ALLWEILER

Progressing cavity pump

Operating and maintenance instructions with instructions for assembly and disassembly

Series AEB1F, AEB1L, AEB.E, AEB.N, AEB.H, AEDB1E, AEDB2N
Construction Types IE, ZE

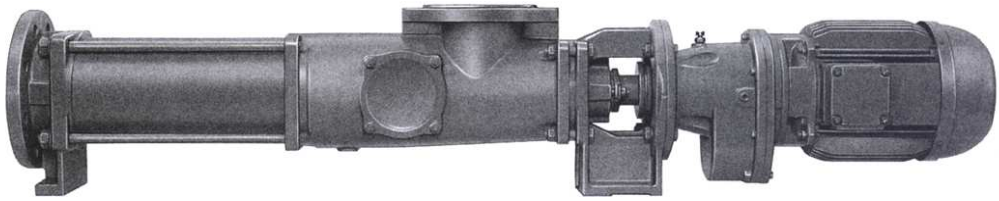
Retain the **operating instructions** for future use!
This is a translation of the original operating instruction.
Refer to the order-specific section of the documentation for operational data, dimensions and other additional information.

Order No.:

Pump ID No.:

Machine No.:

Pump model:



Edition BA-2011.11
Print No. 174 700
VM-No. 732.0002 GB

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CE

Subject to technical changes!

Important note:
These operating instructions are supplemented with order-specific information.

These operating and maintenance instructions contain notices from the pump manufacturer. It may be necessary to amend these instructions with instructions from the company that operates the pump.

Specific notices about operating and maintaining the overall system in which the pump is integrated are not provided here. These must be provided by the persons who are responsible for planning and constructing the system (system manufacturer).

Specific notices of this type regarding operation and maintenance of the overall system in which the pump is integrated have precedence over the pump manufacturer's notices. The systems manufacturer must comply with operational limits at all times!

Refer to the system manufacturer's operating instructions!

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1 About these instructions

These instructions:

- are part of the pump,
- are valid for the specified series and construction types,
- describe safe and proper usage in all phases of operation.

1.1 Who should read these instructions

Target group	Task
Operators	Keep these instructions accessible for later use at the place where the system is operated.
	Require employees to read and observe these instructions and other valid documents, especially safety and warning notices.
	Observe all other stipulations and regulations related to the system.
Technical assembly personnel	Read, observe, and follow these instructions and related documents, especially safety and warning notices.

Tab. 1 Who should read these instructions

1.2 Related documents

Document	Purpose
Order data sheet	Technical specifications, operating conditions, operating limits
Unit drawing	Setup and connection dimensions, etc.
Technical description	Technical specifications
Sectional drawing	Sectional drawing, parts numbers, component names
Supplier document-tation	Technical documentation for third-party parts
List of spare parts	Ordering spare parts
Declaration of conformity	Standards conformity
ATEX supplemental instructions	Instructions for operation in potentially explosive atmospheres.

Tab. 2 Other applicable documents

1.3 Warning notices and symbols

Several names and symbols are used in the operating instructions to represent hazards and safety regulations.

Together with written safety notices, the safety symbols are designed to draw attention to unavoidable residual hazards during usage of the machine. These residual hazards are related to:

- People,
- the machine,
- other objects,
- the environment.

Warning notice	Level of danger and consequences for failure to observe
	**Danger!** Draws attention to an immediate danger that could result in death or serious injury.
	**Warning!** Draws attention to a potentially dangerous situation that could result in death or serious injury.
	**Caution!** Draws attention to a potentially dangerous situation that could result in minor injuries or property damage.
	**Caution!** Draws attention to the danger of electrical shock.

Tab. 3 Overview of dangers

Warning notice	Level of danger and consequences for failure to observe
	Safety symbol Comply with all measures identified by the safety symbol in order to avoid injury or death.
▶	Instructions for action
1. , 2. , …	Multi-step instructions for action
✓	Requirement
→	Cross-reference
	Notice! Draws attention to information that can contribute to a better understanding of machine operations.

Tab. 4 Symbols and their meaning

1.4 Technical terms

Pump: "Pump" refers to the pump without coupling, drive, or any other components.

Pump unit: "Pump unit" refers to the pump with coupling, drive, and any other components.

1.5 Safety notices

Please carefully read the operating instructions before beginning work on the system.

Knowledge of basic safety notices and safety regulations is a fundamental requirement for safe activities and disturbance-free operation of this machine.

All persons involved with set-up, start-up, operation, maintenance, or repair of the system must be properly qualified or trained and comply with all aspects of these operating instructions.

Furthermore, they must comply with accident-prevention rules and regulations at the place of usage.

Unauthorized conversions and modifications to the system are not permitted for safety reasons.

Notices applied directly to the machine, such as:

- arrow indicating direction of location,
- fluid connection labels, and
- safety notices

must be observed at all times and maintained in a readable condition.

1.6 Keep information accessible

Operating instructions must be retained at the machine. All persons expected to perform activities on the machine must have access to the operating instructions at all times. In addition to the operating instructions, other instructions related to the German Work Protection Law (*ArbSchG*) and Work Equipment Ordinance (*AMBV*) must also be provided.

All signs containing safety and operating notices must be kept in readable condition at all times. Signs that are damaged or become unreadable must be replaced immediately.

1.7 Inspection

All pumps are subjected to leak and performance tests before leaving our factory. Only flawlessly operating pumps that meet our performance specifications leave the factory. Therefore, observance of the following operating instructions will provide the conditions necessary for disturbance-free operation.

1.8 Warranty

Our liability for defective products is defined in our delivery terms. We accept no liability for damage caused by a failure to observe the operating instructions and operating conditions.

If operating conditions change (different liquid, speed, viscosity, temperature or pressure conditions) at a later time, we must investigate and decide on a case-by-case basis whether the pump is suitable for the new conditions. Absent special agreements, only we or authorized and contracted customer service workshops may during the warranty time period open or modify the pumps that we delivered. Only original parts or parts approved by the manufacturer may be used. Failure to observe these requirements will remove our liability for any defects as well as invalidate the machine’s EC declaration of conformity.

2 Safety

The operating instructions contain important notices that must be observed during set-up, operation, and maintenance. For this reason, the installer and all technical personnel/operators must read these operating instructions before installation and operation; these instructions must remain with the machine/system at all times. In addition to the general safety notices listed under this main section "Safety", all special safety notices inserted below the other main points, such as notices applicable to private usage, must also be observed.

2.1 Dangers of failure to observe safety notices

Failure to observe the safety notices can result in dangers for people and the environment as well damage to the machine. Failure to observe safety notices will lead to loss of all damage compensation claims.

In particular, failure to observe safety notices may result in the following dangers:

- Failure of important functions on the machine/system.
- Failure of required methods for maintenance and repair.
- Danger of injury from electrical, mechanical, and chemical hazards.

Environmental damages caused by escape of hazardous materials.

2.2 Proper use

The pump as well as its parts and modules may be used only for their intended purposes.

Any other or additional usage is improper usage. ALLWEILER will not be liable for any resulting damages.

Proper use also refers to observation of all notices in the operating instructions and completion of inspection and maintenance tasks.

Use only original spare parts, wearing parts, and accessories. These parts are designed specifically for the system. There is no assurance that third-party parts are designed to withstand operating loads and safety specifications.

We do not approve the use of any parts or special equipment that we did not deliver.

2.3 Avoiding common mistakes (examples)

- Always observe the pump's operational limits regarding temperature, pressure, capacity, viscosity, and speed. (→ order data sheet)
- If pumping liquids loaded with solids, comply with limitations on the proportion of solids and grain size. (→ order data sheet, technical description)
- If using auxiliary operating systems, ensure a permanent supply of the required operating liquid.

2.4 General safety notices

2.4.1 Product safety

The pump was built according to the current state of technology and recognized safety regulations. Despite this, dangers to life and limb of the user or other persons or damage to the pump or other property remain possible.

- Operate the pump in accordance with these instructions and in a technically flawless condition and use it only in the proper manner with awareness of safety and dangers.
- Keep these instructions and related documents in their entirety in readable condition and keep them available at all times.
- Prohibit any activity that will endanger your employees or unrelated third parties.
- In the event of a potentially dangerous failure of the pump, stop the pump immediately and have the disturbance removed by the responsible person.
- In addition to the documentation, comply with all legal and other safety and accident-prevention regulations as well as applicable standards and directives in the country of operation.

2.4.2 Operator's responsibilities

Work in a safe manner

► Operate the pump in accordance with these instructions and in a technically flawless condition and use it only in the proper manner with awareness of safety and dangers.

- ► Ensure compliance and monitoring of:
  - proper use.
  - legal or other safety and accident-prevention regulations.
  - safety stipulations controlling the handling of hazardous materials.
  - applicable standards and directives of the country where the pump is operated.

Provide access to personal protective equipment.

2.4.3 Personnel responsibilities

- ► Observe notices on the pump and keep them in readable condition, i.e. arrow indicating direction of rotation, liquid connection labels.
- ► Do not remove safety guarding for hot, cold, and moving parts during operation.
- ► Use personal protective equipment whenever necessary.
- ► Perform work on the pump only when the pump is shut down.
- ► Shut off the motor's power supply and lock it in the off position before all assembly and maintenance tasks.
- ► After completing work on the pump, always properly reinstall the safety equipment.
- ► Never step on the pump, coupling guard, and attached parts or use them as a climbing aid.

2.5 Safety precautions

2.5.1 Authorized operating personnel

Only authorized and trained personnel may work on the progressing cavity pump. Operators must be at least 18 years of age.

Apprentices may work on the system only under the supervision of an experienced person.

The operator is responsible for other people within his area of activity.

Responsibilities for various activities on the system must be clearly defined and respected. Lack of clarity regarding responsibilities represents a safety risk.

All persons who perform activities on the machine must read the operating instructions and confirm with their signature that they have understood the operating instructions.

2.5.2 Safety measures during normal operation

The progressing cavity pump may be operated only when all safety devices are fully functional.

No safety equipment may be removed or taken out of operation before or during operation of the system.

Before switching on the system, ensure that no one will be endangered by starting of the system.

The system must be regularly checked for visible damage and functionality of the safety equipment.

2.5.3 Safety at the place of installation

Safe access to the system must be provided at all times.
Do not block any escape paths!

The operator must provide a nonslip, level floor and adequate illumination in the workplace.

Keep the area immediately surrounding the system clean at all times.

Children and the public may not have access to the system.

Safety devices (emergency stop switch) must be freely accessible and reachable at all times.

2.6 Maintenance and repair, removal of malfunctions

The operator must ensure that all maintenance, inspection, and assembly tasks are performed by authorized and qualified personnel who have obtained adequate information through careful reading of the operating instructions.

Work on the machine may be performed only when the machine is shut off. Comply under all circumstances with the shutdown procedures (Shutdown → page 19) described in the operating instructions.

Pumps or systems that move hazardous liquids must be decontaminated.

The points listed under the section "Initial startup" (→ page 17) must be observed before bringing the machine back into operation.

Required adjustment, maintenance, and inspection tasks must be performed according to schedule.

Operating personnel must be informed before starting maintenance and repair tasks.

All upstream and downstream parts of the system and operating media like compressed air and hydraulics must be secured against unintentional restarting.
When performing any maintenance, inspection, and repair tasks, always shut off the power to the system and secure the switch against unintentional restarting.

- ► If possible, lock the main switch and remove the key.
- ► Or attach a sign that warns against restarting.

Immediately after concluding the work, replace all safety and protection devices, bring them back into operation, and test their functionality.

2.7 Unauthorized conversion and production of spare parts

Changes to or conversion of the machine is permissible only with the approval of the manufacturer. Original spare parts and manufacturer-approved accessories promote safety. Use of other parts will nullify liability for any resulting consequences.

2.8 Impermissible operating methods

Operational safety of the delivered machine is ensured only through proper use as described in Section 1 of the operating instructions.
Never exceed the limit values specified in the data sheet.

2.9 Protective clothing

Protective gloves

Wear protective gloves at all times.

Footwear

Wear sturdy, insulated safety shoes with steel tips. This will protect your feet from falling parts.

Safety glasses

Wear safety glasses when working near the shaft seal area.

Clothing

Wear suitable clothing. Do not wear synthetic items of clothing. These have a risk of catching fire.

2.10 Residual risks

Functional inspection and/or adjustment requires unhindered access to the shaft seal.

Danger!

Danger of being drawn in and trapped. Perform work on the pump only when the pump is shut down.

3 Danger points

3.1 Hazards when working with the system

The progressing cavity pump was built according to the current state of technology and recognized safety regulations. Nevertheless, danger to life and limb of the user or third parties may arise during use of the pump or damage may occur to the system or other property.

Dangerous parts of the system include:

- Moving parts
- Components of the electrical equipment (mains connection).

Hazardous materials include:

- Poisonous materials
- Materials that are hazardous to health
- Acidic materials
- Irritants
- Potentially explosive materials
- Oxidants; highly, easily, and flammable materials
- Carcinogens
- Teratogenic materials
- Mutagens

Materials that are hazardous to humans in other ways.

3.2 Dangers of leaks

Leaks (such as at the shaft seal) of hazardous pumped liquids (explosive, poisonous, hot, etc.) must be led away in such a way that there is no danger to people or the environment. Always obey all legally defined directives.

3.3 Dangers of electrical energy

Electrical hazards are present when working on the pump, such as:

- through direct contact with live parts or parts that have become energized due to faulty conditions.
- through electrostatic energy
- through high voltage
- through short circuits and overloads

Only electrical technicians may perform work on the electrical power supply.

The machine's electrical equipment must be inspected on a regular basis. Loose connections and charred cables must be removed immediately.

Proper earthing must be provided whenever there is the potential for electrostatic charges.

If it is necessary to work on live parts, always work with a second person who can shut off the main switch in an emergency.

3.4 Hazards caused by dust

When operating pump units in dust-filled environments (such as in a mill, during production of particle board, in a baked goods factory, etc.) regularly clean the surfaces of the pumps and motors according to the actual concentration of dust in order to maintain the cooling effect and eliminate the possibility of spontaneous ignition. → Refer to explosion protection directives (BGR 104)

3.5 Dangers of moving parts

The safety guarding for moving parts (such as the coupling) may not be removed while the machine is in operation.

3.6 Danger of hot or cold parts

If hot or cold parts represent a hazard, these parts must be secured against contact at the site of installation.

3.7 Operating in potentially explosive atmospheres

If the pump or pump unit is operated in potentially explosive atmospheres, follow the ATEX supplemental instructions.

3.8 Danger of pumped liquid

Squirting pumped liquid can cause injury or poisoning. Use the proper protective clothing whatever working at the pump.

4 Design and function

4.1 Application and area of usage

Progressing cavity pumps are self-priming, rotating displacement pumps suitable for pumping and metering low-viscosity and high-viscosity liquids, neutral or aggressive liquids, undiluted or abrasive liquids, liquids containing gases, liquids prone to foaming, and liquids with fibrous or solid particles.

4.2 Labeling

4.2.1 Nameplate

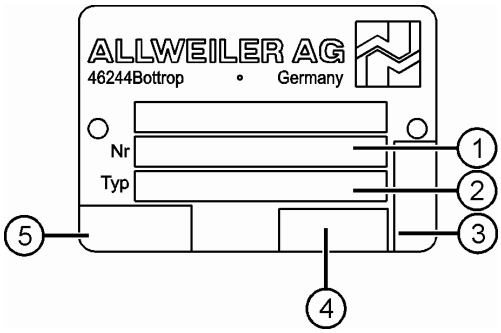


Fig. 1 Nameplate (example)

1 Pump number
2 Pump model
3 Direction of rotation or pumping
4 Direction of rotation or pumping
5 CE Mark, Year of Manufacture

4.2.2 ATEX nameplate

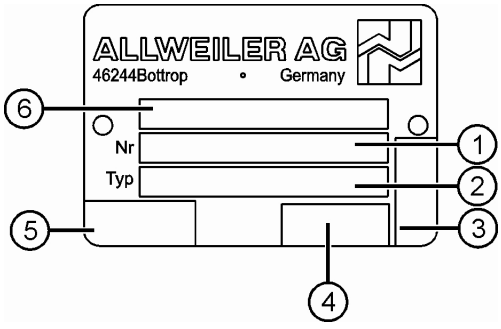


Fig. 2 ATEX nameplate

1 Pump number
2 Pump model
3 Direction of rotation or pumping
4 Direction of rotation or pumping
5 CE Mark, Year of Manufacture
6 Explosion Protection Designation

Danger!
If the pump or pump unit is operated in potentially explosive atmospheres, follow the ATEX supplemental instructions.

4.2.3 Pump model label

The model code for progressing cavity pumps has several components, as shown in this example:

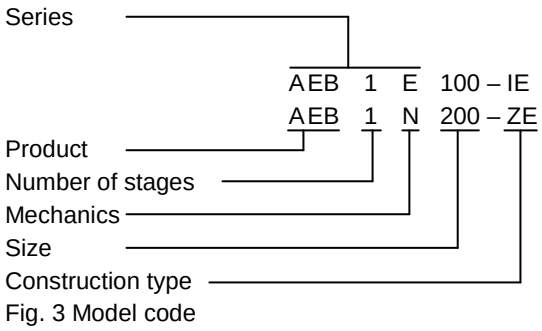


Fig. 3 Model code

This model code is engraved on the nameplate.

4.3 Performance data

Refer to the order data sheet for the exact performance data applicable to the pump.

4.4 Design

4.4.1 Structural design

Self-priming single, double or quadruple progressing cavity pump. Pumping elements are the rotor and stator. A coupling transfers the drive torque to the stub shaft, the universal joint shaft, and the rotor.

External housing connection screws (clamp bolts) hold together the discharge casing, stator, and suction casing.

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

4.4.2 Bearing and lubrication

Both sides of the universal joint shaft have liquid-sealed encapsulated pin joints. Lubrication is provided by joint oil.

Bearing of the driveshaft/stub shaft is provided in the drive's reinforced bearings.

4.4.3 Shaft seal

The shaft is sealed by means of uncooled, cooled, or heated stuffing boxes or by means of uncooled or cooled, maintenance-free, unbalanced, single or double-acting mechanical seals.

4.4.4 Dimensions/ branch positions/flanges

Please refer to the unit drawings for dimensions of the pump and pump unit, for branch positions, and flange dimensions.

4.4.5 Noise level

The conditions for measuring noise are as follows: 1 meter away from the pump.

If the pump speed and/or the differential pressure fall below the value specified in the table below, the noise level will decrease.

Pump size	Number of stages	Pump speed [min^{-1}]	Differential pressure Δ p [bar]	Noise level L_p (A) [dB(A)]
50	1	860	6	< 70 dB(A)
100	1	700	6	
103	1	660	6	
200	1	600	6	
203	1	530	6	
380	1	500	6	
403	1	420	6	71,4 dB(A)
550	1	500	6	73,8 dB(A)
553	1	500	6	
703	1	350	6	73,7 dB(A)
750	1	400	6	
1000	1	400	6	75,5 dB(A)
1003	1	400	6	
1450	1	300	6	78,5 dB(A)
1603	1	270	6	74,5 dB(A)
2700	1	250	6	77,5 dB(A)
25	2	1000	12	< 70 dB(A)
50	2	860	12	
100	2	700	12	
200	2	600	12	71,8 dB(A)
380	2	500	12	76,9 dB(A)
750	2	400	12	79,3 dB(A)
1450	2	300	12	79,3 dB(A)
2700	2	250	12	79,1 dB(A)
12	4	1200	24	< 70 dB(A)
25	4	1000	24	
50	4	860	24	71,3 dB(A)
1) 100 G	1	700	12	74,3 dB(A)
1) 200 G	1	600	12	72,3 dB(A)
1) 380 G	1	500	12	76,0 dB(A)
1) 750 G	1	400	12	78,4 dB(A)
1) 1450 G	1	300	12	78,9 dB(A)
51	1	800	4	< 70 dB(A)
101	1	650	4	< 70 dB(A)
201	1	550	4	
381	1	440	4	
551	1	360	4	71,1 dB(A)
751	1	340	4	72,2 dB(A)
1001	1	280	4	73,2 dB(A)
1451	1	250	4	74,4 dB(A)
2701	1	200	4	75,2 dB(A)
3003	1	210	4	74,6 dB(A)
5001	1	180	4	77,4 dB(A)
5503	1	180	4	76,8 dB(A)
75	1	650	8	< 70 dB(A)
150	1	550	8	
300	1	440	8	
560	1	360	8	71,9 dB(A)
1200	1	280	8	73,2 dB(A)
2300	1	220	8	75,7 dB(A)
4250	1	180	8	78,5 dB(A)
38	2	800	16	< 70 dB(A)
75	2	650	16	
150	2	550	16	70,5 dB(A)
300	2	440	16	72,0 dB(A)
560	2	360	16	73,6 dB(A)
1200	2	280	16	75,1 dB(A)
2300	2	220	16	76,7 dB(A)

1)Stator with uniform elastomer wall thickness.

Tab. 5 Noise level

4.4.6 Non-ionizing radiation

No non-ionizing radiation, such as from magnetic fields, is emitted from the progressing cavity pump.

4.4.7 Operation

Self-priming, rotating displacement pump. The pumping elements are the rotor and the fixed stator. The rotor and stator contact each other at two points of their cross-section on series AEB1F, AEB.E, AEB.N, AEB.H and at three points on series, AEB1L, AEDB1E, AEDB2N. When viewed over the length of the pumping elements, these two or three points form an equal number of sealing lines along the length of the pumping elements. As the rotor turns, the contents located in the resulting sealed chambers are moved axially and continuously from the suction to the pressure side of the

pump. Despite rotation of the rotor, no turbulence results.
The consistent chamber volumes eliminate crushing forces and ensure an extremely gentle, low-pulse pumping action.

4.5 Pump unit design

4.5.1 Drive

Driven by electric motors with or without explosion protection, gear motors, or variable gear motors.

4.5.2 Base plate

Horizontally-installed pumps are usually installed with the drive on a shared base plate. Unless specified otherwise by the operator, the base plate is made of steel.

5 Transport, storage, and disposal

5.1 Packaging

Observe the graphical symbols on the packaging.

The pump's suction and pressure sides and auxiliary connections must be closed with plugs during transport and storage.

► Remove the plugs when installing the pump unit.

5.2 Transportation

The pump or pump unit must be transported safely to the place of installation, if necessary through the use of lifting gear.

Danger!

Be aware of the danger of falling and loss of stability. Observe the requirements for lifting in accordance with VBG 9a. Crane equipment and attachment equipment must be properly dimensioned!

► Attachment equipment may not be fastened to the motor's eyelets, unless being used as additional safety against tilting when top-heavy.

Refer to the order-specific documents for weight specifications.

When using a crane to transport a pump, place the attachment ropes securely around the suction casing. If transporting a complete pump unit, attach an additional rope to the drive motor.

The attachment ropes must be placed around the pump and pump unit so that they are precisely balanced during lifting.

Make sure that the pump unit is transported safely and in a stable position to and at the place of installation. Make sure that it cannot tip over due to top-heaviness.

Notice!

When receiving the pump, inspect it for transport damages. Immediately report any damages!

5.3 Preserving progressing cavity pumps and placing them into storage

5.3.1 Preserving

Notice!

Not necessary with stainless materials.

Caution!

Improper preservation can result in property damages!

► Properly apply a preservative inside and outside.

- Select a preservative according to the type and duration of storage (→ Preservatives, page 11).
- Use preservatives according to manufacturer specifications.
- Preserve all exposed metal parts inside and outside.

Caution!

Use of improper preservatives may damage the seal, universal joint collar, and stator.

► Ensure that the seals, stator, elastomer, universal joint collars, and rotor screw are preserved with silicone oil only.

5.3.2 Storage

Caution!

Improper storage can result in property damages!

► Properly preserve and store the pump

- Seal all openings with blank flanges, blank plugs, or plastic covers.
- Ensure that the storage space meets the following conditions:
  - dry
  - frost-free
  - vibration-free
- Fully rotate the shaft once per month.
- When doing so, make sure the shaft, rotor, and bearing move as well.

Notice!
The elastomer stator in the progressing cavity pump is particularly sensitive to the elements (ozone, light, temperature). Depending on the pump size and type of storage, it may be necessary to remove the stator, package it in dark film and store it within the temperature range of -10 to +25 °C.
✓ Discuss with factory.

5.3.3 Removing preservative

Notice!
Necessary only for preserved pumps.

Warning!
Danger of food or water poisoning by preservatives and cleaning agents.
► Use only cleaning agents that are compatible with the pumped liquid (→ Cleaning agents, page 12).
► Completely remove the preservatives

Caution!
High water pressure or spray water may damage the bearing!
► Do not clean the bearing areas with spray water or steam jets.

Caution!
Improper cleaning agents can damage the universal joint collar, stator, and seal!
► Make sure that the cleaning agent does not attack the universal joint collar, stator, and seals.

- Internal preservatives can be removed by rinsing the pump with the pumped liquid. But, if contamination in the pumped liquid is impermissible, the pump must be disassembled and the metal parts cleaned with an approved cleaning agent.
- Choose cleaning agents appropriate for the area of usage (→ Cleaning agents, page 12).
- Dispose of preservatives according to local regulations.
- If storage time is greater than 12 months:
  - Inspect all elastomers (stator, round seal rings, shaft seals) for shape elasticity and replace if necessary.
  - Replace elastomers made of EP rubber (EPDM).

5.3.4 Preservatives

Notice!
Preservatives from Valvoline or comparable are recommended.

Type of storage	Storage time (months)	Internal preservative	Replacement (months) internal	External preservative	Replacement (months) external
In a closed, dry, and dust-free area.	6-12	Tectyl 502-C-EH	-	Tectyl 846-K-19	-
	>12	Tectyl 502-C-EH	24	Tectyl 846-K-19	36
Outdoors, central European climate	6-12	Tectyl 502-C-EH	3	Tectyl 846-K-19	-
	>12	Tectyl 502-C-EH	3	Tectyl 846-K-19	12
Outdoors, tropical climate, aggressive industrial air, or near the ocean.	6-12	Tectyl 502-C-EH	3	Tectyl 846-K-19	-
	>12	Tectyl 502-C-EH	3	Tectyl 846-K-19	12

Tab. 6 Valvoline preservatives

1) Reference to “Internal preservation” point from Tab. 6, page 11.

Caution!
Use of improper preservatives may damage the seal, universal joint collar, and stator elastomer.
► Ensure that the seals, universal joint collars, stator elastomers, and rotor screw are preserved with silicone oil only.

5.3.5 Cleaning agent

Operational range	Cleaning agent
Food and drinking water	Such as spirits, Ritzol 155, highly alkaline soap base, steam jets (for individual parts only).
Miscellaneous	Cleaning ether, cleaning solvent, diesel fuel, petroleum, alkaline cleaner

Tab. 7 Cleaning agents

5.4 Disposal

Plastic parts and elastomers can be contaminated by toxic or radioactive pumped liquids in such a way that cleaning is not adequate.

Warning!

Danger of poisoning or environmental damage by pumped liquid or oil!

- ► Use personal protective clothing when performing any work on the pump.
- ► Before disposing of the pump: Capture escaping liquid and oil.
- ► Dispose of them separately according to local regulations.
- ► Neutralize residual liquid in the pump.
- ► Remove preservative → 5.3 Preserving progressing cavity pumps and placing them into storage page 10.
- ► Remove plastic parts and elastomers and dispose of them according to local regulations.

Dispose of pump according to local regulations.

6 Installation and connection

6.1 Setting up the pump

Pumps can be installed horizontally or vertically, with the bearing pointing upward.

Caution!

Improper installation position can result in damage to the shaft seal and bearing.

Refer to the order data sheet for the proper installation position!

Warning!

Danger of burns and scalding!

To avoid burns and personal injury, protective equipment according to EN 809 must be provided at the site of installation when the temperature of pumped liquids exceeds 60 °C.

6.2 Foundation

The type of foundation depends on the size of the pump and pump unit and conditions at the site of installation.

Refer to our dimension sheets and unit drawings for precise pump and unit dimensions.

The foundation may take the form of a concrete foundation or a weight-bearing frame constructed of steel, for example.

Regardless of foundation type, the foundation must be designed so that it can absorb the weight of the pump unit along the entire surface area.

6.2.1 Steel frame configuration

A steel frame must be designed so the entire surface of the base plate contacts the frame and can be fastened with screws or welded in place.

Caution!

If the base plate is supported only at isolated points, this will cause the pump unit to sag in the center or warp. This will affect alignment of the pump unit and can lead to high noise emissions and damage!

6.2.2 Characteristics of a concrete foundation

The foundation must be horizontal, even, and clean and fully absorb the foundation load.

A concrete foundation must be designed so the entire base plate contacts the foundation and can be fastened with suitable screws (refer to unit drawings for connection dimensions).

Caution!

If the base plate is supported only at isolated points, this will cause the pump unit to sag in the center or warp. This will affect alignment of the pump unit and can lead to high noise emissions and damage!

6.2.3 Fastening the pump unit to the concrete foundation

► After aligning the pump unit on the foundation, uniformly tighten the attachment screws by incrementally tightening each of the screws.

6.2.4 Characteristics of a concrete foundation for cast base plates

When building forms for the concrete foundation, make sure that there will be adequate space between the upper edge of the completed foundation block and the lower edge of the base plate for the purpose of aligning the pump unit and packing with mortar compound.

► After aligning the pump unit on the foundation, uniformly tighten the attachment screws by incrementally tightening each of the screws.

► The cured concrete foundation must be horizontal, even, and clean.

► Any oil present on the foundation must be removed.

- ► Clean and blow with air the recessed anchor holes for the foundation screws.
- ► Before bringing the pump unit into place, roughen and clean the surface of the concrete foundation in order to ensure good adhesion between the foundation block and mortar compound.

6.2.5 Mortaring the base plate

- ► After aligning the base plate on the concrete foundation, use a non-shrinking mortar compound to mortar the entire length of the base plate. Mortar the anchor holes with the foundation screws loosely in place.
- ► Once the mortar compound has cured around the base plate and in the anchor holes, uniformly tighten the foundation screws by incrementally tightening each screw.

Notice!
Make sure that the entire length of the base plate has support during mortaring and packing of the mortar compound. Tap the base plate to detect any unfilled areas. Fill any unfilled areas that are found!

6.3 Base plate

Fasten the base plate to the foundation without residual tension.

Check the pump unit for twisting:

- Loosen fastening screws at the foot of the discharge casing (504) (→ see sectional drawings on pages 40, 41, 42, 43 and 44). After loosening of the screws, the foot of the discharge casing may not be tilted, nor spring, nor be under pressure.
- If major deviations are found, loosen the base plate attachment and remove the tension by refilling.

6.3.1 Space requirement for maintenance and repair

Caution!
The pump must be accessible from all sides in order to enable the necessary visual inspections.

Provide enough room for maintenance and repair tasks, especially for the replacement of pumping elements. Disassembly dimensions for the stator and rotor are provided in the dimension sheet for the pump and pump unit. Also make sure that all pipes can be installed and removed without hindrance.

6.4 Laying the pipes

6.4.1 Nominal widths

The nominal widths of the suction and pressure lines should match the nominal widths of the pump branches. Any major deviations, particularly on the suction side, must be discussed with the factory.

Stopping devices must be present in the suction and pressure lines.

Danger!
On the ZE construction type, always cover the suction opening with an adapter to prevent injury.

6.4.2 Supports and flange connections

Connect the pipes without tension to the pump via the flange connections. The pipes require support close to the pump and should screw in easily to avoid twisting. After loosening of the screws, the flanges may not be tilted, nor spring, nor be under mutual pressure. Any heat stress at the pipes must be kept away from the pump with suitable measures, such as installation of compensators.

6.4.3 Cleaning the pipes before installation

It is essential to flush and clean the suction-side pipes, gate valves, and valves before installing the pump.

Use the cleaning, disinfectant, and flushing agents recommended by the operator together with the related process.

Notice!
Residual items from assembly, such as screws, nuts, weld beads, or pieces of metal will destroy the pump's internal parts.

Warranty claims of any kind are invalidated whenever damages are caused by such residual items. Flange gaskets may not protrude inward. Blank flanges, plugs, protective film, and/or protective coatings on flanges and sealing strips must be completely removed.

6.4.4 Laying auxiliary piping for additional equipment

All auxiliary piping needed to supply the shaft seal and the jacketed casing (if present) for heating and cooling the pump must be attached without tension or leaks.

The lines for the quench liquid on a single-acting mechanical seal with quench (versions G0Q and G1Q) and for the buffering liquid on a double-acting mechanical seal (version G0D/G1D) should be laid with a large flow cross-section when possible. The quench or buffering liquid shall exit at the highest connection on the mechanical seal casing.

The directions of flow for the flushing, buffering, and quench liquids are indicated with arrows in the sectional drawings.

To provide for auto-venting, lay the lines at a constant gradient, keep them short, and provide for positive flow characteristics.

Formation of air pockets and gas bubbles must be avoided. If necessary to achieve this, provide ventilation connections. Attach the heating/cooling liquid outlet to the highest connection on the jacketed casing (if present).

6.5 Safety and inspection equipment

6.5.1 Pressure and vacuum gauges

Attach a pressure gauge to the pressure line and a vacuum gauge to the suction line.

6.5.2 Safety device in the pressure line

Warning!

Driving the pump with a pressure-side liquid column is dangerous due to the risk of reverse flow.

A return flow-stop must be located between the discharge branch and the stop valve to ensure that the pumped liquid does not flow backwards when the pump is shut off!

If a shut-off device is located in the pressure line or if there is the possibility that the pressure line could become clogged, a safety device must be installed, such as a diversion line with integrated overpressure valve, space diaphragm, motor protection switch, etc.

Warning!

High pressure

Progressing cavity pumps are displacement pumps and are theoretically capable of generating unlimited pressure.

If the pressure lines are closed (due to clogging or mistaken closing of a valve), the pressure generated by the pump could be several times higher than the pressure permitted in the system. This may lead, for example, to rupturing of the lines, which is particularly dangerous when pumping hazardous materials. For this reason, appropriate safety devices (such as pressure switches) must be installed in the system!

6.5.3 Electrical connections

Caution!

A professional electrician must attach the coupled drive motor's power supply cable in accordance with the connection diagram provided by the motor manufacturer. All VDE regulations and regulations from the local power supply company must be obeyed. Hazards associated with electrical power must be eliminated.

An emergency off switch must be installed!

7 Operation

7.1 Preparing for initial start-up

7.1.1 Filling the pump with liquid

Caution!
The pump may not run dry!
► The pump must be filled with liquid before initial start-up or when starting after a long period of downtime.

Even just a few revolutions without liquid can damage the stator. For this reason, the suction casing must be filled with water or pumped liquid before start-up in order to lubricate the stator and rotor. Repeat the filling procedure after long periods of downtime, i.e. when you suspect that the residual fluid in the pump has evaporated, or after repairs.

After filling, the pump will prime itself. Ventilation is not necessary, because the pump is able to immediately begin moving a liquid/gas mixture.

7.1.2 Switching on additional equipment for shaft seals (if present)

If the pumps are charged with a flushing/buffer liquid or quench liquid, the stop valves must be opened and adjusted to the downstream pressure before initial start-up of the pump.

- **Supplying the stuffing box with flushing or buffer liquid (versions P02, P12, P03, P13, P04, and P14).**

Notice!
Stuffing boxes with flushing ring or seal chamber ring require a flushing or buffering liquid to maintain functionality.

The required flushing or buffer liquid pressure on pumps with a stuffing box is as follows (packing stuffing box version):

- P02/P12 = 0.1 to 0.5 bar (over internal suction casing pressure),
- P03/P13 = 0.5 bar (over internal suction casing pressure),
- P04/P14 = 0 to 0.5 bar (flushing and buffering liquid, → see Section 7.1.3 page 18).

- **Supplying the single-acting, unbalanced mechanical seal with throttle ring (versions G0S/ G1S and G0T/G1T).**

Notice!
To maintain functionality, these mechanical seals require a flushing liquid that carries off frictional heat and limits the amount of pumped liquid that can enter the seal chamber.

The pressure of the flushing liquid must be within the range of 0.1 and 0.5 bar above the suction casing's internal pressure. The required flow of flushing liquid to carry off the thermal power loss of the mechanical seal can be retrieved from the table in section 9.1.5 page 23 (Flushing liquid → Section 7.1.3 page 18).

- **Supplying the double-acting unbalanced mechanical seal (version G0D/G1D).**

Notice!
To maintain functionality, these mechanical seals require a buffering liquid that carries off frictional heat and prevents the pumped liquid from entering the sealing clearance.

Caution!
Circulation of buffer liquid must be ensured before each time the pump is started.

Warning!
On buffering pressure systems, make sure that the permissible container pressure is not exceeded (→ Manufacturer's specifications).

The buffering liquid pressure must be approximately 1.5 to 2 bar above the pressure in the suction casing. The flow volume must be regulated so that the outlet temperature does not exceed approximately 60 ℃ and is thereby at least 30 K below the boiling point at operating pressure. The temperature difference between inlet and outlet may be no more than 15 K. (Buffering liquid → Section 7.1.3 page 18).

- **Supplying the single-acting mechanical seal with quench (versions G0Q and G1Q).**

The space between the counter ring and the shaft sealing ring must be charged with quench liquid. The maximum permissible pressure differential between the quench liquid and pressure in the suction casing is p=0.5 bar.
Max. quench liquid pressure is 3 bar. (Quench liquid → Section 7.1.3 page 18).

7.1.3 Quality and properties of the flushing/buffering and quench liquids

Any liquid can be used as buffering/flushing or quench liquid that does not violate the corrosion resistance of any contacted parts and that is compatible with the liquid being sealed.

Caution!
The liquid must be free of solids, it may not tend to form deposits, should have the lowest boiling point possible, have a good ability to conduct heat, and have low viscosity.

Clean, medium-hardness water fulfills these requirements.

7.1.4 Switching on additional equipment for heating or cooling the stuffing box casing and/or the stator and/or the suction casing (jacketed casing)

If the pumps are equipped with this additional equipment, all buffering equipment for heating or cooling systems must be opened. The downstream pressure and temperature limits must be maintained.

► Supplying the cooled or heated stuffing box casing and/or the stator and/or the suction casing (jacketed casing) with suitable liquid medium.

Warning!
Liquid may squirt out under high pressure and result in danger.
Only liquids that do not violate the corrosion resistance of all contacted parts may be used as heating or cooling liquids.

Maximum pressure of the heating or cooling liquid is 6 bar. Maximum heating temperature may not exceed 150 ℃ and cooling temperature may not fall below 40 ℃.

Notice!
Refer to the order data sheet for the design temperature.

7.1.5 Pump rotation difficulties

When restarting the pump or starting after a long period of downtime, make sure that the drive machine turns the pump. If a high level of adhesion between the rotor and stator in a new pump/refurbished prevents this from occurring normally, you can use a suitable feather key to help move the stub shaft.

Caution!
Avoid damage to the stub shaft.

7.1.6 Checking the direction of rotation

Viewed from the drive to the stub shaft, the normal direction of rotation is to the left. The suction connection is on the shaft seal side so the shaft seal is balanced. In special cases the pump will turn to the right, such as when sucking from a vacuum or when pumping liquids that do not tolerate any gas inclusions. The suction and pressure sides are then reversed.

Caution!
The pump's direction of rotation must match the "n" directional arrow on the pump's nameplate. Improper direction of rotation can damage the pump!

► To check the direction of rotation, turn the pump on and immediately back off.

7.2 Bringing the pump into operation

7.2.1 Starting

Caution!
Open all blocking devices on the suction and pressure sides before starting.

7.2.2 Drive

► Switch the motor on.

Caution!
Observed the characteristics of the specific drive you are using. **Refer to the drive manufacturer's operating instructions.**

7.2.3 Checking pump capacity

Once the drive has reached its operating speed, use the vacuum gauge and pressure gauge to check the pump's inlet and outlet pressures.

Do not overload the motor. Power consumption can be checked with an ampere meter. The temperature and viscosity of the pump liquid should be monitored in this context. Compare the values obtained with the order data sheet and inspection protocol.

7.2.4 Dry-running protection

If there is no pumped liquid on the suction-side of the pump, the heat generated by dry friction and deformation forces in the pumping elements of the progressing cavity pump will no longer be adequately dissipated. This will result in thermal destruction of the stator elastomer after only a short period of time. A variety of dry-running protection devices are available for protection of the pumping elements. Please inquire at the factory for more information.

7.3 Taking the pump out of operation

7.3.1 Stoppage

► Switch the motor off.

7.3.2 Measures for longer periods of downtime

If operations will be interrupted for a longer period of time and there is a danger of frost, the pump must be emptied.

► To empty the pump, remove screw plug (502) from suction casing (505). The pump must then be treated with preservatives (→ Section 5.3 Page 10).

7.4 Special applications of the pump

If the progressing cavity pump will be used to transport food or if it will be used in the cosmetics or pharmaceutical industries, special cleaning, disinfection, and flushing agents must be used in conjunction with the proper procedures.

Make sure that the regular pumped liquids do not become contaminated with residuals of the cleaning and/or flushing/disinfection agents. We recommend using only liquids that, should they contaminate the pumped liquid, will not have harmful effects.

If the pump or pump unit is operated in potentially explosive atmospheres, follow the ATEX supplemental instructions.

8 Maintenance cycles and intervals

Maintenance may be necessary for the following parts:

Rotor + stator:

Wear to the rotor and/or stator is manifested in the form of lower pump capacity and lower pressure. Maintenance can be planned when this is noticed, i.e. it is not necessary to immediately replace the rotor and/or stator.

For detailed information about maintenance procedures and intervals for other components, please refer to section 9, page 21 and section 10, page 24.

9 Maintenance

9.1 Maintenance

- Observe the information provided in section 2 Safety whenever performing maintenance and repair tasks.
- Regular monitoring and maintenance of the pump and drive will extend the service life.

Caution!
Use protective equipment whenever necessary.

9.1.1 General monitoring

- Do not run the pump dry.
- Do not overload the drive motor.
- Check suction and pressure lines for leaks.
- A stuffing box must drip slightly during operation. A mechanical seal may not have any significant leaks.
- Observe pressure- and temperature-monitoring devices and compare them with the order data sheet and inspection protocol.
- Additional equipment like flushing, sealing, or quenching of the shaft seal must be monitored if present.
- Monitor additional equipment for heating or cooling the stuffing box casing and/or the stator and/or the suction casing, if present.

9.1.2 Universal joints

Universal joints must be lubricated with ALLWEILER special joint oil of type B or oil ET1510 ISO 460 from Tribol Lubricants GmbH of Mönchengladbach, Germany; if the pump is employed in the food industry, use ALLWEILER special joint oil type BL or oil 1810/460 from Tribol Lubricants GmbH.

Caution!
We have not tested any other lubricants and therefore cannot recommend any others!

The joints have lifetime lubrication. However, if the pump must be opened for other reasons, we recommend checking the joint collar for leaks and replacing the joint oil after 8000 operating hours. The table in section 9.1.5 Page 23 shows the oil quantity in cubic centimeters for various pump sizes. Refer to section 10 page 24 for information on changing the joint oil.

9.1.3 Shaft seal

The shaft is sealed either via a stuffing box or a mechanical seal.

Danger!
Functional inspection and/or adjustment requires unhindered access to the shaft seal.
Danger of being drawn in and trapped!
Perform work on the pump only when the pump is shut down.

9.1.3.1 Stuffing box

The stuffing box may exhibit elevated leaks in the first hours of operation, but this normally decreases on its own during the run-in time.

If necessary, lightly tighten hexagon nuts (202) at stuffing box gland (203).

Note that a slight leak is necessary at the stuffing box. This leak serves to carry off frictional heat produced at the sealing surface.

If leak losses increase excessively and if several efforts to tighten the hexagon nuts (202) do not reduce the leaks, then the packing rings have lost their shape elasticity and must be replaced.

Removing old packing rings and cleaning the stuffing box casing

Old packing rings can be removed after depressurizing the pump and removing the stuffing box gland. Use a packing extractor with a flexible shaft. Then carefully clean the stuffing box area and the area of the stub shaft near the packing rings.

Worn stub shafts must be replaced (see section 10 page 24).

Installing the packing rings

Caution!
Use only packing rings that meet the pump's required operating conditions!

Refer to the table in section 9.1.5 page 23 for the dimensions and required quantity of pre-pressed packing rings and ring blanks or cut lengths.

If using blanks, we recommend a straight cut perpendicular to the shaft. To achieve a gap-free, parallel alignment of the cut ends when closing the packing ring, the cut angle should be approximately 20° at both ends (→ see image below).

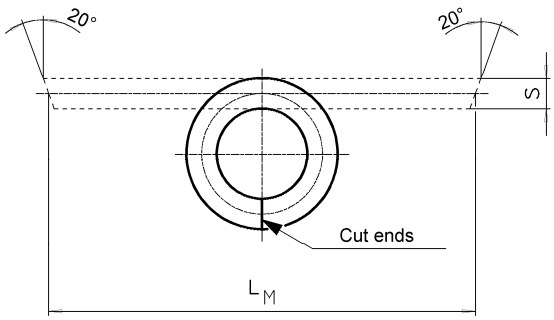


Fig. 4 Cutting the packing rings

Caution!
Pre-pressed packing rings or ring cuts should be carefully rolled up in the axial and radial direction so that they can be just slipped over the shaft. Bending the rings up can lead to buckling and damage!

During installation into the packing area, the packing rings must be carefully bent back into ring shape. The cut joints must be displaced by 90°. Use the stuffing box gland to insert each ring individually into the stuffing box area with the cut ends forward. The seal chamber ring or flushing ring is then inserted as required.

Caution!
Never use pointed objects because these may damage the shaft and deform the packing materials.

Bringing the stuffing box into operation after re-packing

Tighten the stuffing box only slightly before bringing it into operation. When the pump starts, a leak rate of 50 to 200 drops per minute is permitted.

During the running-in process of approximately 30 minutes, tighten the stuffing box gland (203) incrementally via the hexagon nuts (202) to set a minimum leak of 2 to 20 drops per minute.

Caution!
The temperature of the stuffing box may not increase abnormally during this time. Approximately 20 to 60 ℃ above the temperature of the pumped liquid is permissible. If temperature increases suddenly, immediately loosen the stuffing box gland and repeat the run-in process. The leak can be directed through the threaded hole located in the bearing bracket's drip pan.
Eliminate any possibility of injury and environmental damage caused by leaks of hazardous materials!

9.1.3.2 Mechanical seal

Unbalanced mechanical seals are used in all material pairings and versions. The mechanical seal is maintenance free.

In the event of strong wear-induced leaks, the mechanical seal must be replaced (→ section 10.1 page 24).

Caution!
Since dry-running of a mechanical seal must be avoided, the pump may be switched on only when filled and with any additional equipment switched on (→ section 7.1.2 page 17)!

9.1.4 Drive motors and (variable) gear

Refer to the manufacturer's operating and maintenance instructions.

9.1.5 Packing ring dimensions (→ section 9.1.3), lubrication amounts for joint (→ section 9.1.2), and flushing liquid flow rate (→ section 7.1.2)

		Pump size						
Pump series	AEB1F	103	203	403	553 703	1003 1603	3003	5503
	AEB1E	50	100	200	380 550	750 1000	1450	2700
	AEDB1E	75	150	300	560	1200	2300	4250
	AEB2E	50	100	200	380	750	1450	2700
	AEB1N	25	50	100	200	380	750	1450
	AEB2N	25	50	100	200	380	750	1450
	AEDB2N	38	75	150	300	560	1200	2300
	AEB1L	51 101	201	381	551 751	1001 1451	2701	5001
	AEB.H	12	25	50	-	-	-	-
Number of packing rings on version P01①		6	6	6	6	6	6	6
Dimensions of the packing rings when 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
Dimensions of packing rings when cut 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
Oil volume in cm^3 per joint		10	18	37	52	87	169	290
Flushing water flow rate, water l/min		0,05	0,07	0,09	0,11	0,11	0,15	0,21

① Reduce quantity by 1 for shaft seal versions P02, P03, and P04.
Tab. 8 Packing ring dimensions

10 Maintenance

For the positions of parts referenced in the following chapters → sectional drawings on pages 40, 41, 42, 43 and 44.

10.1 Disassembly and assembly instructions

Trained customer service technicians are available upon request for assembly and repair tasks.

Caution!

Before starting repairs with your own personnel or our technicians, ensure that the pump is completely empty and clean.

Make sure that any pumps sent for repairs to our factory or a contracted service station are clean and empty!

In the interest of our employees and the environment, we must refuse any pumps sent for repair that are filled with liquid.

If we receive a pump that is filled with liquid, we must invoice the customer/operator for the cost of environmentally-sound disposal.

If pumps used to move hazardous materials and/or environmentally harmful liquids require repair, the customer/operator must independently inform his internal assembly personnel or, if the pump is sent back to our factory or a contracted service center, our technicians before sending the pump. In these situations, documentation of the pumped liquid, such as a DIN safety data sheet, must be presented when requesting a customer service technician.

Whenever tasks are performed on-site, always inform your internal personnel or our assembly technicians of any hazards that may arise during the repairs.

These instructions describe the most important disassembly and assembly tasks. The assembly steps described in each of the sections must be followed consistently.

10.1.1 Disassembling the progressing cavity pump

Perform the following tasks before disassembly:

1. Disconnect the motor's power cord. Prevent the motor from switching on unexpectedly.
2. All blocking devices in the feed and pressure lines must be closed.

✓ Be certain that the pump is pressureless.

3. Drain the pumped liquid from the suction casing. To do this, remove screw plug (502).

Notice!

Use a collection container.

4. Remove feed and pressure lines as well as all secondary piping.
5. Loosen and remove screws on the pump feet.

10.1.2 Removing the stator

1. Remove hexagon nuts (609) and washers (610) from the clamp bolts (611).
2. Pull off discharge casing (504).
3. Remove any clamp bolts (611) and brackets (612).
4. Pull off stator (402) from rotor (401).

Notice!

If difficult to move, simultaneously turn stator (402) with pointy nose pliers. Hold the stub shaft (125) stationary.

5. If the stators are made of plastic or metal, remove stator seals (403) and (404).
6. Remove reducing flange (512) and O-ring (513) if present.

10.1.3 Removing the rotor and rotor-side joint

Remove the rotor and the rotor-side joint after removing the stator (402) ➞ Section 10.1.2 page 24.

1. Remove hexagon nuts (607), serrated washers (608), and hexagon screws (606).
2. Pull off suction casing (505) over the rotor (401).

Caution!
The rotor is manufactured to close tolerances. Make sure it is not damaged.

3. Remove the seal for the suction case (501).
4. Use a metal saw to cut open the seal on the joint clamp (306); use a screwdriver to press it outward to both sides. Remove the joint clamp (306) from the joint collar (308) (see image below).

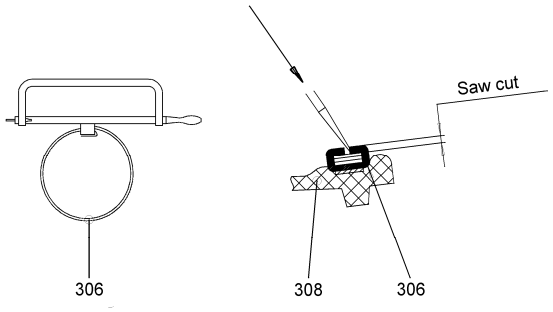


Fig. 5 Removing the joint clamp

5. Lift up the joint collar (308) with a screwdriver and remove it axially in the direction of the joint shaft (307).

Notice!
Use a collection container.

6. Drive the joint sleeve (304) over the collar of the universal joint shaft (307). Do not deflect the universal joint shaft (307) (see image below).

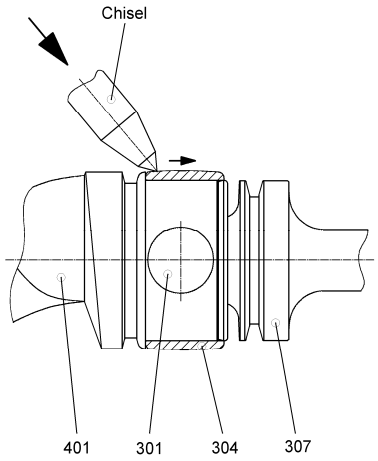


Fig. 6 Removing the joint sleeve

7. Knock out the joint bolt (301).
8. Use a brass pin punch to drive out half-way both bushes for the joint bolt (303). Deflect the universal joint shaft (307) to do this (see image below).

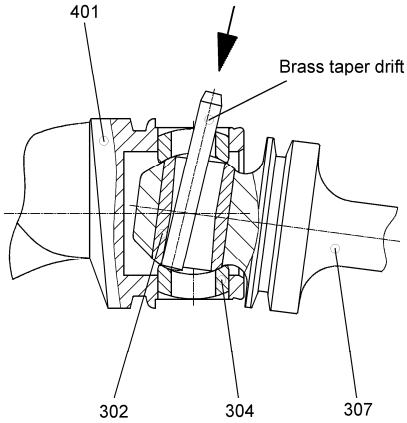


Fig. 7 Removing the bushes for joint bolt

9. Pull off the rotor (401) from the universal joint shaft (307).
10. Push out the joint bush (302) from the universal joint shaft (307). This step not performed for:
    - AEB1F 103
    - AE1L 51 / AE1L 101
    - AE1E 50 / AE2E 50
    - AE1N 25 / AE2N 25 / AE4N 25
    - AED1E 75
    - AED2N 38
    - AE4H 12

11. Use a brass punch to fully drive out the bush for the universal joint shaft (303) from the rotor (401).

10.1.4 Removing the universal joint shaft and the drive-side joint

Remove the universal joint shaft and the drive-side joint after removing the stator (402) and the rotor (401) → section 10.1.2 page 24 and 10.1.3 page 25.

1. Disassemble the drive-side joint as described under section 10.1.3.
2. Pull off the universal joint shaft (307) from the stub shaft (125).
3. Push out the joint bush (302) from the universal joint shaft (307).
4. Use a brass punch to fully drive out the bush for the universal joint shaft (303) from the stub shaft (125).

10.1.5 Removing the shaft seal and stub shaft

Notice!
When a pump uses a stuffing box for the shaft seal, the packing rings → section 9.1.3.1 page 21 can be replaced without removing the stub shaft. Removal of the stub shaft is essential when the pump is equipped with a mechanical seal. If the stub shaft or shaft sleeve are damaged near the shaft seal, the pump must be disassembled as described below.

1. Remove stator (402) (→ Section 5 page 24).
2. Remove hexagon nut (607), serrated washer (608), and hexagon screw (606).
3. Pull off suction casing (505) over the rotor (401).

Caution!
The rotor is manufactured to close tolerances. Make sure it is not damaged.

4. Remove the seal for the suction case (501).
5. Pull the thrower (123) from the clamp set (123).
6. Loosen the clamp bolts of the clamp set (123) evenly and **in order.**
7. Turn the stub shaft (125) if necessary. If the outer ring of the clamp set does not loosen from the inside ring on its own, a few of the clamp bolts can be rotated out and screwed into the neighboring pressure-test threading. Loosening will then go smoothly.

Warning!
Never fully remove the clamp bolts in order to avoid losing parts.

8. Remove the stub shaft (125) with all parts of the shaft seal and the clamp set (123) from the lantern base (122).
9. Pull the clamp set (123) from the stub shaft (125).

10.1.6 Removing the stuffing box

1. Remove self-locking hexagon nut (202) and take off both halves of the stuffing box gland (203).
2. Pull off the stuffing box casing (204) from the stub shaft (125).
3. Remove the following from the stuffing box casing (204): the gland packing (207) on versions P02, P12 including flushing ring (208); including seal chamber ring (209) on versions P03, P13 and P04, P14.

10.1.7 Removing the mechanical seal, single-acting

1. Pull off from the stub shaft the mechanical seal casing (214) with the mechanical seal's (219) atmosphere-side counterring.

Notice!
To avoid damaging the counterring, be sure to pull off the casing with the mechanical seal's counterring concentrically and without canting.

2. Push out the mechanical seal's counterring and O-ring from the mechanical seal casing (214). Be sure to apply pressure evenly.

3. Drive out the locking pin (220).
4. If present, loosen threaded pins in the rotating part of the mechanical seal (219) and pull mechanical seal from the stub shaft (125).

Caution!
Before loosening the threaded pins, mark or measure the position of the mechanical seal on the stub shaft. Do not slide O-rings over the screw pressure mark!

10.1.8 Removing the mechanical seal, single-acting with quench

1. Pull off from the stub shaft (125) the mechanical seal casing (214) with the mechanical seal's (219) atmosphere-side counterring.

Notice!
To avoid damaging the counterring, be sure to pull off the casing with the mechanical seal's counterring concentrically and without canting.

2. Push out the mechanical seal's counterring and O-ring from the mechanical seal casing (214). Be sure to apply pressure evenly.
3. Drive out the locking pin (220).
4. If present, loosen threaded pins in the rotating part of the mechanical seal (219) and pull mechanical seal from the stub shaft (125).

Caution!
Before loosening the threaded pins, mark or measure the position of the mechanical seal on the stub shaft. Do not slide O-rings over the screw pressure mark!

5. Press out the shaft seal (232).

10.1.9 Removing the mechanical seal, single-acting with throttle ring

1. Remove hexagon screws (245).
2. Pull off from the stub shaft the mechanical seal casing (214) with the mechanical seal's (219) atmosphere-side counterring.

Notice!
To avoid damaging the counterring, be sure to pull off the casing with the mechanical seal's counterring concentrically and without canting.

3. Pull off O-ring (218).
4. Push out the mechanical seal's counterring and O-ring from the mechanical seal casing (214). Be sure to apply pressure evenly.
5. Drive out the locking pin (220).
6. Loosen threaded pins in the rotating part of the mechanical seal (219) and pull mechanical seal from the stub shaft (125).

Caution!
Before loosening the threaded pins, mark or measure the position of the mechanical seal on the stub shaft. Do not slide O-rings over the screw pressure mark!

7. Pull off mechanical seal cover (215) with throttle ring (234) from the stub shaft (125).
8. Separate throttle ring (234) and remove with the O-ring (235).
9. Pull locking pins (236) from the mechanical seal cover (215).

10.1.10 Removing the mechanical seal, double-acting

1. Remove hexagon screws (245).
2. Pull off from the stub shaft the mechanical seal casing (214) with the mechanical seal's (219) atmosphere-side counterring.

Notice!
To avoid damaging the counterring, be sure to pull off the mechanical seal's casing with the mechanical seal's counterring concentrically and without canting.

3. Pull off O-ring (218).
4. Loosen threaded pins in the rotating part of the mechanical seal (219) and pull mechanical seal from the stub shaft (125).

Caution!
Before loosening the threaded pins, mark or measure the position of the mechanical seal on the shaft sleeve or stub shaft. Do not slide O-rings over the screw pressure mark!

5. Pull off from the stub shaft (125) the mechanical seal cover (215) with the mechanical seal's (219) product-side counterring.

Notice!
To avoid damaging the counterring, be sure to pull off the mechanical seal's cover with the mechanical seal's counterring concentrically and without canting.

6. Push out the mechanical seal's counterrings and O-rings from the mechanical seal casing (214) and mechanical seal's cover (215). Be sure to apply pressure evenly.
7. Remove locking pins (220) and (236).

10.2 Assembling the progressing cavity pump

To assemble the pump, carefully clean all parts and proceed in the reverse order.

10.2.1 Installing the shaft seal while the stub shaft is removed

10.2.1.1 Installing the stuffing box

1. Slide the stuffing box casing (204) onto the drive shaft (125).
2. Install the following into the stuffing box casing (204): the gland packing (207) on version P02 including flushing ring (208); including seal chamber ring (209) on versions P03 and P04.
(→ see also section 9.1.3.1 page 21).

10.2.1.2 Installing the mechanical seal, general

Mechanical seals are manufactured to highly precise tolerances. Always follow the manufacturer's installation instructions. Gentle handling and extreme cleanliness are required during installation to ensure flawless functionality. To facilitate installation, surfaces over which O-rings glide may be lubricated with silicon oil, polydiol, or lubricating soap, for example.

Caution!
Do not use petroleum-based or synthetic oil as a lubricant!

Notice!
Always replace in pairs those parts that glide over each other. When using double PTFE-encased O-rings, make sure that the joint of the outermost encasement points against the direction of installation. Otherwise the encasement may open and pull off (→ see next image).

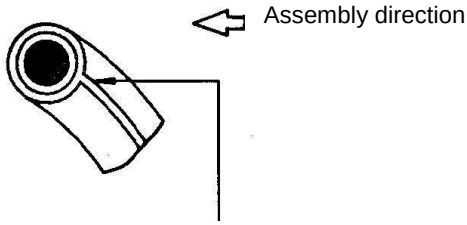


Fig. 8 Joint of the outermost encasement points against the direction of installation

10.2.1.3 Installing the mechanical seal, single-acting

1. Drive the locking pin (220) into the mechanical seal casing (214).
2. Concentrically press the mechanical seal's counterring (219) with O-ring into the clean mechanical seal casing (214).

Notice!
Always use uniform pressure distribution on the locking pin. The locking pin (220) may not protrude inwards.

3. Slide the rotating part of the mechanical seal (219) onto the stub shaft (125).

Notice!
Observe precisely the installation dimension and position of the mechanical seal (as marked during removal).

4. If threaded pins are present, insert them into the rotating part of the mechanical seal (219) and screw them in place with Loctite No. 241 or a comparable product.
5. Slide the mechanical seal casing (214) with the mechanical seal counterring (219) over the stub shaft (125).

Notice!
To avoid damaging the mechanical seal counterring, make sure that the mechanical seal casing does not become canted when sliding it onto the stub shaft.

10.2.1.4 Installing the mechanical seal, single-acting with quench

1. Install the mechanical seal as described under the section "Installing the mechanical seal, single-acting" (→ section 10.2.1.3 page 28).
2. Drive in the locking pin (220) and utilize sealing material (251) Loctite No. 640 or a similar product.
3. Press the shaft seal ring (232) into the clean mechanical seal casing (214). Do not grease the sealing lip.

Notice!
The sealing lip of the shaft seal ring must always face the side being sealed (pointing inward).
Use a suitable pressing die to press it inward. It is extremely important that the pressing force be applied as close to the outer diameter of the shaft seal ring as possible.

Caution!
In order to flare the sealing lip of the shaft seal ring, first slide the mechanical seal casing (214) with integrated shaft seal ring (232) backwards onto the stub shaft (125) with the shaft seal ring ahead. After flaring, pull off the mechanical seal casing (214) from the stub shaft (125) and quickly slide it back onto the stub shaft (125) in the proper position with the flange side ahead.

10.2.1.5 Installing the mechanical seal, single-acting with throttle ring

1. Concentrically push the throttle ring (234) with O-ring (235) into the mechanical seal cover (215).

Notice!
Be sure to apply pressure evenly.

2. Use a punch to drive the locking pin (236) into the mechanical seal cover (215). The locking pin may not protrude inwards.
3. Slide the mechanical seal cover (215) over the stub shaft (125).
4. Install the mechanical seal as described under the section "Installing the mechanical seal, single-acting" (→ section 10.2.1.3 page 28).
5. Pull the O-ring (218) onto the mechanical seal casing (214).
6. Slide the mechanical seal casing (214) with the mechanical seal's counterring (219) over the stub shaft (125) and secure with the hexagon screws (245) on the cover of the mechanical seal (215).

10.2.1.6 Installing the mechanical seal, double-acting

1. Drive the locking pin (236) into the mechanical seal cover (215).
2. Concentrically press the mechanical seal's counterring (219) with O-ring into the mechanical seal cover (215).

Notice!
Always use uniform pressure distribution on the locking pin. The locking pin may not protrude inwards.

3. Slide the mechanical seal cover (215) over the stub shaft (125).
4. Install the mechanical seal as described under the section "Installing the mechanical seal, single-acting" (→ section 10.2.1.3 page 28).
5. Pull the O-ring (218) onto the mechanical seal casing (214).
6. Slide the mechanical seal casing (214) with the mechanical seal's counterring (219) over the stub shaft (125) and secure with the hexagon screws (245) on the cover of the mechanical seal (215).

10.2.2 Installing the stub shaft with shaft seal

1. The clamp sets (123) are delivered ready for installation. Therefore, do not take them apart before initial tightening.
2. Removed clamp sets (123) must not be taken apart and re-lubricated before retightening.
3. The clamp set (123) must be cleaned and re-lubricated only if it becomes contaminated.
4. Use a solid lubricant with a frictional value of μ = 0.04.

Lubricant	Commercial form/manufacturer
Molykote 321 R (sliding lacquer)	Spray/ Dow Corning
Molykote Spray (powder spray)	Spray/ Dow Corning
Molykote G Rapid	Spray or paste/ Dow Corning
Aemasol MO 19 R	Spray or paste/ A.C. Matthes
Molykombin UMFT 1	Spray/ Klüber Lubrication
Unimoly P 5	Powder/ Klüber Lubrication

Tab. 9 Lubricants

5. If the tapered surfaces are damaged, the clamp set must be replaced.
6. Grease the clamp bolt threads and connecting surface with Molykote; manually screw in the clamp bolts until their heads contact the inside ring of the clamp set.

Caution!
Do not tighten the clamp bolts (125) until the stub shaft has been slid onto the shaft of the drive. Avoid damage to the clamp set.

Caution!
Clean and **degrease** the shaft of the drive and hole of the stub shaft (125).

7. Slide the thrower (123) onto the drive shaft (125).
8. Lightly grease the seat of the clamp set (123) on the stub shaft (125) and slide the clamp set (123) onto the stub shaft (125) until it stops.
9. Slide the stub shaft (125) onto the shaft of the drive until it stops.
10. Tighten the clamp bolts of the clamp set (123) uniformly and in order. Turn the stub shaft if necessary.

Caution!
Tighten all clamp bolts until the front surfaces of the outer and inner rings are flush and the tightening torque increases greatly (→ see functional condition in Figure 9). The permissible tightening torques in Nm are engraved in the clamp set (123).

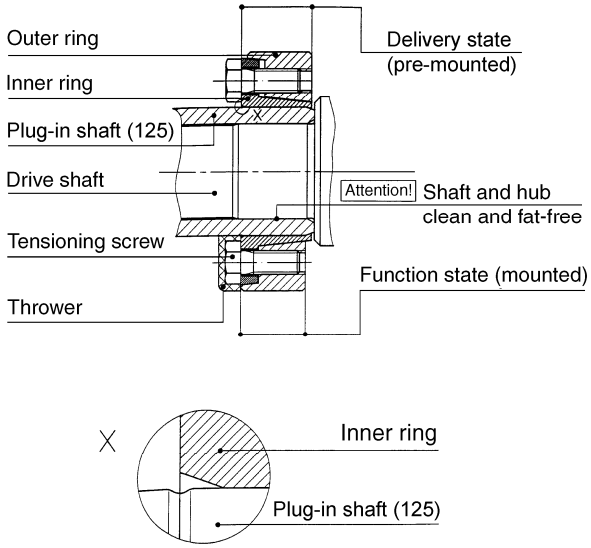


Fig. 9 Clamp sets in inner collar

11. Make sure the clamp set (123) is in the proper location on the stub shaft (125) as depicted in Figure 9, Detail X.
12. Pull the thrower (123) onto the clamp set (123).

10.2.3 Installing the rotor and rotor-side joint

1. Use a brass punch to drive the bushes for the joint pin (303) halfway into the rotor (401).
2. Press the joint pin (302) into the joint shaft (307) as follows:

Caution!
The longitudinal axis of the oval hole (marked with two cuts) must align with the longitudinal axis of the joint shaft, and the joint bush must protrude uniformly from both sides of the joint shaft (see image below).

Joint bush (302) not present on:

- AEB1F 103
- AEB1L 51 / AEB1L 101
- AEB1E 50 / AEB2E 50
- AEB1N 25 / AEB2N 25
- AEDB1E 75
- AEDB2N 38
- AEB4H 12

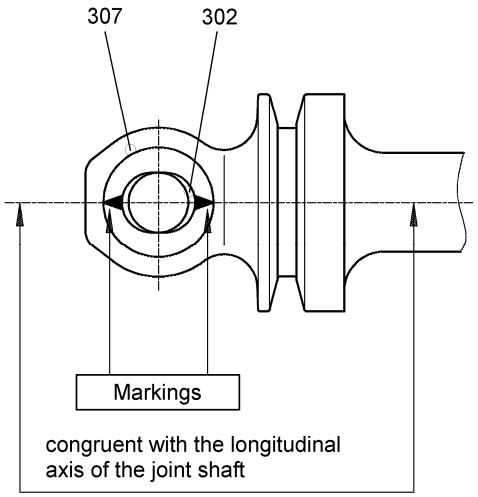


Fig. 10 Pressing in the joint bush

3. Slide joint clamps (306), joint collars (308), and joint sleeve (304) onto the joint shaft (307).
4. Slide the joint shaft (307) into the head of the rotor (401).
5. Slide the joint pin (301) into the joint bush (302) and fully drive in bushes for joint pin (303).
6. Where needed, grind the outer diameter of the joint sleeve (304) and pull onto the head of the rotor (401).
7. After pulling on the joint sleeve (304) secure it against axial shifting on the head of the rotor (401).

Caution!
To do this, drive the face side of the joint sleeve (304) with a prick punch into the groove on the head of the rotor (401) (see image below)!

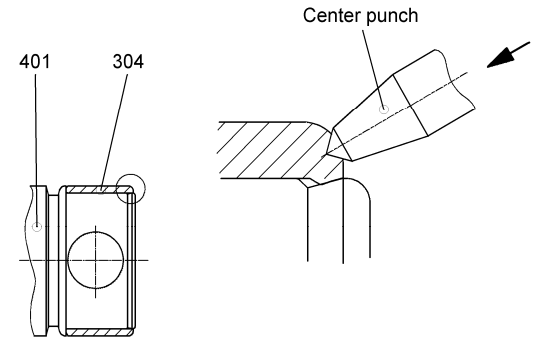


Fig. 11 Securing the joint sleeve

8. Use a screwdriver to pull up the joint collar (308), lift up on top with screwdriver, guide the oil bottle's thrower under the collar and fill the joint area with ALLWEILER special joint oil type B or oil ET 1510 ISO 460 from Tribol Lubricants GmbH of Mönchengladbach, Germany. If used in the food industry, fill with ALLWEILER special joint oil type BL or oil 1810/460 from Tribol Lubricants GmbH of Mönchengladbach, Germany. Filling volume see table section 9.1.5 page 23.
9. Check if the joint clamp's (306) bent strap is contacting the joint clamp seal. If it is not, apply pressure with a commercially available pliers (see next image).

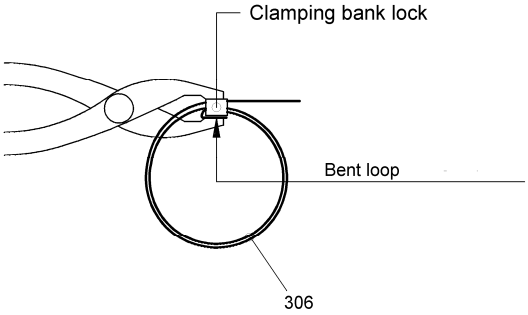


Fig. 12 Apply pressure to the joint clamp strap on the joint clamp seal.

10. Place the joint clamps (306) into the grooves around the joint collar (308) and tighten.

Notice!
Use the clamping tool below:

- For pump sizes smaller/equal to:
  AEB1F 703
  AEB1L 751, AEB1N 200, AEB2N 200, AEDB2N 300, AEB1E 380, AEB2E 380, AEDB1E 560, AEB.H 100 use clamping tool PoK-It II.
- For pump sizes larger/equal to:
  AEB1F 1003
  AEB1L 1001, AEB1N 380, AEB2N 380, AEDB2N 560, AEB1E 750, AEB2E 750, AEDB1E 1200, AEB.H 200 use clamping tool Band-It together with adapter J050.

These tools can be obtained from us.

Tightening the joint clamps is described in the next section.

10.2.3.1 Tightening with Band-It clamping tool and adapter J050

1. Insert strip end of the joint clamp (306) (up to the joint clamp seal) into the clamping tool with adapter.
2. Securely hold the clamp end with the clamping tool's lever and tighten the joint collar (306) by turning the crank (→ see next image).

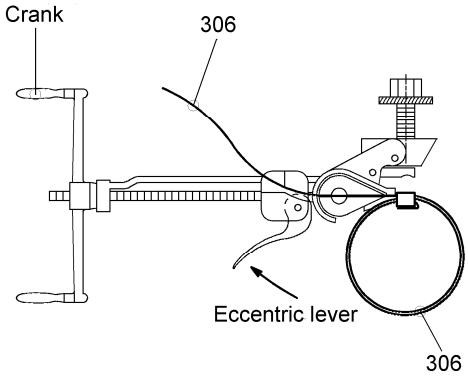
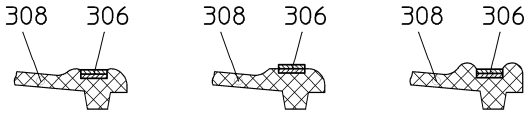


Fig. 13 Band-It clamping tool and adapter J050

Notice!
The image below shows proper tightening of the joint clamps (306).



Correct	Incorrect	Incorrect
The joint clamp (306) has slightly drawn in the external shape of the collar and sits securely.	Joint clamp (306) is too loose and can slide off.	Joint clamp (306) too tight. Collar will be damaged (sheared off).

Fig. 14 Tightening the joint clamps

3. Make sure that the joint clamp (306) lies in the collar groove along the

entire circumference of the joint collar (308).

4. Slowly swivel the clamping tool approximately 60° upward until the cutting hook engages behind the joint clamp seal (→ see next image).
5. Manually tighten the pressure screws until the joint clamp is securely clamped.

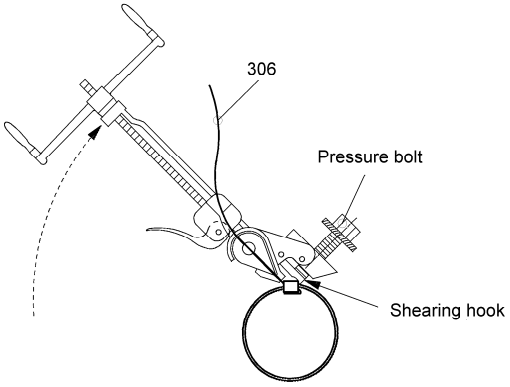


Fig. 15 Shearing off the joint clamp

6. Rotate the pressure screw in the clockwise direction with a screw wrench or ratchet until the joint clamp is sheared off.

Caution!
If the joint clamp is raised slightly on the cut side, counteract this by carefully rebending it. Hammering or striking the joint clamp seal is not acceptable because this may cause damage to the collar!

Notice!
The clamping tool cannot be used to shear off joint clamps made of Hastelloy.

► After canting at the joint clamp seal, use metal shears to shear off the joint clamp; deburr the cut edges (→ see following image).

10.2.3.2 Tightening with clamping tool PoK-It II

If using the PoK-It II clamping tool, swivel the clamping tool after tightening in order to cant the joint clamp (306) at the joint clamp seal in such a way that the clamp cannot slide through the seal. After canting at the joint clamp seal, use metal shears to shear off the joint clamp; deburr the cut edges (→ see following image).

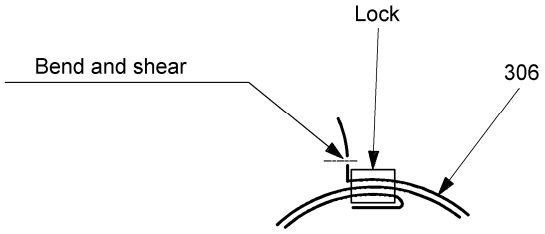


Fig. 16 Canting and shearing off the joint clamp

Caution!
Make sure the joint clamp is properly bent so that it cannot slide back through the joint clamp seal (→ image above). Otherwise, remove the joint clamp and replace it with a new one!

10.2.4 Installing the universal joint shaft and the drive-side joint

1. Mount the drive-side joint onto the stub shaft (125) as described under Section 10.2.3 page 31.
2. Slide the universal joint shaft into the stub shaft's (125) joint head.
3. Secure the joint sleeve (304) with prick punch as shown.
4. Pull on joint collar (308), fill joint area with joint oil, and fasten joint clamps as described.
5. Insert seal for the suction casing (501).
6. Slide suction casing (505) over the rotor (401). The rotor is manufactured to close tolerances. Make sure it is not damaged.
7. Use the hexagon screws (606), serrated washers (608), and hexagon nuts (607) to fasten the suction casing (505) to the pedestal bracket (122).

Notice!
Align the suction casing's (505) connection flange before tightening the hexagon nuts (607).
Observe the proper positions of the connections in the stuffing box casing (204) or mechanical seal casing (214) (→ our dimension sheets).

10.3 Installing the stator

1. Insert O-ring (513) and reducing flange (512), if present, into the suction casing (505).
2. Coat the stator (402) and rotor (401) with lubricant (silicon oil, polydiol, lubricating soap, or similar) before mounting.

Caution!
Do not use petroleum-based or synthetic oil as a lubricant!

3. If the stators are made of plastic or metal, insert the stator seals (403) and (404).

Notice!
The seal (403) and O-ring for plastic stators must always lie on the pressure side.

Notice!
If stator (402) is difficult to move, turn it simultaneously with pointy nose pliers. Hold the stub shaft (125) stationary.

4. If bracket (612) is present, slide it onto the clamp bolts (611).
5. Use the clamp bolts (611) and hexagon nuts (609) to screw into place the pressure casing (504), bracket (612) if present, stator (402), and suction casing (505). Tighten hexagon screws uniformly.
6. Tighten hexagon nuts (613).

11 Spare parts

The following sectional drawings show all referenced pumps with various versions of the shaft seals and bearings. Index of parts also included. The parts labeled in the index of parts can be used as spare/reserve parts.

Caution!
For safety reasons, stock and use only original spare parts provided by Allweiler. Refer to the information provided under Section 2.7 (→ page 5)!

When ordering spare or reserve parts, always provide the following information:

- Pump number
- Pump model
- Part number
- Description and quantity of the part
- or ID number and quantity

Notice!
The pump number and pump model are stamped onto the nameplate. Refer to the attached list of spare parts for the ID number and quantity.

11.1 Index of spare parts and recommended spare/reserve parts

Legend:

R = large repair kit
r = small repair kit

Part No.	Description	Repair kit	Quantity	Remarks
122	Lantern base		1	
123	Clamp set		1	
125	Stub shaft	R	1	
201	Stud bolt		2	
202	Self-locking nut		2	
203	Gland		1	
204	Stuffing box casing		1	
207	Gland packing	R, r		❶
208	Flushing ring		1	
209	Seal chamber ring		1	
212	Screw plug		1	
213	Joint tape		1	
214	Mechanical seal casing		1	
215	Mechanical seal lid		1	
218	O-ring	R	1	
219	Mechanical seal	R	1	
220	Locking pin		1	
232	Shaft seal ring	R	1	
234	Throttle ring	R	1	
235	O-ring	R	1	
236	Locking pin	R	2	
245	Hexagon head screw		3	
251	Sealing material		1	
301	Joint pin	R, r	2	
302	Joint bush	R, r	2	❺
303	Bush for joint pin	R, r	4	
304	Joint sleeve	R, r	2	
305	Joint oil	R, r		❶
306	Joint clamp	R, r	4	
307	Joint shaft	R, r	1	

❶ see Section 9.1.5 page 23

❺ not included with AEB1F 703, AEB1L 51, AEB1L 101, AEB1E 50, AEB2E 50, AEB1N 25, AEB2N 25, AEDB1E 75, AEDB2N 38. AEB4H 12

Part No.	Description	Repair kit	Quantity	Remarks
308	Joint collar	R, r	2	
401	Rotor	R, r	1	
402	Stator	R, r	1	
403	Pressure-side stator seal	R, r	1	
404	Suction-side stator seal	R, r	1	
501	Seal for suction casing	R, r	1	
502	Screw plug		1	❸
503	Seal ring	R	1	❸
504	Discharge casing		1	
505	Suction casing		1	
506	Suction casing lid		2	
507	Seal	R	2	
508	Stud bolt		8	
509	Nut		8	
512	Reducing flange		1	
513	O-ring	R	1	
525	Washer		8	
601	Nameplate		1	
602	Round head grooved pin		4	
603	Information plate “Start-up”		1	
604	Information plate “Suction”		1	
605	Information plate “Pressure”		1	
606	Hexagon head screw		4	
607	Hexagon nut		4	
608	Serrated lock washer		4	
609	Hexagon nut		4	
610	Washer		4	
611	Clamp bolt		4	
612	Bracket		1	❷
613	Hexagon nut		2	1❹

Tab. 10 Single part labeling

❷ 2 pieces on AEB4H 100-IE, AEB4H 200-IE
❸ 2 pieces on branch positions 2 and 4
❹ 4 pieces on AEB4H 100-IE, AEB4H 200-IE

11.2 Sectional drawing for series AEB1F, AEB1L, AEB.E, AEB.N, AEDB1E, AEDB2N; IE construction type

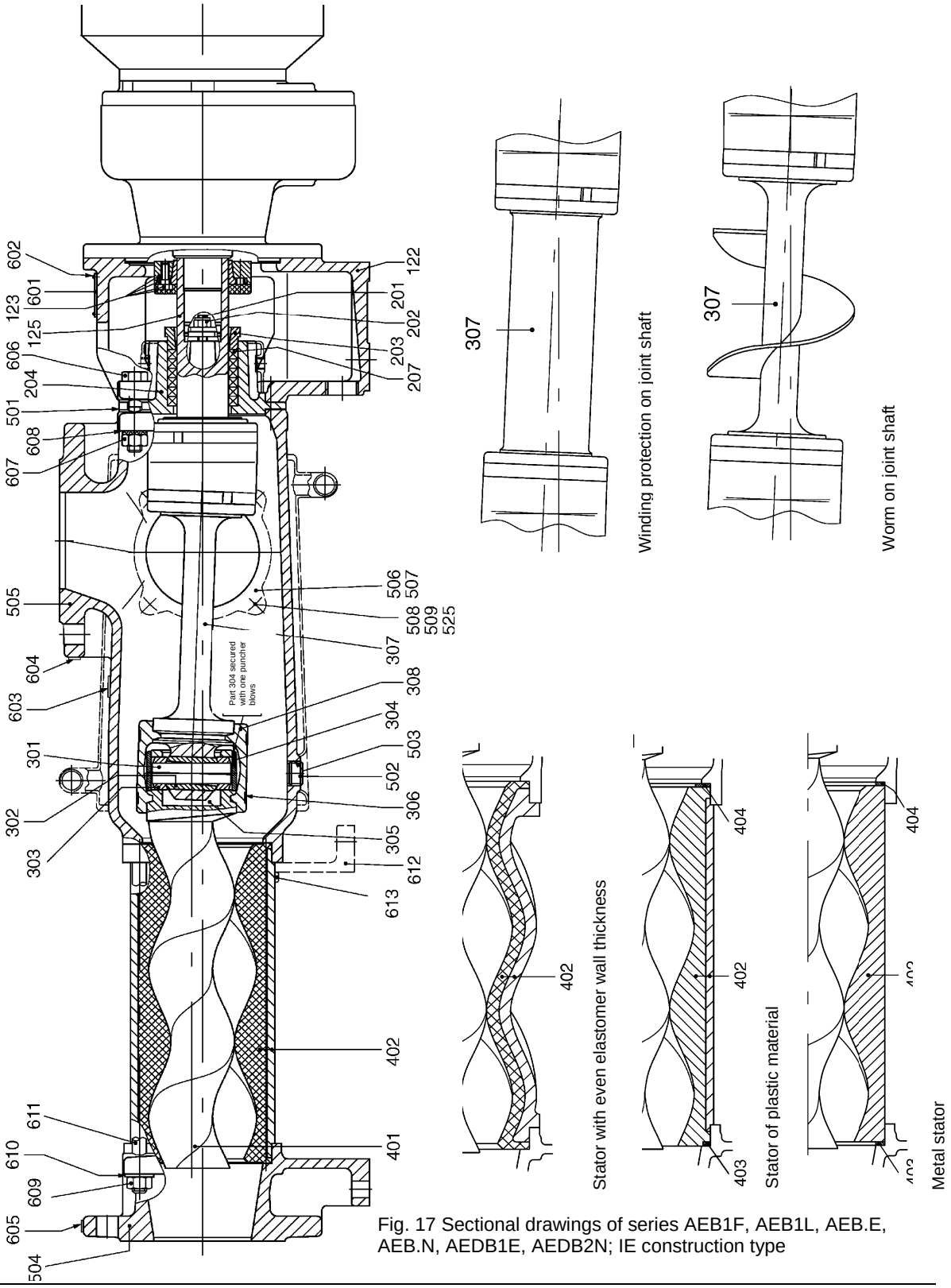


Fig. 17 Sectional drawings of series AEB1F, AEB1L, AEB.E, AEB.N, AEDB1E, AEDB2N; IE construction type

11.3 Sectional drawing for series AEB.H; IE construction type

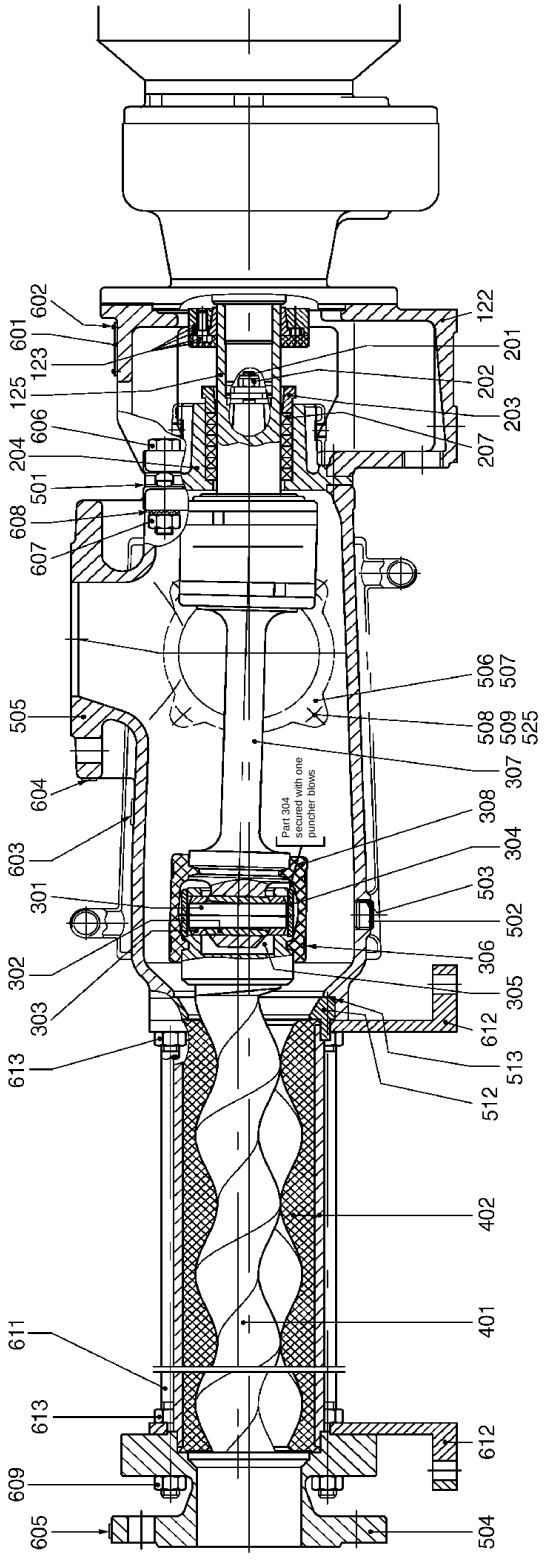


Fig. 18 Sectional drawings of series AEB.H; IE construction type

11.4 Sectional drawings of shaft seals

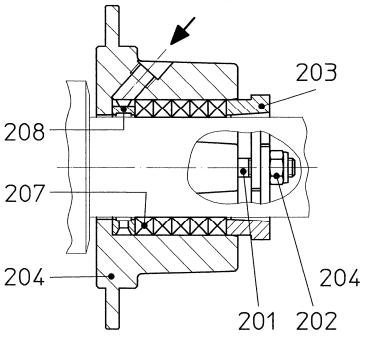


Fig. 19 P02 Stuffing box with flushing ring

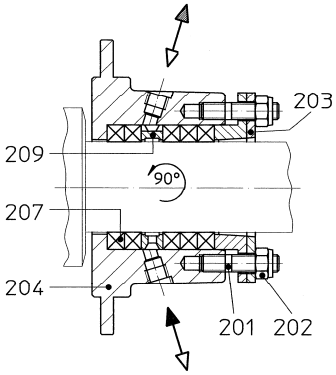


Fig. 20 P03 stuffing box with internal seal chamber ring

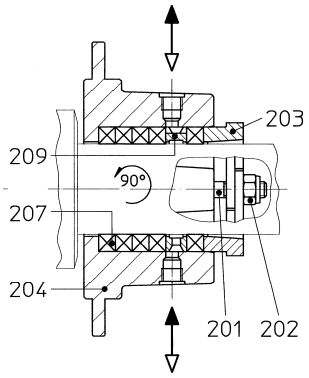


Fig. 21 P04 stuffing box with external seal chamber ring

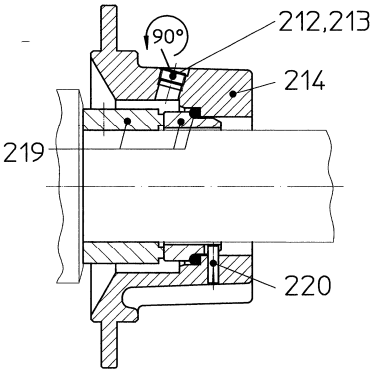


Fig. 22 G0K and G0N mechanical seal, single-acting

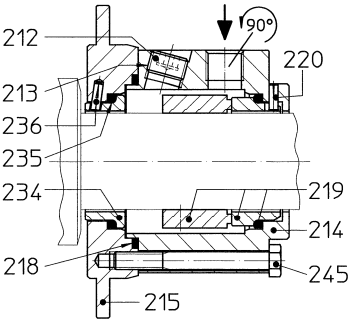


Fig. 23 G0S and G0T, mechanical seal, single-acting with throttle ring

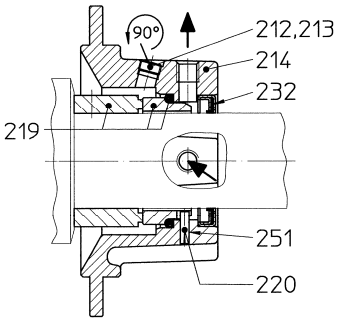


Fig. 24 G0Q mechanical seal, single-acting with quench

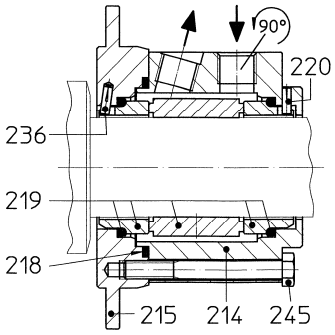


Fig. 25 G0D double-acting mechanical seal

11.5 Sectional drawing for series AEB.N; ZE construction type

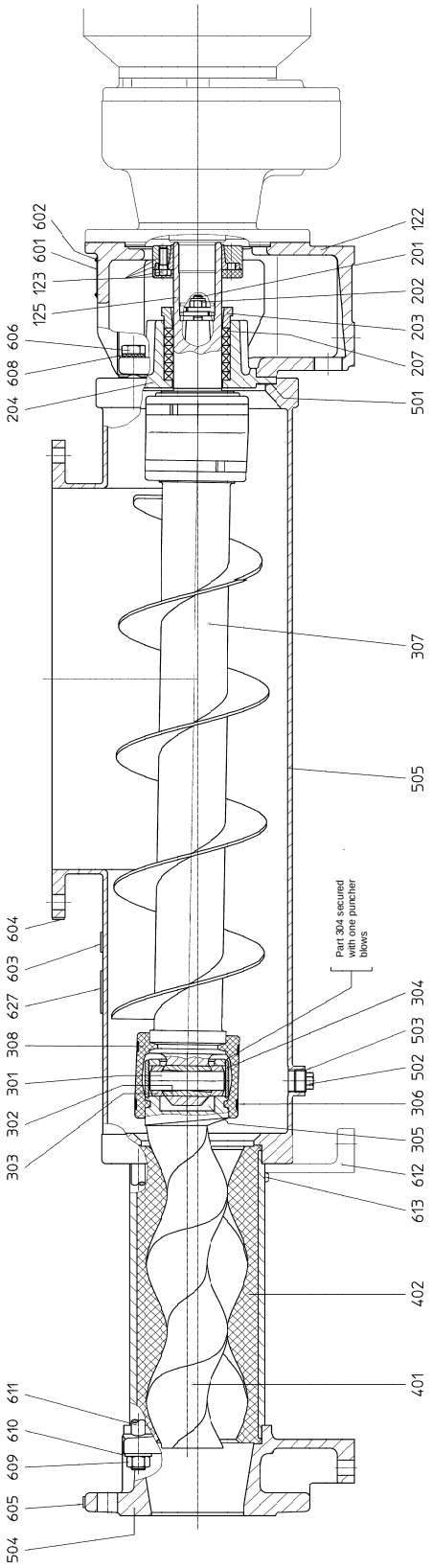


Fig. 26 Sectional drawings of series AEB.N; ZE construction type

11.6 Sectional drawing for series AEB.H; ZE construction type

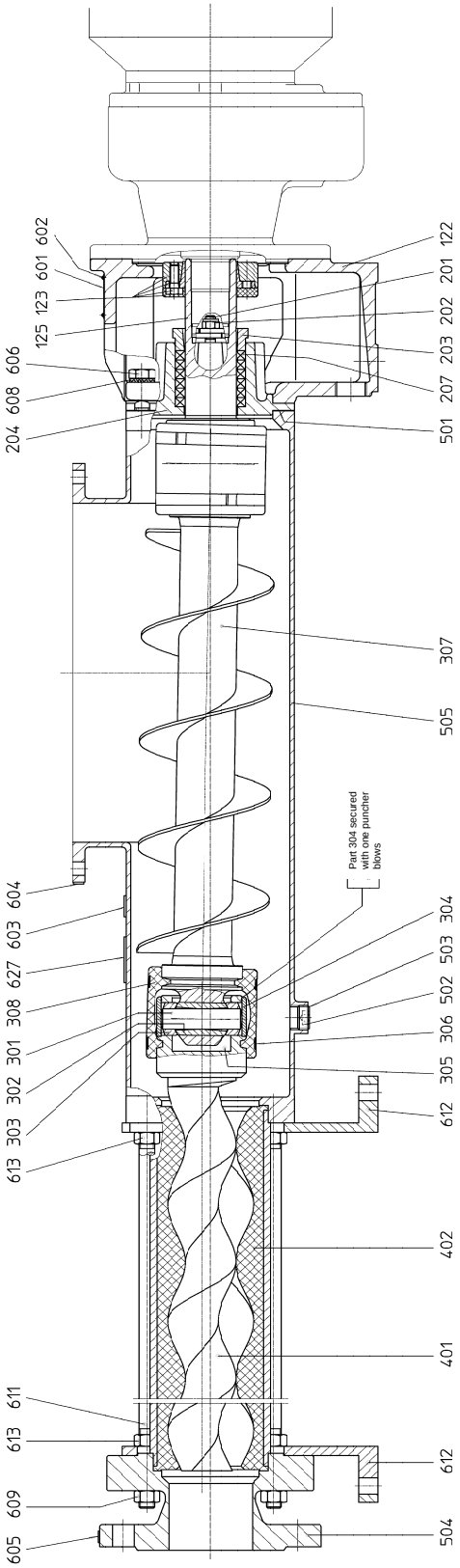


Fig. 27 Sectional drawings of series AEB.H; ZE construction type

12 Causes and removal of operational faults

Discuss with the manufacturer any disturbances not contained in the following table or that cannot be traced to the causes listed below.

Each possible disturbance is labeled with a letter in the table below. Reference this letter in the table of disturbances to find the corresponding cause and correctional measure.

→Refer to letter f in the following table to reduce noise and vibrations.

Letter	Disturbance
a:	Pump does not start
b:	Pump does not generate suction
c:	Capacity not reached
d:	Delivery head not reached
e:	Pumping is not uniform
f:	Pump is loud or vibrates
g:	Pump has seized or no longer pumps
h:	Motor gets too warm
i:	Stator wears out prematurely
k:	Shaft seal leaks

Tab. 11 Overview of potential disturbances

No.	Operational disturbances										Causes and removal
	a	b	c	d	e	f	g	h	i	k	
1	●							●			High adhesion between rotor and stator in new condition after long period of downtime Use tool to manually turn pump.
2		●									Reference arrow on pump to check direction of rotation; reverse polarity of motor if necessary.
3		●	●		●	●	●				Check suction line and shaft seal for leaks.
4		●	●		●	●					Check suction head; enlarge cross-section of suction line if necessary. Install larger filter. Open suction valve completely.
5		●	●		●						Check viscosity of pumped liquid.
6	●		●					●			Check speed of rotation. Check speed and power consumption of drive motor. Check voltage and frequency.
7			●		●						Avoid air inclusions in pumped liquid.
8	●		●				●	●	●		Check delivery head. Fully open gate valve in pressure line, remove blockage in the pressure line.
9		●	●		●		●		●		Pump is running partially or completely dry. Make sure enough pumped liquid is present on the suction side.
10		●	●								Increase speed with low-viscous liquids and large suction volume.
11		●			●	●					Reduce speed with viscous liquids - danger of cavitation.
12						●					Check longitudinal tolerance of joint pins, joint bush may be improperly installed.
13	●	●	●				●		●		Check for foreign objects in the pump, disassemble pump, remove foreign objects, replace any defective parts.
14		●	●	●		●	●				Stator and rotor are worn. Disassemble pump, replace defective parts
15		●	●			●	●				Joint parts (f, g) and/or stub shaft (b, c) are worn. Disassemble pump, replace defective parts
16		●	●				●		●		Suction line partially or completely blocked.
17	●	●					●	●	●		Check temperature of pumped liquid. Stator expansion too large; stator stuck on rotor; stator may be burned or swollen.
18	●	●	●					●		●	Gland packing: Replace unusable rings (b, c, k), loosen stuffing box gland (a, h), tighten stuffing box gland (b, c, k).
19	●	●					●		●		Proportion of solids and/or grain size too large. Reduce speed. Install screen in front of pump with permissible mesh size.
20	●	●							●	●	Solids settle and harden when pump stops. Immediately flush pump; disassemble and clean if necessary.
21	●	●					●		●	●	Liquid solidifies when temperature drops below certain limit: Heat pump.

Tab. 12 Troubleshooting disturbances Clearance certificate

13 Clearance certificate

The pump and accessories submitted for inspection / repairs together with the safety certif cate by us, the signatory,

Type: _____ Delivery date: _____

Part no.: _____ Order no.: _____

Reason for inspection / repair: _____

☐ Was not used with liquids that are hazardous to health or the environment.

☐ Used for the following application: _____

and came into contact with liquids that must be labeled for safety or are considered to be polluting.

☐ Last pumped liquid: _____

☐ The pump has been carefully emptied and cleaned on the outside and inside prior to delivery or provision.

☐ Special safety precautions are not necessary for subsequent handling.

☐ The following safety precautions regarding rinsing liquids, liquid residue and disposal are necessary:

_____

_____

If the pump was used with critical liquids, please make sure you enclose a **safety data sheet** in the package.

We hereby declare that the information given is correct and complete, and that the pump is being shipped in accordance with legal requirements.

Company / address: _____ Phone: _____

Fax: _____

Customer no.: ___ ___ ___ ___ ___ ___ ___

Issuer name: (capital letters) _____ Position: _____

Date: **Company stamp / signature:**

Fig. 28 Clearance certificate

14 Declaration according to EC machinery directive

Declaration of conformity according to EC machinery directive

Notice!

The following declaration contains neither serial numbers nor signatures. The original declaration with the name of the documentation officer and signatures is included with each pump.

ALLWEILER

EG-Konformitätserklärung

EC Declaration of Conformity
Déclaration de conformité CE

gemäß / acc. to / d'après

Maschinenrichtlinie 2006/42/EG Anhang II A
Machinery Directive 2006/42/EC Annex II A
Directive 2006/42/CE Annexe II A

Hiermit erklären wir, / We hereby declare / Par la présente, nous déclarons

Allweiler AG, Postfach 200123, 46223 Bottrop, Tel. +49 (0)2045-966-60, Fax. +49 (0)2045 966-679

dass die Maschine / that the machine / que le machine

Ident Nr. / Ident no / Nº d'ident :
Benennung / Designation / Désignation :
Equipment Nr. / Equipment no./ Nº d'équipment :
Auftrag Nr. / Order no. / Nº de commande :

übereinstimmt mit folgenden einschlägigen EG-Richtlinien:
corresponds to the following relevant EC directives:
répond à la directive communautaires s'y afférent:

Maschinenrichtlinie (2006/42/EG) / Machinery Directive 2006/42/EC / Directive 2006/42/CE relative aux machines
Niederspannungsrichtlinie (2006/95/EG) / Low Voltage Directive (LVD) 2006/95/EG / Directive Basse Tension (DBT) 2006/95/EG
EMV-Richtlinie (2004/108/EG) / Electromagnetic Compatibility (EMC) Directive 2004/108/EG / directive sur la Compatibilité électromagnétique (CEM) 2004/108/CEE

Dokumentationsverantwortlicher, person authorised to compile the technical file, la personne autorisée à constituer le dossier technique

……

Angewandte harmonisierte Normen in der jeweils gültigen Ausgabe:
harmonized standards applied in the valid version:
norme harmonisée employée dans l'édition valable:

EN 809
EN ISO 12100-1
EN ISO 12100-2
EN ISO 14121-1

28.10.11

Datum	Geschäftsführer	Qualitätsleiter
Date	general manager	Quality manager
Date	gérant	conducteur de qualité

Dieses Dokument wurde maschinell erstellt und gilt als rechtsverbindlich.
This document has been created automatically and is legally binding
Le présent document a été établi à l'aide d'une machine et a force obligatoire

Fig. 29 EC Declaration of Conformity

Subject to technical changes!

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Edition: BA-2011.11
Print No.: 174 700
VM No.: 732.0002 GB