

Manual

Butter pump Visco 140



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Chapter 1

1. Safety notes

1.1 Important notes

- Read these instructions before assembly and initial operation.
- They describe the safe use of the pump in all life cycles.
- Heed the safety notes contained without fail
- Do not put damaged products into operation

The notes on safe and undisturbed operation are designated as follows:

Symbol	Signal word	Meaning	Consequences of disregard
<p>Example.</p>  <p>General hazard</p>  <p>Specific hazard, e.g. electric shock</p>	Danger	Imminent danger	Severe or fatal injury
	Warning!	Possible dangerous situation	Severe or fatal injury
	Caution!	Possible dangerous situation	Minor injuries
	Note!	Potential damage to property	Damage to pump or plant system
	Note!	Important notes on explosion prevention and protection	Neutralizing the explosion protection and resulting dangers
	Note!	For safe and undisturbed operation	

1.2 Qualified personnel

The operating company has to instruct the operator by means of this operating manual. The minimum age is 16 years. An experienced person has to supervise young persons and apprentices during the work on the machine.

Only metal workers, industrial mechanics or persons with comparable education may perform assembly, maintenance, initial commissioning, and repair work on the screw pump.

All electro technical work may only be performed by a trained electrically qualified person. Electrically qualified person in the sense of this manual are individuals who are familiar with electrical installation, commissioning, troubleshooting, and maintenance and hold a corresponding qualification for this function.

All work in the other fields, transport, storage, operation, and disposal may only be carried out by individuals who know the manual and have been appropriately instructed.

Make sure that the applicable standards and regulations of the respective country of use are kept and monitored.


Chapter 1

1.3 Further applicable documents


Heed the following additional documents:

Document	Description
Data sheet	Technical data, performance and operating limitations, service conditions
Dimensional drawing	Pump dimensions and connections with mounting points
Spare parts lists	Exploded drawing with spare parts
Assembly instructions	Special models or incomplete machine
ATEX supplementary instructions	Operating the pump in explosion hazardous area
Drive documentation	Drive Operating Manual
Accessories documentation	Accessories Operating Manual
Declaration of decontamination	Shipping the pump for repair

1.4 Safety Notes for Commissioning, Maintenance, Inspection and Installation works.

	Warning!!
	<p>The pump has live, pressurized, pressure-retaining and rotating or moved machine parts and possibly hot surfaces during operation. Potential consequences: Severe or fatal injuries.</p>

- Principally perform any necessary work on the machine when the system is at a standstill.
- Disconnect the electric drive from mains and secure against unauthorised and inadvertent activation.
- Make sure prior to opening the pump that the system and its auxiliary systems are in the no-pressure state.
- Keep in mind that the pump may possibly have hot surfaces during and after operation.
- Follow the regulations on handling the pumping medium when opening the pump.
- Reattach all protection devices before restarting.
- Heed the points stated in Chapter 'Commissioning' when restarting.

	Warning!
	<p>Risk of injuries through falling or tipping heavy machine parts. Potential consequences: Severe or fatal injuries.</p>

- The pump or parts of it may be very heavy and need to be moved using appropriate lifting gear.

Chapter 1

1.5 Intended Use

The machine is intended for commercial use and may only be employed for delivery of the agreed pumping media in accordance with this manual.

The operating points (delivery volume, pressure, rotational speed) mentioned in the pump specification (→ data sheet) should be understood as limit values and must not be exceeded.

Any change of the pump delivery conditions (e.g. delivery rate, delivery route, pressurisation level, pipe diameter, throttle devices) may result in strongly changed operating conditions. If this occurs, compare the new operating conditions with the data contained in the data sheet. You will need to consult with the manufacturer if the changed conditions should exceed the data contained in the data sheet.

Deployment in the Ex area is prohibited unless not expressly intended for this purpose.

1.6 Predictable Misuse

- Only use the pump to deliver the specified medium.
- Do not operate the pump beyond the specified speed range.
- The solids contents in the pumping medium must not exceed the specified limit values for grain size and proportion of solids.
- Take appropriate measures to ensure that no foreign objects (metal parts, stones, etc.) can get into the pump and possibly cause damage.
- Do not use the stationary pump as shut-off device.

1.7 Operating Restrictions

The screw pump is a positive displacement pump that can build up very high pressure. The developing pressure with the delivery line shut can reach the multiple of the permissible system pressure. This may result in serious damage to system components posing a risk to persons.

ATTENTION


Possible damage to property

- **Do not operate against closed shut-off devices!**
Breakage and risk of injuries!
- **Secure the pump through approved safety devices (overpressure protection).**
- Keep the relevant safety and handling instructions when delivering dangerous media.
- Medium contamination through foreign objects may result in damage to the pump elements.
- Observe the relevant legal requirements and the possibly resulting requirements and restrictions when delivering and storing hazardous substances and inflammable liquids.

Chapter 1

1.8 Specific safety notes

Provide constructional contact protection for hot and cold parts.
Provide appropriate earth in case of a possible electrostatic charge.

	<p>Danger!</p> <p>Rotating screw spindles in the pump can draw in arms or other parts of the body. Imminent danger: Severe or fatal injuries.</p>
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- Access into the pump during operation must not be possible.
- The running screw spindles can cause serious hand and personal injuries.
- Only operate the pump when mounted (connected to a piping system).
- Be sure to secure the openings (pressure and suction port) when running a possibly necessary test run.
- Only perform manual cleaning and maintenance work after disconnecting the drive (system control) from mains and protecting it from inadvertent and unauthorised reclosure.

1.9 Specific safety notes on pumps with heating jacket

The housing of these pumps is of double jacket design and has connections for heating medium flow. The housing has been designed for **6 bar** overpressure if no other internal pressure has been approved in the data sheet.

Use for the inlet- and outlet connection of the heating circuit the connectors on the opposite according to the nozzle. The connectors on the nozzle side can be used for the vent or a pressure measurement.

<p>ATTENTION</p>	<p>Possible damage to property</p>
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- Operate the heating circuit exclusively using water.
Make sure by corresponding pressure limiting devices that the approved pressure rating for the housing will not be exceeded. The medium escaping via the relief port has to be discharged safely into a pressure less area when the pressure limiting device is responding. No shut-off devices are allowed to be arranged in this area.

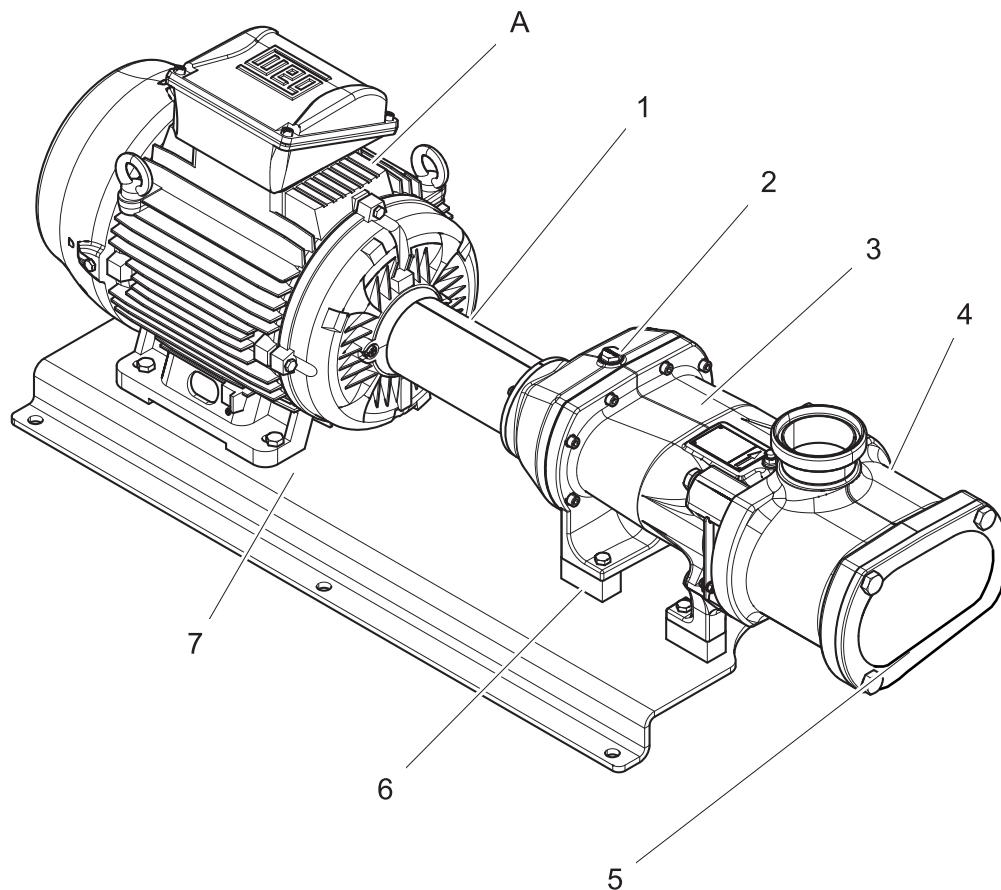
Chapter 2

2. Construction and general description

2.1 ViscoTwin pump construction



- only exemplary representation. Decisive for the dimension is the (dimensional drawing)
- 3-A baseframe according to 3-A requirements as per drawing #



- | | |
|---|---------------------|
| A | Drive |
| 1 | Coupling with guard |
| 2 | Gear housing |
| 3 | Bearing housing |
| 4 | Pump casing |
| 5 | Cover |
| 6 | Pump foot |
| 7 | Base plate |

Chapter 2

2.2 General description

ViscoTwin Screw pumps are rotating displacement pumps for delivering low to highly viscose media.

Pumps for use in the foodstuffs and beverage industry are designed and built to the recommendations of DIN EN 1672-2 'Food processing machinery - Basic concepts'. This does not include pipe connections, which require special cleaning procedures. These must be cleaned manually by the operator. The cleaning cycle is dependent on the food and the relevant hazard from. This is set by the operator. Correspond to the pipe connections according to DIN 11864, according to DIN EN 1672-2 there is no health risk. The operator does not define any special cleaning measures.

Non-corroding materials suitable for cleaning and/or disinfection are being used for the product-contacting parts of these pumps. Elastomer materials and seals correspond to the BfR (German Federal Institute for Risk Assessment) recommendations and the FDA guidelines respectively (US Food and Drug Administration) and the Regulation (EC) No 1935/2004.

The pumps and pump units respectively are designed and built taking the health and safety requirements of the EC Machinery Directive into account with all requirements met, either the EC Declaration of Conformity (with CE mark) or in the case of partly completed machines, a Declaration of Incorporation is issued.

ViscoTec, Inc. is assuring the conformity of 3-A standard 02-11 for the pumps delivered to 3-A requiring purposes and verifies all parts and elastomer fulfill the sanitary standards also for spare parts.

2.3 Sound emission

Each pump is manufactured and tested acc. to the currently valid technical documentation. The weighted continuous sound level is normally <70 dB(A) with drive and pipe lines not included in this measurement. Cavitation-free operation and proper fastening of the pump unit on level concrete slab or warp resistant steel structure is taken for granted.

Chapter 3

3. Transport, packaging, storage

3.1 Transport / packaging

ViscoTwin pumps are shipped in non-returnable packaging. Any transport damage has to be immediately reported to the transport company after receipt of the consignment. Do not put damaged products into operation



Warning!

The pump can drop or tilt as a result of improper transport.
Potential consequences: Severe or fatal injuries.

- Use only hoisting gear and load-carrying equipment with sufficient load capacity.
- Lift pumps with suitable load-carrying equipment (chains, ropes) properly acc. to opposing pictures using hoisting gear.



- The pictures used are example pictures

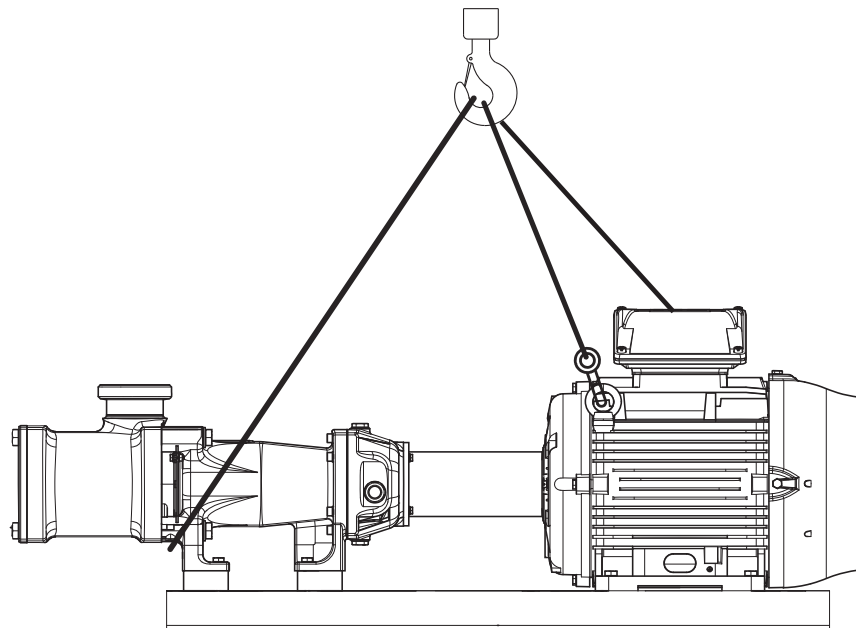


Fig. 3.1 ViscoTwin 130 with baseplate and drive

ATTENTION

Possible damage to property

- When transporting pump units, consider that they can be very top heavy due to certain drive assemblies.
- Never lift the whole unit using the lifting eye bolts of the drive unit. These suspension points should only be used for the motor and/or gear unit.
- Always transport screw pumps in horizontal position.

Chapter 3

3.2 Storage

ViscoTwin pumps are sufficiently preserved under normal environmental conditions.

Take the following measures when storing for a longer period;

- **Protect pump from dust, dirt, water, and other harmful environmental influences. Coat all non-painted surfaces with acid-free and resin-free grease.**
- **Do not grease stainless steel parts and non-metallic parts.**
- **Cover all openings of pressure and suction ports.**
- **Drain water when using it as quench medium for shaft seal.**
 1. Make sure that the storage room meets the following conditions:
 - frost-protected and dry.
 2. Check the preservation regularly.

3.3 Disposal

Collect oil from gear unit and seals and dispose of acc. to the local regulations

3.3.1 Final decomposition of the pump, sorting

Check parts for applicability as spare parts and optionally store it.

Dispose of casing parts, screw spindles, shaft seals as steel scrap (VA scrap).

O-rings and parts of the rotating mechanical seals made from carbon/ceramics as residual waste.

Chapter 4

4. Assembly / installation

4.1 Rotational direction

The rotational direction of the drive shaft determines the direction of flow. The rotational direction is stated on the data sheet and on the pump casing / coupling guard.

4.2 Speed and torque of the pump

The permissible speed and the maximum torque on the clutch shaft of the screw pumps are shown in the following table:

Type of pump	Min. Rotation	Max.	Maximum torque on the clutch shaft
ViscoTwin 130	100 rpm	2900 rpm	400 Nm

4.3 Mounting

Mounting of the pump in the case of the screw pump is done via the holes in the base plate and the holes in the case foot respectively.

Provide for a solid and level ground, such as:

- **A sufficiently dimensioned, level concrete slab,**
- **a level and warp resistant steel structure.**

The foundation has to sustain the dead weight and all operating forces and guarantee pump unit stability.

The size of the holes on the casing or base plate predetermine the diameters of the screws or dowel anchors.



- **Normally, mounting is done by screwed connection (hexagon head screws, dowel anchors). In this context, observe the following screw diameters and max. torquing values:**

Screw diameter	Max. tightening torque
M10	44 Nm
M12	90 Nm
M16	220 Nm

(The values apply for hexagon head bolts to DIN 931-B or EN 24014 of strength category 8.8)

The pump units need to be tightly mounted to the base plate mounting points when the pump unit is put up on 4 – 6 calottes. With this job done, the pump unit needs to be horizontally aligned by adjusting the calotte feet so that the pump stands safely and firmly on the ground.

For the base frame installation of pumps meeting the requirements of 3-A Sanitary Standards (Standard 02-11) leveling feet also meeting the requirements of 3-A Sanitary Standards (Standard 88-00) have to be used.

For pumps meeting the requirements of 3-A Sanitary Standards (Standard 02-11) a clearance of at least 100 mm between aggregate console and the floor has to be observed.

Mobile pump units have to be locked via their fixing wheels prior to commissioning.

Chapter 4

4.3.1 Tightening torques for specified components

Tightening torques has been specified for certain components as shown in appendix.

4.4 Pipe lines

Correct dimensioning of the pressure-side pipe line is crucial to avoid unnecessary pressure build up when delivering viscous media. Therefore, orient yourself at least by the dimensions of the pump flanges. The pressure stated in the data sheet must not be exceeded. Mind the delivery pressure stated in the data sheet with respect to the pipe line pressure resistivity. Purge the piping system and the feeding devices and clean them from foreign objects.

Seal pipe connections for quench exclusively with a sealing tape. Do not use liquid seals. Liquid seal can clog the inner flushing lines.

ATTENTION

Possible damage to property

- **Do not use liquid seals.**
- **Liquid seal can clog the inner flushing lines.**

4.4.1 Connection of the pipe lines

1. Clean and purge the pipes.
2. Flange the pump to the pipe line via elastic seals so that a tight connection develops and no undue forces act on the pumps.
3. Provide shut-off devices for removing the pump and maintenance and fitting pieces in the pressure and suction lines.
4. Provide safety valve or pressure monitoring right into the pipe line behind the pump.

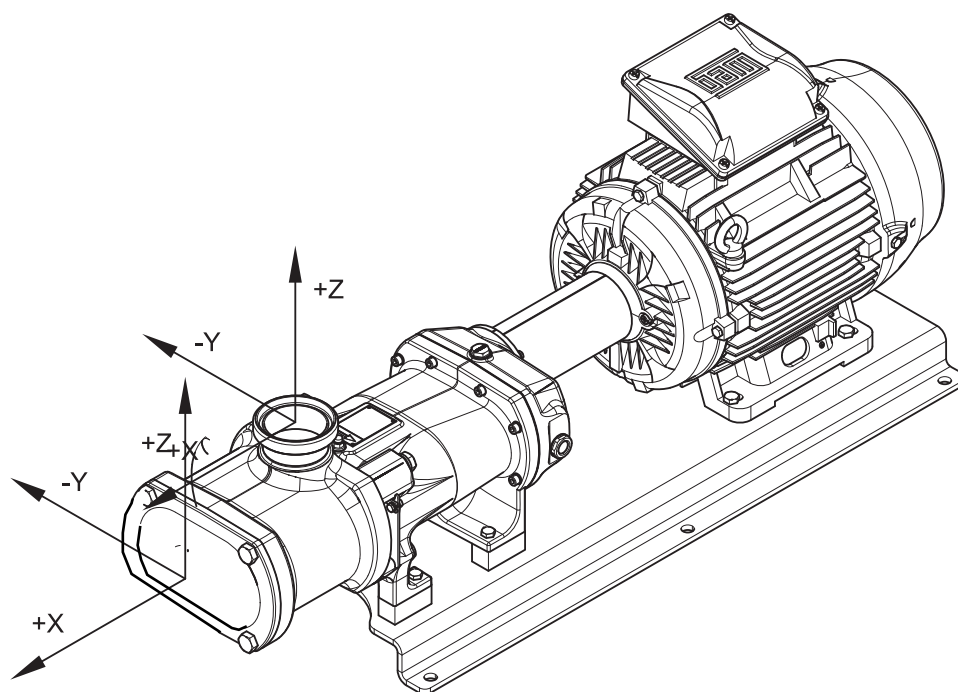
Chapter 4

ATTENTION

Possible damage to property

- Do not support pipe lines on the pump! Mount pipe lines as force- and torque-free as possible.
- Allow for the permissible forces and torques on the ports (see table below) when connecting the pipe lines.
- Do not stress threaded connections with torques causing pipe clamping or declamping in the pump casing.

4.4.2 Permissible forces and torques on the pump flanges



$$F_{ges} = \sqrt{Fx^2 + Fy^2 + Fz^2} \quad \text{and} \quad M_{ges} = \sqrt{Mx^2 + My^2 + Mz^2}$$

Nominal width	F (x,y,z) [N]	F (tot) [N]	M (x,y,z) [Nm]	M (tot) [Nm]
65	700	1000	310	450
100	840	1200	380	550
150	1190	1700	560	800
200	1540	2200	730	1050

4.5 Permissible pressure in the pump casing

The permissible internal compressive stress is specified in the datasheet.

Chapter 4

4.6 Operation and maintenance space requirements



- Allow for free space around the pump (→ dimensional drawing to provide for maintenance work without removing the pump. To simplify installation, use fitting pieces and shut-off devices).
- In addition, plan free space for sufficient drive motor ventilation (→ drive documentation).

4.7 Electric connection

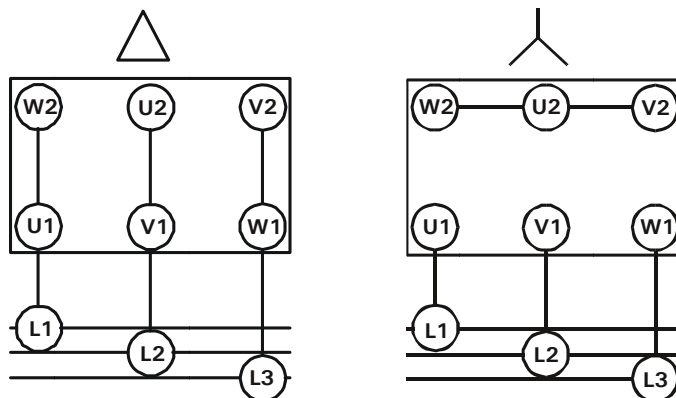


Danger!

Danger to life through electric shock!
Potential consequences: Severe or fatal injuries.

- **Electrical connection by qualified personnel only.**
- **Disconnect system from mains and prevent unintentional restart/reclosing.**
- Check the data on the motor type plate against mains voltage and frequency before connecting the motor.
- When connecting the motor, it is an imperative to heed the drive manufacturer's instructions and the applicable regulations for electrical equipment (e.g. motor protection, main switch).
- Check the phase sequence for the direction of motor rotation prior to making the connection.
- Screw pump are preferably operated on frequency converters or on soft-start control units.

Three-phase current squirrel-cage motor



Low
voltage stated on the type plate.


high

- Provide emergency stop facilities to shut down the pump in the event of dangerous situations.

Manual ViscoTwin 130-xx 3A

Chapter 4

4.8 Driving elements

	Warning!
	<p>Driving elements are quickly moving during operation. They can squash hands. Potential consequences: Severe or fatal injuries.</p>

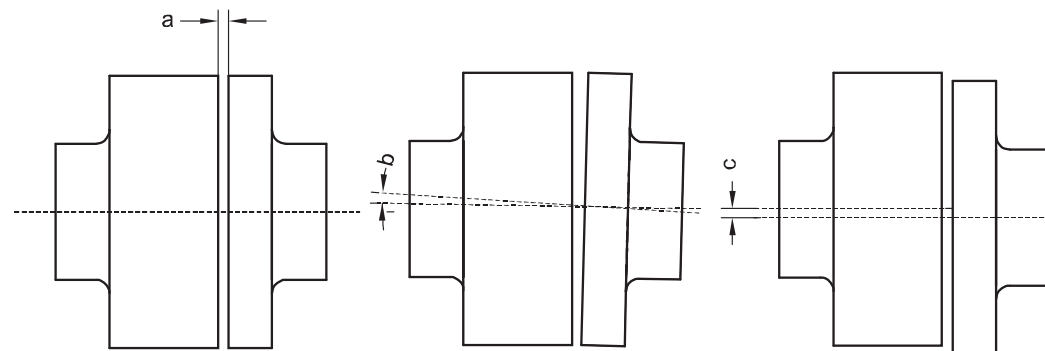
- Always cover driving elements with a protective guard.


4.8.1 Coupling elements

ViscoTwin screw pump with free shaft (cylinder shaft with shaft key) are connected to the drive through a flexible coupling.

ATTENTION	Possible damage to property
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- Do not mount using a hammer
- Use a pull-on device or heat the coupling half to approx. 90 °C.
(Remove rubber parts before) and mount the coupling in hot condition.



	<ul style="list-style-type: none"> • The coupling halves must be aligned against each other.
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- When assembling the drive with the pump, it is necessary to adjust
a = Maximum and minimum clearance
b = Angular offset and
c = Axial offset
acc. to the coupling manufacturer's specifications. (Enclosures)

4.9 Mounting and adjusting additional equipment accessories

Mount additional equipment accessories (speed measuring devices, counter-pressure systems) according to the attached instructions (see Appendix).

Chapter 4

4.10 Shaft seals

It is of the essence that there is a lubricating and cooling film between the seal faces. Depending on application, there are various methods of ensuring that the appropriate medium is being fed to the seal so that this film can be developed. Different types of rotating mechanical seals can be installed into the screw pump. The built-in version is stated on the data sheet.

4.10.1 Single acting mechanical seal

The seal is being lubricated through the medium.

4.10.2 Single acting mechanical seal with Quench

In this version rotary shaft lip type seals provide a quench chamber at the mechanical seal. The quench fluid is being supplied to the seal via a quench reservoir, and the quench fluid is circulated back into the reservoir via a return pipe.

4.10.3 Double-acting mechanical seal with quench and thermo siphon rotation

In this version, the quench fluid is being supplied to the seal via a quench reservoir, and the quench fluid is circulated back into the reservoir via a return pipe.

The quench medium circulates between seal and quench vessel due to the elevated temperature on the rotating mechanical seal faces during pump operation.

Make sure before starting the pump that the quench medium can circulate from the seal to the vessel and back. Carefully bleed the system.

For this purpose, attach the quench vessel approx. 1-2 m above the pump and the seal and vessel should be connected through tubes preferably made from stainless steel. Other tubes or even hoses can also be used temperature and medium permitting. The lines towards the seal inlet must be fastened in continuously falling way and the lines from the seal outlet back to the vessel must be fastened in a continuously rising way. (See Fig. 4a)

ATTENTION

Possible damage to property

- **The quench medium should not exceed a temperature of 70 °C.**
- **No bubbles should form since otherwise circulation would no longer be ensured.**
- **In case that quench fluid temperature has to be cooled, the vessel can be equipped with a condensing coil through which cold water flows.**

4.10.4 Double-acting mechanical seal with flow

The seal is flown through by a quench medium in this version. This medium is supplied from an external source (pressure pipe system, pump, connected 'water line', etc.).

Please ensure that the quench supply has been connected to the seal and quench fluid is flowing through the seal before the pump is started. This is necessary to ensure that the sliding surfaces on the outside are being cooled. Carefully bleed the system.

Both pressure and flow through the seal can be adjusted using a flow meter and two control valves. This flow should be adapted to the heat generation on the seal depending on pressure, speed and media temperature.

Adjust the flow such that the quench fluid outlet temperature does not exceed 40-45 °C. The flow velocity should not drop below 1 l/min.

Chapter 4

4.10 Quench media

The manufacturer uses only quench fluids suitable for food products (e.g. distilled water). Some usable quench media are being shown below. Change these quench media at regular intervals. Do not use aggressive quench fluids.

Glycerine/water mix

This mixture is used in different concentrations. Glycerine does not boil until 290 °C and decomposes in the process. The water vaporises in continuous operation and has to be regularly refilled particularly at higher temperatures of up to 150 °C. Suitable for foodstuffs.

Glycol/water mix

This is also used in various concentrations. Glycol does not boil until 190 °C. The water vaporises in continuous operation and has to be regularly refilled particularly at higher temperatures of up to 150 °C. Suitable for foodstuffs.

Distilled water

Distilled water is a poor lubricant but cools very well. The water boils at 90-100 °C. The water vaporises in continuous operation and has to be regularly refilled particularly at higher temperatures of up to 80 °C. Suitable for foodstuffs.

The following rules have to be kept when using water as a quench fluid:

Solid particles max. 10 mg/l

Particle size max. 50 µm

Permanganate value max. 30 (humus-free)

Iron content max. 1 mg/l

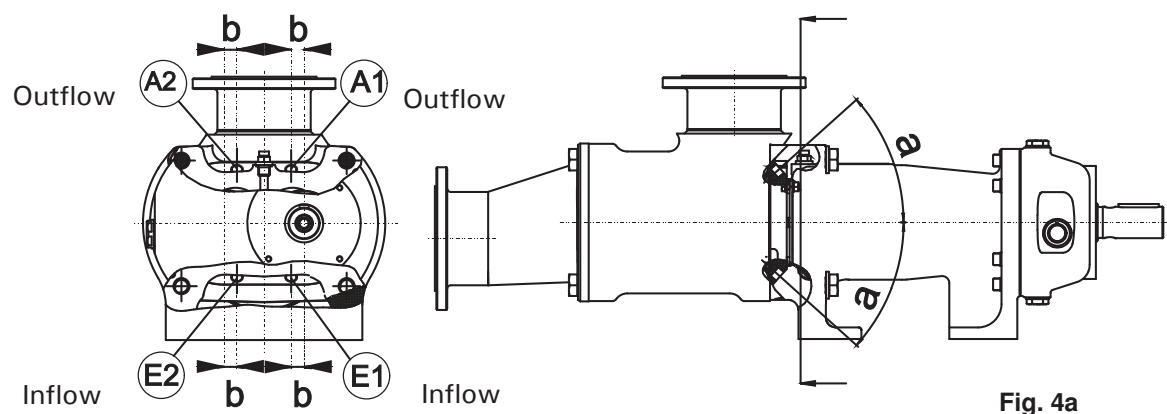
Water hardness max. 10 ° of German hardness (dH)

Critical particle size 2-5 µm

Do not use any de-ionized water

Critical particles of the above-mentioned size of 2 – 5 µm can accumulate between the sliding surfaces resulting in increased wear.

4.11 Quench connections




Pump type	a	b	A1	A2	E1	E2
104	37°	12,5 mm	G1/4"	G1/4"	G1/4"	G1/4"
130	42°	14,4 mm	G1/4"	G1/4"	G1/4"	G1/4"

Chapter 5

5. Commissioning

5.1 Preparing commissioning

	Warning!
	Risk of injuries through rotating machine parts or from liquids escaping under high pressure. Potential consequences: Severe or fatal injuries.

- **Do not perform any work with the pump running!**
- **Only let qualified personnel perform commissioning.**

5.1.1 Pump

Clean the pump prior to initial commissioning.

5.1.2 Sealing system

1. Check the shaft seal (version → data sheet).
2. Oil level in the pump gearbox checked?
3. Auxiliary systems (quench supply of the seals) connected?

ATTENTION	Possible damage to property
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- **Pressurise double-acting mechanical seals using the counter-pressure system.**
- **Operation without quench medium can destroy the seal.**

5.1.3 Pumps for handling foodstuffs

Deploying ViscoTwin pumps for handling foodstuffs make sure that they are clean before commissioning and each production cycle. Cleaning can be carried out as follows:

- **Basically by disassembling the pump and manual cleaning of the component parts using the detergents required for that purpose (hand cleaning).**
- **By the so-called C.I.P. - Cleaning (Cleaning in Place) or S.I.P. (Sterilisation in Place), flushing using appropriate cleaning agents, provided the cleaning method is permissible for this medium.**

A CIP of the pump should be executed at the following times:

- **When the pump is first commissioned for use**
- **When any spare components are fitted into the wetted area of the Pumpenfabrik Wangen**
- **After operations, i.e. before a fairly long idleness of the pump**
- **After long idleness, before re-operation**

With the CIP cleaning process completed, subsequent to initial commissioning, first cleaning cycles, corresponding periods, and any modifications on the system, cleaning process or detergent, the cleaning efficiency has to be inspected (i.e. whether the pump is really clean) by disassembling the pump.

The operator is responsible for securing the cleaning success. The manufacturer cannot assume any warranty for the cleaning success and does not accept any liability for consequential damage.

Chapter 5

5.1.4 Pumps in a processing system by 3A Standard (02-11)

Pumps to be used in a processing system not designed so that the system automatically is shut down if the product pressure in the system becomes less than of the atmosphere and cannot be started until the system is resterilized shall have a steam or other sterilizing medium chamber surrounding (1) the shaft, (2) the portion of the inlet and outlet connection adjacent to the product, and (3) the pump cover.

C.I.P. – process

Are suitable for the materials of the pump:


Surfactant-containing solutions (usually NaOH and HNO₃) with temperatures between 60 and 95 °C and concentrations of 0.5% up to 3%.

Acidic solutions with a pH value of less than 3 must not be used.

S.I.P – process


Are suitable for the materials of the pump:

Sterilization at 125 - 135 °C over a period of 10 to 30 minutes with saturated steam (2.2 – 3.0 bar).

	Warning!
	Risk of injuries through rotating machine parts or from liquids escaping under pressure. Potential consequences: Severe or fatal injuries.

- **Do not perform any work with the pump running!**
- **Disconnect the pump from mains and secure against inadvertent start up. (U-lock)**
- **Use safety gloves and goggles when using aggressive detergents.**

1. Connect pump to CIP cleaning system or switch system.
2. Start cleaning system.
3. Cleaning pipe line system and pump.
4. Shut cleaning system, remove CIP medium completely.

	<ul style="list-style-type: none">• C.I.P. cleaning must conform to the hygiene of foodstuffs regulations as amended from time to time. The specifics pertaining to material stability must be strictly observed.• In case you have developed own C.I.P. cleaning methods for your pumping media, ensure pump suitability for the selected method by consulting the pump supplier.
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ATTENTION	Possible damage to property
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- **Avoid abrupt changes in temperature during the cleaning process. With the pump in stationary state, fill in hot medium and wait until the pump has warmed up.**


Chapter 5

5.2 Switching on

Check before switching on:

- **Pump with drive safely installed and connected?**
 - **Connections sealing and connected stress-free?**
 - **Oil level checked?**
 - **Quench fluid level OK? Correct pressure set in case of a counter-pressure device?**
 - **Rotational direction checked?**
 - **Safety devices (covers and limit switches, safety valve) installed and checked for function?**
1. Before start up, check pump for contamination and foreign objects.
 2. Fully open pressure and suction-side valves.
 3. Fill pump with medium to enable suction safely.
 4. Switch on drive.
 5. When initially operating the pump, check to see whether it and the pipe lines are tight.

5.3 Operation

	<p>Warning!</p> <p>Do not operate against closed shut-off devices. Bursting of the pipe line or downstream system components is possible. Potential consequences: Severe or fatal injuries.</p>
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- **Secure the pump through an approved overpressure protection.**

<p>ATTENTION</p>	<p>Possible damage to property</p>
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- **The pump needs to be cleaned for handling foodstuffs (→ Commissioning pumps for handling foodstuffs)**


Chapter 6

6. Placing out of operation

	Warning!
	Rotating machine parts or liquids escaping under high pressure. Potential consequences: Severe or fatal injuries.

6.1 Shutting off

1. Stop the pump by shutting down and switching off the drive unit.
2. Shut the pressure and suction-side valves.

	Caution!
	Risk of injuries through hot machine parts Potential consequences: Burns.

6.2 Drainage

Drain the pump after shutdown and clean it, particularly when:

- **it is a pump for foodstuffs,**
- **the pump was deployed outdoors and the medium can freeze up due to atmospheric influences,**
- **the pumping medium tends to settle / cool or hardens through chemical reaction.**

6.3 Decommissioning


Please observe following measures when decommissioning the unit or shutting it down for a longer period:

- **Clean the pump thoroughly.**
- **Open the cover so that residual water can run out.**

6.4 Final decommissioning of the pump

1. Disconnect the electrical power (electrical engineering professionals).
2. Close the inlet and outlet lines. Remove pipelines. Drain the pump.
3. Complete emptying and cleaning of the pump. (Professional and material disposal of the residues see also chapter 3)

7. Maintenance and servicing

	Warning!
	Risk of injuries through rotating machine parts. Potential consequences: Severe or fatal injuries.

Do not perform any work while the pump is running!

Drain pump and connected pipe lines and check the surface temperature before opening.

7.1 Maintenance tasks and schedule

Period	Part, position	Who	Tasks and Actions
50 hours after initial startup or general maintenance	All external screws and bolts	Maintenance	Check for correct tightening values according to torque schedule in appendix of this manual.
Continuously (at least daily)	Bearing housing	Operator Maintenance	Check oil level (see chapter 7.4.1): <ul style="list-style-type: none"> If necessary, top up/change oil, see chapter 7.4.2
Weekly	Pump housing	Operator Maintenance	Sanitary Inspection, see chapter 7.2
	Mechanical seals (position 1303)	Operator Maintenance	Check against leakage: <ul style="list-style-type: none"> In case of stronger leakage replace seal faces (position 2327BF) and elastomers (position 2261BF)
	Shaft sealing rings (position 1111)	Operator Maintenance	Check for leakage (e.g. oil on floor or on pump head below position 1111): <ul style="list-style-type: none"> In case of leakage, replace shaft sealing ring position 1111 (see chapter 9). Coordinate further actions with ViscoTec, Inc.
	Spindle screws (position 2180)	Maintenance	Check spindle screws and O-rings: <ul style="list-style-type: none"> If contaminated or medium is leaking → see chapter 7.2
	External bolt connections	Operator	Check tightening torques on conformity with tightening torque schedule in appendix of this manual. <ul style="list-style-type: none"> If required, tighten bolts according to tightening torque values in appendix
250 hours after initial startup	Bearing housing	Maintenance	Replace oil and clean magnets on position 1541 (see chapter 7.4.3)
After 100 hours of operation or at least semi-annually	Pump housing	Maintenance	Check tightening torque of the spindle screws position 2180 (see chapter 9 and appendix for torque values to apply) <ul style="list-style-type: none"> If required, tighten bolts according to tightening torque values in appendix

Period	Part, position	Who	Tasks and Actions
As long as PeakValue is 0: every month	Bearing housing	Maintenance	Check, record and report PeakValue <ul style="list-style-type: none"> Follow instructions as per Table 7-3 in chapter 7.5
If PeakValue is 10:	Bearing housing	Maintenance	Prepare for Bearing housing exchange, notify ViscoTec for upcoming bearing exchange. <ul style="list-style-type: none"> Follow instructions as per Table 7-3 in chapter 7.5
After 500 cleaning cycles or thermal cycles, after one year at the latest	Pump housing and mechanical seals	Maintenance	Renew all O-rings (see chapter 9)
In continuous operation after 3000 operating hours or 1 year	Gear housing	Maintenance	Change gear oil (see chapter 7.4.3)
Annually, if acid sanitizer is used	Shaft seal rings position 1111	Maintenance	Replace shaft seal rings position 1111

Table 7-1: Overview and schedule maintenance tasks

7.2 Sanitary inspection of pumps for food processing

Instructions provided in chapter 7.1 apply exceedingly to sanitary pumps for food processing.

Spindle screws (2180) are to be checked every 100 operating hours. If contamination (underneath the O-ring) is detected, all parts in this sector which are in direct contact with the medium (spindle, spindle screw with O-ring) must be dismantled and thoroughly cleaned in an alcoholic bath. Clean and disinfect the shafts and all inner parts of the pump housing carefully with alcohol solution and a clean cloth. Renew the O-ring of the spindle screw position 2194 and the O-ring position 130 of the Inboard Rotor Holder position 80 inside the mechanical seal.

Subsequently, no corrosion or seizure marks must be visible; otherwise the affected parts must be replaced.

If contamination on the mechanical seal outside the medium is detected after 500 cleaning cycles or one year at the latest, all component parts of the mechanical seal are to be thoroughly cleaned and disinfected in an alcohol bath. Replace all O-rings of the inboard rotor holder (O-ring 90, 130, 140 and 220) (see explosion drawings in appendix).

Subsequently, no corrosion or seizure marks must be visible; otherwise the affected parts must be replaced.

7.3 Special replacements in case of use of acid sanitizer

If acid sanitizer for surface cleaning is used, we recommend replacing shaft sealing rings (position 1111) every 12 months.

7.4 Lubrication

Sufficient lubrication of all bearings is required in order to achieve the designed bearing life span. Shorter oil exchange intervals are required under the following operating conditions:

- large temperature variations

Manual ViscoTwin 130-xx 3A (Visco 140)

- large pressure fluctuations

7.4.1 Checking the oil level



Figure 7-1: Oil level indicator of Visco 140 with NORD M6 placement (90°) indicating appropriate oil level.

- Shut down the pump and wait for 3 minutes until oil has settled. Then determine the oil level. The level needs to be above the centerline of the upper shaft (driven shaft)
- Top up the gear oil if necessary.
- Visual inspection of oil quality by color: Dark and nearly opaque oil must be replaced. The locking screws have a magnetic core. Please inspect thread and gasket, and clean the magnet from debris.

7.4.2 Topping up gear oil

1. Shut down the pump.
2. Open pressure relief screw at position 1541 (with Visco 140 installed on its side with the drive shaft to the bottom, position 1541 is on top).
3. Clean the locking screw thoroughly.
4. Re-fill gear oil up to center line of driven shaft.
5. Mount pressure relief screw position 1541.

7.4.3 Changing gear oil

1. Shut down the pump.
2. Disassemble pump and place pump head with feet downwards.
3. Put a vessel under lower locking screw at position 2233
4. Open lower locking screw at position 2233.
5. Open upper locking screw 2233 and drain the gear oil into a vessel.
6. Clean both locking screws thoroughly from debris.

Manual ViscoTwin 130-xx 3A (Visco 140)

7. Mount both locking screws position 2233 (top and bottom).
8. Reassemble pump.
9. Open pressure relief screw at position 1541 (with Visco 140 installed on its side with the drive shaft to the bottom, position 1541 is on top).
10. Re-fill gear oil up to center-line of driven shaft.
11. Mount pressure relief screw at position 1541.

ATTENTION

Possible damage to property

Only use gear oil approved for the food industry. Use correct type of gear oil. (See list of lubricants)

7.4.4 Lubricating agents

The following gear oil suitable for food products to the FDA guideline NSF-H1 and viscosity of ISO VG 220 is recommended for ViscoTwin applications in the food sector.

Product	Gear oil
Castrol	Optileb Hy 68

Other gear oils of other producers and makes that correspond to the same specification can be alternatively used. (e.g.)

Product	Gear oil
AVIA	AVIAFOOD GEAR 68
Mobil	Mobil DTE FM 68

7.4.5 Lubricating filling quantity

With Visco 140 installed on its side with the drive shaft to the bottom, required filling quantity is 1 L.

7.5 Bearing housing surveillance

Systematic monitoring for bearing vibrations in the bearing housing is required to ensure that the bearings are replaced before they fail. The preferred method is described below. In mutual agreement with ViscoTec Inc, alternative methods may be applied.

7.5.1 Method for bearing monitoring

Measuring equipment

2140 Machinery Health Analyzer or CSI 2600 Machinery Health Expert from Emerson Electric Co., St. Louis MO, USA

Designation and description of technology applied

The PeakValue Technology from Emerson Electric Co. divides whole range of vibration into 6 different so called Fault Stages as listed in table 7-2

Manual ViscoTwin 130-xx 3A (Visco 140)

Fault Stage	Impacting [g's] Peak Value	Early warning with severity
0	0	Good machine
1	10	Alert - notify maintenance.
2	20	Problem getting serious
3	30	Near end of life
4	40	Failure imminent
	50	Failure occurs

Table 7-2: The 6 fault stages of PeakValue method of Emerson (source: Emerson Electric Co.)

Method description

With vibration deviations from the gauged PeakValue 0, the validation is established. According to the schedule listed in table 7-1 and table 7-3, bearing surveillance actions have to be performed.

Period, interval	Task
As long as PeakValue is 0 → monthly	<p>Measure and record PeakValue:</p> <ul style="list-style-type: none"> If PeakValue is 0 → next PeakValue measurement shall take place after 1 month If PeakValue is 10 <ul style="list-style-type: none"> Weekly Peak Value measurement Prepare for bearing housing exchange report to ViscoTec for planning of bearings exchange If PeakValue is 20, immediate bearing housing exchange If PeakValue is 30, immediate pump shut down and bearing housing exchange
As long as PeakValue is 10 → weekly	<p>Measure and record PeakValue:</p> <ul style="list-style-type: none"> If PeakValue is 10 <ul style="list-style-type: none"> Weekly Peak Value measurement Prepare for bearing housing exchange report to ViscoTec for planning of bearings exchange If PeakValue is 20, immediate bearing housing exchange If PeakValue is 30, immediate pump shut down and bearing housing exchange

Table 7-3: Vibration monitoring schedule for Visco 140 (ViscoTwin 130-xx 3A High Pressure)


7.6 Maintenance of shaft seal

Check the quench fluid filling level regularly and at least once a week. Top up the quench fluid as required or change the fluid at regular intervals. The filling level can also be monitored using a level indicator.

Persisting leakage (medium seeps out from the lower opening in the bearing housing) indicates wear of the slip rings or damage to the elastomer rings.

Mechanical seals being operated under counter-pressure need also to be checked for this counter-pressure or monitored via corresponding monitoring equipment (level switches).

7.7 Disassembling the pump

	Warning!
	Risk of injuries through rotating machine parts or from liquids escaping under pressure.
	Potential consequences: Severe or fatal injuries.

- **Do not perform any work with the pump running!**
 - **Disconnect system from mains and prevent unintentional restart/reclosing.**
 - **Only qualified personnel may carry out work on the electric system.**
 - **Only let qualified personnel carry out pump disassembly.**
1. Shut down the pump.
 2. Shut the suction and pressure-side valves.
 3. Let the pump cool.
 4. Drain the pump; collect the flowing out pumping medium and dispose of it.
 5. Disconnect the pump from electrical energy.
 6. Remove connections of auxiliary systems (sealing systems, temperature sensors, etc.).
 7. Remove the pump from the system.

7.9 Shipping the pump for repair

	<ul style="list-style-type: none">• Repair work is only carried out with the declaration of decontamination at hand.
-------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------

1. Drain and clean the pump.
2. Seal all openings and holes.
3. Ship the pump to the manufacturer along with completely filled in declaration of decontamination
4. Attach information about reasons of repair and operating conditions.

Chapter 8

8. Disturbances and their elimination

Disturbances on pumps and pump units can basically be of hydrodynamic, mechanical or electrical nature.

8.1 Mechanical and hydrodynamic disturbances checklist

Type of disturbance	possible cause	Elimination
Pump does not start	Jam by foreign objects	Remove foreign objects
	Deposits at shutdown	Immediately clean pump
	Medium hardens (due to temperature/chemical action)	
	Solids content too high	Check pump delivery conditions, change project planning if necessary
	System pressure too high	Compare pump pressure rating with system conditions, change project planning if necessary
Delivery rate decreases or is not reached any longer	Shut-off devices partly shut, pipe line clogged	Open shut-off devices fully, eliminate clogging
	Screw spindles worn	replace
	Trapped air in medium	Check suction line, medium supply and seals
	Seals defective	Replace seals
Pump does not suck	wrong direction of rotation	Correct direction of rotation, observe directional arrow
	Spindles mounted incorrectly	mount spindles correctly
	Suction line clogged	clean
	Pump or filter clogged	Clean pump / filter
	Suction line draws air.	Seal line / Increase filling level when sucking from tank
Loud pump noise	Cavitation, rotational speed too high or suction pipe too narrow, clogged	Check project planning, chose lower speed if necessary, increase pipe line cross-section


8.2 Electric disturbances

Disturbances in the electric drive of the pumps or the pump unit can have numerous causes (power supply, dimensioning of the drive, motor protection, etc.).


Eliminate disturbances in connection with the electric drive following the attached drive manufacturer's operating and maintenance manual.

Chapter 9

9. Disassembly and assembly


	Warning!
	Risk of injuries through rotating machine parts or from liquids escaping under pressure or hot surfaces. Potential consequences: Severe or fatal injuries.

- Do not perform any work with the pump running!
- Don not operate pump without lantern protection!
- Disconnect system from mains and prevent unintentional restart/reclosing.
- Drain the pump and connected pipe lines and check the surface temperature before opening.
- Let the pump cool.

	Warning!
	Risk of injuries through falling or tipping heavy machine parts. Potential consequences: Severe or fatal injuries.

The pump or parts of it may be very heavy and need to be moved using appropriate lifting gear.

9.1 General notes on disassembly and assembly

	<ul style="list-style-type: none">• Always replace the removed gaskets, O-rings and shaft sealing rings after disassembly.• The numbers stated in the following figures are the F-numbers of the spare parts list.
-------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Please see the enclosed exploded drawing incl. spare parts list for the designations used for the parts.

9.2 Lantern protection

The lantern protection behind the seal housing reliably prevents reaching into the pump. It can be removed for better accessibility of the pump parts for maintenance and repair work.

The pump must not be operated without a mounted lantern protection.

Chapter 9

9.3 Disassembling and installing the pump

9.3.1 Driving elements

	Caution!
	Risk of jamming and crushing when disassembling the drive. Potential consequences: Minor injuries

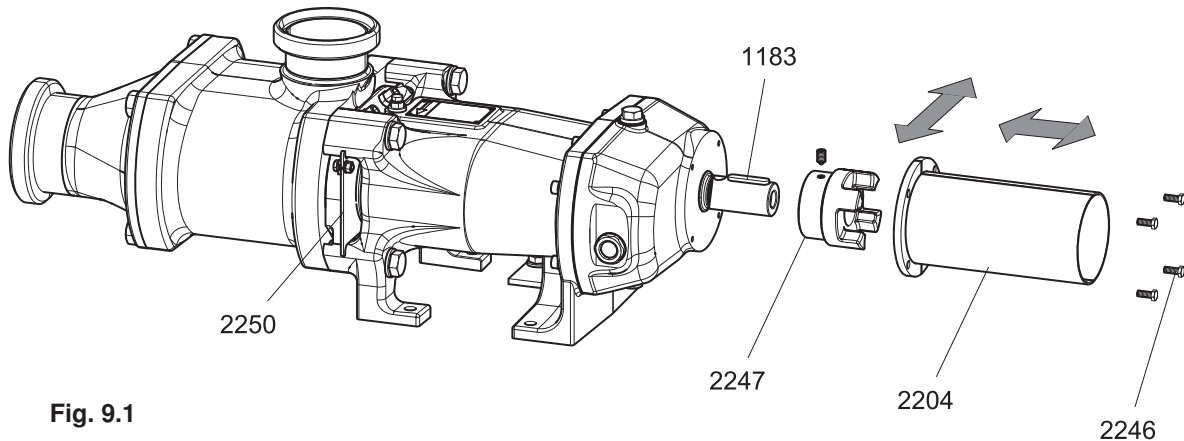


Fig. 9.1

Disassembly:

1. Loosen screws 2246 using a socket of size 10 mm and remove screws and coupling guard.
2. Disconnect the pump from piping system. Loosen the fastening of the pump on the base plate, carefully lift the pump and remove it from the coupling. (Lifting gear) Remove flexible coupling element and keep it.
3. Loosen the threaded pin in coupling part 2247 and pull it out from the pump shaft using a suitable puller. Lift key 1183.

Installation:

4. Insert key into the drive shaft. Slightly grease the drive shaft and slide the coupling onto the shaft. Screw in the threaded pin and tighten it.
5. Mount pump, align it toward the drive. (see chapter 5)
6. Insert both halves of the coupling guard, insert screws 2246 and tighten them.

ATTENTION	Possible damage to property
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- Do not mount the coupling using a hammer.
- Use a pull-on device or heat the coupling to approx. 90 °C (remove rubber parts before) and mount the coupling in hot condition.

Chapter 9

9.3.2 Gear housing

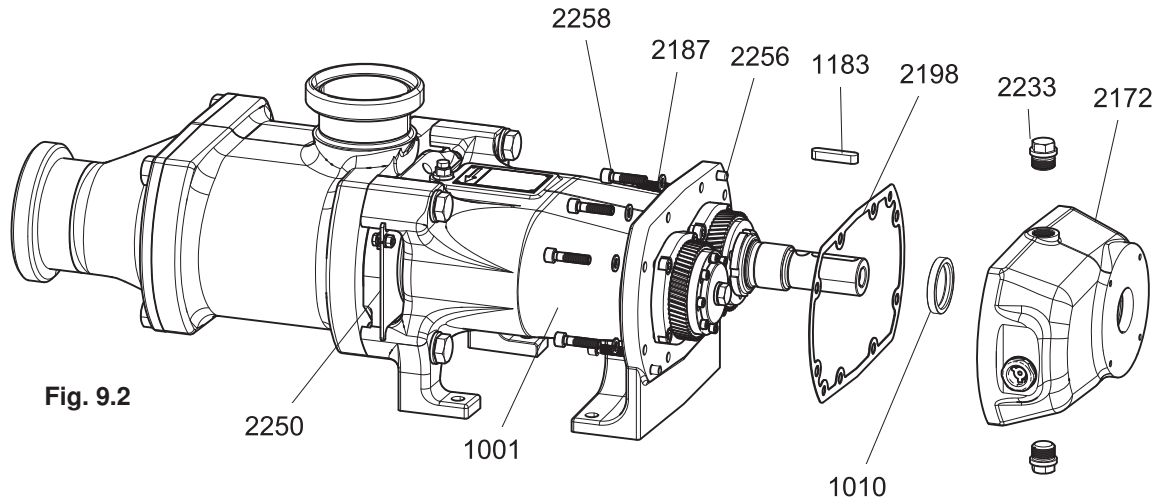


Fig. 9.2

Disassembly:

1. Remove key 1183.
2. Open the upper locking screw 2233 and then the lower locking screw 2233 in gear housing 2172 and drain the gear oil into a sump tray.
3. Loosen the screws 2258 and remove them together with the washers 2187. Carefully pull off the gear housing. This may require slight hammer blows (plastic hammer) since the gear housing has been fitted with cylindrical pins 2256. Carefully remove gasket 2198.

Installation:

4. Clean the sealing surfaces between bearing housing 1001 and gear housing 2172.
5. Insert new gasket 2198.
6. Insert gear housing 2172 into the cylindrical pins 2256, insert and tighten the cylinder head screws 2258 including washers 2187. (Torque 20 Nm)
7. Screw in and tighten the lower locking screw 2233, fill in clean gear oil (see chapter 'Maintenance') and check the oil level on sight glass 1541.
8. Screw in and tighten upper locking screw 2233.

Chapter 9

9.3.3 Cover

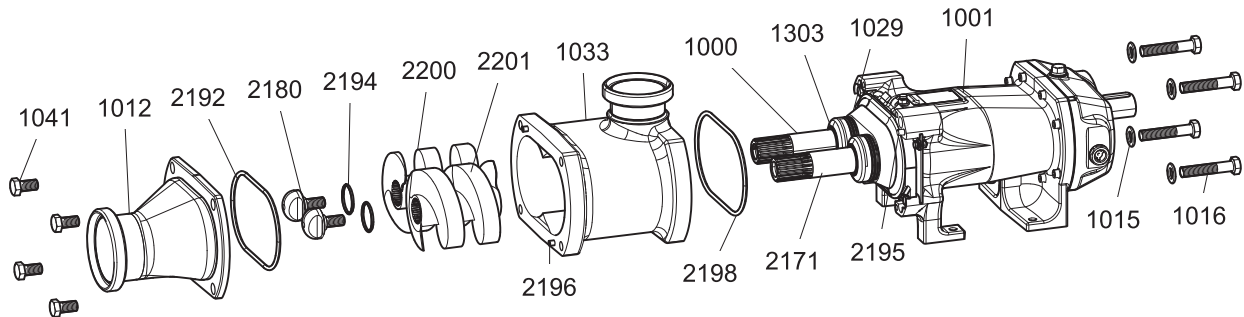


Fig. 9.3

Disassembly

1. Loosen and remove screws 1041.
2. Remove the cover.
3. Thoroughly clean the cover and its seal seat.



- If necessary, loosen the cover using slight blows of a hammer (plastic hammer) because it is centred by dowel pins 2196.

Installation:

1. Insert seal 2192 into the cover. Place the cover onto pump casing 1033 via the cylindrical pins, screw in and tighten screws 1041.

9.3.4 Removing and installing screw spindles



- Relieve existing counter-pressure device, drain quench fluid, unscrew and remove connections.

Disassembly:

1. Loosen and unscrew hexagonal screws 1016 and remove them with washers 1015. Remove pump housing.
2. Loosen and unscrew spindle screws 2180 while holding drive shaft 1000 tight via locking hole using a tool (steel mandrel), carefully remove O-rings 2104.
3. Remove screw spindles 2200 + 2201 from the shaft. (Use puller)
4. Check the screw spindles, shafts as well as the pump casing for damage and carefully clean all parts. Replace O-ring 2198 on seal housing 1029.

Chapter 9

Installation:

Installation:

1. Carefully slide the screw spindles (imperative in pairs) onto the shafts. The left-hand spindle will then be located on the driver shaft (long shaft) and the right-hand spindle on the driven shaft. Observe correct seat of the O-rings when sliding the spindle onto the seal.
2. Insert O-ring 2194 into the greased groove of the spindle nuts.
3. Screw in spindle nuts on both shafts and slightly tighten alternating, manually at first, then using an open-end spanner. In this process, just hold shafts and spindles in place manually.



- **The seals are prestressed when slightly tightening the spindle nuts. Check to see that exterior stator 1A is slowly pushed into the seal housing against its spring.**

4. Tighten the spindle nut on the driving shaft (long shaft) while holding the shaft in place in the drive shaft with the steel mandrel inserted in the hole. Torque = 150 Nm.
5. Tighten driven shaft spindle nut using torque of 150 Nm and block the shaft by inserting a wedge made from soft material (aluminium or copper).
6. Let pump housing 1033 slide into the dowel pins via the screw spindles, insert and tighten screws 1016 with washers 1015 via the bearing housing.
7. Further pump assembly in reverse order.

ATTENTION

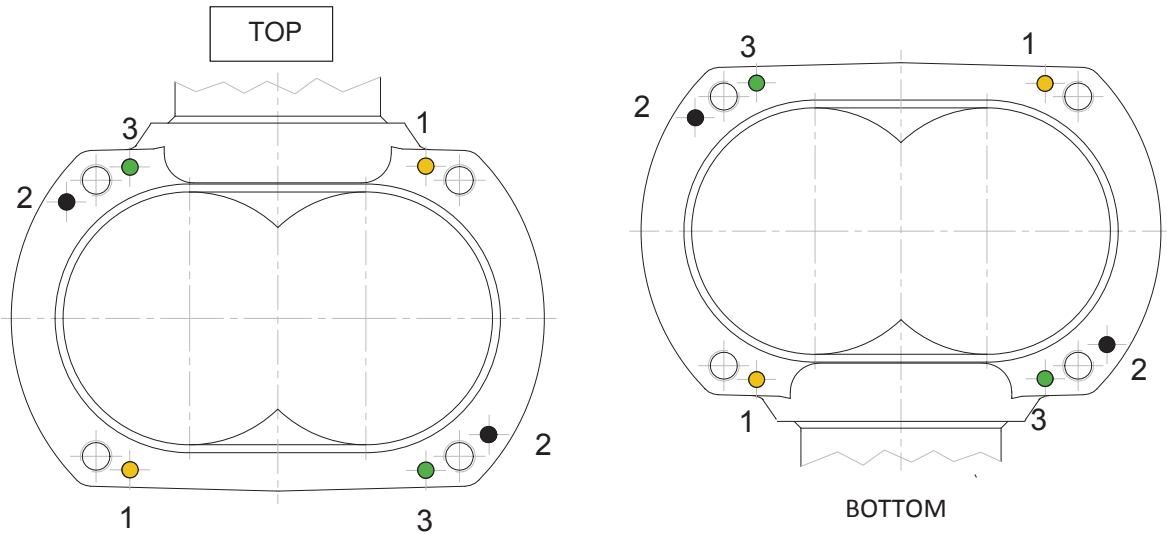
Possible damage to property

- **Carefully slide the screw spindles together onto the shafts.**
- **Before screwing in the spindle screws, wet both threads on the spindle screws with a thread-locking compound (factory uses Loctite 270).**
- **Observe the required tightening torques (Chapter 4)**
- **When replacing screw spindles, you will also need to synchronize them via the pinion gear drives (see Chapter 9.6)**

Chapter 9

9.3.5 Arranging the pump casing

There are 3 intended arrangements of the dowel pins corresponding to the three different positions of the pump casing. The arrangement of the different positions is shown in colours here.



		Pos. of housing nozzle	
		TOP	BOTTOM
Rotating direction	LEFT	1	3
	LEFT/RIGHT	2	2
	RIGHT	3	1

ATTENTION

Possible damage to property

- Wrong combination of the dowel pin arrangement and wrong direction of load rotation results in damage to the pump casing and spindles.
- See the data sheet for correct arrangement of the dowel pins (direction of rotation, direction of flow and position of the housing nozzle).

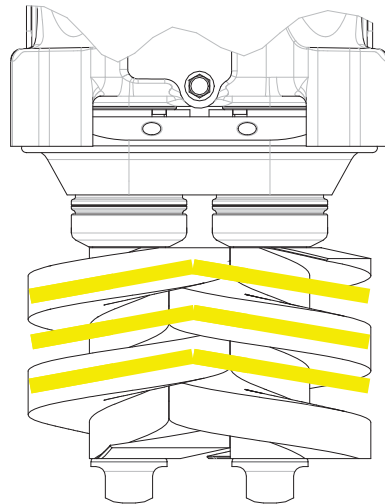
Chapter 9



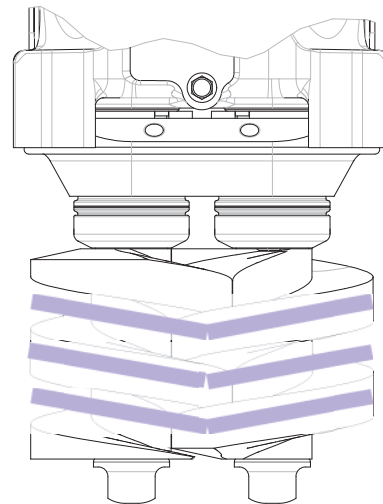
- The pump casing must be clean.
- Screw spindles must also be meticulously clean.
- Apply lubricant to shafts and hubs of the screw spindles (factory uses Germalyn® 2).

9.3.6 Arranging the spindles

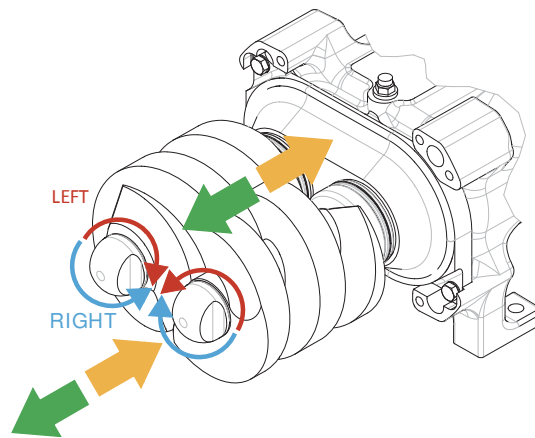
Right-hand and left-hand spindles can be swapped but this will change the flow direction of the pump as well as reversal of drive rotation direction.



V



A



		Flowdirection	
		V	A
Rotation-direction	LEFT		
	RIGHT		

For example: The medium will flow toward the cover nozzle in 'Forward' flow direction and left-hand drive rotation

Chapter 9

9.4 Shaft seal

9.4.1 Shaft seal (single-acting)

Disassembly:

1. Disassemble cover 1012.
2. Disassemble pump housing 1033.
3. Disassemble both screw spindles.
4. Pull down inboard rotor holders 80 from the shaft. Inserted in it are seal face 40, drive pins 210 as well as O-rings 90, 130 and 220. Twist the inboard rotor holder quickly while pulling to separate the seal faces.
5. Loosen screws 2259 of seal housing 1029 and remove it from the shafts along with the remaining seals.
6. Remove the inboard stators 11 from the seal housing. Remove O-rings 140 located in the front section of the seal housing.
7. Using circlip pliers, grasp and remove the retaining rings 200 on the rear of the seal housing. In addition, remove spacers 190, backup rings 180 as well as wave rings 50 in backward direction.
8. Finally, remove drive disc 150 along with drive pins 210 from the seal housing.

ATTENTION

Possible damage to property

- Equally clean the seal housing as well as the shafts and seal seats and carefully check the removed parts. Replace any damaged parts as well as all O-rings and shaft sealing rings
- During disassembly be careful about the drive pins 210. If they get lost use new ones. Therefore use grease to stick them in the holes of the drive discs 150 and inboard rotor holders 80 respectively.

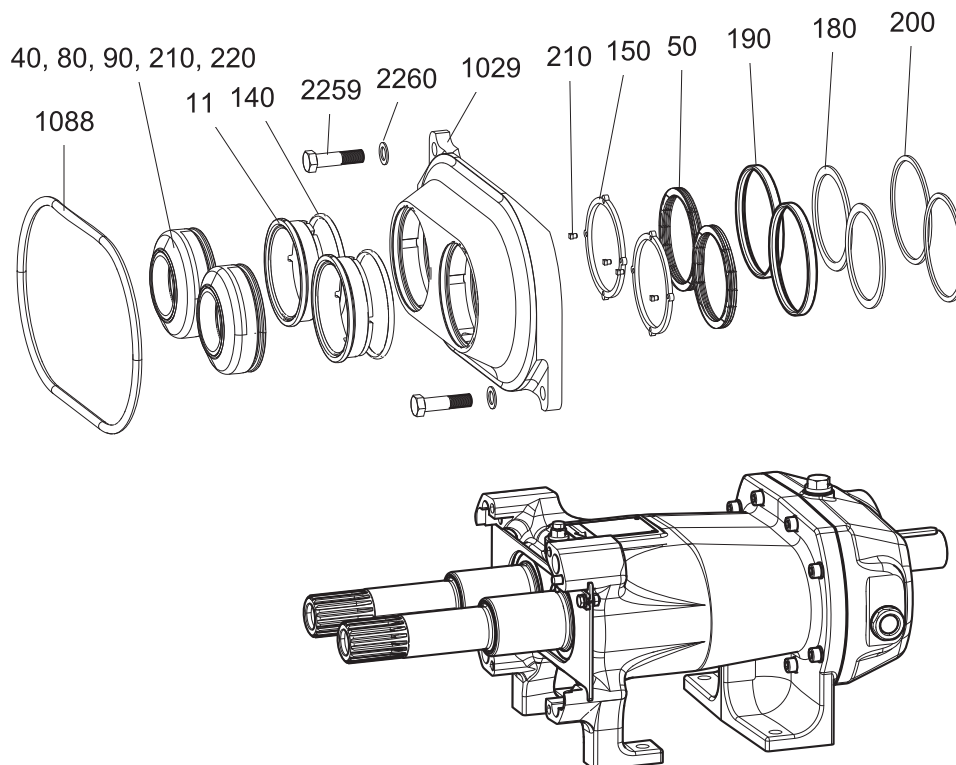
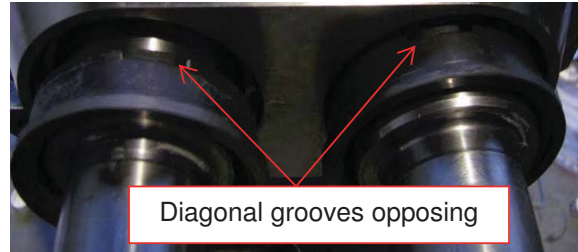


Fig. 9.5a

Chapter 9

Installation:

1. Insert drive disks 150 with the pre-assembled drive pins 210 (glue them into the disc ring using grease) into the seal housing from behind. The drive pins must be directed to the front
2. Fit backup rings 180 into the rear groove of the seal housing. Push wave ring 50 against it from behind. Slide spacers 190 against it.
3. Insert retaining rings 200 using circlip pliers.
4. Insert O-rings 140 into the front groove of the seal housing.
5. Carefully slide the seal housing onto the shafts. Position screws 2259 with washers 2260 and screw them into the pump casing. Tighten the fitting screws (10 Nm torque).
6. Carefully slide inboard stators 11 into the seal housing via the shaft. The stator groove must engage with drive pins 210 of drive disc 150. (see picture)
7. Place inboard rotors 80 incl. seal faces 40 and built-in O-rings onto the shaft.



ATTENTION

Possible damage to property

- Check the free room of motion of the sealing by pushing the inboard rotor holder and spinning it bidirectional. During spinning a small gap shall be noticeable, coming from the gap between the drive pins 210 and the grooves they are positioned in the seal faces. During pushing the gap between the stator 11 and the seal housing 1029 shall stay circular constant.

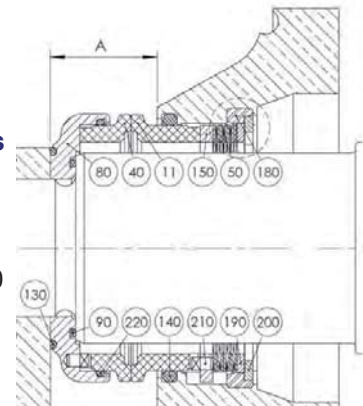
- Therefore dimension A in the drawing showing the sealing cross section shall be controlled. (depth gauge)

A = 33.3 \pm 0.3 mm (ViscoTwin 130); 25.2 \pm 0.3 mm

8. (ViscoTwin 130)

When installing the screw spindles make sure that the O-rings 130 (are located to the front of the inboard rotor holders) are correctly placed in their receptacle. The seals will now be prestressed during the installation of the screw spindles.

9. Insert O-ring 1088 in seal housing, insert pump housing 1033.
10. Screw in screws 1016 with washers 1015 and tighten. (torque 150Nm)
11. Set cover in place with O-ring 2192, screw in screws 1041 and tighten them. (torque 150Nm)



ATTENTION

Possible damage to property

- Slide the screw spindles together onto the shafts.
- Before screwing in the spindle screws, wet both spindle screws 2180 at the spindle nuts with a thread-locking compound (factory uses Loctite 270).
- Observe the required tightening torques (Chapter 4)
- When replacing screw spindles, you will also need to synchronize them via the pinion gear drives (see Chapter 9.6)
- Keep the sliding surfaces free from dust and grease. Avoid any contact with the hands. If necessary, clean with a soft, clean cloth and acetone.

Chapter 9

9.4.2 Shaft seal (single-acting with quench)

Disassembly:

1. Drain the quench fluid. Disassemble the auxiliary systems.
2. Disassemble cover 1012.
3. Disassemble pump housing 1033.
4. Disassemble both screw spindles.
5. Pull down inboard rotor holders 80 from the shaft. Inserted in it are seal face 40, drive pins 210 as well as O-ring 90, 130 and 220.
6. Loosen screws 2259 of seal housing 1029 and remove it from the shafts along with the remaining seals.
7. Remove the inboard stators 11 from the seal housing. Remove O-rings 140 located in the front section of the seal housing.
8. Press out the shaft seals 2272 from seal housing.
9. Using circlip pliers grasp and remove the retaining rings 200 on the rear of the seal housing. In addition, remove spacers 190, backup rings 180 as well as wave rings 50 in backward direction.
10. Remove drive disc 150 along with drive pins 210 from the seal housing.
11. Loosen sets screws 1064 in shaft sleeves and pull off of from shafts. Remove Centrifugal disk 2275. Renew shaft seal 2272 and the centrifugal disk 2274.

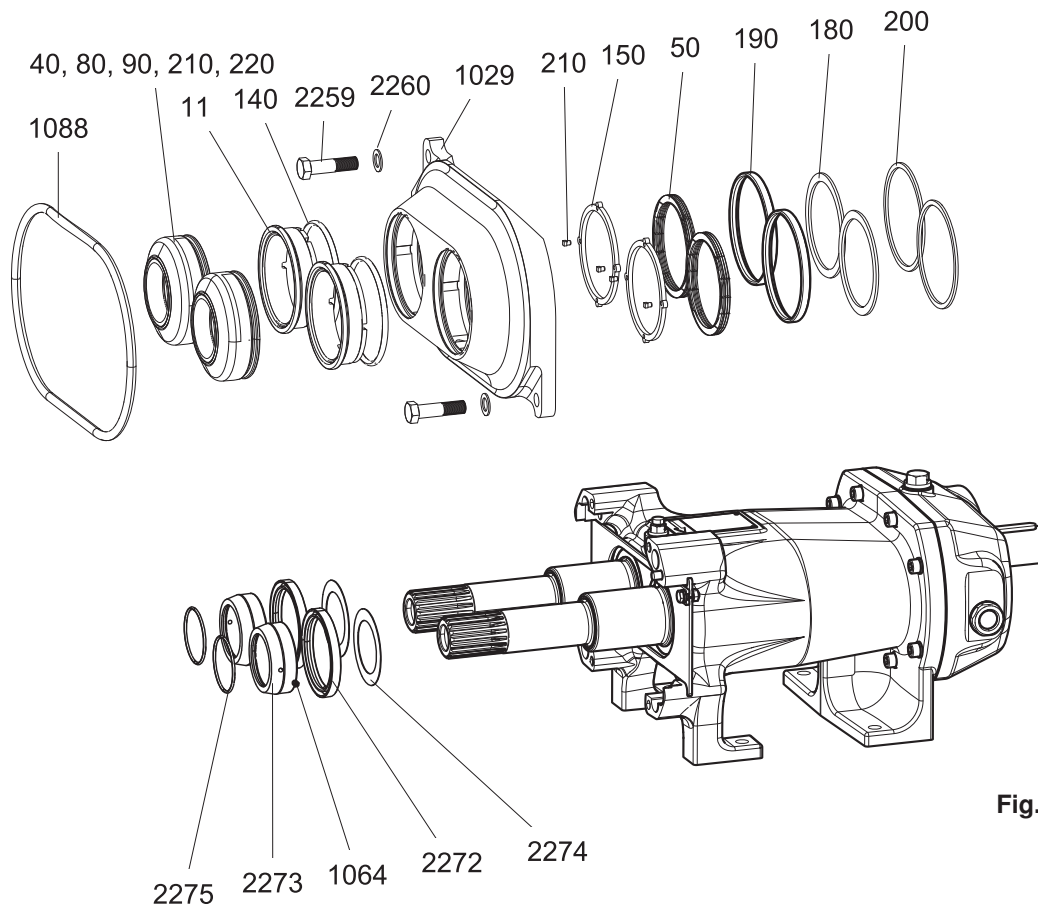


Fig. 9.5a

Chapter 9

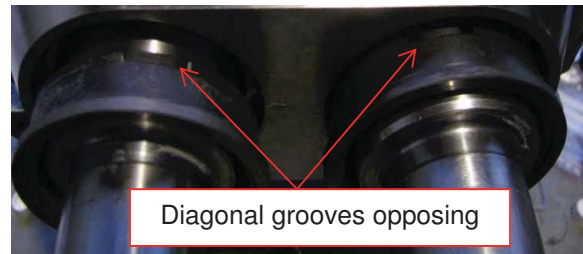
ATTENTION

Possible damage to property

- Equally clean the seal housing as well as the shafts and seal seats and carefully check the removed parts. Replace any damaged parts as well as all O-rings and shaft sealing rings
- During disassembly be careful about the drive pins 210. If they get lost use new ones. Therefore use grease to stick them in the holes of the drive discs 150 and inboard rotor holders 80 respectively.

Installation:

1. Insert disc rings 150 with the pre-assembled drive pins 210 (glue them into the disc ring using grease) into the seal housing from behind. The drive pins must be directed to the front.
2. Fit backup rings 180 into the rear groove of the seal housing. Push wave ring 50 against it from behind.
3. Slide spacers 190 against it.
4. Insert retaining rings 200 using circlip pliers.
5. Insert O-rings 140 into the front groove of the seal housing.
6. Insert centrifugal disk 2274 onto both shafts (against the shaft, shoulder its must be tight)
7. Insert O-rings into shaft sleeves 2273. Lightly grease the shaft sleeves 2273 and push against the centrifugal disk 2274. Screw in set screws 1064 into the shaft sleeves while keeping pushed towards the centrifugal disk and fix it. (1.5 Nm torque)
8. Press in shaft seals 2272 into seal housing 1029.
9. Carefully slide the seal housing onto the shafts. Position screws 2259 with washers 2260 and screw them into the pump casing. Tighten the fitting screws (10 Nm torque).
10. Carefully slide inboard stators 11 into the seal housing via the shaft. The stator groove must engage with drive pins 210 of drive disc 150. (see picture)
11. Place inboard rotor holders 80 incl. seal faces 40 and built-in O-rings onto the shaft.



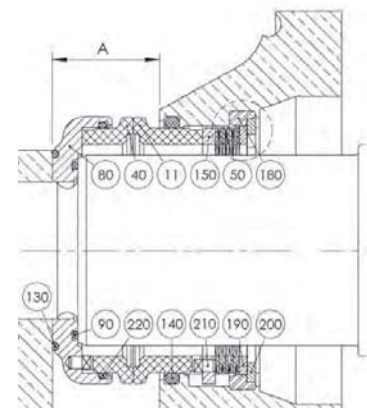
ATTENTION

Possible damage to property

- Check the free room of motion of the sealing by pushing the inboard rotor holder and spinning it bidirectional. During spinning a small gap shall be noticeable, coming from the gap between the drive pins 210 and the grooves they are positioned in the seal faces. During pushing the gap between the stator 11 and the seal housing 1029 shall stay circular constant.
- Therefore dimension A in the drawing showing the sealing cross section shall be controlled. (depth gauge)

A = 33.3 \pm 0.3 mm (ViscoTwin 130)

12. When installing the screw spindles make sure that the O-rings 130 (located to the front of the inboard rotor holders) are correctly placed in their receptacle. The seals will now be prestressed during the installation of the screw spindles. (see 9.3.4)
13. Insert O-ring 1088 in seal housing, insert pump housing 1033.
14. Screw in screws 1016 with washers 1015 and tighten them. (torque 150Nm)



Chapter 9

15. Set cover in place with O-ring 2192, screw in screws 1041 and tighten them. (torque 150Nm)
16. Connect quench chamber, fill up fluid and vent the shaft seal.

ATTENTION

Possible damage to property

- Slide the screw spindles together onto the shafts.
- Before screwing in the spindle screws, wet both spindle screws 2180 at the spindle nuts with a thread-locking compound (factory uses Loctite 270).
- Observe the required tightening torques (Chapter 4)
- When replacing screw spindles, you will also need to synchronize them via the pinion gear drives (see Chapter 9.6)
- Keep the sliding surfaces free from dust and grease. Avoid any contact with the hands. If necessary, clean with a soft, clean cloth and acetone.

9.4.3 Double-acting mechanical seal

9.4.3.1 Disassembly of double acting mechanical seals

1. Relieve quench system or counter-pressure device, drain quench fluid.
2. Disassemble cover 1012.
3. Disassemble pump casing 1033.
4. Disassemble spindle screws 2180 and spindles (twin screws) 2200, 2201.
5. Remove inboard rotor holder 1303BC-80 incl. seal faces 1303BC-40 from the shafts. This will also disassemble O-rings 90, 130 and 220 as well as drive pins 210.
6. Loosen fitting screws 2259 and remove them along with washers 2260.
7. Remove the seal housing 1029 via the shafts.
8. Remove Inboard stators 11 on the front side from seal housing 1029. Remove O-rings 140.
9. Pull out outboard stators 12 from the seal housing via the rear side of the seal housing. Remove O-rings 140 and backup rings 170.
10. Remove disc rings 150 along with built-in drive pins 210 from the seal housing.
11. Pull off outboard rotors 20 from the shafts.
12. Remove wave rings 50 from the shafts.
13. Loosen the threaded pins of stop rings 110 and pull off the stop rings 60 incl. O-rings 30 and 160 from the shafts.

ATTENTION

Possible damage to property

- Equally clean the seal housing as well as the shafts and seal seats and carefully check the removed parts. Replace any damaged parts as well as all O-rings and shaft lip type seals.
- During disassembly be careful about the drive pins 210. If they get lost use new ones. Therefore use grease to stick them in the holes of the drive discs 150 and inboard rotor holders 80 respectively.

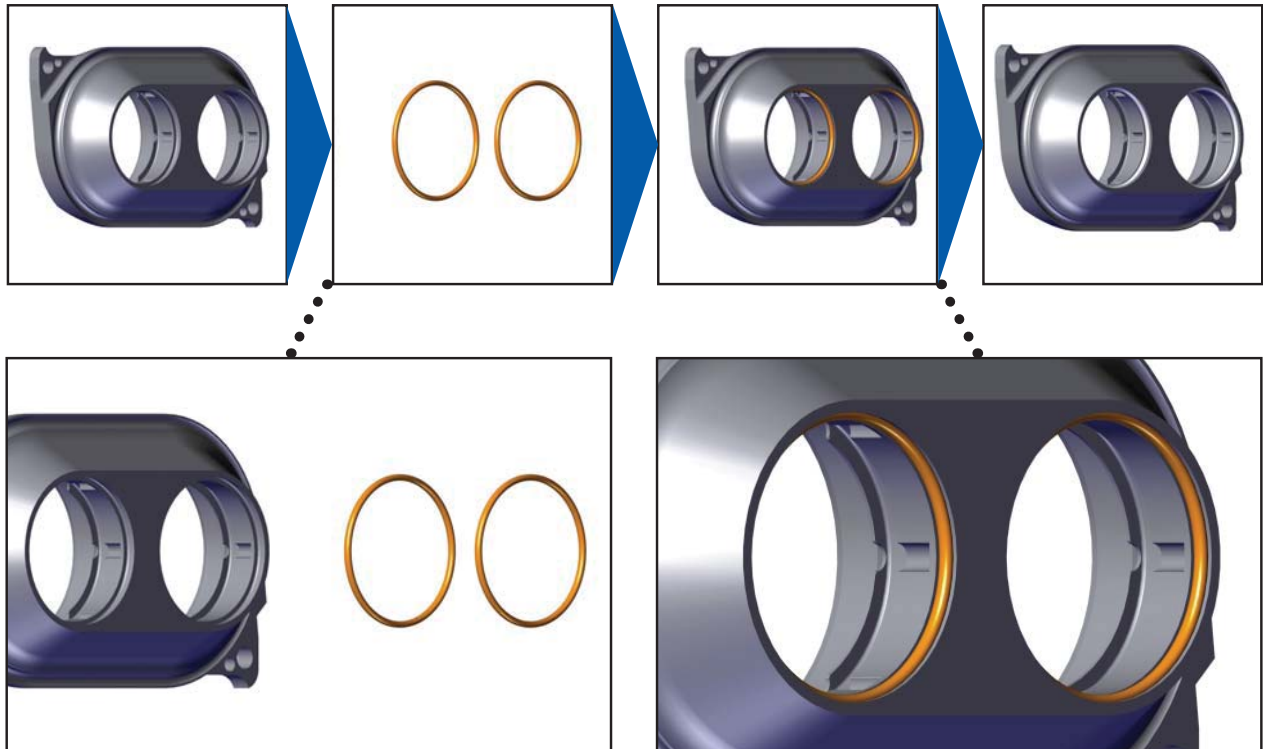
9.4.3.2 Assembly of double acting mechanical seals

see following pages.

Assembly of double Acting Mechanical Seals



Step 1: placing O-Rings



Tool/ Components:

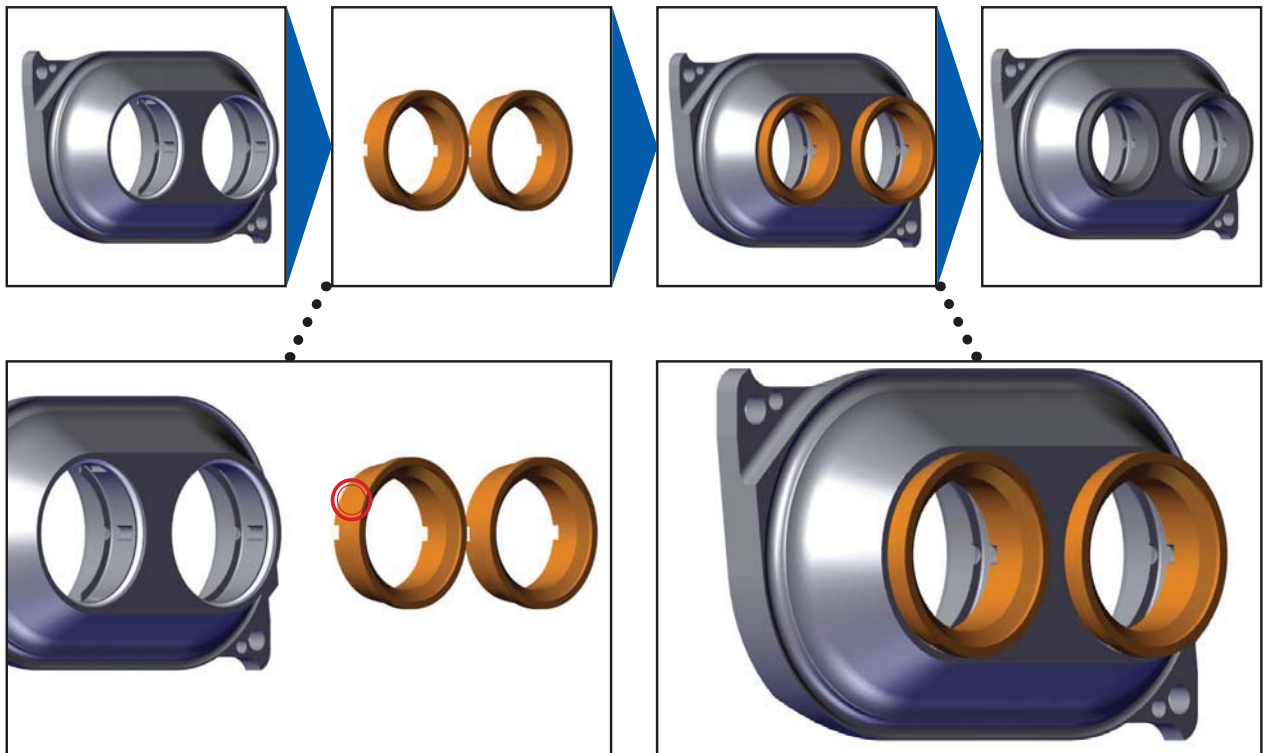
Food Grade Grease
Cleanser
Cleaning-Cloth
O-rings 58x3 Pos.3 (2x)

Steps:

- Clean O-ring grooves
- put lubricant on O-rings (thin layer only)



Step 2: placing seal-faces on product side



Tools / Components:

Lubricant

SealFace Pos. 1 (2x)

Steps:

Outer surface of seal faces cover with thin layer of lubricant

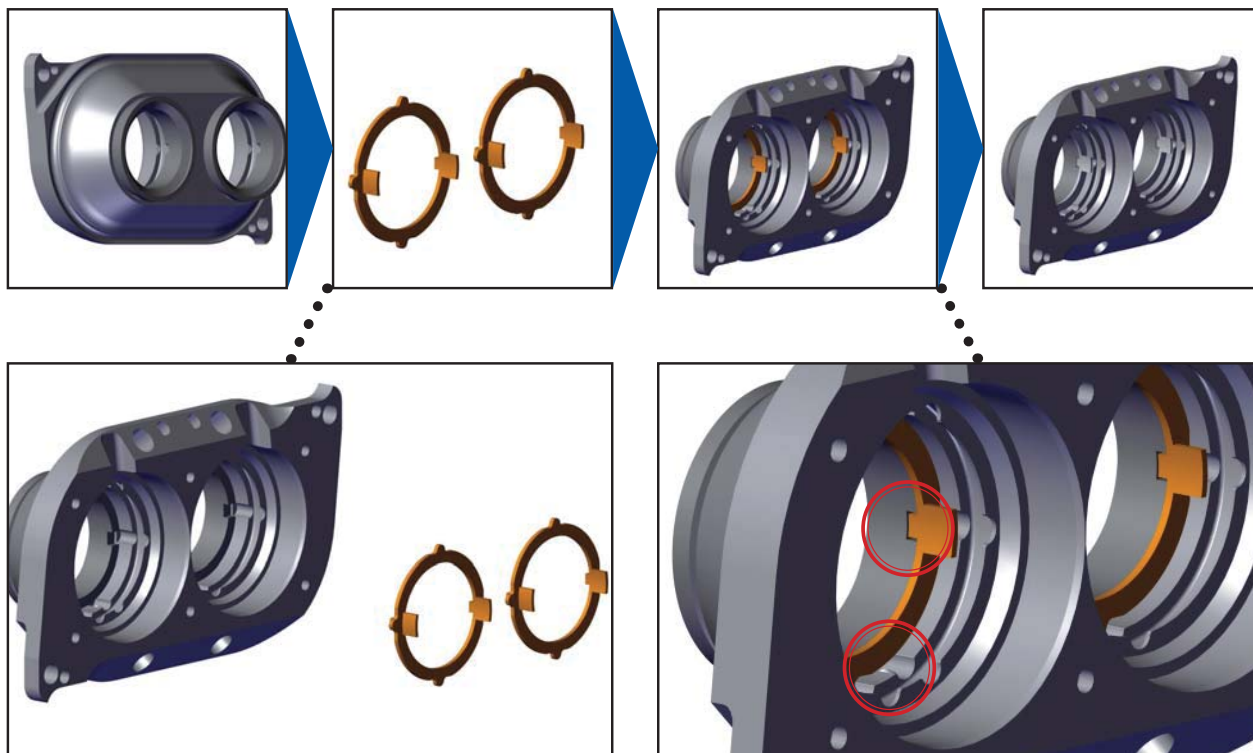
Carefully place the seal faces straight into place. Grooves need to fit over cross.

Caution:

Front of seal face is delicate, do not use tools. Scratches will lead to leakage.



Step 3: set pressure rings



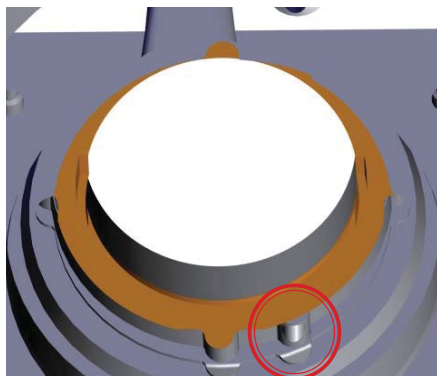
Tools / Components:
Pressure Ring Pos. 7 (2x)

Steps:

Place pressure ring into grooves
place into grooves in positions:

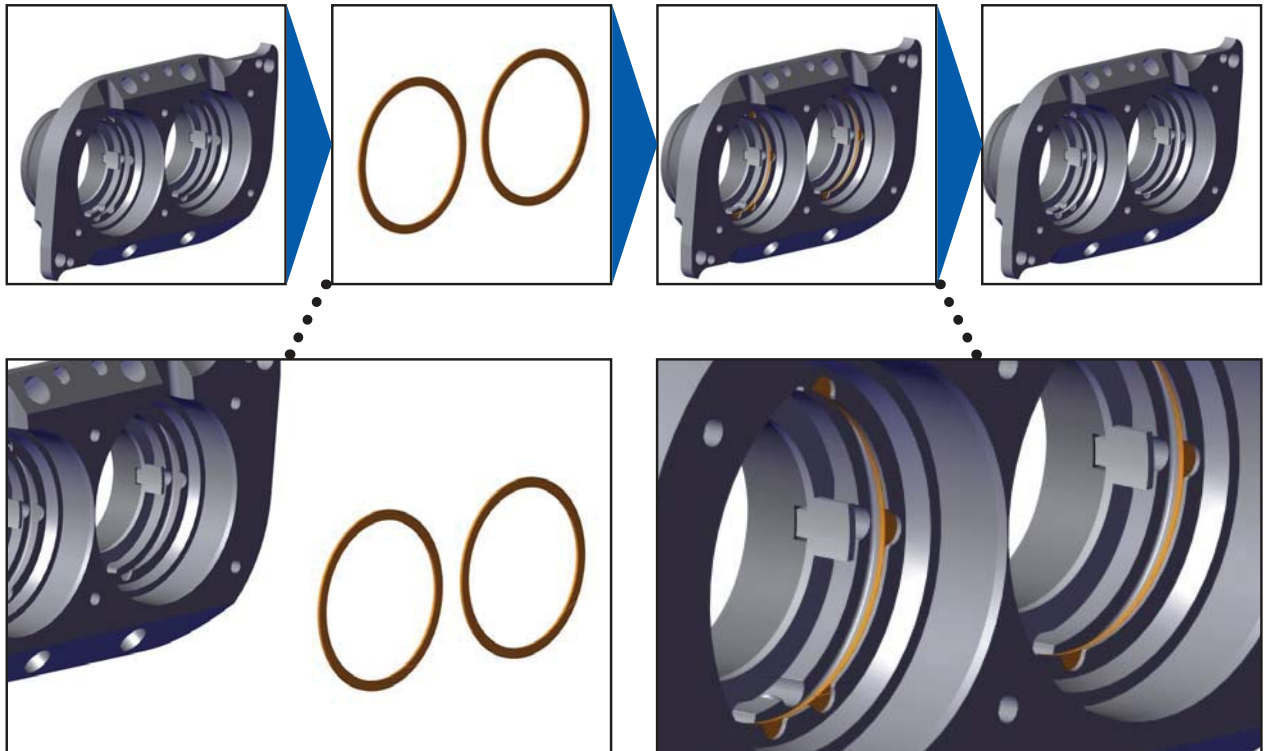
12-3-6-9

Keep flushing grooves clear!





Step 4: place plastic safetyrings



Tools / Components:

Safety rings Pos.13 (2x)

Steps:

Clean grooves thoroughly

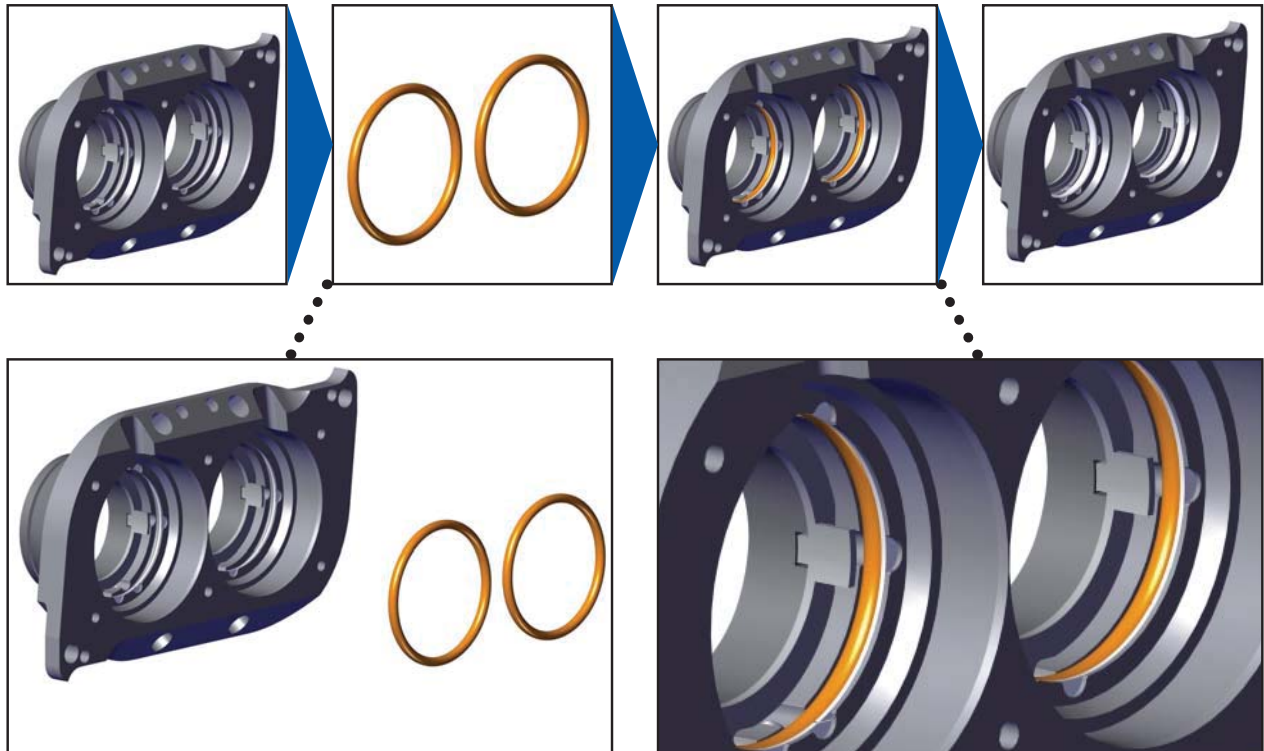
insert safety rings and insure snug
fit to rim

Do not rip safety ring apart

Assembly of double Acting Mechanical Seals



Step 5: place O-Rings 43x2



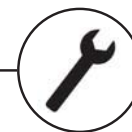
Tools/Components:

O-Rings Pos. 4 (2x)

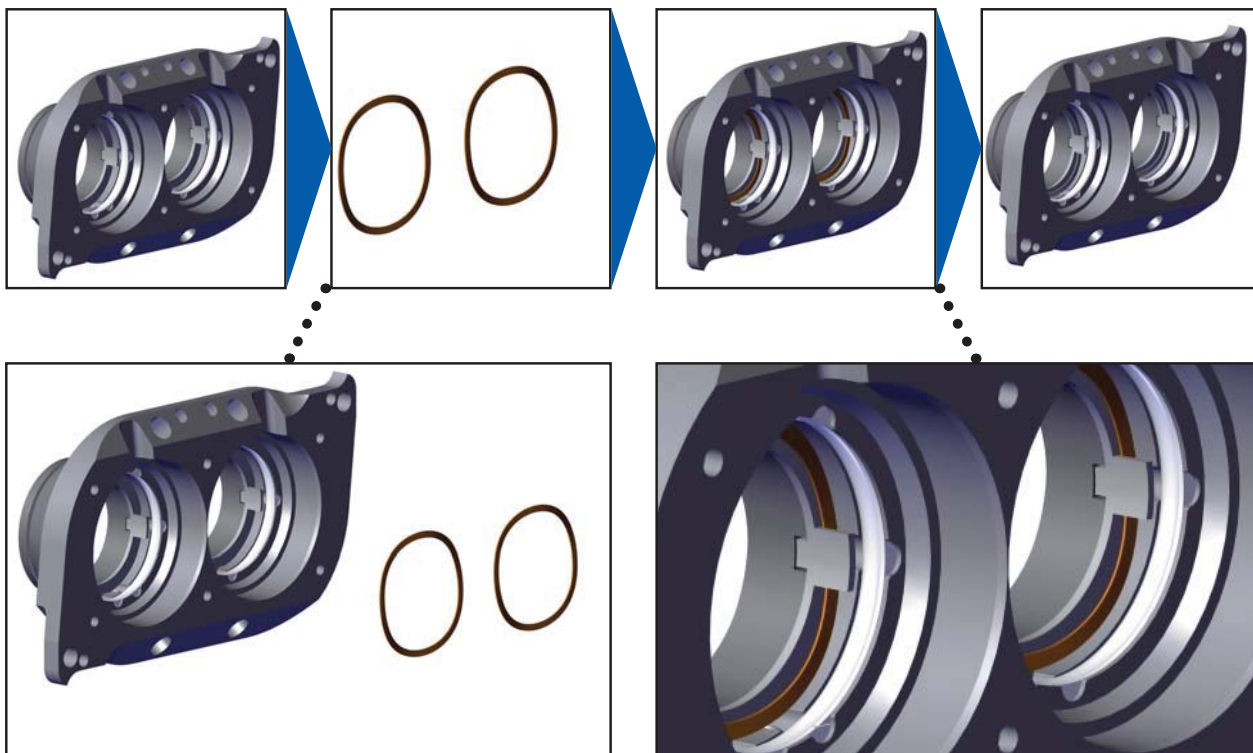
Steps:

Place O-ring behind safetyring

Assembly of double Acting Mechanical Seals



Step 6: place sinus-spring 43x2



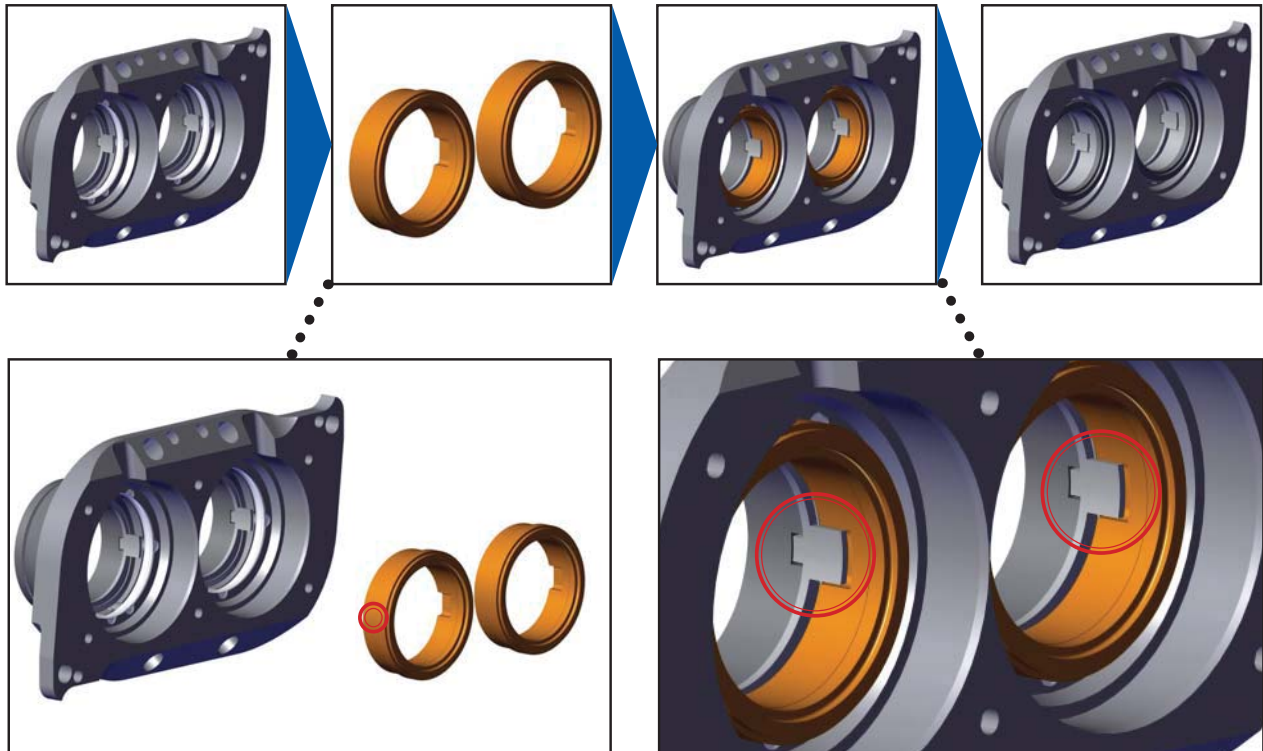
Tools / Components:
Sinus spring Pos. 8 (2x)

Steps:
Place Sinus spring at Pos. 8

Assembly of double Acting Mechanical Seals



Step 7: place seal face atmospheric



Tools / Components:

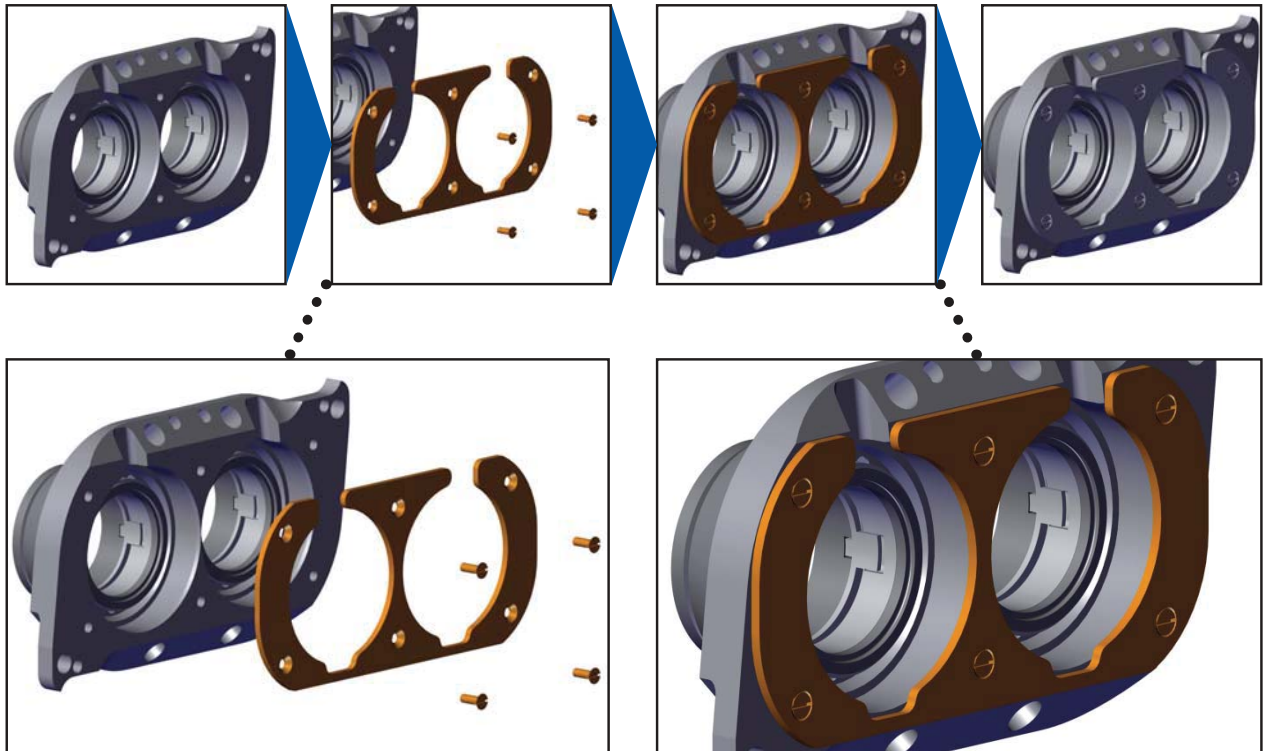
Seal faces Pos. 2 (2x)

Steps:

Put a thin layer of lubricant on the outside of the seal face.
Place seal face (Pos.2) the way the groove of the seal face fits the cog of the pressure ring (Pos.7) on both sides accurately



Step 8: mounting locking plate



Tools / Components:

Screw driver
Lubricant

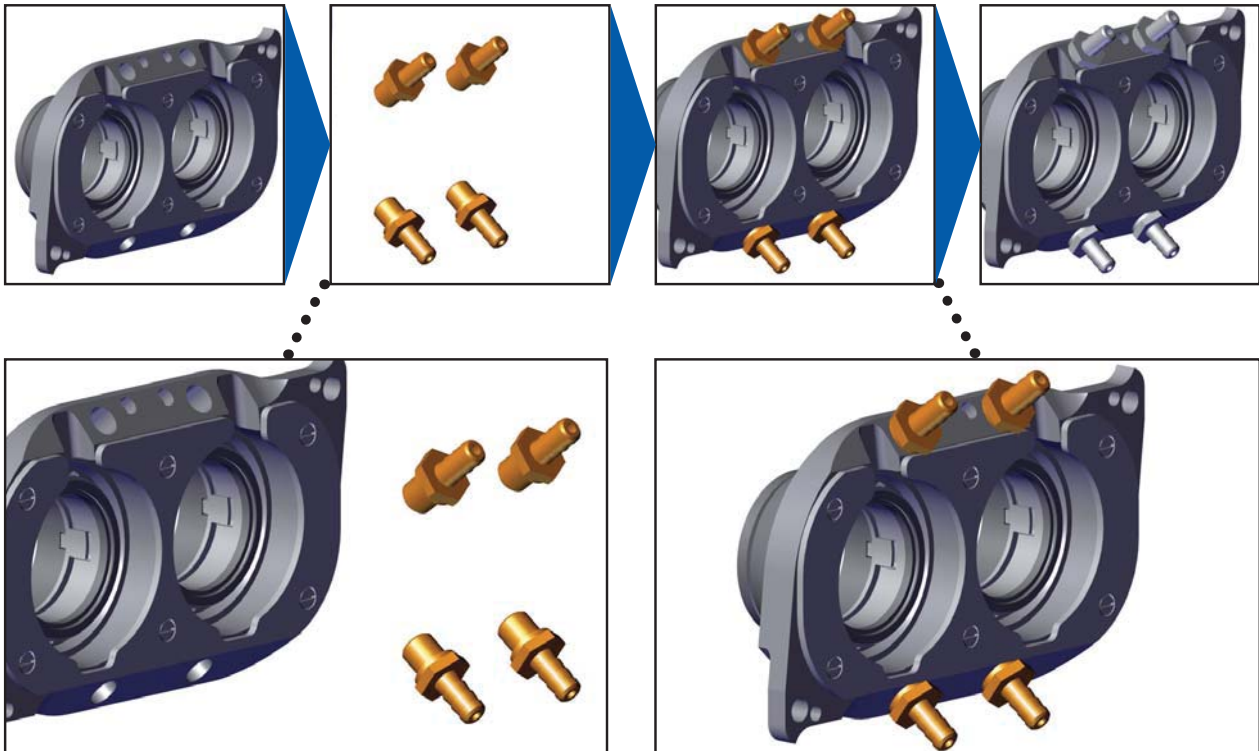
Cleanser/Cleaning Cloth
Locking plate 2324
countersunk head screws 2325

Steps:

Lubricate countersunk head screws
Clean locking plate
mount locking plate 2324 on sealing body 1029
with countersunk head screws
torque to 7.375 lb/ft (10 Nm)



Step 9: mounting of flushing-sockets



Tools / Components:

Teflonband (for sealing)

Wrench SW19

for double acting mechanical seals:
Flushing hose-sockets 1864 (4x)

For single acting n=mechanical seals:
Lamellar plugs 1966 (4x)

Steps::

Wrap some Teflon band around the outer thread of the nipples. (Depending on the sealing type, a different connection might be applicable:

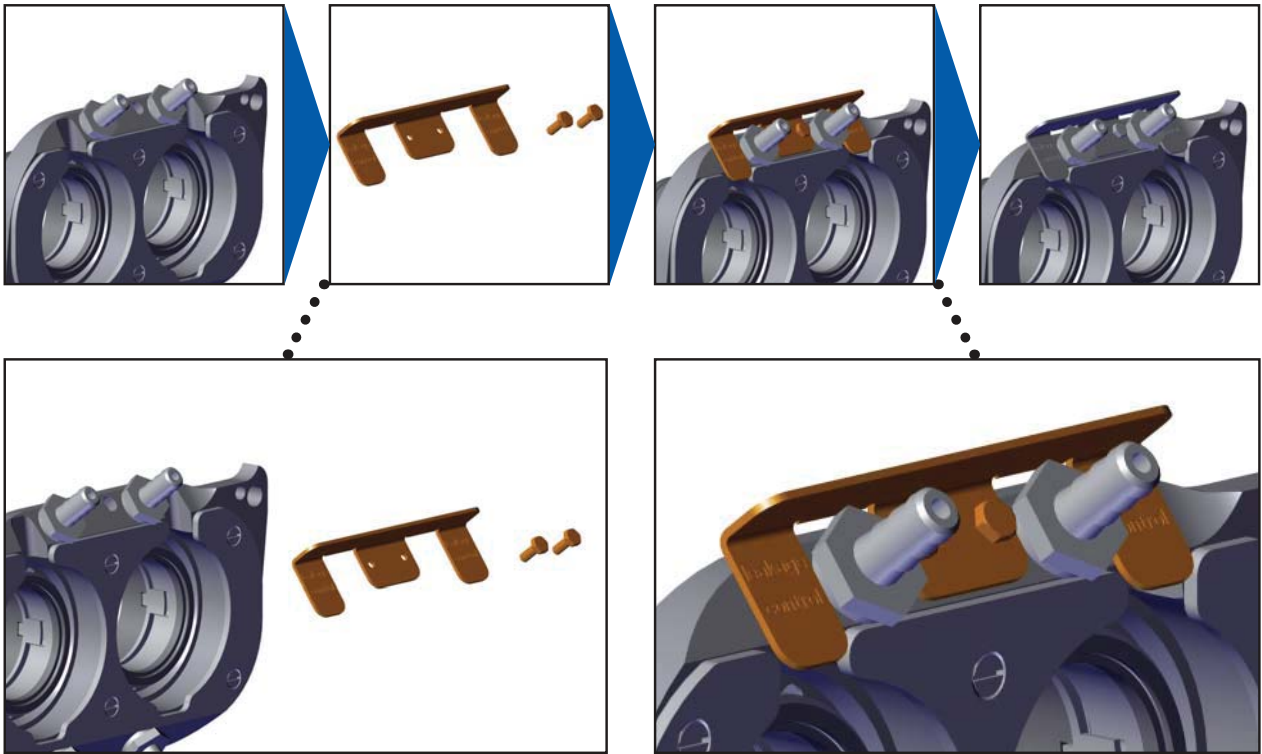
- Double acting mechanical seal
- single acting mechanical seal

Torque to :14.750 lb/ft |(20Nm)

Assembly of double Acting Mechanical Seals



Step 10: Mounting of guard plate



Tools / Components:

Loctite, blue (medium hard))
Wrench SW8

guard plate 2286
Hexhead bolt 2287 (2)

Steps:

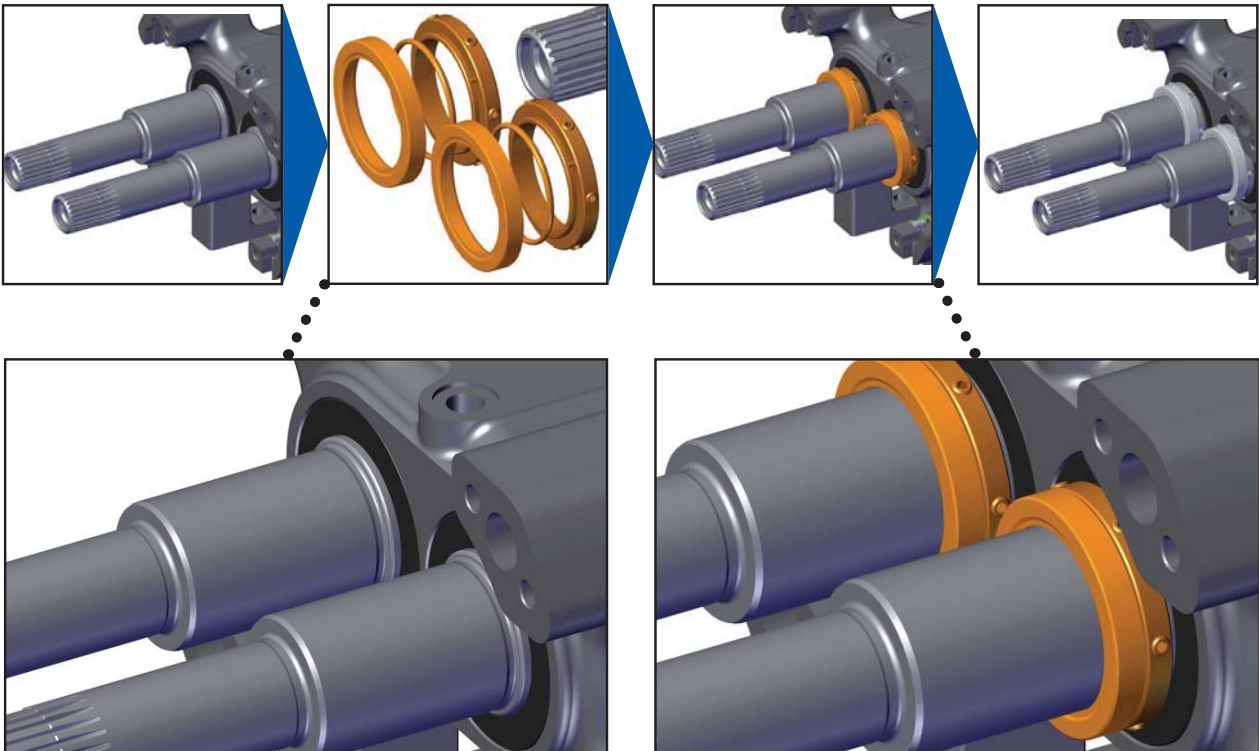
Drip a small amount of loctite blue
on hexhead thread

Torque: 7.375 lb/ft (10Nm)

Assembly of double Acting Mechanical Seals



Step 11: mounting of stationary seat rings



Tools / Components:

Allen key 2,5 Loctite
blue (medium strength)
Stationary Seat rings
Pos. 6; 11;14; 15

Steps:

Position stationary seal rings to
suspension point .
Lubricant threads of set-screws.

Caution: tigh the set crews cross wise

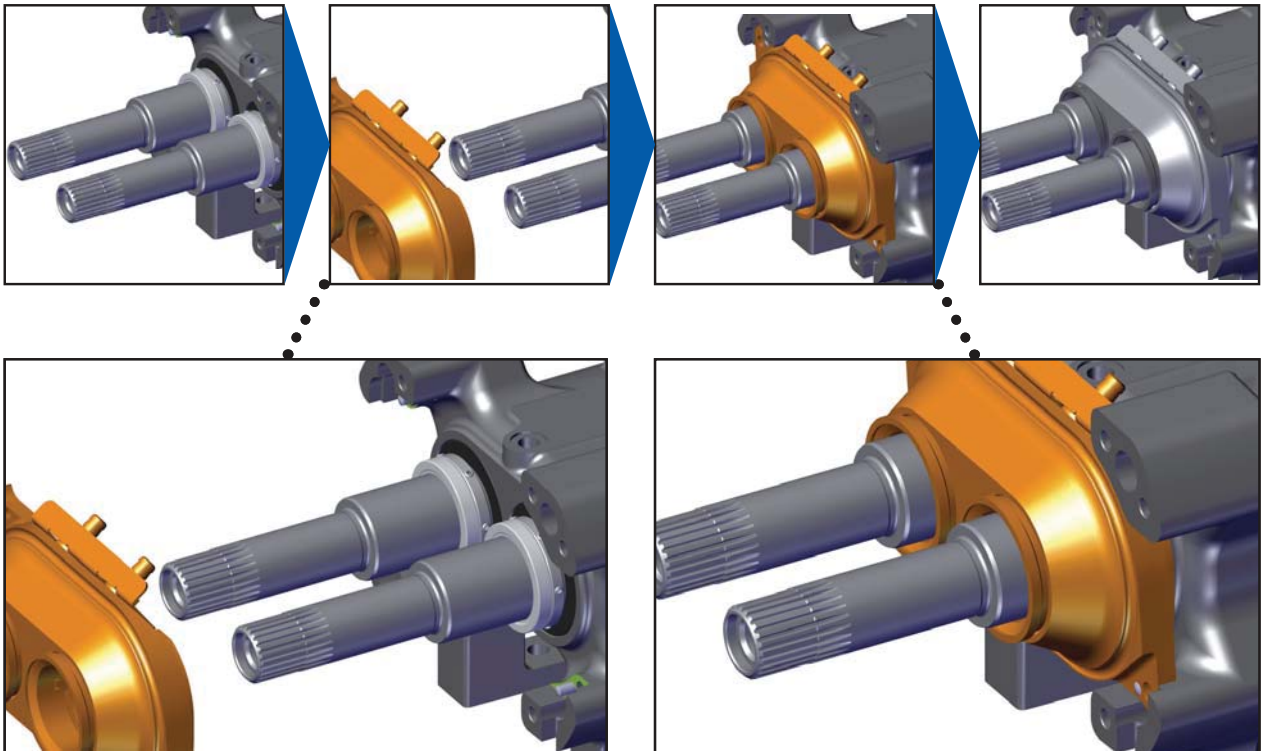
Torque: 3.68 lb/ft (5Nm)



Double Acting Mechanical Seal



Step 12: set sealing body in place



Tools / Components:

Double acting mechanical
seals premounted
cleanser & cleaning cloth

Steps:

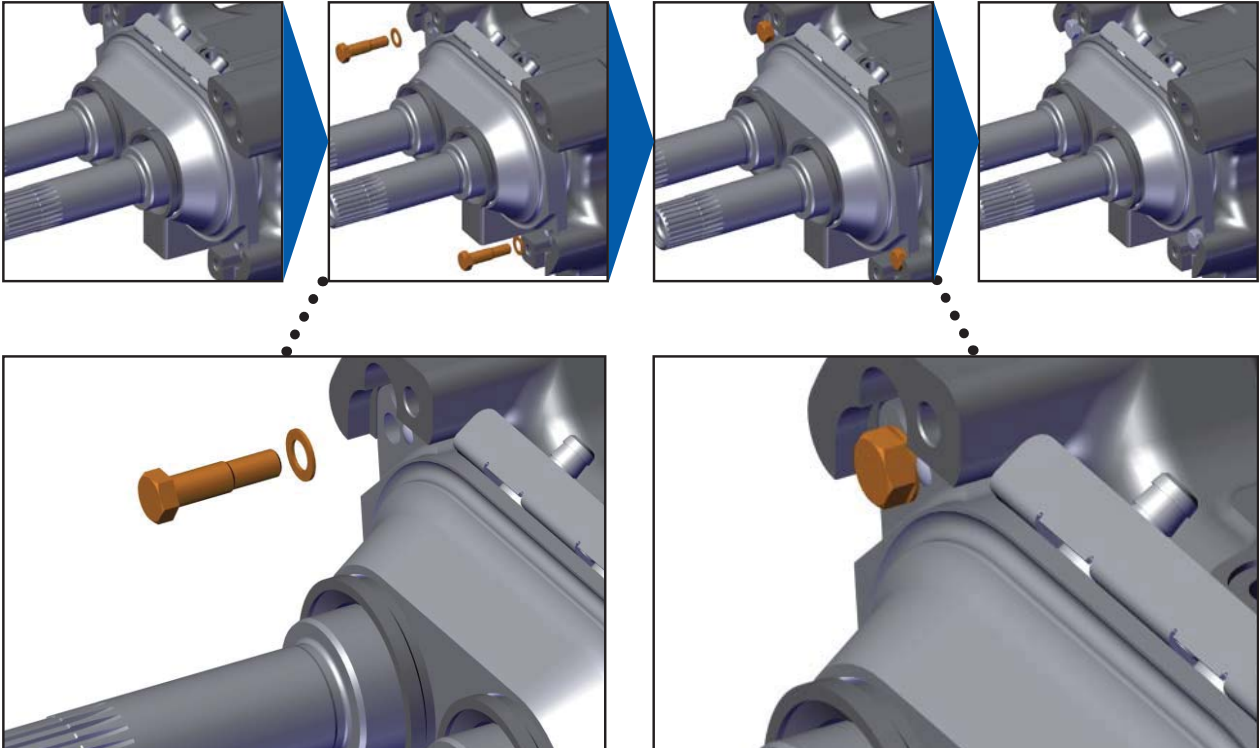
Degrease and clean seal face
surfaces Pos.2 + Pos.6

Implement sealing body

Assembly of double Acting Mechanical Seals



Step 13: tighten sealing body on bearing housing



Tools / Components:

Socket wrench
socket SW13 Dowel
screw 2259 (2x)
Washer 2260 (2x)

Steps::

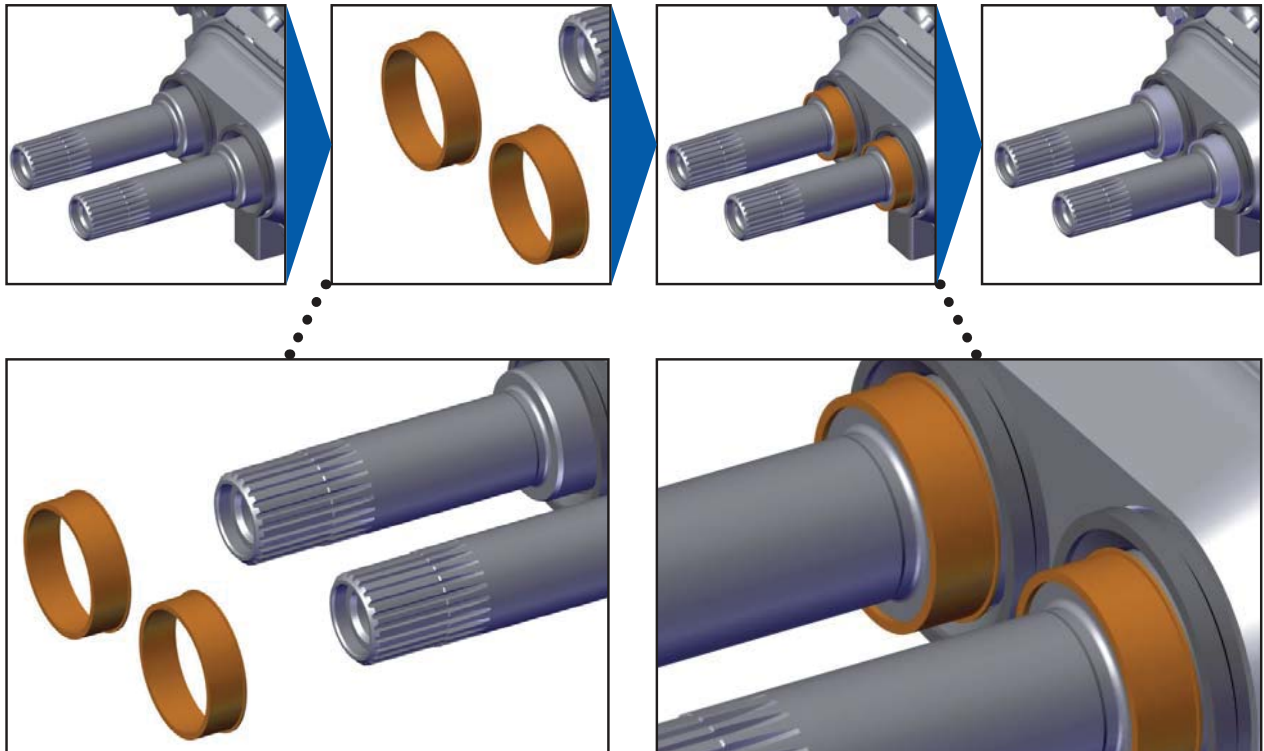
screw in dowel screw and washer in
the bearing housing 2276

Torque to :59 lb/ft (80Nm)

Assembly of double Acting Mechanical Seals



Step 14: position insert ring



Tools / Components:

Cleanser
Cleaning Cloth
Lubricant
Insert ring Pos.16 (2x)

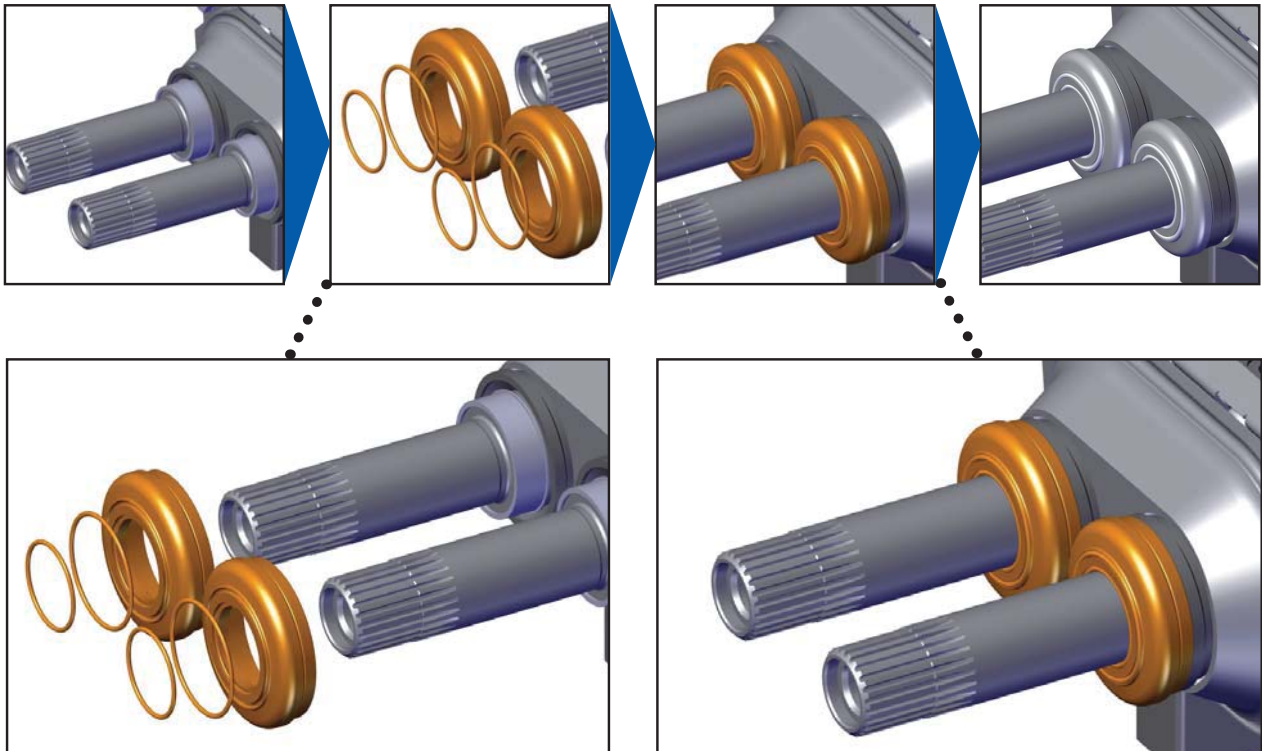
Steps:

Clean insert rings
clean drive shafts
Lubricate joining area
position insert rings

Assembly of double Acting Mechanical Seals



Step 15: mounting of seal faces on product side



Tools / Components:

Cleanser/
cleaning cloth
Lubricant
O-ring Pos. 9 (2x)
O-ring Pos 12 (2x)

O-ring Pos. 3 (2x)

Sealing housing Pos. 10 (2x)
Rotating seal face Pos. 5 (2x)
Pins Pos. 17 (4x)

Steps:

Lubricate O-rings Pos. 9 and Pos. 12
Insert O-rings Pos. 9 and Pos. 12 in the
seal face housing Pos. 10 .




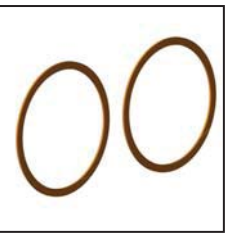

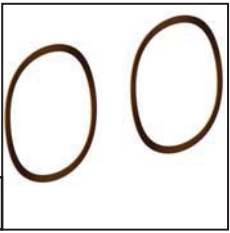





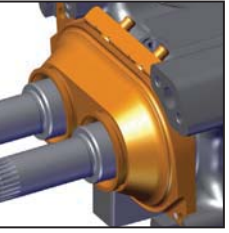
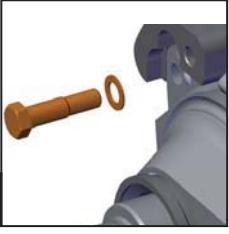


position seal face housing on drive
shafts until snug fit
Pos. 9;12;3;10;5;17

Caution: degrease seal faces before
positioning seal face housing Pos. 5
This step is important to prevent from
braking seal faces due to extended
period of non-operating the pump.

Assembly of double Acting Mechanical Seals



Final checklist

<input type="checkbox"/> 1. Step		<input type="checkbox"/> 2. Step		<input type="checkbox"/> 3. Step		<input type="checkbox"/> 4. Step	
<input type="checkbox"/> 5. Step		<input type="checkbox"/> 6. Step		<input type="checkbox"/> 7. Step		<input type="checkbox"/> 8. Step	
<input type="checkbox"/> 9. Step		<input type="checkbox"/> 10. Step		<input type="checkbox"/> 11. Step		<input type="checkbox"/> 12. Step	
<input type="checkbox"/> 13. Step		<input type="checkbox"/> 14. Step		<input type="checkbox"/> 15. Step			

Chapter 9

9.4.4 Bearing

Disassembly:



- For this purpose, the following pump elements need to be removed before: drive, coupling elements if necessary, gear housing, cover, pump casing, screw spindles, and shaft seal.
- Disassembled bearings need to be replaced with new ones during the assembly work.



- Be sure to mark the position of the gear wheels to one another now.
- Only loosen screws 2186 when disassembling the gear wheels if the installation of new shafts, screw spindles or a new basic setting of the pump is being intended.

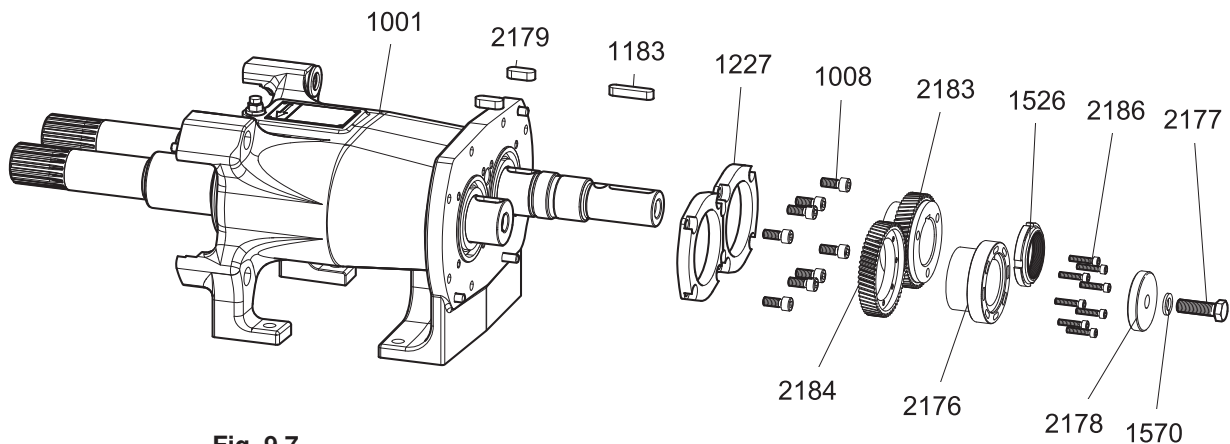


Fig. 9.7

Special tools:

Hook spanner for shaft nut, steel mandrel for counter holding, assembly press, various mounting sleeves

1. Loosen hexagon screw 2177 of driven shaft 2171 and remove it incl. washer 2178.
2. Pull off gear wheel 2184 incl. hub 2176 from the driven shaft.
3. Loosen and remove shaft nut 1526 of the drive shaft (counter hold via the locking hole in the shaft using a steel mandrel).
4. Remove gear wheel 2183 from the shaft.
5. Remove and store keys 2179.
6. Loosen cylinder head screws 1008 of bearing caps 1227 and remove the bearing caps.

Chapter 9

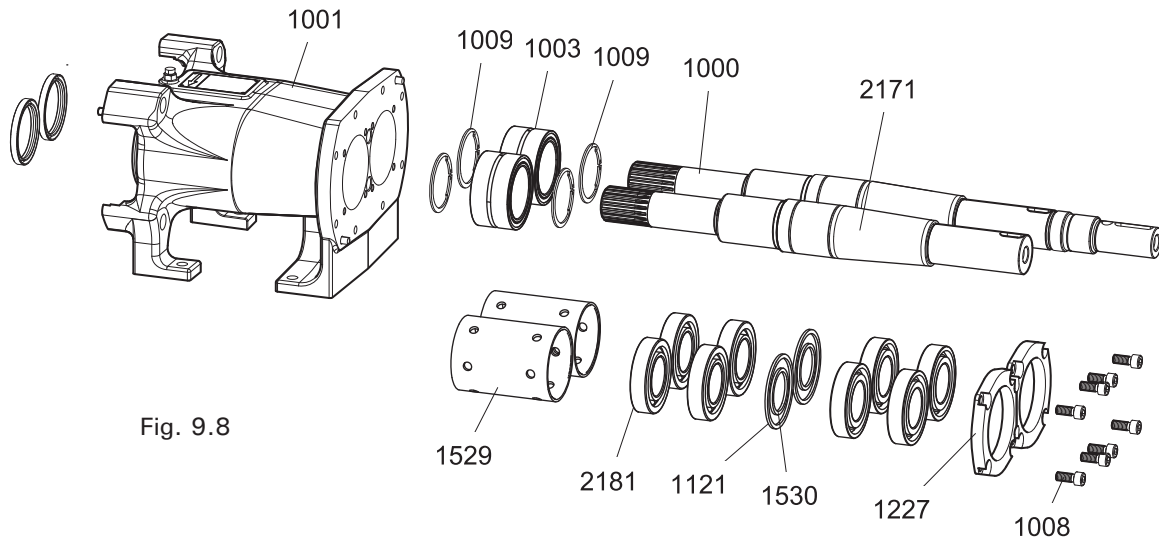


Fig. 9.8

7. Using a press, press out the shafts incl. bearings and distance rings toward the drive end. Afterwards, remove locking rings 1009 and remove the needle bearings from the shaft using an extractor tool. Next, pull out angular ball bearings 2181 from the shaft one after the other and remove distance rings 1530, 1121 and spacer rings 1529. Remove spacer rings 1529 and using a puller, pull out the outer race of the needle bearings from the bearing housing.
8. Press out shaft sealing rings 1010 from the pump casing.

ATTENTION

Possible damage to property

- Carefully equally clean the drive shafts and gear wheels. Replace worn parts.

Installation:

1. Place the housing of the bearing bracket onto the press bed
2. Grease the bearing surfaces of the housing. (See Chapter 4 for assembly grease)
3. Likewise apply lubricating agent onto the shafts in the region of the bearing positions.
4. Insert inner snap rings 1009 into the shafts. Press inner sleeves of needle bearings 1003 onto the shafts using a pressure sleeve. Slide on needle bearings. Mount outer snap rings 1009.
5. Place distance tube 1529 onto the shaft.
6. Press 2 each angular ball bearings 2181 one after the other and individually onto the shaft. (Heed installation position, in double O arrangement) (press only the inner races of the bearings) Place distance rings 1521 and 1530 into the middle between the 4 angular ball bearings.
7. Carefully insert the drive shaft incl. fitted bearings into the bearing housing and carefully press fit the shaft with its bearings all the way up using the press and a mounting bush that only presses onto the outer race of the bearing. The last bearing will then only protrude approx. 1 mm from the bearing housing.

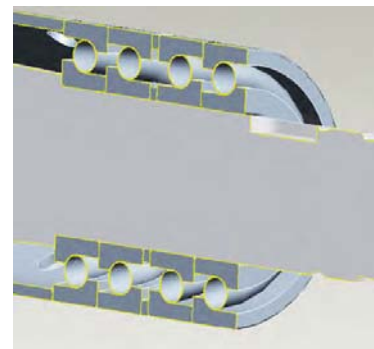


Fig. 9-9 Angular ball bearing in O arrangement

Chapter 9

ATTENTION

Possible damage to property

- **Align the distance bushes and rings precisely when pressing them in otherwise they will be destroyed.**
8. Install the driven shaft in similar way.
 9. Into the bearing housing new shaft seals 1011 press with a mounting sleeve. (The spiral ring of the sealing lip shows in the pump housing).
 10. Insert both bearing covers 1227, apply thread lock fluid onto cylinder head screws 1008 (factory uses Loctite 270), screw them in and tighten. M8 torque = 20 Nm.
 11. Lubricate shaft sealing rings 1111, slide them over the toothed shaft ends and carefully fit them into the seat in the bearing housing using a mounting tube (tube D = 75, d = 61, L = 225).
 12. Insert keys 2179 into the shafts on the drive side.
 13. Slide gear wheel 2183 onto the drive shaft, screw in and tighten shaft nut 1526 (torque 90 Nm).
 14. Slide gear wheel 2184 incl. hub 2176 onto the driven shaft. (Observe mark)
Screw in and tighten screw 2177 incl. washer 1570 and lock washer 2178 (torque 80 Nm).

ATTENTION

Possible damage to property

- **Place a bronze or copper bar into gear teeth of the gear wheels when tightening screw 2177.**
 - **Do not use hard metals, such as pry bars or steel bars keeping the sensitive tooth flanks in mind.**
15. Place on gear housing 2172 incl. gasket 2198 (housing being centred through dowel pins), screw in and tighten cylinder head screws 2258. (Torque 20 Nm).
 16. Install shaft seal and screw spindles, mount pressure housing (Torque 150 Nm). Install suction housing (torque XY).
 17. Mount driving elements (coupling guard).
 18. Fill in gear oil. Check the oil level via the sight glass.

Chapter 9

9.5 Adjusting screw spindles.

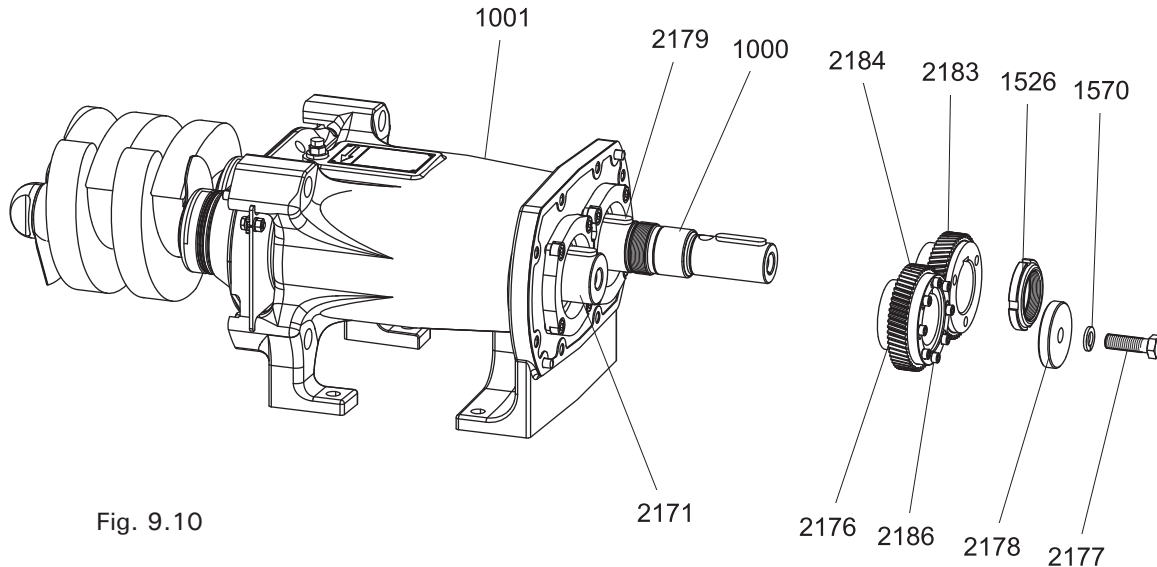


Fig. 9.10

Installation:

1. Insert keys 2179.
2. Slide gear wheel 2183 onto the drive shaft 1000, screw on and tighten shaft nut 1526. (Tightening torque 70 Nm for M35, 90 Nm for M45) (Plug steel mandrel through the shaft hole counter holding with it while tightening the shaft nut).
3. Slide on gear wheel hub 2176 incl. gear wheel 2184 onto driven shaft 2171. Turn the gear wheel on the hub until the holes of hub and tapped holes of the gear ring check. (Tapped hole is positioned roughly in the middle of the oblong hole). Note the inclined position of the gear ring.
4. Screw in cylinder head screws 2186 by hand.
5. Place lock washer 2178 onto the driven shaft, screw in and tighten hexagon screw 2177 incl. spring ring 1570. (Torque 80 Nm).

ATTENTION

Possible damage to property

- Place a bronze or copper bar into gear teeth of the gear wheels when tightening screw 2177.
- Do not use hard metals, such as pry bars or steel bars keeping the sensitive tooth flanks in mind.

Chapter 9

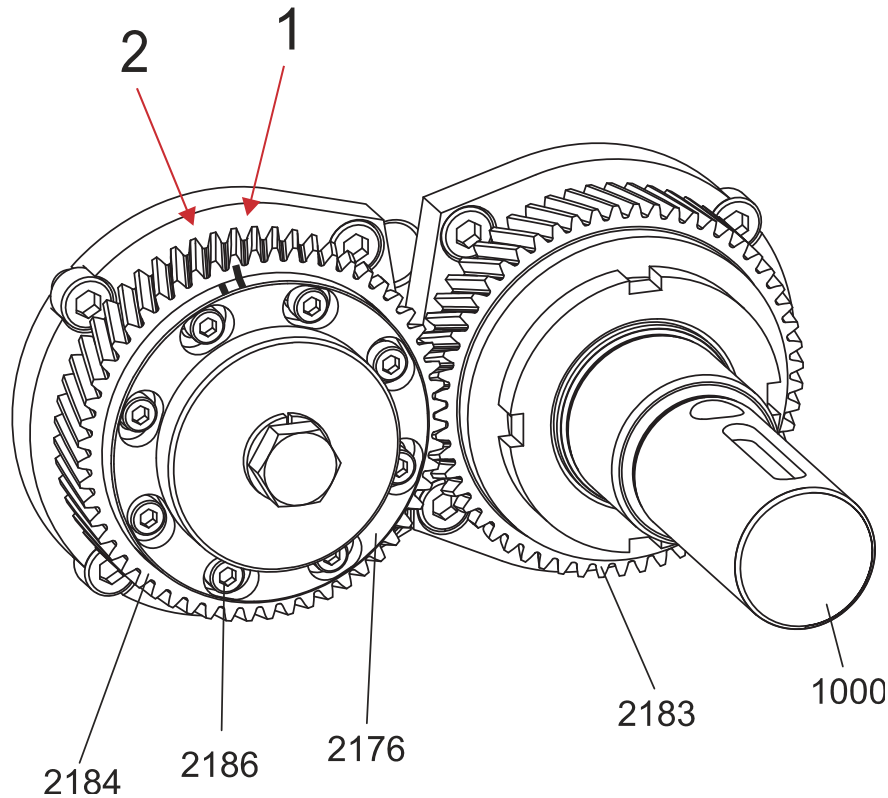


Fig. 9.11

Adjustment:

1. Turn drive shaft 1000 until the spindles stop.
2. Mark this position on gear wheel hub 2176 and driven gear wheel 2184.
3. Now turn the drive shaft into the opposite direction until the spindles jam.
4. Mark this position on gear wheel hub 2176, too.
5. Turn back the drive shaft by a half of this mark. The screw spindles are freely moving now.
6. Now tighten cylinder head screws 2186 crosswise in alternating fashion.



- Tightening torque of the cylinder head screws = 8 Nm

Chapter 10

10. Stocking of spare parts

10.1 Spare parts

Wear and hence the life-cycle of the major pump components are essentially influenced by a variety of factors, such as:

- Working pressure,
- Temperature,
- Properties and condition of the pumping medium,
- System operating times.

We recommend stocking up the major spare parts as per table below. You will thus reduce the MTTR values (Mean Time to Repair) (recommendation acc. to DIN 24296).

Number of same pumps per system section			
Spare parts	P-number	up to 2 pumps	from 3 pumps
Gear housing shaft sealing ring	1010	1	up 2
Bearing housing shaft sealing ring	1111	2	4
Pump casing O-ring	1088	1	2
Spindle nuts O-ring	2194	4	8
Cover O-ring	2192	1	2
Gear housing gasket	2198	1	1
Shaft seal, set of O-rings	2261	2	4
Gear ring	2249	1	2
Gear oil, 1 L	2294	1	2

(*) depending on pump model chosen (see data sheet)

ATTENTION

Possible damage to property

- **Use only original ViscoTwin spare parts to avoid any adverse effects on the functionality of your pump.**

10.2 Ordering spare parts

When ordering spare parts: state

- Pump type and
- Pump number, please.

The necessary data are on the pump type plate.

No liability will be assumed for wrong deliveries on account of insufficient data.

Send your spare parts order to the following address, please:

ViscoTec, Inc.

Telephone: +1(559) 429-4227

933 W Hemlock Ave

Fax: +1(559) 429-4228

Visalia, CA 93277

E-mail: info@viscotec.com

Appendix



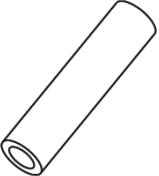
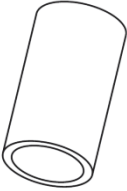
- Special wrenches and tools (4 pages)
- Exploding drawings with index (3 pages)
- Tightening torque values (1 page)
- The Engineering Design and Technical Construction File
 - CIP | SIP | Manual Cleaning (4 pages)
 - Oil change (1 page)

Appendix 1: Special wrenches and tools for dismantling and installation

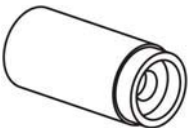
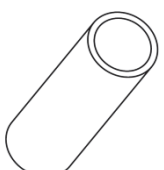
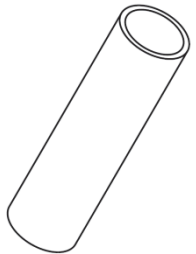
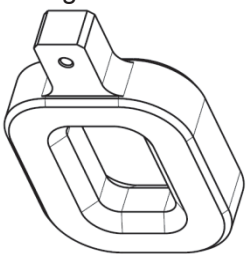
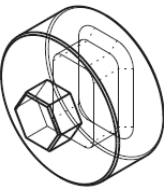
With the dismantling and installation of the pumps, special wrenches and tools must be employed, as represented below.

The indicated tools can be found under the designated article number at ViscoTec, Inc., Visalia, CA

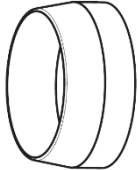


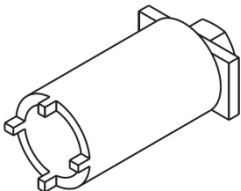
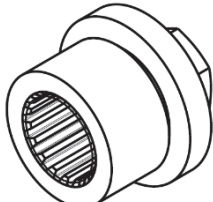
If you should wish to produce the tools yourself, you can request a list of the tools with the measurements.

Tool	Tool No.:	Drawing number	Pump model	Item Number	Material
Pressure plate for needle roller bearing inner race 	T 10	1011-397	# 070	95534	1.4301
	T 19	1011-398	# 104	95535	
	T 20	1011-399	# 130	95536	
Receptacle plate installation shaft ball bearing 	T 12	1011-401	# 070	955537	1.4301
	T 33	1011-402	# 104	95538	
	T 34	1011-403	# 130	95539	
Installation pipe for ball bearing inner race 	T 13	1011-406	# 070	95556	1.4301
	T 21	1011-407	# 104	95552	
	T 22	1011-408	# 130	95550	
Installation pipe for ball bearing outer ring 	T 14	1011-409	# 070	95554	1.4301
	T 23	1011-410	# 104	95555	
	T 24	1011-411	# 130	95549	



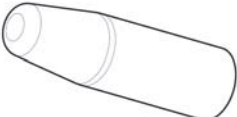

Special wrenches and tools for dismantling and installation (page 2 of 4)

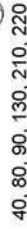
Tool	Tool No.:	Drawing number	Pump model	Item Number	Material
Installation pin for bearing crown shaft ring gasket 	T 1 T 2 T 3	1011-718 1011-772 1011-773	# 070 # 104 # 130	95578 95579 95580	1.4301
Installation pipe for needle roller bearing outer ring 	T 11 T 31 T 32	1011-416 1011-417 1011-418	# 070 # 104 # 130	95553 95548 95551	1.4301
Installation pipe bearing housing shaft ring gasket 	T 15 T 27 T 28	1011-419 1011-420 1011-421	# 070 # 104 # 130	955547 95545 95546	3.1645
Spindle key without hexagon 	T 35 T 37	1010-823 1010-820	# 070# # 104 / # 130	40706 40705	3.1645
Spindle key with hexagon 	T 36 T 38	1011-124 1011-125	# 070 # 104 / # 130	41106 41107	3.1645

Special wrenches and tools for dismantling and installation (page 3 of 4)

Tool	Tool No.:	Drawing number	Pump model	Item Number	Material
Shaft ring gasket assembly sleeve bearing housing 	T 16 T 25 T 26	1010-806 1011-082 1011-083	# 070 # 104 # 130	95439 95441 95442	1.4301
Shaft ring gasket assembly sleeve lip sealing 	T 6 T 7 T 8	1011-351 1011-354 1011-374	# 070 # 104 # 130	41446 41454 41500	1.4301
Spur gear wheel puller 	T 9 T 18	1010-648 1009-756	# 070 # 104 / # 130	95434 95427	1.4301
Socket spanner for groove nut 	T 17 T 29 T 30	1011-405 1011-404 1009-215	# 070 # 104 # 130	95532 95533 W0803	1.4301
Shaft adjustment for keeping the shaft on the gearing 	T 39 T 40 T 41	1011-422 1011-423 1011-424	# 070 # 104 # 130	95445 95444 95443	1.4301

Special wrenches and tools for dismantling and installation (page 4 of 4)

Tool	Tool No.:	Drawing number	Pump model	Item Number	Material
Installation pipe for inner race retaining ring needle roller bearing 	T 42 T 44 T 45	1011-441 1011-444 1011-445	#070 #104 #130	95561	1.4301
Sliding sleeve for inner race retaining ring needle roller bearing 	T 43	1011-446	# 070	95562	1.4301
Mounting sleeve for rotary shaft seal 	T 46 T 47 T 48	1011-782 1011-783 1011-784	# 070 #104 #130	95581 95582 95583	1.4301
Centering rod for gear housing 	T 49 T 50 T 51	1011-785 1011-786 1011-787	# 070 #104 #130	955584 955585 95586	1.4301



Explosion drawing ViscoTwin 130-xx 3A

Einzelteilliste		Parts list		Pièces détachées	
P-No	Qty	Benennung	Description	Description	
1000	1	Antriebswelle	Drive shaft	Arbre de commande	
1001	1	Lagergehäuse	Bearing housing	Corps de palier	
1003	2	Nadellager	Needle roller bearings	Roulements à aiguilles	
1008	8	Zylinderschraube	Socket head cap screw	Boulon à six pans creux	
1009	4	Sicherungsring	Snap ring	Circlip	
1010	1	Wellendichtring	Shaft sealing ring	Joint d'étanchéité de l'arbre	
1012	1	Deckel	Cover	Couvnr	
1015	4	Scheibe	Washer	Rondelle	
1016	4	Sechskantschraube	Hexagonal screw	Vis à tête hexagonal	
1029	1	Dichtungsgehäuse	Shaft seal housing	Corps de garniture	
1033	1	Pumpengehäuse	Pump housing	Corps de pompe	
1041	4	Sechskantschraube	Hexagonal screw	Vis à tête hexagonal	
1064	2	Gewindestift	Set screw	Vis sans tête	
1088	1	O-Ring	O-ring	O-ring	
1111	2	Wellendichtring	Shaft sealing ring	Joint d'étanchéité de l'arbre	
1121	2	Distanzring	Distance ring	Bague d'écartement	
1183	1	Passfeder	Key	Clavette	
1227	2	Lagerdeckel	Bearing cover	Chapeau de palier	
1303	2	Gleitringdichtung (komplett)	Mechanical seal (Complete)	Garniture mécanique (complet)	
1400	1	Grundplatte	Baseplate	Plateau de base	
1473	1	Antrieb	Drive unit	Entrainement	
1526	1	Wellenmutter	Groove nut	Écrou en T	
1529	2	Distanzhülse	Spacer ring	Manche	
1530	2	Distanzring	Distance ring	Bague d'écartement	
1538	1	Typenschild	Type plate	Plaque signalétique	
1541	1	Ölstandsauge	Oil level glass	Voyant de niveau d'huile	
1543	1	Getriebeöl	Gear oil	Huile à engrenages	
1570	1	Federring	Spring ring	Circlip	
2171	1	Abtriebswelle	Driven shaft	Arbre de sortie	
2172	1	Getriebegehäuse	Gear housing	Logement d'entraînement	
2174	4	Fundamentblock	Fondation bloc	Fondation bloc	
2176	1	Nabe	Driving collar	Moyeu	
2177	1	Sechskantschraube	Hexagonal screw	Vis à tête hexagonal	
2178	1	Spannscheibe	Lock washer	Plaque de serrage	
2179	2	Passfeder	Key	Clavette	
2180	2	Spindelmutter	Nut for spindle	Écrou pour le fuseau	
2181	8	Schrägkugellager	Angular ball bearing	Roulements à billes à contact oblique	
2183	1	Stirnrad Antrieb	Spur gear, drifty	Engrenage, flottante	

Einzelteilliste		Parts list		Pièces détachées	
P-No	Qty	Benennung	Description	Description	
2184	1	Stirnrad Antrieb	Spur gear, propelled	Engrenage, actionnée	
2186	8	Zylinderschraube	Socket head cap screw	Boulon à six pans creux	
2187	8	Scheibe	Washer	Rondelle	
2192	1	O-Ring	O-ring	O-ring	
2194	2	O-Ring	O-ring	O-ring	
2195	2	Passstift	Dowel pin	Goupille de serrage	
2196	2	Passstift	Dowel pin	Goupille de serrage	
2198	1	Flachdichtung	Flat seal	Joint	
2200	1	Schraubenspindel, linksgängig	Screw spindle, left handed	Vérin, fileté à gauche	
2201	1	Schraubenspindel, rechtsgängig	Screw spindle, right handed	Vérin, fileté à droite	
2204	1	Kupplungsschutz (komplett)	Coupling guard (complete)	Garde de couplage (complet)	
2205	4	Sechskantschraube	Hexagonal screw	Vis à tête hexagonal	
2232	1	Entlüftungsschraube / Quench	Breather plug / Quench	Bouchon évent / Quench	
2233	2	Verschlussschraube	Plug screw	Vis d'arrêt	
2246	4	Sechskantschraube	Hexagonal screw	Vis à tête hexagonal	
2247	1	Kupplungsteil, Pumpe	Clutch part, pump	Élément d'accouplement, pompe	
2248	1	Kupplungsteil, Antrieb	Clutch part, drive	Élément d'accouplement, Entrainner	
2249	1	Zahnkranz	Sprocket	Pignon	
2250	2	Laternenschutz	Lantern protection	Protection de la lanterne	
2251	2	Sechskantschraube	Hexagonal screw	Vis à tête hexagonal	
2252	4	Scheibe	Washer	Rondelle	
2253	2	Sechskantmutter	Hexagonal nut	Écrou hexagonal	
2256	2	Passstift	Dowel pin	Goupille de serrage	
2258	8	Zylinderschraube	Socket head cap screw	Boulon à six pans creux	
2261	1	O – Ring Dichtungssatz	O-ring seal kit	Joint kit	
2265	4	Kontaktschutz Pumpe	Contact protection pump	protecteur de contact pompe	
2266	4	Kontaktschutz Motor	Contact protection motor	protecteur de contact moteur	
2272	2	Wellendichtring	Shaft sealing ring	Joint d'étanchéité de l'arbre	
2273	2	Wellenschonhülse	Shaft sleeve	Chemise d'arbre	
2274	2	Schleuderscheibe	Centrifugal disk	Rondelle de joint	
2277	4	Kontaktschutz Lagergehäuse	Contact protection bearing housing	protecteur de contact corps de palier	
2278*	4	Fundamentblock	Fondation bloc	Fondation bloc	
2279	4	Sechskantschraube	Hexagonal screw	Vis à tête hexagonal	
2280*	4	Sechskantschraube	Hexagonal screw	Hexagonal screw	

*if necessary

*wenn erforderlich

*le cas échéant

The Engineering Design and Technical Construction File

4. CIP - SIP and COP Instructions, Swab-Testing Instructions

4.1 CIP & SIP Instructions

Pumps in a processing system by 3A Standard (02-11)

Pumps used in a SIP processing system must be equipped with a pressure monitoring device, which shuts down the system immediately if the processed product falls below atmospheric pressure and the system cannot be re-started without getting sterilized again.

4.1.1 C.I.P. – process

Are suitable for the materials of the pump:

Use 1 percent nitric acid solution at a temperature up to 82 ° C (acid)

or use a 1 percent solution of sodium hydroxide or sodium hypochlorite (200ppm) (alkaline)
for your C.I.P. process.

For pump housings with chrome-wear coating pH values below 3 are not permitted. Therefore use an accordingly lower acid concentration when using the nitric acid solution for CIP Cleaning.

4.1.2 S.I.P – process

Are suitable for the materials of the pump:

Sterilization over a period from 10 to 30 minutes with saturated steam at about 2.2 bars is allowed.

The maximum steam temperature for elastomeric materials in EPDM is 121° C.

The maximum steam temperature for elastomeric materials in FKM is 135° C.

If the equipment is installed in an aseptic processing system that is sterilized by heat and operated At a temperature of 250°F (121°C) or higher, 3-A Standard 02-11 requires that the system monitors Internal pressure and shuts the system automatically down if the product pressure in the system Becomes less that atmospheric. The system shall only be able to be restarted after it is re-sterilized.



Warning!

Risk of injuries through rotating machine parts or from liquids escaping under pressure.

Potential consequences: Severe or fatal injuries.

4.1.3 Do not perform any work with the pump running!

Disconnect the pump from mains and secure against inadvertent start up. (U-lock)

Use safety gloves and goggles when using aggressive detergents.

4.1.3.1 Connect pump to CIP cleaning system or switch system.

4.1.3.2 Start cleaning system.

4.1.3.3 Cleaning pipe line system and pump.

4.1.3.4 Shut cleaning system, remove CIP medium completely.



C.I.P. cleaning must conform to the hygiene of foodstuffs regulations as amended from time to time. The specifics pertaining to material stability must be strictly observed.

In case you have developed own C.I.P. cleaning methods for your pumping media, ensure pump suitability for the selected method by consulting the pump supplier.

ATTENTION

Possible damage to property

Avoid abrupt changes in temperature during cleaning process with the pump in stationary state, fill in hot medium and wait until the pump has warmed up..

4.2 Inspection of sanitary pumps for food processing.

The instruction given in chapter 7.2 'Notes on service and maintenance' apply exceedingly to sanitary pumps for food processing.

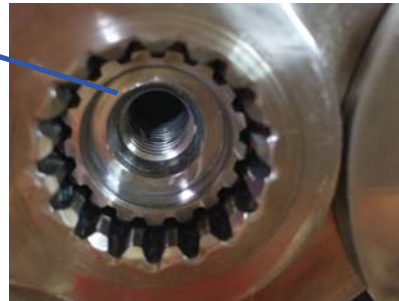
Then the spindle screws are to be checked every 100 operating hours. If contamination (underneath the O-ring) is detected, all parts in this sector which are in direct contact with the medium (spindle, spindle screw with O-ring) must be dismantled and thoroughly cleaned in an alcoholic bath. Clean and disinfect the shafts and all inner parts of the pump housing carefully with alcohol solution and a clean cloth. Renew the O-ring of the spindle screw 2194 and the O-ring 130 of the Inboard Rotor Holder 80 inside the mechanical seal. (® _see Parts List)

Subsequently, no corrosion or seizure marks must be visible; otherwise the affected parts must be replaced.

If contamination on the mechanical seal outside the medium sector is detected after 500 cleaning cycles or one year at the latest, all component parts of the mechanical seal are to be thoroughly cleaned and disinfected in an alcohol bath. Replace all O-rings of the Inboard Rotor Holder (O-ring 90, 130, 140 and 220). (® _see Parts List)

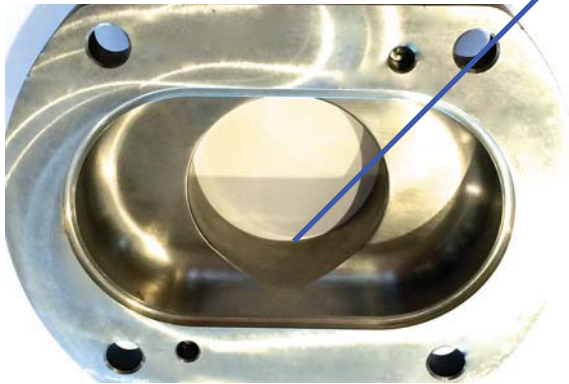
Subsequently, no corrosion or seizure marks must be visible; otherwise the affected parts must be replaced.

1. Remove Bolts from the Spindles and first visually test the cleanliness of the O-ring and the groove.
2. Visually check cleanliness of threads on the shaft



3. Remove O-Rings and clean bolts with FDA-compliant detergent. If needed sanitize with alcohol-bath
4. Remove residue from bolts with the use of a sturdy brush
5. Remove residue from the threads by spraying alcohol, blow it out with compressed air
 - hold a towel in front of the thread to protect yourself from spilling solution.
6. Wipe it with non-fuzzing paper towel dry and clean.
7. Now install NEW O-rings (3-A approved elastomers) and fixate with medium strength Loctite food grade, torqued to required value. (see Appendix "Torque-table")

Fully drainable pump housing due to machined DRAIN in the front cover. See picture below:



Make sure, drain shows to bottom when Mounting to the housing

4.3 COP (manual cleaning) Instructions

4.3.1 Safety is first – DISCONNECT THE PUMP FROM THE POWER!

4.3.2 Disconnect piping from the pump housing

4.3.3 Remove the 4 hexagon screws (Pos. 1016 on explosion drawing)

4.3.4 Remove the pump housing and manually wash it properly with FDA-compliant detergent. Avoid scratching pads. Rinse it with clear water.

4.3.5 Clean the impellers manually with non-scratching pad or sponge with FDA-compliant detergent. Spin the shafts to clean the impellers from all sides. Rinse with clear water.

4.4 Swab-Test

4.4.1 Safety is first – DISCONNECT THE PUMP FROM THE POWER!

4.4.2 Disconnect piping from pump housing

4.4.3 Remove the 4 hexagon screws (Pos. 1016 on explosion drawing)

4.4.4 Remove pump housing carefully

4.4.5 Take swab-sample as per Lab-Instruction of food-safety instructions
(This procedure may be vary based on customer's internal requirements)

4.5 Switching on

Check before switching on:

4.5.1 Pump with drive safely installed and connected?

4.5.2 Connections sealing and connected stress-free?

4.5.3 Oil level checked?

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4.5.4 Quench fluid level OK?

4.5.5 Correct pressure set in case of a counter-pressure device?

4.5.6 Rotational direction checked?

4.5.7 Safety devices (covers and limit switches, safety valve) installed and checked for function?

4.5.7.1 Before start up, check pump for contamination and foreign objects.


4.5.7.2 Fully open pressure and suction-side valves.

4.5.7.3 Fill pump with medium to enable suction safely.

4.5.7.4 Switch on drive.

4.6 When initially operating the pump, check to see whether it and the pipe lines are tight.

Operation

	Warning!
	<p>Do not operate against closed shut-off devices. Bursting of the pipe line or downstream system components is possible. Potential consequences: Severe or fatal injuries.</p>
<p>Secure the pump through an approved overpressure protection.</p>	
<div style="border: 2px solid black; padding: 2px; display: inline-block;"> ATTENTION </div>	<p>Possible damage to property</p>