE2N; Design ZD



7.9 Sectional drawing, series AE1+1H, AE2+2H; Design ZD

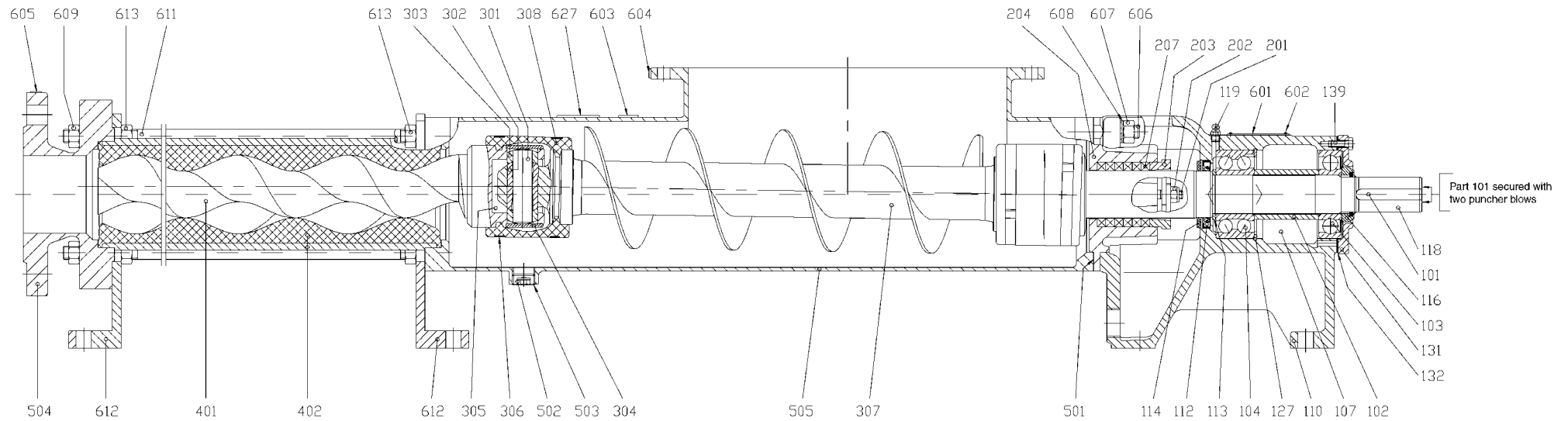


Stator with even elastomer wall thickness

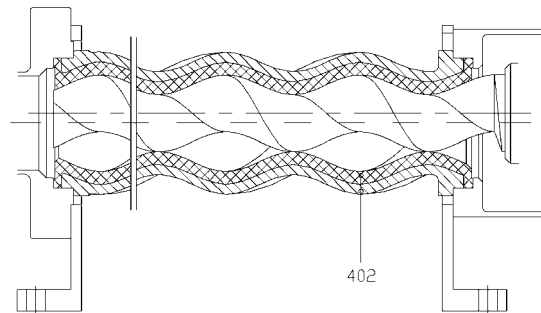


Metal stator

7.10 Sectional drawing, series AE2H, AE4H; Design ZD



Part 101 secured with two puncher blows



Stator with even elastomer wall thickness

8. Operating faults, causes and remedial action

No.	Interruptions of service										Cause and remedial action
	Pump does not start	Pump does not draw	Discharge not achieved	Pressure height not achieved	Pump discharges unevenly	Pump emits noises	Pump is stuck or no longer discharges	Motor gets too warm	Stator wears down prematurely	Leaking shaft seal	
	a	b	c	d	e	f	g	h	i	k	
1	•							•			High adhesion between the rotor and stator in a new state after longer periods of standstill. Turn pump by hand with auxiliary tools.
2		•									Check the rotation direction with the arrow on the pump. In case of wrong direction, reverse the polarity on the motor.
3		•	•		•	•	•				Check suction pipe and shaft seal for tightness.
4		•	•		•	•					Check suction height – poss. increase suction pipe diameter – install larger filters – open suction valve all the way.
5		•	•		•						Check viscosity of the conveyor media.
6	•		•					•			Check the rotation speed of the pump – check rotation speed and power consumption of the drive motor – check voltage and frequency.
7			•		•						Avoid air bubbles in the conveyor medium.
8	•		•				•	•	•		Check pressure height – open slider in the pressure pipe all the way, remove congestion in the pressure pipe.
9		•	•		•		•		•		Pump runs partially or completely dry. Check whether there is sufficient conveyor media on the suction side.
10		•	•								Increase the rotation speed with thin media and large suction volume
11		•			•	•					Reduce rotation speed with viscous media – danger of cavitation.
12						•					Check longitudinal clearance of the joint bolts, poss. joint bush wrongly mounted.
13	•	•	•				•		•		Check for foreign objects in the pump, dismount pump, remove foreign objects, replace defect parts.
14		•	•	•			•				Stator and rotor worn out. Dismantle pump, replace defect parts.
15		•	•			•	•				Joint parts (f, g) and/or drive shaft resp. shaft protector sleeve (b, c) worn out: dismount pump, replace defect parts.
16		•	•				•		•		Suction pipe partially or completely obstructed.
17	•	•					•	•	•		Check the temperature of the conveyor media – stator expansion too large – stator stuck on the rotor – stator poss. burnt or swollen.
18	•	•	•					•		•	Stuffing box: exchange obsolete rings (b,c,k), loosen gland (a,h), tighten gland (b,c,k)
19	•	•					•		•		Solid substance content and/or graining too large – reduce rotation speed: install a sieve with admissible mesh width in front of the pump.
20	•	•							•	•	Solid substances sediment when the pump stands still and harden. Rinse pump immediately, if necessary dismount and clean.
21	•	•					•		•	•	Medium hardens when undercutting a certain temperature limit – heat pump.
22						•		•			Aligns clutch or pulleys exactly.

Technical alterations reserved.



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