

Operating and Maintenance Instructions with Dismounting and Mounting Instructions

Eccentric Screw Pumps Series SLP, SEP, SNP, SHP, SNZP

Operating data of pump according to order data sheet

Job No.:

Pump Ident. No.:

Machine No.:

Pump Type:

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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 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.

1.4 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.

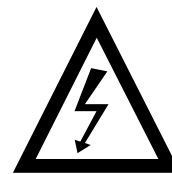
2.1 Marking of hints in the operating instructions

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 added.

Hints directly attached to the machine such as

- Directional marker
- Sign 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 (e.g. coupling) must not be removed when the machine is in operation.

- 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.

Prior to restarting, the items listed in Section „Initial starting“ are to be observed.

2.7 Arbitrary 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 Section 1 of the operating instructions. The limit values given in the data sheet must by no means be exceeded.

3. Transportation and intermediate storage

3.1 Packing

The symbols applied to the packing must be observed. During transportation and storage, suction and delivery 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

Due to their weight, eccentric screw pumps and all pump aggregates are transported to the place of installation by means of a lifting appliance.

When transporting the pumps by means of a crane, the sling ropes must be placed safely around the suction casing.

In case of complete pump aggregates, a rope must be additionally fixed to the drive motor.

The sling ropes must be placed around the pump and/or the pump aggregate so that when being lifted, they are in exact balance.

 The crane installation and the sling ropes must be sufficiently sized. The sling ropes must not be fixed to the suspension eyes of the motor.

3.3 Preservation and storage of eccentric screw pumps

Please refer to our document VM 2102 GB/ ...

4. Description

4.1 Structural design

Self-priming, single, one, two or four-stage eccentric screw pump. Rotor and stator are the conveying elements. Via the drive shaft and coupling rod, the drive torque is transmitted onto the rotor.

Discharge casing, stator and suction casing are held together by external casing connecting screws (tie rods).

The stuffing box or mechanical seal casing are arranged between the suction casing and bearing bracket.

4.1.1 Bearing and lubrication

Coupling rod with liquid-tight encapsulated pin joints on both sides. Lubrication by joint oil.

Bearing of the drive shaft is in the bearing bracket by grease-lubricated axial and grooved ball bearings and/or cylindrical roller bearings.

4.1.2 Shaft seal

By uncooled or cooled stuffing box or by uncooled or cooled, maintenance-free, non-balanced, single- or double-acting mechanical seal.

4.1.3 Dimensions/branch position/flanges

The dimensions of the pump and/or pump aggregate, the branch position and flange dimensions are to be taken from the tables of dimensions.

4.2 Mode of operation

Self-priming, rotary, positive-displacement pump, the conveying elements of which are the rotating eccentric screw (rotor) and the fixed stator. Both meet in the cross-section at two points each which, regarded over the length of the conveying elements, form two sealing lines. The contents of the tight chambers formed as the rotor rotates are shifted axially and completely continuously from the suction to the discharge side of the pump. There is no turbulence despite the rotor rotation. The constant chamber volume excludes squeezing thus ensuring an extremely gentle low-pulsation delivery.

4.3 Aggregate construction


4.3.1 Drive

By non-explosion-proof or explosion-proof electric motors, geared motors or variable-speed geared motors. Other drive variants (e.g. via V-belt) are possible.

4.3.2 Shaft coupling and protection against accidental contact

Shaft coupling according to DIN 740.

A protection against accidental contact **according to DIN 24 295** 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 may be started only with a protection against accidental contact according to DIN 24 295.**

If a protection against accidental contact is not supplied, same is to be installed by the customer.

4.3.3 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 steel.

5. Installation/mounting

5.1 Installation

The pumps may be installed horizontally or vertically with the 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.

5.3 Base plate

The base plate must be fixed on the foundation, stress-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 Assembly of pump and drive

The aggregate being completed at the place of service only, the coupling must be assembled as follows:

1. Cover pump and drive shaft end with a filmy coat of molybdenum disulfite (e.g. Molykote), and insert keys.
2. By means of a mounting device, push pump and motor-side coupling halves on until the shaft end is flush with the coupling hub.
If no mounting device is available, heating of the coupling halves to approx. 100°C (without rubber buffers) facilitates mounting.
3. By means of a grub screw according to DIN 916, fix coupling halves axially.
4. When assembling the pump and motor, geared motor or variable-speed drive it must be ensured that the coupling halves are accurately aligned.
Depending on the size of coupling, the coupling gap must be 2–8 mm.



5. Mount protection against accidental contact according to DIN 24295.

5.6 Drive by V-belt drive

In case of a V-belt reduction from drive to pump, make sure that the 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 anti-friction 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 allowing necessary visual inspections to be performed.

For maintenance and service operations, sufficient space must be provided, especially for the replacement of the conveying elements. Stator and rotor dismounting dimensions are given in the pump and/or pump aggregate table of dimensions. In addition, see to it that all pipelines can be readily mounted and dismantled.

5.8 Laying of pipelines

5.8.1 Nominal diameters

The nominal diameters of the suction and discharge lines should be designed according to the nominal pump branch diameters. For considerable deviations, especially on the suction side, please contact the factory.

5.8.2 Supports and flange connections

By way of the flange connections, the pipelines must be connected to the pump, stress-free. They must be supported close to the pump and should allow of easy screwing to avoid deformations. After the screws have been slackened, the flanges must neither be inclined nor springy nor be supported under pressure. Any thermal stresses that may occur at the pipelines must be kept away from the pump by taking appropriate measures, e.g. by the installation of compensators.

5.8.3 Cleaning of pipelines prior to attachment

Prior to mounting the pump, the suction-side pipelines, slides and valves must by all means be flushed and/or cleaned.

Items left over from assembly operations, e.g. bolts, nuts, large stones, pieces of steel etc. will destroy the pump internals. Any guarantee claims will expire if damages are caused by such items.

5.9 Laying of auxiliary pipelines for additional facilities

All auxiliary pipelines for the supply of the shaft seal and the possible double shell casing for heating and cooling of the pump are to be connected, stress-free and sealing.

If possible, the lines for the sealing liquid in case of double-acting mechanical seal (design: G.8, G.9) are to be laid with the largest possible flow cross section. The sealing liquid outlet is at the highest connection of the mechanical seal housing.

The flow direction of the flushing and sealing liquid is represented by arrows in the sectional drawings.

In order to ensure automatic ventilation, the lines must be laid continuously ascending and short, promoting easy flow.

Air bag formation and gas bubble formation are to be avoided, if required, ventilation connections must be provided. The heating/cooling liquid outlet is to be connected at the highest connection of the double shell casing, if any.

5.10 Safety and control mechanisms

5.10.1 Pressure gauge and vacuum gauge

A pressure gauge and vacuum gauge must be connected to the pressure and suction line.

5.10.2 Safety element in the discharge line

If a shut-off element is fitted in the discharge line or if there is a possibility of the discharge line becoming blocked, a safety element must be provided. For example: by-pass line with built-in relief valve, bursting disk, motor protection switch, etc.



Eccentric screw pumps are positive-displacement pumps and can theoretically generate an infinitely high pressure.

With the discharge line closed, e.g. by clogging or by incidental closing of a valve, the pressure generated by the pump may reach a multiple of the admissible pressure of the plant. This may, for example, lead to the bursting of lines which must be absolutely avoided especially with dangerous products being handled. Thus, appropriate safety devices must also be installed in the plant (e.g. pressure switches).

5.11 Electric connections



Connection of the power supply cables of the coupled drive motor must be effected by an electrical expert according to the switching diagram of the motor manufacturer. For these purposes, the current VDE regulations and the regulations of the local energy supply association are to be observed. Danger by electrical energy must be excluded.

6. Starting/Stopping

6.1 Preparation for starting

6.1.1 Filling the pump with liquid

ATTENTION Do not allow the pump to run when dry! For initial start-up and after prolonged shut-down periods, the pump must be filled with liquid. Even a few revolutions without liquid can damage the stator. It is for this reason that the suction casing must be filled with water or the pumped medium in order to lubricate the stator and rotor before start-up. After a long shut-down period, i.e. when it is to be expected that the remaining liquid in the pump will have evaporated, or after a repair, the filling procedure must be repeated.

Once it has been filled, the pump is self-priming. Venting is unnecessary as a mixture of liquid and gas can be handled without any trouble.

6.1.2 Switching in the additional facilities for shaft seals (if provided)

If the pumps are charged with flushing/sealing liquid, the stop valves, prior to initial start-up of the pump, must be opened and set to the pressures listed below.

- **Supply of the stuffing box with flushing or sealing liquid** (Designs P02, P12, P03, P13, P04 and P14).
Note: For maintaining their function, stuffing boxes with flushing or lantern rings require a flushing/sealing liquid.

The required flushing and/or sealing liquid pressure in case of pumps with stuffing box is for stuffing box designs

$$\begin{aligned} P02/P12 &= 0.1 \text{ up to } 0.5 \text{ bar} \\ &\quad (\text{over internal suction casing pressure}) \\ P03/P13 &= 0,5 \text{ bar} \\ &\quad (\text{over internal suction casing pressure}) \\ P04/P14 &= 0 \text{ up to } 0.5 \text{ bar} \end{aligned}$$

(For flushing and sealing liquid, please refer to Section 6.1.3 below).

- **Supply of the single-acting, non-balanced mechanical seal with throttled sealing liquid outlet** (Designs G.4 ... G.7)

Note: For maintaining their function, these mechanical seals require a flushing liquid which dissipates the generated frictional heat and limits the penetration of the liquid to be pumped into the sealing chamber.

The required flushing liquid pressure is 0.1 up to 0.5 bar above the internal suction casing pressure (for flushing liquid, please refer to Section 6.1.3 below).

- **Supply of the double-acting non-balanced mechanical seal** (Designs G.8, G.9)

Note: For maintaining their function, these mechanical seals require a sealing liquid which has to dissipate the generated frictional heat and to avoid the penetration of the liquid to be pumped into the sealing gap.

ATTENTION Prior to each start-up, the circulation of the sealing liquid must be ensured. The sealing liquid pressure must be approx. 1.5 to 2 bar above the pressure in the suction casing. The flow rate must be regulated so that the outlet tem-

perature of approx. 60°C is not exceeded and is at least 30 K below the boiling temperature at operating pressure (for sealing liquid, please refer to Section 6.1.3 below).

6.1.3 Quality and properties of the flushing/sealing liquid

ATTENTION Any liquid may be used as sealing/flushing liquid in consideration of the corrosion resistance of all contacted parts and the consistency with the medium to be sealed. The liquid must be free from solids, must not tend to sedimentations, should have the highest possible boiling point as well as a good heat conductivity and low viscosity. Clean water of low hardness meets these demands to a high degree.

6.1.4 Switching in the additional facility for heating or cooling the stuffing box housing, discharge casing and/or the suction casing (double shell casing)

If the pumps are equipped with this additional facility, any and all stopping devices for heating or cooling systems must be opened. The below-mentioned pressure and temperature limits must be observed.

- **Supply of the cooled or heated stuffing box housing, discharge casing and/or suction casing (double shell casing) with appropriate liquid medium**

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

The maximum heating or cooling liquid pressure is 1.5 bar in case of series SZP and 10 bar in case of the other series.

The maximum heating temperature must not exceed 180°C, and the cooling temperature not be fallen below -40°C.

Note: For the design temperature, please refer to the order data sheet.



6.1.5 Break-away of the pump

When starting up for the first time or after a long shut-down period, ensure that the pump can be turned easily by the drive motor. If this is not readily possible, e.g. due to a high degree of adhesion between the rotor and stator when brand new, movement can be assisted by using a suitable tool in the key area of the drive shaft.

ATTENTION The drive shaft must not be damaged when doing so.

6.1.6 Control of the sense of rotation

The normal sense of rotation of the pump is anti-clockwise, looking from the drive unit towards the drive shaft. In this case, the suction connection is on the shaft seal side, relieving the shaft seal of any pressure. In special cases, e.g. when drawing from a vacuum or when handling materials which cannot tolerate any gas inclusions, the pump rotates clockwise, with the suction and delivery sides reversed.

ATTENTION The sense of pump rotation must correspond to the directional marker „n“ in the pump name plate. Wrong sense of rotation may result in damages to the pump. For the control of the sense of rotation, the motor on/off switch is to be touched only briefly.

6.2 Starting

6.2.1 Start-up

All shut-off elements on the suction and delivery sides must be opened before starting up.

6.2.2 Drive

Switch motor in.

ATTENTION Consider product-specific particularities of the drive. Please refer to the operating instructions of the drive manufacturer.

6.2.3 Checking the delivery values

After the drive has reached its operating speed, the inlet pressure and pump outlet pressure must be checked via the vacuum gauge and pressure gauge.

The motor must not be overloaded. The power consumption can be checked by means of an ammeter. In this connection, temperature and viscosity of the liquid to be handled must be checked. The values read must be checked against the order data sheet and/or acceptance report.

6.2.4 Protection against dry running

If no further fluid to be pumped arrives at the suction side, the thermal energy generated in the conveying elements of the eccentric screw pump due to dry friction and churning work is no more sufficiently dissipated as a result of which the stator elastomer is thermally destroyed already after a short period of time. For the conveying elements to be protected, various dry running protection systems are available, adapted to the respective operating conditions (please contact factory).

6.3 Stopping

6.3.1 Shut-down

Switch motor off.

6.3.2 Measures in case of a longer shut-down period

If a longer shut-down period is projected and there is a danger of frost, the pump must be drained. For these purposes, turn screwed plug (502) out of the suction casing (505). Thereafter, the pump must be preserved (please refer to Section 3.3. above).

7. Maintenance/Service

7.1 Maintenance

- For maintenance and service operations, the details listed under Section 2. Safety are to be observed. Regular control and maintenance of the pump and drive will extend the service life.

7.1.1 General control

1. Do not allow the pump to run when dry.
2. The drive motor must not be overloaded.
3. Check suction and discharge lines for tightness.
4. During operation, an installed stuffing box must be slightly dripping.
An installed mechanical seal must not have any heavy leakage.
5. Observe pressure and temperature monitoring instruments, and check against the order data sheet and/or acceptance report.
6. Observe additional facilities such as flushing or sealing of the shaft seal, if provided.
7. Observe additional facilities for heating or cooling of the stuffing box housing, the discharge casing and/or the suction casing, if provided.

7.1.2 Maintenance of components

7.1.2.1 Joints of the coupling rod

The joints of the coupling rod are lubricated with ALLWEILER special joint oil Type B or oil ET 1510 ISO 460 of Messrs. Tribol Lubricants GmbH, Mönchengladbach, Germany; if used for foodstuffs, with ALLWEILER special joint oil Type BL or oil 1810/460 of Messrs. Tribol Lubricants GmbH, Mönchengladbach, Germany.

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

The joints are lubricated for life. However, if the pump must be opened for any other purposes, we recommend to check the cover sleeve for tightness and to change the joint oil after 8,000 working hours. The table under Section 7.1.2.6 below shows the allocation of the pump size to the oil quantity in cubic centimeters and/or to the grease quantity in grams. For the change of the joint oil, please refer to the Dismounting and Mounting Instructions.

7.1.2.2 Bearing of the drive shaft and lubrication of the bearing

The bearing of the drive shaft in the bearing bracket is by axial and grooved ball bearings and/or cylindrical roller bearings. The bearing types H and A are lubricated for life, the bearing type V is regreaseable.

Bearing greases

For the lubrication of the ball bearings, we recommend to use the below-listed bearing greases or equivalent. The order of manufacturers is no quality ranking.

Manufacturer	Brand
ARAL	HL 3
BP	BP ENERGREASE LS 3
CALTEX	CALTEX MULTIFAX 2
ESSO	BEACON 3
GULF	GULFCROWN GREASE No. 2 GULFCROWN GREASE No. 3
MOBIL-OIL	MOBILUX GREASE FETT 3
SHELL	SHELL ALVANIA FETT 3
SKF	ALFALUB LGMT 3
VALVOLINE	VALVOLINE LB 2

If the listed bearing greases are not available, we recommend in any case a multi-purpose grease on lithium basis.

Grease mixtures with grease grades of different basic oils and thickeners lead to a reduction of the lubricating properties and must therefore be avoided.

The table in Section 7.1.2.6 below shows the allocation of the pump size to the grease quantity in grams.

Relubrication period of bearing type V

Every 4000 operating hours, the bearings must be relubricated.

Relubrication

Relubrication is effected by means of the grease nipples (119). Relubrication must be repeated for such a period of time until the used grease emerges. The used grease must be scraped off.

7.1.2.3 Shaft seal

Shaft sealing is either via a stuffing box or a mechanical seal.

● Stuffing box

Increased leakages, if any, at the stuffing box during the first few hours of operation normally disappear automatically during the running-in period.

If necessary, slightly tighten hexagon nuts (202) at the gland (203).

Please note that the stuffing box must be slightly leaking. This causes dissipation of the frictional heat generated at the sealing surface.

If the leakage losses increase excessively, and if leakage cannot even be reduced by repeated slight tightening of the hexagon nuts (202), the packing rings have lost their elasticity of shape and must be replaced.

- Dismounting the old packing rings and cleaning the stuffing box housing

Following the pressure relief of the pump and after removal of the gland, the old packing rings can be removed. A packing puller with flexible shaft serves as tool. Thereafter, the stuffing box chamber and the drive shaft must be carefully cleaned within the area of the packing rings. Worn drive shafts and/or shaft wear sleeves must be replaced (refer to the Dismounting and Mounting Instructions).

- Mounting the packing rings

ATTENTION In principle, only such packing rings are to be installed which correspond to the required operating conditions of the pump.

For the dimensions and necessary quantity of the pre-pressed packing rings and ring cuts or cutting lengths, please refer to the table Section 7.1.2.6 below.

For cutting purposes, we recommend the straight cut perpendicular to the shaft. In order to achieve a gap-free parallel position of the cut ends when closing the packing ring, the cutting angle should be approx. 20° to both cutting ends (please refer to Figure 1 below).

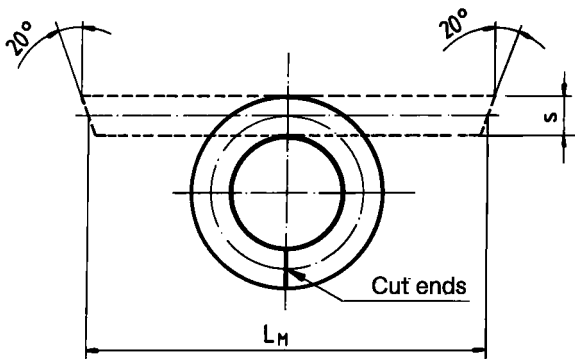


Figure 1: Cutting of packing rings

Pre-pressed packing rings or ring blanks must be carefully untwisted axially and radially to such a degree only that they can just be pushed over the shaft. Bending-up the rings may result in damage by breaking.

During installation in the packing chamber, the packing rings must be carefully re-bent into angular shape. During this process, the kerfs must be set off by 90°. By means of the gland, each ring must be individually pushed into the stuffing box chamber with the cut ends foremost. Lantern ring or flushing ring must be installed consistently.

ATTENTION Pointed items must never be used for these purposes as there is a danger of shaft damage and deformation of the packing materials.

- Commissioning of the stuffing box after re-packing

Prior to commissioning, the stuffing box must be only slightly tightened. During pump starting, 50 to 200 drops in a minute are admissible as seepage quantity.

During the starting process of approx. 30 minutes, a minimum leakage of 2 to 20 drops in a minute must be set by gradually and evenly tightening the gland (203) by means of the hexagon nuts (202).

ATTENTION During this process, the stuffing box temperature must not rise abnormally. Approx. 20 to 60°C above the temperature of the liquid pumped are admissible. In case of a sudden temperature rise, the gland must be immediately slackened and the running-in procedure repeated. The seepage can be drained through the threaded hole provided in the collecting trough of the bearing bracket.



Personal injuries and environmental damages resulting from the leakage of dangerous materials must be excluded.

● **Mechanical seal**

Non-balanced mechanical seals are used in any material combinations and models. The mechanical seal is maintenance-free.

In case of heavy leakage due to wear, the mechanical seal must be replaced (please refer to the Dismounting and Mounting Instructions).

ATTENTION As dry running of a mechanical seal must be avoided, the pump may only be started in a filled condition and, if provided, with the additional facilities switched in (please refer to Section 6.1.2 above).

7.1.2.4 V-belt drive

Please refer to our maintenance instructions for the V-belt drive with tensioning device VM 706.0001 GB – Ident No. 133 586.

7.1.2.5 Drive motors and (variable-speed) gears

Please refer to the manufacturers' operating and maintenance instructions.

7.1.2.6 Packing ring dimensions (to Section 7.1.2.3) Lubricant quantities for joints (to Section 7.1.2.1) and bearing (to Section 7.1.2.2).

Pump size	Series										Dimensions of packing rings for models P01 and P11*) for ring blanks	Dimensions of packing rings as blanks L _{max}	Oil qty. cm ³ /joint	Grease qty. g/bearing types H and V	Grease qty. g/bearing type A
	SLP	SEP		SNP			SHP	SNZP							
Pump size	99.1	50.1	50.2	12.2	25.1	25.2				25.2	5 pieces ∅ 46/30 x 8	127,7 x 8	10**	10	160
	199.1	100.1	100.2	50.1	50.2	50.2	25.4		50.1	50.2	5 pieces ∅ 51/35 x 8	144,5 x 8	18	15	250
	400.1	200.1	200.2	100.1	100.2	100.2	50.4		100.1	100.2	5 pieces ∅ 56/42 x 8	168,1 x 8	37	25	400
	720.1	380.1	380.2	200.1	200.2	200.2	100.4		200.1	200.2	5 pieces ∅ 72/52 x 10	208,4 x 10	52	40	650
	1560.1	750.1	750.2	380.1	380.2	380.2	200.4		380.1	380.2	5 pieces ∅ 87/63 x 12	252,1 x 12	87	65	1050
		1450.1	1450.2	750.1	750.2	750.2			750.1	750.2	6 pieces ∅ 102/78 x 12	302,5 x 12	169	125	2000
			2700.1	1450.1	1450.2	1450.2			1450.1	1450.2	6 pieces ∅ 123/95 x 14	366,4 x 14	290	200	-

*) for shaft seal designs P02...P04, P12...P14, the quantity is reduced by 1 piece

**) with SNP 12.2 = 4 grams or 4 cm³

7.2 Servicing (Dismounting and Mounting Instructions)

General



On request, trained service engineers will be at your disposal for mountings and repairs.

In case of repairs performed by the customer's own personnel or our trained mechanics, it must be ensured that the pump is completely empty and clean.

This applies in particular to pumps which, in case of repair, are sent to our factory or to one of our contractual repair shops.

In protection of our staff and for reasons of environmental protection, we have to refuse to accept for repair any pumps filled with liquid pumped. Otherwise, we will have to charge the customer/operator with the costs for an ecologically acceptable waste disposal.

In case of repair of pumps operated with dangerous materials ① and/or liquids harmful to the environment, the customer/operator must advise hereof his own and/or our local mounting personnel or, in case of return, our factory and/or contractual service shop of his own accord. In such a case, evidence of the liquid handled, e.g. in the form of a DIN safety data sheet will have to be presented to us when requesting a service engineer.

① Dangerous materials are:

- Toxic substances
- Substances detrimental to health
- Caustic substances
- Irritants
- Explosive materials
- Fire-promoting, highly, easily and normally inflammable materials
- Carcinogenic substances
- Foetopathic substances
- Genes-changing substances
- Substances which are dangerous to human beings in any other way

When working locally, the customer's own and/or our mounting personnel must be referred to dangers which may be caused in connection with repairs.

The most important dismounting and mounting operations are described in these instructions. The mounting steps described in the individual sections must be consistently observed.

7.2.1 Dismounting the eccentric screw pump

Prior to commencing the dismounting, the following operations must be performed:

- Disconnect power supply cable from the motor. Motor must not be capable of being started.
- All shut-off elements in the supply and discharge line must be closed.
- Drain the liquid to be pumped from the suction casing. For these purposes, screw out screwed plug (502). **Note:** Use collecting tank.
- Dismount protection against accidental contact.
- Dismount supply and discharge line as well as all auxiliary pipelines.
- Loosen screws at the pump feet, and screw out.

7.2.1.1 Dismounting the stator

- Remove hexagon nuts (609) and washers (610) from the tie rods (611).
- Withdraw discharge casing (504).

- Remove tie rods (611) and support (612), if provided.
- Withdraw stator (402) from the rotor (401). **Note:** In case of stiffness, simultaneously turn stator (402) by means of chain tongs. For these purposes, fix drive shaft (118).
- In case of stators of plastic or metal, remove stator gaskets (403) and (404).

7.2.1.2 Dismounting the rotor and rotor-side joint

Dismounting of the rotor and the rotor-side joint is effected following the dismounting of the stator (402). Please refer to Section 7.2.1.1 above.

- Remove hexagon nuts (607) and serrated lock washers (608) as well as hexagon screws (606).
- Pull suction casing (505) over rotor (401) ensuring that the precision-machined rotor is not damaged.
- Remove suction casing gasket (501).
- Cut buckles on clamping bands (306) with a metal saw, and with a screw driver, press out to both sides. Remove clamping bands (306) from the cover sleeve (308) (please refer to Figure 2 below).

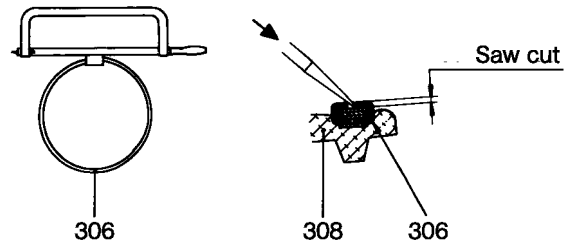


Figure 2: Removal of the clamping bands.



- By means of a screw driver, lift cover sleeve (308) and withdraw axially towards the coupling rod (307).
- In case of an oil-filled joint, collect oil filling in a tank.
- Drive retaining sleeve (304) over the collar of the coupling rod (307). In doing so, do not deflect coupling rod (307) (please refer to Figure 3 below).

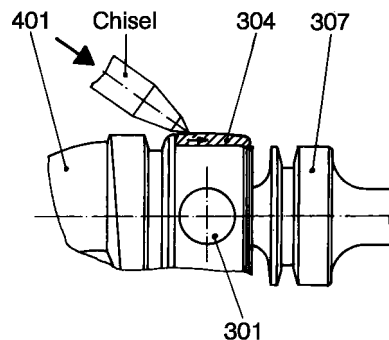


Figure 3: Dismounting the retaining sleeve.

- Eject coupling rod pin (301).
- By means of a brass ejector, drive out the two bushes for coupling rod pin (303) by one half. For these purposes, incline coupling rod (307) (please refer to Figure 4 below).

Figure 4: Dismounting the bushes for coupling rod pin.

- Remove rotor (401) from the coupling rod (307).
- Press joint bush (302) out of the coupling rod (307).
- By means of a brass mandrel, completely drive bush for coupling rod pin (303) out of the rotor (401).

7.2.1.3 Dismounting the coupling rod and the drive-side joint

Dismounting of the coupling rod and the drive-side joint is effected following the dismounting of the stator (402) and the rotor (401). Please refer to Sections 7.2.1.1 and 7.2.1.2 above.

- Dismount drive-side joint as described under Section 7.2.1.2 above.
- Withdraw coupling rod (307) from the drive shaft (118).
- Press joint bush (302) out of the coupling rod (307).
- By means of a brass mandrel, completely drive bush for coupling rod pin (303) out of the drive shaft (118).

7.2.1.4 Dismounting the shaft seal and drive shaft with bearing

Note: In case of pumps with shaft seal by stuffing box, the packing rings can be exchanged without dismounting the drive shaft, as described under Section 7.1.2.3 above. Dismounting of the drive shaft is required whenever the pump is equipped with a mechanical seal. In case of damages to the drive shaft or shaft wear sleeve within the area of the shaft seal, the pump must also be dismounted, as described hereinafter.

- Dismount stator (402) (please refer to Section 7.2.1.1 above).
- Remove hexagon nut (607) and serrated lock washer (608) as well as hexagon screw (606).
- Pull suction casing (505) over rotor (401), ensuring that the precision-machined rotor is not damaged.
- Remove suction casing gasket (501).
- Withdraw coupling half and/or V-belt pulley and remove key (101).
- Pull flinger ring (114) against gland (203).
- Loosen circlip (108) and remove it from the groove.

- Drive out drive shaft (118) with all mounted parts from the bearing bracket (110).
- Clamp drive shaft (118) in a torsionally resistant position at the end of the shaft.

● Dismounting the bearings for bearings H and V

- Remove tab washer for bearing nut (117), and loosen bearing nut (116).
- Remove bearing nut (116), tab washer for bearing nut (117) and, for bearing H, in addition spacer rings (113) and Nilos ring (105).
- Pull off radial bearing (103).
- Remove second Nilos ring (105), spacer sleeve (102) and Nilos ring (106).
- Pull off axial bearing (104).
- Remove spacer ring (113), bearing cover (111) with lip seal (112), O-ring (109) and circlip (108).
- Pull off flinger ring (114).
- Remove shaft sleeve (205).

● Dismounting the bearings for bearing A

- Remove circlip (121).
- Pull off radial bearing (103), remove spacer sleeve (102).
- Pull off axial bearing (104).
- Remove spacer ring (113), bearing cover (111) with lip seal (112), O-ring (109) and circlip (108).
- Pull off flinger ring (114).

● Dismounting the stuffing box

- Remove self-locking nut (202), T-head bolt (201) and gland (203).
- Pull stuffing box housing (204) from the drive shaft (118).
- Remove stuffing box packing (207) in case of models P02, P12 including flushing ring (208), and for models P03, P13 and P04, P14, including lantern ring (209) from stuffing box housing (204).
- For model with shaft wear sleeve, pull shaft wear sleeve (206) and O-ring (115) from the drive shaft (118).

● Dismounting the mechanical seal, single-acting

- Withdraw mechanical seal housing (214) with atmosphere-side stationary seal ring of the mechanical seal (219) from the drive shaft.
Note: Particularly see to it that the casing with stationary seal ring of the mechanical seal is withdrawn concentrically and not canting to avoid damages to the stationary seal ring.
- Press stationary seal ring of the mechanical seal and O-ring out of the mechanical seal housing (214). See to uniform pressure distribution.
- Drive out retaining pin (220).
- Undo grub screws, if provided, in the rotating part of the mechanical seal (219), and withdraw mechanical seal from the drive shaft (118).

ATTENTION Before undoing the grub screws, mark or measure the position of the mechanical seal on the shaft wear sleeve or drive shaft. Do not push O-rings over the pressure marks caused by the grub screws!

- For design with shaft wear sleeve, withdraw shaft wear sleeve (206) and O-ring (115) from the drive shaft (118).
- Remove locating ring (217) with O-ring (218).

● Dismounting the mechanical seal, single-acting with throttled sealing water outlet

- Dismounting as for mechanical seal, single-acting.
- Remove mechanical seal cover (215) with O-ring (218).

● Dismounting the mechanical seal, double-acting

- Withdraw mechanical seal housing (214) with atmosphere-side stationary seal ring of the mechanical seal (219) from the drive shaft.
Note: Particularly see to it that the casing with stationary seal ring of the mechanical seal is withdrawn concentrically and not canted to avoid damages to the stationary seal ring.
- Remove O-ring (218).
- Undo grub screws in the rotating part of the mechanical seal (219) and pull off mechanical seal from the drive shaft (118).

ATTENTION Before undoing the grub screws, mark or measure the position of the mechanical seal on the shaft wear sleeve or drive shaft. Do not push O-rings over the pressure marks caused by the grub screws!

- Pull off mechanical seal cover (215) and clamping ring (216) with product-side stationary seal ring of the mechanical seal (219) from the drive shaft (118).
Note: Particularly see to it that the mechanical seal cover with stationary seal ring of the mechanical seal is withdrawn concentrically and not canted to avoid damages to the stationary seal ring.
- Press stationary seal rings of the mechanical seals and O-rings out of the mechanical seal housing (214) and mechanical seal cover (215). See to uniform pressure distribution.
- Remove retaining pin (220).
- For design with shaft wear sleeve, withdraw shaft wear sleeve (206) and O-ring (115) from the drive shaft (118).

7.2.2 Mounting the eccentric screw pump

General

Mounting of the individual pump components is effected after careful cleaning analogously in reverse order.

7.2.2.1 Mounting the shaft seal with the drive shaft dismounted

- For design with shaft wear sleeve, pull O-ring (115) on drive shaft (118).
- Push shaft wear sleeve (206) with the inside bevel pointing to the drive shaft head onto the drive shaft (118).

● Mounting the stuffing box

- Push stuffing box housing (204) onto the shaft wear sleeve (206) and/or onto the drive shaft (118).
- In case of models P02, P12 including flushing ring (208) and in case of models P03, P13 and P04, P14 including lantern ring (209), install stuffing box packing (207) in the stuffing box housing (204). Please also refer to Section 7.1.2.3 “Mounting new packing rings”.

● Mounting the mechanical seal, general

Mechanical seals are high-quality precision parts. The mounting instructions of the mechanical seal manufacturers are to be observed. Careful handling and extreme cleanliness during mounting are a condition of proper functioning. To facilitate mounting, surfaces on which O-rings are sliding, may be lubricated with lubricants such as silicon oil, Polydiol or soft soap.

ATTENTION Do not use ordinary oil.
Note: See to it that the parts sliding on each other are only exchanged in pairs. When using double PTFE-coated O-rings, see to it that the joint of the outer coating points against the mounting direction as otherwise, opening and/or withdrawal of the coating may be effected (please refer to Figure 5 below).

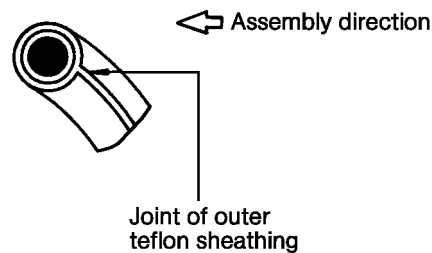


Figure 5: Joint of the outer coating points against the mounting direction.

● Mounting the mechanical seal, single-acting

- Drive retaining pin (220) into the mechanical seal housing (214).
- Concentrically press stationary seal ring of the mechanical seal (219) with O-ring into the cleaned mechanical seal housing (214).
Note: See to uniform pressure distribution and retaining pin. Retaining pin (220) must not protrude to the inside.
- Push locating ring (217) and O-ring (218) onto the drive shaft (118).
- Push rotating part of the mechanical seal (219) onto the drive shaft (118).
Note: Exactly observe installation dimension and/or position of the mechanical seal as marked for dismounting.
- Insert grub screws, if provided, in the rotating part of the mechanical seal (219) with the screw locking means Loctite No. 241 or equivalent, and tighten.
- Push mechanical seal housing (214) with stationary seal ring of the mechanical seal (219) over the drive shaft (118).
Note: When pushing the mechanical seal housing onto the drive shaft, see to it that the mechanical seal housing is not canted to avoid damages to the stationary seal ring of the mechanical seal.

● Mounting the mechanical seal, single-acting with throttled sealing water outlet

- Push mechanical seal cover (215) and O-ring (218) onto the drive shaft (118).
- Mounting of the mechanical seal is effected as described under Section – **Mounting the mechanical seal, single-acting.**

● Mounting the mechanical seal, double-acting

- Concentrically press stationary seal ring of the mechanical seal (219) with O-ring into the mechanical seal cover (215).
Note: See to uniform pressure distribution.

- Push mechanical seal cover (215) and clamping ring (216) over the drive shaft (118).
- Mounting of the mechanical seal is effected as described under Section – **Mounting the mechanical seal, single-acting.**

7.2.2.2 Mounting the drive shaft with bearing

Note: In case of bearings H and A, the pumps are equipped with anti-friction bearings lubricated for life and in case of bearing V, with regreasable anti-friction bearings. For re-mounting, the anti-friction bearings must be provided with a sufficient grease filling.

- If required, carefully clean anti-friction bearings with Diesel fuel. The contact faces being blank and undamaged, the anti-friction bearings (103) and (104) can be re-used. If this is not the case, the anti-friction bearings must be replaced.
- Fill anti-friction bearings (103) and (104) with bearing grease. The grease filling is applied as described below.
 1. Fill hollow spaces between the rolling bodies up to approx. 30 to 50% with grease.
 2. Scrape off excessive grease (most suitably with the fingers, do not use any metallic object). For bearing greases recommended by us, please refer to Section 7.1.2.2 above.

● Mounting the bearings with bearing types H and V

- Push shaft sleeves (205) with contact face (ground face) for lip seal (112) pointing to the bearing onto the drive shaft (118).
- Push flinger ring (114) on.
- Fill space of the lip seal (112) with bearing grease and coat sealing lips.
- Press lip seal (112) into the cleaned seat of the bearing cover (111).

Note: In case of bearing type H, the sealing lip with hose spring of the lip seals (112) must always face the side to be sealed (pointing to the inside) and, in case of bearing type V, the shaft sealing housing (pointing to the outside). Pressing-in is effected with a suitable pressing stamp. Absolutely see to it that the pressing force is applied as close as possible to the outside diameter of the lip seal.
- Push circlip (108), bearing cover (111) with lip seal and O-ring (109) as well as spacer ring (113) onto the drive shaft (118).
- By means of a suitable pipe length, press double-row axial bearing (104) over the inner bearing ring onto the drive shaft (118).

Note: The ball filling groove of the axial bearing must point to the shaft seal side. Slightly oil bearing surface previously.
- Coat the sealing edges of Nilos rings (105) and (106) with bearing grease.
- Push Nilos ring (106), spacer sleeve (102) and Nilos ring (105) onto the drive shaft (118).
- By means of a suitable pipe length, press radial bearing (103) over the inner bearing ring onto the drive shaft (118). Slightly oil bearing surface previously.

Note: Inscription on the outer ring of the radial bearing must be fitted on the inside.
- **In case of bearing type H:** Push drive-side Nilos ring (105), spacer rings (113) and tab washer for bearing nut (117) onto the drive shaft (118), and firmly tighten bearing nut (116). Check whether shaft wear sleeve (206) rests tightly against the head of the drive shaft (118).

ATTENTION Prior to tightening the bearing nut (116), the drive-side Nilos ring (105) and bearing-side spacer ring (113) must be centered on the bearing seat of the drive shaft (118).

- **In case of bearing type V:** Firmly tighten bearing nut (116). Check whether shaft wear sleeve (206) rests tightly against the head of the drive shaft (118).
- Lock bearing nut (116) with tab washer for bearing nut (117).

● Mounting the bearings with bearing type A

- Push flinger ring (114) on.
- Fill space of the lip seal (112) with bearing grease and coat sealing lips.
- Press lip seal (112) into the cleaned seat of the bearing cover (111).

Note: The sealing lip with hose spring of the lip seal must always face the side to be sealed (pointing to the inside). Pressing-in is effected with a suitable pressing stamp. Absolutely see to it that the pressing force is applied as close as possible to the outside diameter of the lip seal.
- Push circlip (108), bearing cover (111) with lip seal and O-ring (109) as well as spacer ring (113) onto the drive shaft (118).
- By means of a suitable pipe length, press double-row axial bearing (104) over the inner bearing ring onto the drive shaft (118).

Note: The ball filling groove of the axial bearing must point to the shaft seal side. Slightly oil bearing surface previously.
- Push spacer sleeve (102) on.
- By means of a suitable pipe length, press radial bearing (103) over the inner bearing ring onto the drive shaft (118). Slightly oil bearing surface previously.
- Mount circlip (121).
- Fill space between axial bearing (104) and radial bearing (103) with bearing grease.

● Mounting the drive shaft

- Coat sealing lip of the lip seal (120) with bearing grease. In case of bearing type A, fill space of the lip seal (120) with bearing grease.
- Press lip seal (120) into the cleaned seat of the bearing bracket (110).

Note: In case of bearing type V, the sealing lip with hose spring of the lip seal (120) must point to the outside and, in case of bearing type A, to the inside. Pressing-in is effected with a suitable pressing stamp. Absolutely see to it that the pressing force is applied as close as possible to the outside diameter of the lip seal.
- Press drive shaft (118) with all mounted parts into the bearing bracket (110). Slightly oil bearing seats previously.
- Mount circlip (108).
- Push flinger ring (114) into bearing direction.
- Insert key (101) in the drive shaft (118) and lock by two punch marks on the front side.

7.2.2.3 Mounting the rotor and rotor-side joint

- With a brass drift, drive bushes for coupling rod pin (303) half-way into rotor (401) (not applicable to size SNP 12.2).

- Press coupling rod bush (302) into the coupling rod (307) so that the longitudinal axis of the oval hole (marked with two notches) coincides with the longitudinal axis of the coupling rod and the coupling rod bush protrudes symmetrically from both sides of the coupling rod (please refer to Figure 6 below).

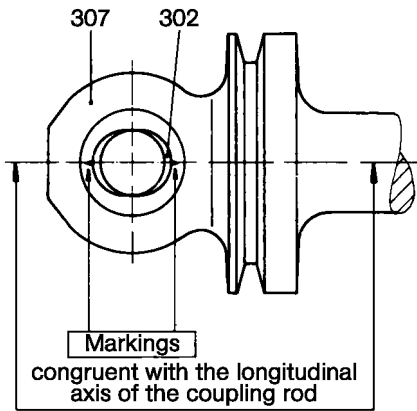


Figure 6: Pressing-in of the coupling rod bush

- Push clamping bands (306), cover sleeves (308) and retaining sleeve (304) onto the shank of the coupling rod (307).
- Push coupling rod (307) into the rotor head (401).
- Push coupling rod pin (301) into the coupling rod bush (302), and drive in guide bushes (303) completely.
- Polish retaining sleeve (304) at the outside diameter, if necessary, with emery, and mount on the rotor head (401).
- Following mounting of the retaining sleeve (304), secure same against axial displacement on the rotor head (401).

ATTENTION For these purposes, drive face of the retaining sleeve (304) into the groove at the rotor head (401) with one punch mark (please refer to Figure 7 below).

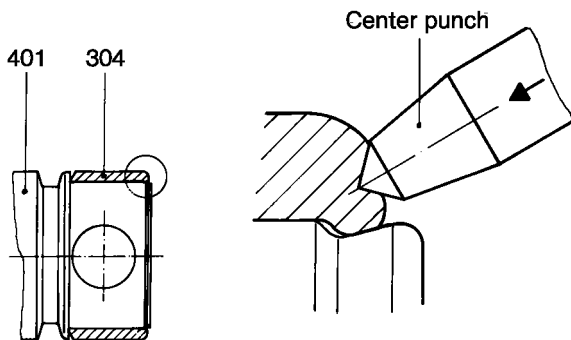


Figure 7: Locking the retaining sleeve.

- Mount cover sleeve (308) with screw driver, lift top with screw driver, run spray pipe of the oil can under the sleeve and fill the space in the joint with ALLWEILER special joint oil type B or oil ET 15 10 ISO 460 of Tribol Lubricants GmbH, Mönchengladbach, Germany. Lubricant quantities see table, Section 7.1.2.6 above. For the use of the pumps for foodstuffs with ALLWEILER special joint oil Type BL or oil 1810/460 of Messrs. Tribol Lubricants GmbH, Mönchengladbach, Germany.

- Check whether bent loop of the clamping bands (306) rests against the clamping band lock. If not, press against by means of commercial flat pliers (please refer to Figure 8 below).

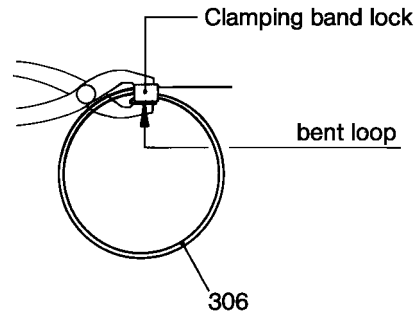


Figure 8: Press clamping band loop against clamping band lock.

- Place clamping bands (306) in the surrounding grooves of the cover sleeve (308), and clamp.
Note: For these purposes, the following clamping tool must be used:

For pump sizes \leq
SLP 720.1, SEP 380.1, SEP 380.2, SEP 550.1,
SNP 200.1, SNP 200.2, SHP 100.4, SHP 200.2,
SNZP 200.1, SNZP 200.2
the clamping tool bearing the designation PoK-It II.

For pump sizes \geq
SLP 1560.1, SEP 750.1, SEP 750.2, SEP 1000.1,
SNP 380.1, SNP 380.2, SHP 200.4, SHP 380.2,
SNZP 380.1, SNZP 380.2
the clamping tool bearing the designation Band-It together with adapter J050.

The said tools may be obtained from us. When clamping the clamping bands, proceed as follows:

● **Clamping with clamping tool Band-It and adapter J050.**

- Introduce band end of the clamping band (306) to the clamping band lock into the clamping tool with adapter.
- Hold clamp end with the eccentric lever of the clamping tool, and clamp clamping band (306) by turning the crank (Figure 9).

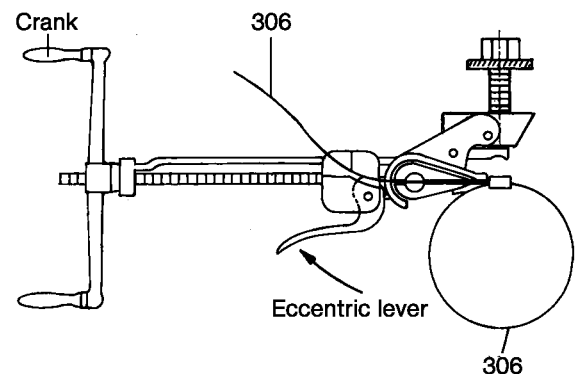


Figure 9: Clamping the clamping band by means of clamping tool Band-It and adapter J050.

Note: Proper clamping of the clamping bands (306) is shown in Figure 10.

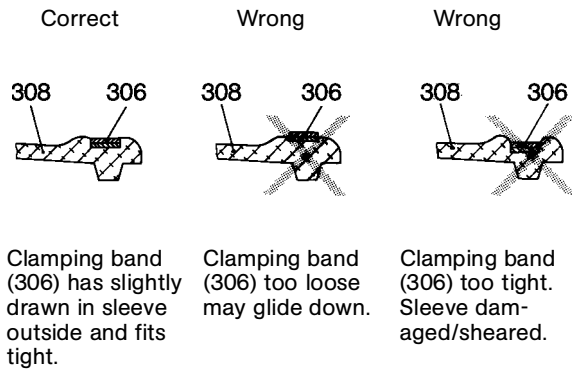


Figure 10: Clamping of clamping bands.

- Check whether on the entire circumference of the cover sleeve (308), the clamping band (306) lies in the sleeve groove.
- Slowly turn clamping tool upwards through approx. 60° until the shearing hook grips behind the clamping band lock (please refer to Figure 11 below).
- Tighten pressure screws by hand until the clamping band is firmly clamped.

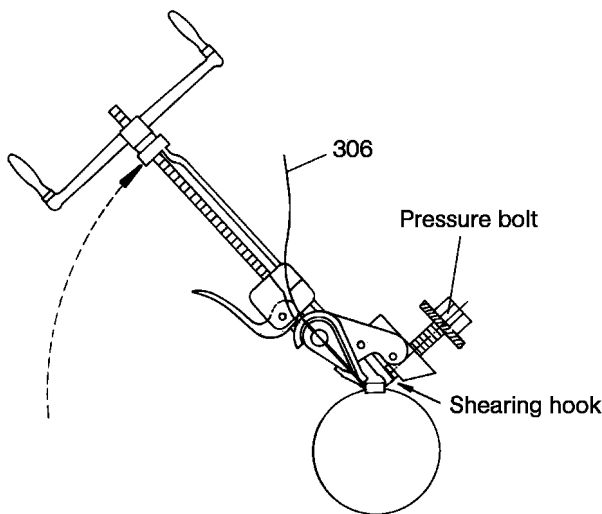


Figure 11: Shearing of the clamping band.

- By means of a spanner or ratchet, turn pressure screw clockwise until the clamping band is sheared.

ATTENTION If the clamping band is slightly lifted on the sheared side, this must be compensated for by careful realignment. Hammering or beating against the clamping band lock is not permitted as otherwise, there may be a danger of sleeve damage.

Note: In case of clamping bands of Hastelloy material, shearing with the clamping tool is not possible. After bending at the clamping band lock, the clamping band must be sheared by means of sheet metal shears and the cutting edges deburred (please refer to Figure 12 below).

● **Clamping with clamping tool Pok-It II**

- When using clamping tool Pok-It II, bend clamping band (306) after clamping at the clamping band lock by swinging the clamping tool so that the band can-

not glide back through the lock. After bending at the clamping band lock, the clamping band must be sheared with sheet metal shears and the cutting edges deburred (please refer to Figure 12 below).

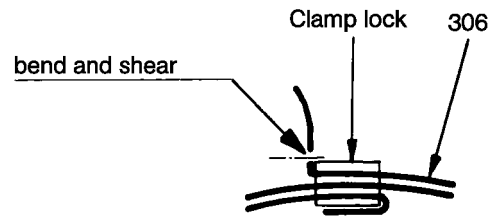


Figure 12: Bending and shearing of the clamping band.

ATTENTION Check whether the clamping band is bent so that it cannot glide back through the clamping band lock (please refer to Figure 12 above). If this was not achieved, the clamping band must be removed and replaced by a new one.

7.2.2.4 Mounting the coupling rod and the drive-side joint

- Mount drive-side joint as described under Section 7.2.2.3 above against the drive shaft (118).
- In doing so, push coupling rod into the joint head of the drive shaft (118).
- Secure retaining sleeve (304) as depicted with a center punch mark.
- Mount cover sleeve (308) joint chamber fill with joint oil and fix clamping bands as described.
- Insert suction casing gasket (501).
- Push suction casing (505) over the rotor (401). In doing so, make sure that the precision-machined rotor is not damaged.
- Fix suction casing (505) with hexagon screws (606), serrated lock washers (608) and hexagon nuts (607) to the bearing bracket (110).

Note: Prior to tightening the hexagon nuts (607), align connecting flange of the suction casing (505). Attend to proper position of the connections in the stuffing box housing (204) and/or mechanical seal housing (214). Please refer to our tables of dimensions.

7.2.2.5 Mounting the stator

- Prior to bending-up, coat stator (402) and rotor (401) with lubricant (silicon oil, Polydiol, soft soap or the like).

ATTENTION Do not use ordinary oil.

- In case of stators of plastic or metal, insert stator gaskets (403) and (404).
Note: In case of stators of plastic, the stator gasket (403) with O-ring must always be on the discharge side.
- Mount stator (402) on the rotor (401).
Note: In case of stiffness, simultaneously turn stator (402) by means of chain tongs. For these purposes, fix drive shaft (118).
- Mount support (612), if provided, on tie rods (611).

- Screw up discharge casing (504), stator (402) and suction casing (505) with the tie rods (611) and hexagon nuts (609). In doing so, uniformly tighten hexagon screws.
- Tighten hexagon nuts (613).

7.3 Spare parts/replacement parts

In the following sectional drawings with parts lists, all pumps mentioned are represented with the various shaft seal and bearing designs. The parts marked in the parts list can be provided as spare parts/replacement parts.

Recommended spare parts/replacement parts:

R = large repair kit

r = small repair kit



For reasons of operating safety, only original spare parts delivered by us may be kept on stock and installed. In this connection, we refer to the statements made under Section 2.7 above.

For spare parts/replacement parts orders, the following must be quoted:

Machine numbers

Abbreviation of pump

Part number

Denomination and part quantity

or Ident No. and quantity

Note: The machine number and the abbreviation of the pump are engraved on the name plate.

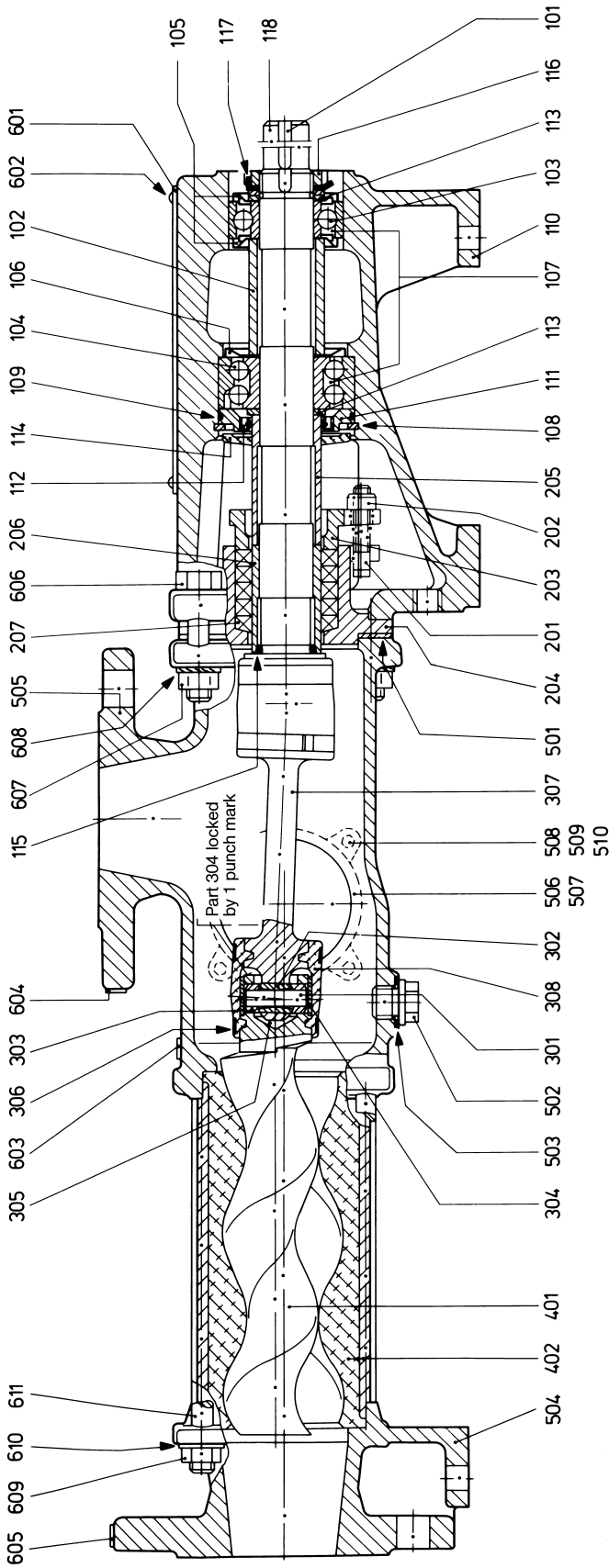
Note: The Ident No. and quantity can be seen from the attached separate spare parts list.

For the sectional drawings and parts list, please refer to pages 18–21

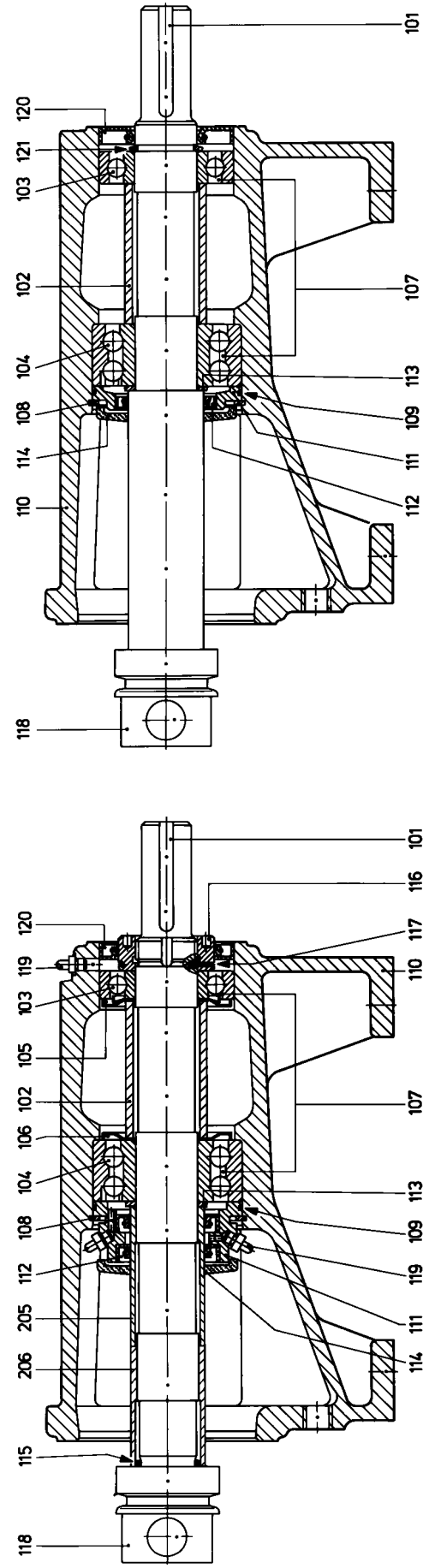
7.4 Sectional drawing with parts list and recommended spare parts / replacements parts for series SLP, SEP, SNP, SHP, SNZP

18 **Sectional drawing of series SEP**

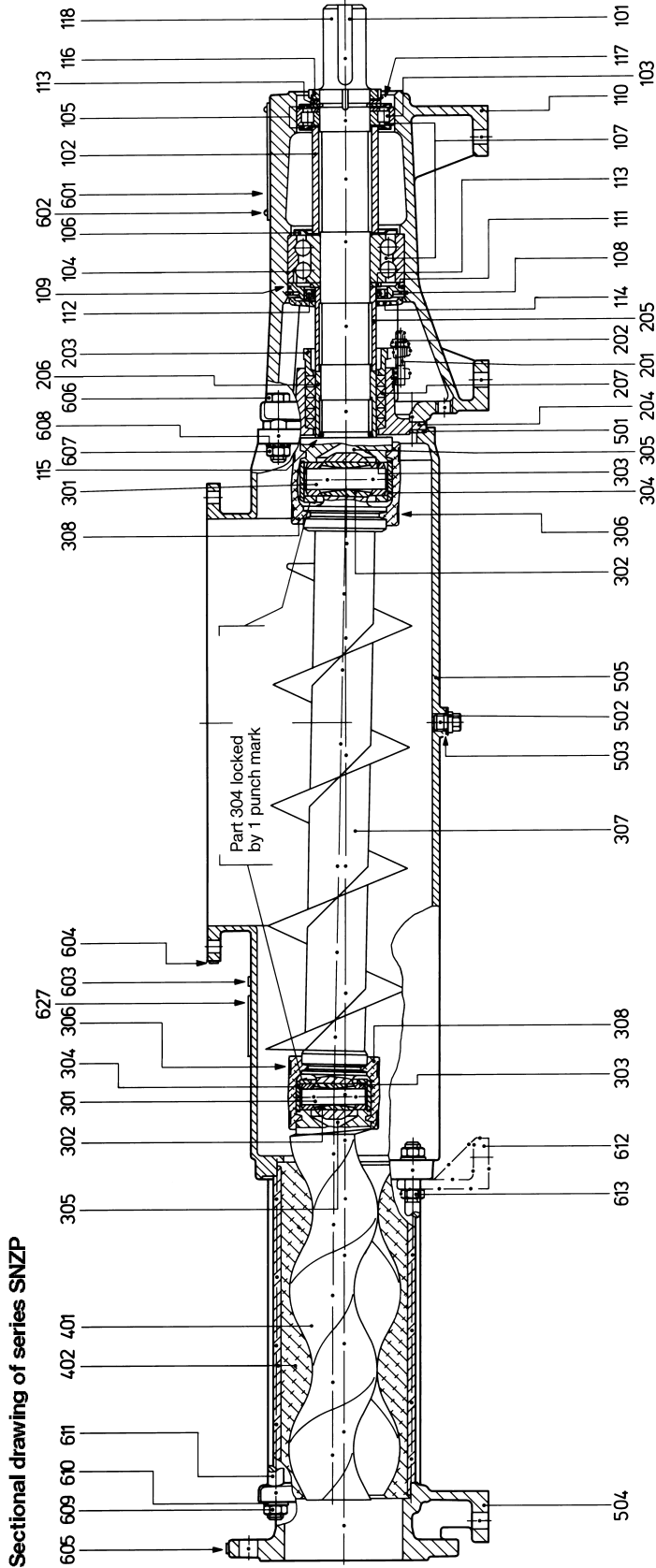
The sectional drawings of pump series SLP, SNP, SHP are similar.



Bearing: H
 Shaft seal: P11 Stuffing box with shaft wear sleeve of standard design (without lantern ring / without flushing ring).
 P01 as P11, but without shaft wear sleeve.



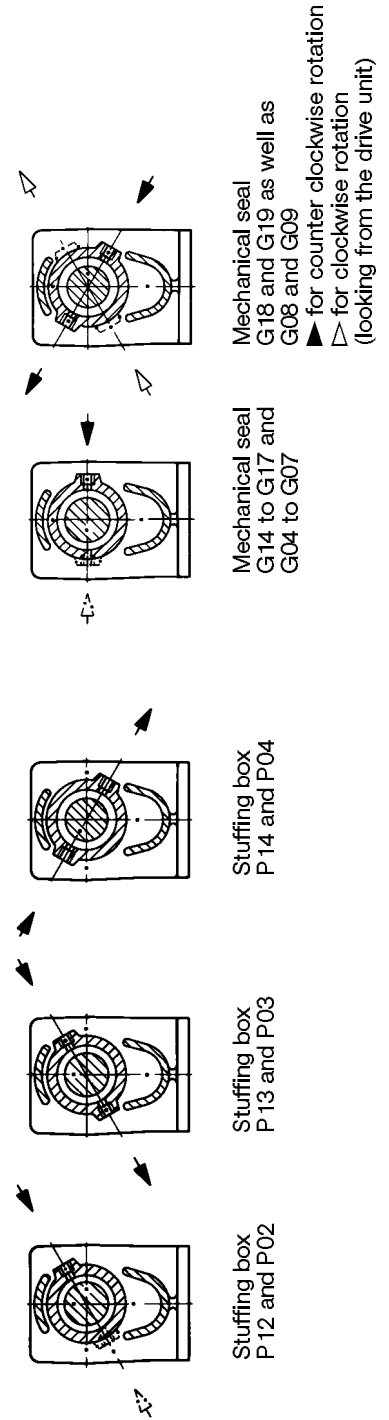
Bearing: V
 Bearing: A



Bearing: H
 Shaft seal: P11 Stuffing box with shaft wear sleeve of standard design (without lantern ring / without flushing ring).

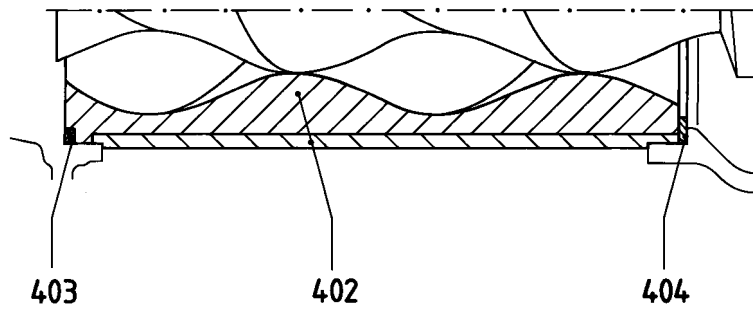
Auxiliary connections

Arrangement of the auxiliary connections on the shaft seals (looking from the drive unit)

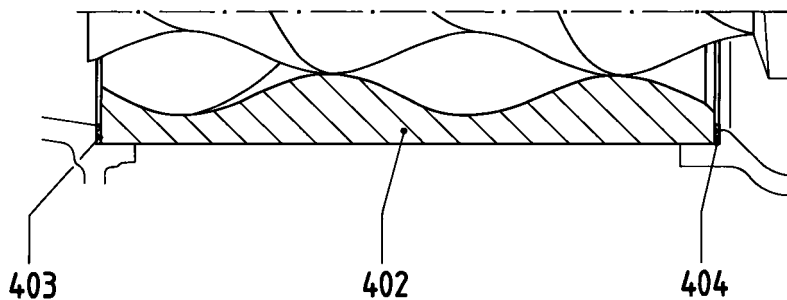


Part No.	Description	Qty.	Part No.	Description	Qty.	
101	Key	1	301	Coupling rod pin	R, r 2	
102	Spacer sleeve	1	302	Coupling rod bush	R, r 2	
103	Radial bearing	R 1	303	Guide bush	R, r 4	
104	Axial bearing	R 1	304	Retaining sleeve	R, r 2	
105	Nilos ring	R 2	305	Joint oil	R, r ①	
106	Nilos ring	R 1	306	Clamping bands	R, r 4	
107	Bearing grease	①	307	Coupling rod	R, r 1	
108	Circlip	1	308	Cover sleeve	R, r 2	
109	O-ring	R 1				
110	Bearing bracket	1	401	Rotor	R, r 1	
111	Bearing cover	1	402	Stator	R, r 1	
112	Lip seal	R 1	⑦	403	Stator gasket, discharge-side	R, r 1
113	Spacer ring	3	⑧	404	Stator gasket, suction-side	R, r 1
114	Flinger ring	1				
115	O-ring	R 1				
116	Bearing nut	1	501	Suction casing gasket	R, r 1	
117	Tab washer for bearing nut	1	502	Screwed plug	1	
118	Drive shaft	R 1	503	Sealing washer	1	
119	Grease nipple	3	504	Discharge casing	1	
120	Lip seal	R 1	505	Suction casing	1	
121	Circlip	1	506	Suction casing cover	2	
			507	Gasket	R 2	
			508	Stud	8	
			509	Nut	8	
			510	Serrated lock washer	8	
201	T-head bolt	2				
202	Self-locking nut	2	601	Name plate	1	
203	Gland	1	602	Dome headed grooved pin	2	
204	Stuffing box housing	1	603	Instruction label for commissioning	1	
205	Shaft sleeve	1	604	Suction label	1	
206	Shaft wear sleeve	R 1	605	Discharge label	1	
207	Stuffing box packing	R, r ①	606	Hexagon screw	4	
208	Flushing ring	1	607	Hexagon nut	4	
209	Lantern ring	1	608	Serrated lock washer	4	
212	Screwed plug	1	②	609	Hexagon nut	8
213	Sealing ring	1	②	610	Washer	8
214	Mechanical seal housing	1	611	Tie rod	4	
215	Mechanical seal cover	1	612	Support	1	
216	Clamping ring	1	613	Hexagon nut	4	
217	Locating ring	1	627	Caution label	1	
218	O-ring	R 1				
219	Mechanical seal	R 1				
220	Retaining pin	1				

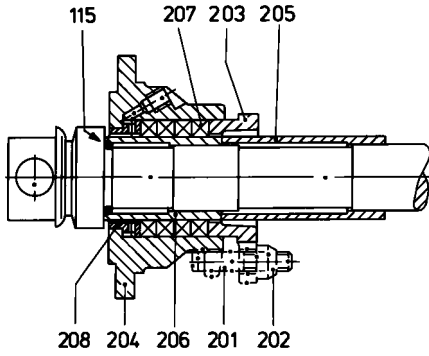
- ① Refer to Section 7.1.2.6
- ② 2 pcs. for G.0...G.3
- ③ 1 pc. for SNZP
- ④ 10 pcs. for SNZP 1450
- ⑤ 4 pcs. for SLP, SEP, SHP
- ⑥ 2 pcs. for SHP and SNZP
- ⑦ 2 pcs. for bearing type V
- ⑧ 1 pc. for bearing types V and A
- ⑨ 2 pcs. for branch positions 2 and 4



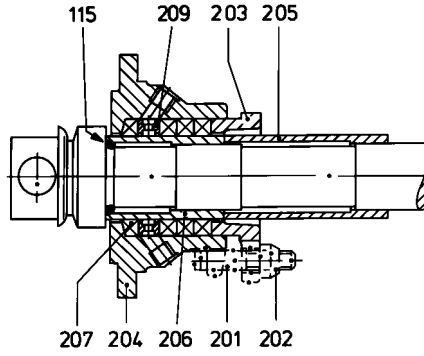
Stator of plastic



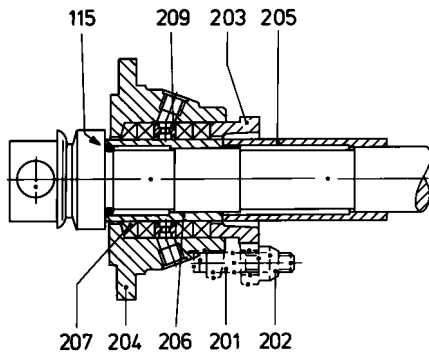
Stator of metal



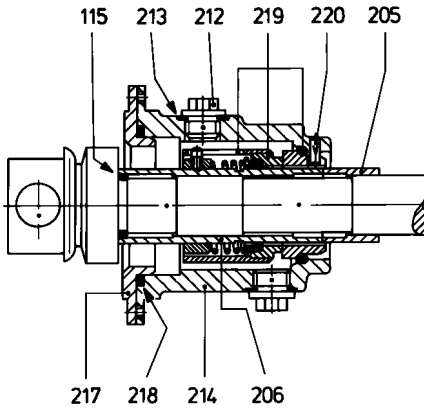
P12 Stuffing box with shaft wear sleeve and flushing ring
P02 as P12, but without shaft wear sleeve



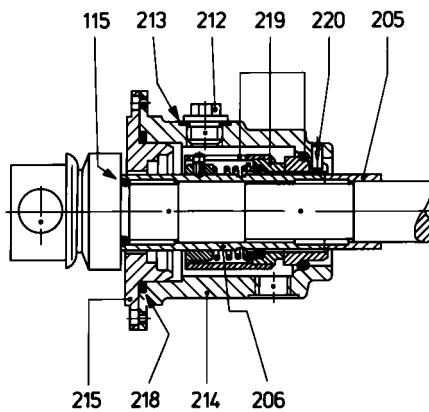
P13 Stuffing box with shaft wear sleeve and internal lantern ring
P03 as P13, but without shaft wear sleeve



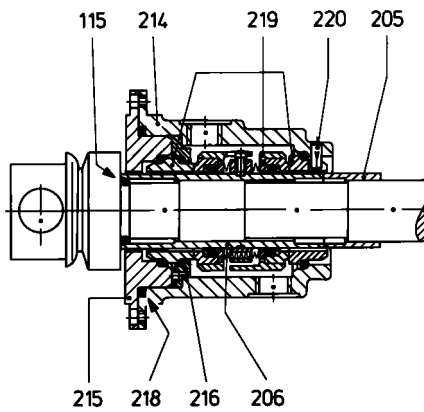
P14 Stuffing box with shaft wear sleeve and external lantern ring
P04 as P14, but without shaft wear sleeve



G10 to G13 Mechanical seal, single-acting, non-balanced, independent of sense of rotation, with shaft wear sleeve (Type G12 as illustrated)
G00 to G03 as G10 to G13, but without shaft wear sleeve



G14 to G17 Mechanical seal, single-acting, non-balanced, independent of sense of rotation, with shaft wear sleeve and throttled sealing liquid outlet into the pump chamber (type G16 as illustrated)
G04 to G07 as G14 to G17, but without shaft wear sleeve



G18 and G19 Mechanical seal, double-acting, non-balanced, independent of sense of rotation, with shaft wear sleeve (type G19 as illustrated)
G08 and G09 as G18 to G19, but without shaft wear sleeve

Part No.	Description	
115	O-ring	R
201	T-headed bolt	
202	Self-locking nut	
203	Gland	
204	Stuffing box housing	
205	Shaft sleeve	
206	Shaft wear sleeve	R, r
207	Stuffing box packing	R, r
208	Flushing ring	
209	Lantern ring	
212	Screwed plug	
213	Sealing ring	
214	Mechanical seal housing	
215	Mechanical seal cover	
216	Clamping ring	
217	Locating ring	
218	O-ring	R
219	Mechanical seal	R
220	Retaining pin	

8. Operating troubles – Causes and remedial action

No.	Operating troubles										Causes and remedial action
	Pump does not start	Pump does not prime	Delivery is not obtained	Pressure heat is not obtained	Irregular pump delivery	Pump operates noisily	Pump is seized or does not deliver	Motor gets too warm	Stator wears prematurely	Shaft seal leaky	
	a	b	c	d	e	f	g	h	i	k	
											ALLWEILER eccentric screw pumps operate trouble-free at any time provided they are applied according to the operating conditions mentioned in our order confirmation and if the operation manual is complied with.
1	●							●			High adhesion between rotor and stator in new condition after longer shut-down period. Crank pump by hand with auxiliary tool.
2		●									Check sense of rotation against arrow on pump, in case of wrong sense of rotation, change motor poles.
3		●	●		●	●	●				Check suction line and shaft seal for tightness.
4		●	●		●	●					Check suction head – increase suction line cross section, if necessary – install greater filters – open suction valve completely.
5		●	●		●						Check viscosity of liquid pumped.
6	●		●					●			Check pump speed – control speed and power consumption of drive motor – check voltage and frequency.
7			●		●						Avoid air inclusions in the liquid to be pumped.
8	●		●				●	●	●		Check pressure head – open valve in discharge line completely, remove obstruction in discharge line.
9		●	●		●		●		●		Pump runs completely or partly dry. Check whether liquid pumped on suction side is sufficient.
10		●	●								Increase speed in case of liquid media and great suction volume.
11		●			●	●					Reduce speed in case of viscous media – cavitation hazard.
12						●					Check longitudinal play of coupling rod pins, joint bush perhaps improperly mounted.
13	●	●	●				●		●		Check whether foreign bodies in pump. Disassemble pump, remove foreign bodies, replace defective parts.
14		●	●	●			●				Stator and rotor worn, disassemble pump, replace defective parts.
15		●	●			●	●				Joint parts (f, g) and/or drive shaft or shaft wear sleeve (b, c) worn: Disassemble pump, replace defective parts.
16		●	●				●		●		Suction line completely or partly clogged.
17	●	●					●	●	●		Check temperature of liquid pumped – stator expansion too great – stator seized on rotor – stator perhaps burnt or swollen.
18	●	●	●					●		●	Stuffing box packing: Replace unserviceable rings (b, c, k), slacken gland (a, h), tighten gland (b, c, k).
19	●	●					●		●		Solids content and/or grain size too great – reduce speed: Install strainer with admissible mesh size in front of pump.
20	●	●							●	●	Solids settle during pump shut-down and harden. Flush pump immediately, disassemble and clean, if necessary.
21	●	●					●		●	●	Medium hardens if a certain temperature limit is fallen below – heat pump.
22						●		●			Align coupling or belt pulleys exactly.

Subject to technical alterations.

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