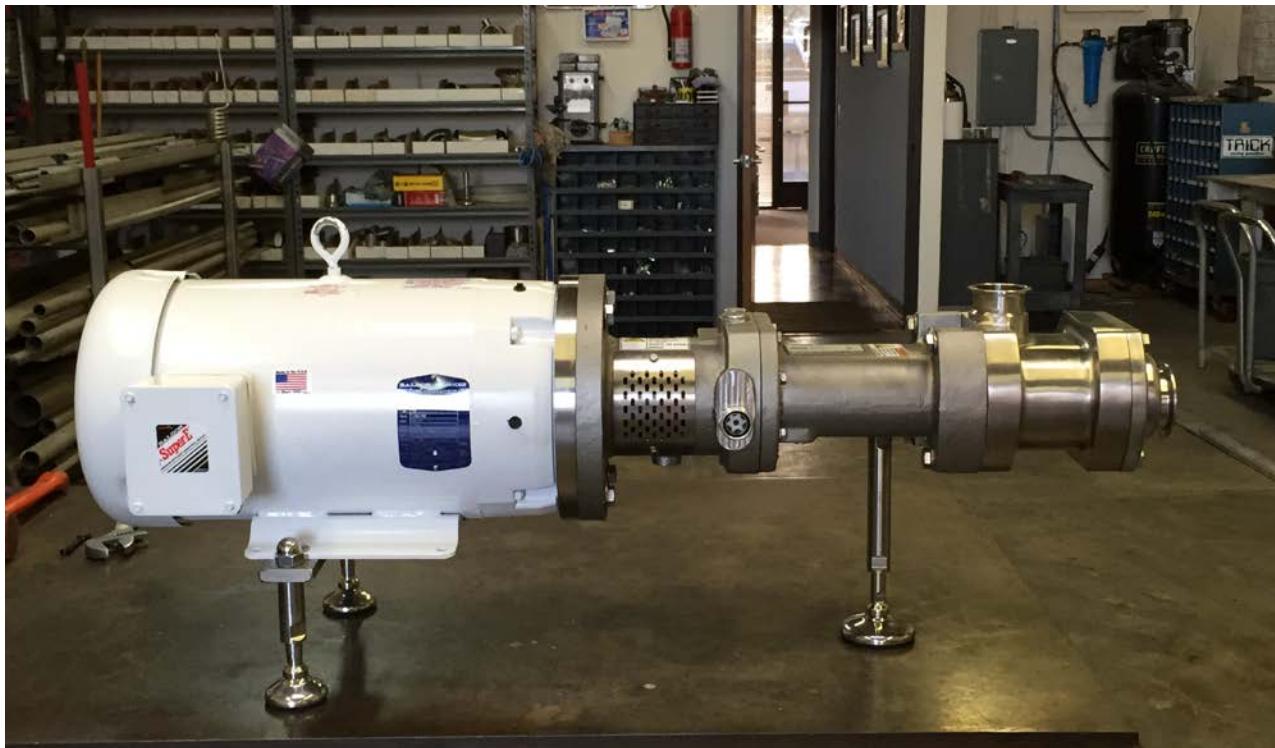


# Manual

**ViscoTwin**  
the most versatile sanitary pump

## ViscoTwin 70 3A



Release: Sep 25, 2018

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## 1. Safety notes

**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
 General hazard  Specific hazard, e.g. electric shock	Danger	Imminent danger	Severe or fatal injury
	Warning!	Possible dangerous situation	Severe or fatal injury
	Caution!	Possible dangerous situation	Minor injuries
<b>ATTENTION</b>	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 Operating 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 Operating Manual and have been appropriately instructed.

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

## 1. Safety notes

**1.3 Further documents applicable**

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
Shaft coupling	Shaft coupling 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!!**

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.

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!**

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.

## 1. Safety notes

### 1.5 Intended use

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

If known to the manufacturer, designated operation points for designated pumps are specified in data sheets. Any change of the operating conditions (e.g. by different process design, flow rate, pipe length and diameter, pressure, additional valves, throttle devices etc.) may result in a significant change of operating points (operating points follow operating conditions). In this case, compare new operating conditions and operating points with application data indicated in data sheets and with operation restrictions specified in this manual (see chapter 1.7). In no way, operating restrictions specified by the manufacturer may be exceeded (chapter 1.7). It is recommended to review new operating conditions and operating points in collaboration with the manufacturer.

Deployment in the Ex area is prohibited unless expressly intended for this purpose. Foreign bodies in the medium are improper change in operating conditions. They are to prevent with suitable measures such as magnetic separators and filters, and others.

The resistance of various sealing materials to some common pumping media is shown in the following table. Because each sealing material can vary in resistance you shall consult the pump manufacturer before choosing the sealing material.

Characteristics of resistance

Material	organic acid	inorganic acid	Alkaline	Oil + Fat	polar solvents	Non-polar solvents	steam	alcohol	Amine
EPDM	well usable	well usable	excellently	do not use	excellently	do not use	excellently	excellently	well usable
FKM	do not use	excellently	do not use	excellently	do not use	well usable	excellently	well usable	do not use

- Organic acids: e.g. citric acid or formic acid
- Inorganic acids: e.g. Nitric acid or hydrochloric acid
- Polar solvents: e.g. acetone
- Non-polar solvents: e.g. methyl ethyl ketone
- In case of equivocality consult the manufacturer.
- Deployment in the Ex area is prohibited unless not expressly intended for this purpose.
- Ensure for 3-A application the use of only 3-A certified elastomers Standard 18-03 class I.

### 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

Unless expressly specified differently by the manufacturer in writing, following limits apply to ViscoTwin 70:

Max differential pressure: 232 psi / 16 bar

Speed: 4'000 rpm

The ViscoTwin twin 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.
- For pumps with gaskets and seals made of EPDM the fat content must not exceed a percentage rate of 8%. Otherwise the resistance of the sealing material is no longer guaranteed.

For pump with gaskets and seals made of FKM / FPM the basic and acidic cleaners must not exceed the following levels:

- E.G. Sodium hydroxide (NaOH) concentration up to 3%
- E.G. nitric acid concentration (HNO<sub>3</sub>) up to 3%

## 1.8 Specific safety notes

Due to the medium or heating of the bearing support the pump can reach a dangerous high temperature. Provide protection against contact for hot and cold parts, without hindering the cooling of the pump. In case of a possible electrostatic charge provide appropriate earthing.

	<b>Danger!</b>
<b>Rotating screw spindles in the pump can draw in arms or other parts of the body. Imminent danger: Severe or fatal injuries.</b>	

**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.

## 1. Safety notes

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.

**ATTENTION****Possible damage to property**

**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.**

## 2. Construction and general description

### 2.1 ViscoTwin pump construction



only exemplary representation,  
Decisive for the dimension is the dimensional drawing  
3-A-Baseframe is different and shown on separate drawing

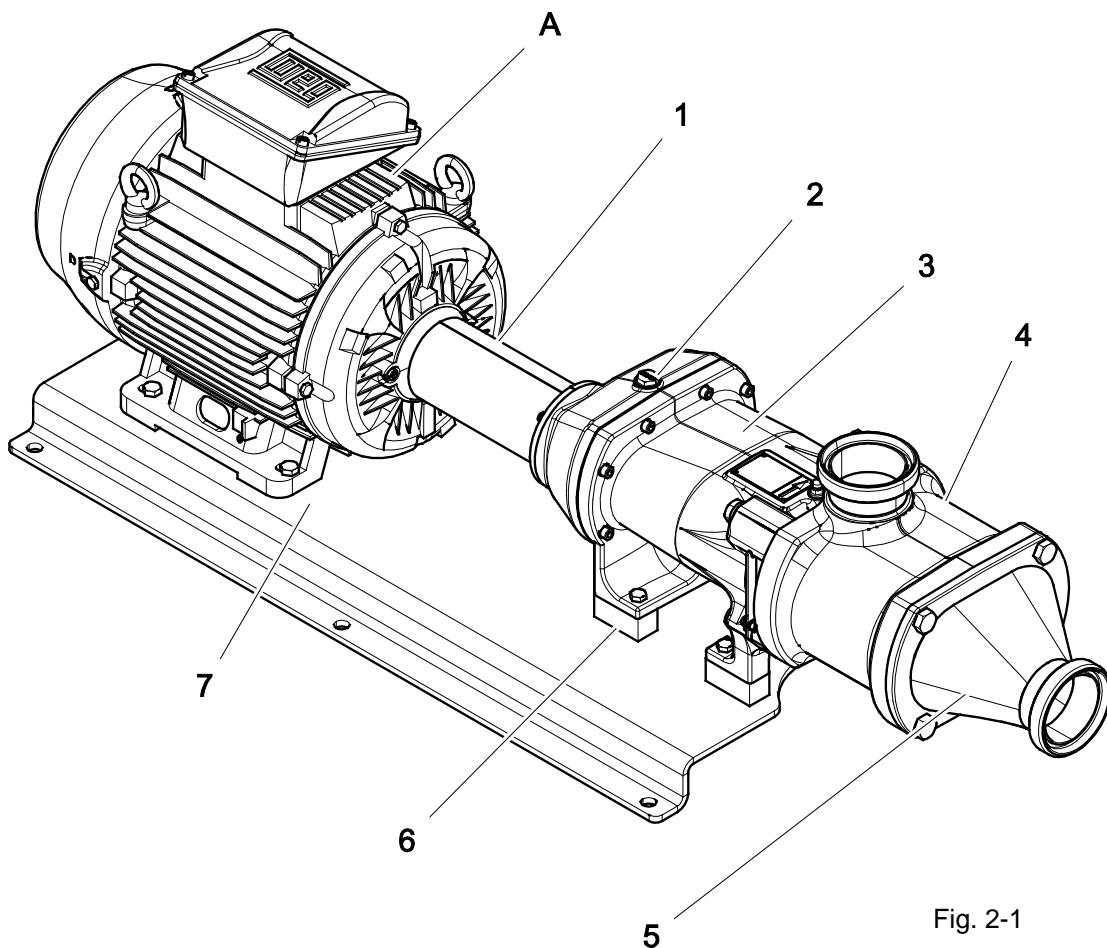


Fig. 2-1

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

## 2.2 General description

Twin 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 for pumps used in the foodstuffs and beverage industry 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.

**The Declaration of Conformity issued by manufacturer is valid for the delivered machine in connection with the intended use of the drive (gear motor, gear unit for mounting an IEC standard motor with defined power and torque as motive propulsion source for the pump) as determined in the data sheet. The customer will be solely responsible for any subsequent interferences or modifications on the machine and has then to assert conformity with the EC directives by himself.**

**For 3-A conformity all pumps, motors (NEMA), connections, base frames, support legs and elastomers are built in respect of 3-A standards.**

## 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.

### 3. Transport, packaging, storage

#### 3.1 Transport / packaging

The 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

	<b>Warning!</b> <b>The pump can drop or tilt as a result of improper transport.</b> <b>Potential consequences: Severe or fatal injuries.</b>
---	--

**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.**

	<b>The pictures used are example pictures</b>
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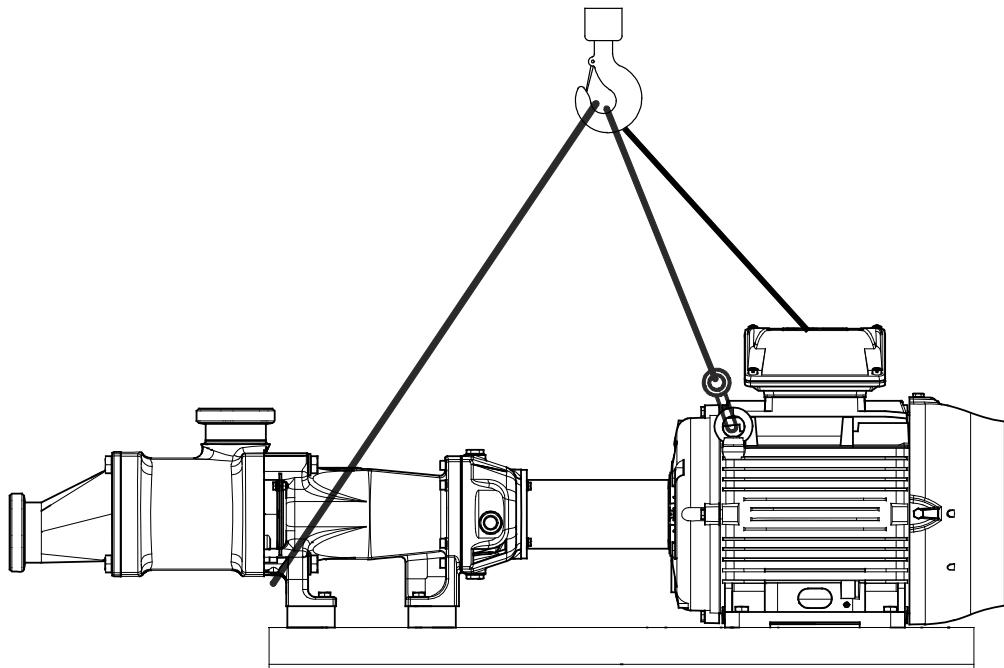


Fig. 3.1 ViscoTwin 130 with baseplate and drive

<b>ATTENTION</b>	<b>Possible damage to property</b>
------------------	------------------------------------

**Lift the pumping aggregates as indicated in the display. Never raise the entire aggregate only at the eye-bolts of the drive unit. These anchor points are to be employed only for the drive alone.**

**When transporting pump units, consider that they can be very top heavy due to certain drive assemblies.**

**Always transport screw pumps in horizontal position.**

## 3.2 Storage

The 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.**

**Make sure that the storage room is frost protected and dry**

**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 availability as spare parts and optionally store it.

- Shaft seal and sealing rings / gaskets: rubbish.
- Bearing support Type P and PC:
- Housing and shafts: Scrap for rustproof steel
- Bearing support other types: Steel scrap
- All parts of the gear: Steel scrap
- All other parts: Steel scrap

## 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:

Characteristic	Value
Min speed	100 rpm
Max. speed	4'000 rpm
Maximum torque on clutch shaft	120 Nm

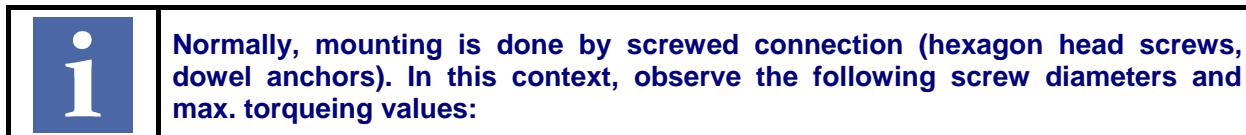
### 4.3 Mounting

Mounting of the twin 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**
- **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.



- 

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.

#### 4.3.1 Tightening torques for specified components

Tightening torques has been specified for certain components as shown in the table below:

Designation	ScrewØ	Tightening torque
Gear housing cylinder head-/hexagonal screws 2258	M 8	20 Nm
Gearwheel hub cylinder head screws 2186	M 5	8 Nm
Driven shaft hexagon screw 2177	M 10	45 Nm
Cover hexagon screw 1041	M 12	70 Nm
Spindle screw 2180	M 18	100 Nm
Pump housing hexagon screw 1016	M 12	70 Nm
Pump foot mounting	M 10	44 Nm
Gear housing screws	M 8	20 Nm
Groove nut	M 25	45 Nm

## 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 pressure line behind the pump.

**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

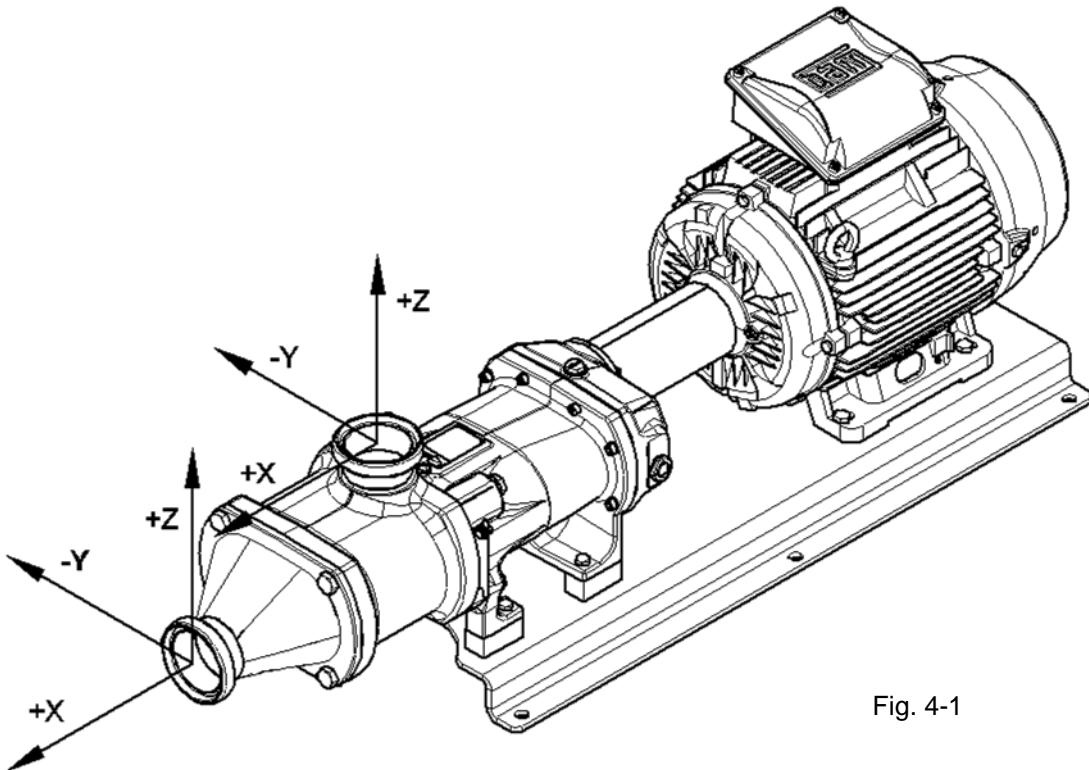


Fig. 4-1

$$F_{ges} = \sqrt{F_x^2 + F_y^2 + F_z^2} \quad \text{and} \quad M_{ges} = \sqrt{M_x^2 + M_y^2 + M_z^2}$$

Nominal width	F (x,y,z) [N]	F (tot) [N]	M (x,y,z) [Nm]	M (tot) [Nm]
1"	190	270	85	125
2"	295	420	145	210
3"	425	600	215	315
4"	505	720	260	385
5"	610	870	325	480

#### 4.5 Permissible pressure in the pump housing

The permissible internal compressive stress is specified in the datasheet.

#### 4.6 Operation and maintenance space requirements

<b>i</b>	<p>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.</p> <p>In addition, plan free space for sufficient drive motor ventilation (→ drive documentation).</p>
----------	---

## 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

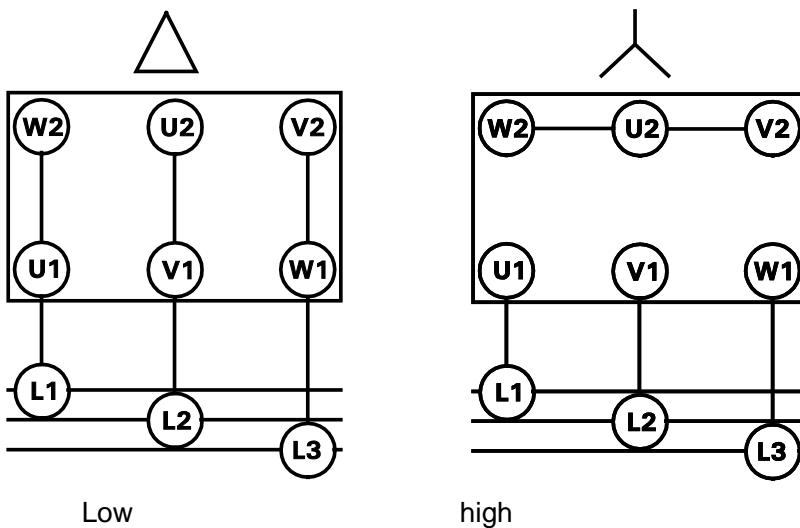


Fig. 4-2

### 4.7.1 Driving elements



### Warning!

**Driving elements are quickly moving during operation.  
They can squash hands.  
Potential consequences: severe or fatal injuries.**

**Always cover driving elements with a protective guard.**

#### 4.7.2 Coupling elements

Screw pumps with free shaft (cylinder shaft with shaft key) are connected to the drive through a flexible coupling.

##### ATTENTION

##### Possible damage to property

**Do not mount using a hammer**

**Use a pull-on device or heat the coupling half to approx. 80 °C.  
(Remove rubber parts before) and mount the coupling in hot condition.**

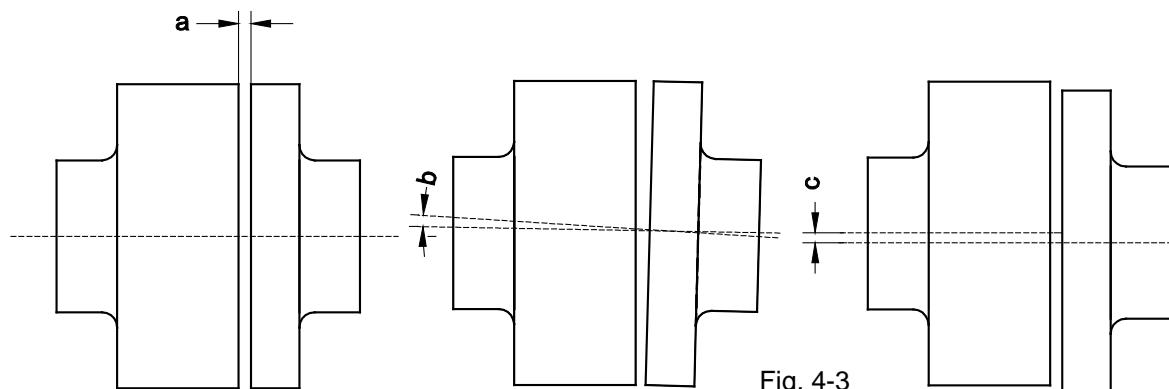


Fig. 4-3



**The coupling halves must be aligned against each other.**

**When assembling the drive with the pump, it is necessary to adjust**

**a = maximum and minimum clearance**

**b = angular offset and**

**c = axial offset**

**according to the coupling manufacturer's specifications.**

The coupling of the ViscoTwin 70 is properly aligned by means of proper central alignment of drive (1473), intermediate flange (2298) and gear housing (2172).

#### 4.8 Mounting and adjusting additional equipment accessories

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

#### 4.9 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.

##### 4.9.1 Single acting mechanical seal

The seal is being lubricated through the medium.

#### 4.9.2 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.

#### 4.9.3 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. 4-4)

##### Applies to all seals with quench:



**The lines must have at least a nominal diameter of 8 mm. The lines must be fastened in a steadily falling way or rising way and should not build waves. Each seal must be fitted with a separate line to the tank or have to be connected in series in a row.**

1. Connect the line from the lower outlet of the quench vessel (**flow line**) up to the bottom of first seal. (**Flow line quench vessel → E 1**) (→Fig. 4-4)
2. Then install a line from the upper outlet of the seal to the lower input of the second seal (**A 1 → E 2**).
3. Finally, a return line onto the top outlet of the second seal and lead to the upper port of the quench vessel (return line). (**A 2 → quench vessel**)
4. All lines and seals should be vented carefully, especially the bridge line between the two seals when connected in series.

#### 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 the case that the quench fluid temperature has to be cooled, the vessel can be equipped with a condensing coil through which cold water flows.**

#### 4.9.4 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 pump is started. This is necessary to ensure that the sliding surfaces on the outside are being cooled. Carefully bleed the system.

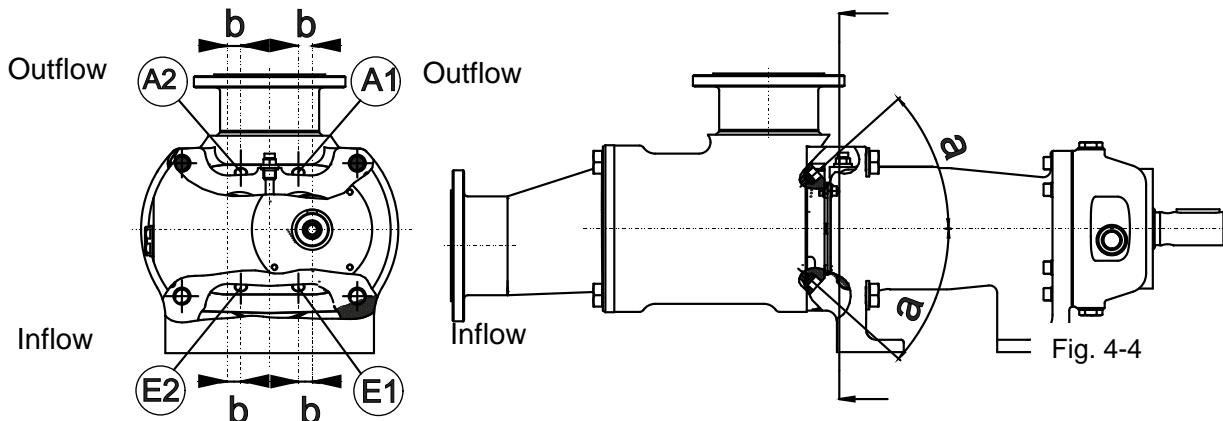
Both pressure and flow through the seal can be adjusted using a flow meter and two control valves. This flow should be adapted to the heat generation on the seal depending on pressure, speed and media temperature.

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.



**Make sure that both seals are sufficiently flows through.  
This can be ensured by two control valves, one for each seal, or series connection of the two seals.**

## 4.10 Quench connections



A	b	A1	A2	E1	E2
29°	10,6 mm	G1/8"	G1/8"	G1/8"	G1/8"

## 4.11 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.

### 4.11.1 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. Glycerine/water mix is suitable for foodstuff.

### 4.11.2 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.

### 4.11.3 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. Distilled water is 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 (d H)**

- **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.

## 5. Commissioning

### 5.1 Preparing commissioning

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

**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 (see data sheet for information which type of shaft seal is in your pump).
2. Check oil level of gearbox
3. Ensure that auxiliary systems (quench supply of the seals) are connected

<b>ATTENTION</b>	<b>Possible damage to property</b>
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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

Ensure that pumps for handling foodstuffs 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 clean in place treatment on 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.**

**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.

#### 5.1.4 EHEDG certified pumps:

These pumps must be cleaned by a flow directed from the pump cover nozzle to the pump casing nozzle.

That is:

- Rotating direction **right hand** along with **Spindle arrangement A**, or
- Rotating direction **left hand** along with **Spindle arrangement B**

We recommend using the Twin pump in addition to its regular duty also as cleaning pump, as CIP-driving pump. So no extra cleaning pump is needed.

To achieve excellent cleaning results run the pump in cleaning process at high rotation speed. Respect the limits of maximum rotation speed as mentioned in chapter 4.2.

### 5.1.5 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 started without getting sterilized again.

#### 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.

#### 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 than atmospheric. The system shall only be able to be restarted after it is re-sterilized.

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

**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.

	<b>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.</b> <b>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.</b>
---	--

<b>ATTENTION</b>	<b>Possible damage to property</b>
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**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..**

## 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

	<b>Warning!</b>
	<b>Do not operate against closed shut-off devices.</b> <b>Bursting of the pipe line or downstream system components is possible.</b> <b>Potential consequences: Severe or fatal injuries.</b>

Secure the pump through an approved overpressure protection.

<b>ATTENTION</b>	<b>Possible damage to property</b>
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The pump needs to be cleaned for handling foodstuffs (see 5.1.3)

## 6. Placing out of operation

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

Do not perform any work with the pump running!

### 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.

	<b>Caution!</b>
<b>Risk of injuries through hot machine parts</b> <b>Potential consequences: Burns.</b>	

### 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. (Professionals
3. Complete emptying and cleaning of the pump. (professional and material disposal of the residues see also chapter 3.3)

## 7. Maintenance and servicing



### Warning!

**Risk of injuries through rotating machine parts**

**Potential consequences: Severe or fatal injuries.**

**Do not perform any work with the pump running!**

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

### 7.1 Maintenance after commissioning

All external screw connections of the pump or pump unit should be checked and, if necessary, tightened after approx. 50 hours of operation.

### 7.2 Notes on service and maintenance

Period	Assembly	Who	Jobs
Weekly	Gear housing	Operator Technical staff	<ul style="list-style-type: none"> <li>→ Check oil level</li> <li>→ If necessary, top up/change oil, see chapter 7</li> </ul>
	Slip-ring seal	Operator Technical staff	<ul style="list-style-type: none"> <li>→ Check for leakage: In case of stronger leakage:<ul style="list-style-type: none"> <li>→ coordinate with manufacturer</li> <li>→ replace slip rings or sealing rings, see chapter 9</li> </ul></li> </ul>
	Shaft sealing rings	Operator Technical staff	<ul style="list-style-type: none"> <li>→ Check for leakage: In case of stronger leakage:<ul style="list-style-type: none"> <li>→ coordinate with manufacturer</li> <li>→ replace slip rings or sealing rings, see chapter 9</li> </ul></li> </ul>
	Counter-pressure system Quench system	Operator Technical staff	<ul style="list-style-type: none"> <li>→ Check for leakage</li> <li>→ Refill counter-pressure/quench medium if necessary.</li> <li>→ Check slip-ring seal and replace counter-pressure/quench medium if quench medium is contaminated.</li> </ul>
After 100 hours of operation or at least semi-annually	Spindle screw	Technical staff	<ul style="list-style-type: none"> <li>→ Check spindle screws and O-rings: If contaminated or medium is leaking through → see chapter 7</li> </ul>
After the first 250 operating hours	Gear housing	Technical staff	<ul style="list-style-type: none"> <li>→ Changing gear oil → chapter 7.4</li> </ul>
Monthly	Pump housing	Technical staff	<ul style="list-style-type: none"> <li>→ Check tightening moment of the spindle nut → chapter 4</li> </ul>
6 months	Counter-pressure system Quench system	Technical staff	<ul style="list-style-type: none"> <li>→ Change counter-pressure and quench medium → chapter 4</li> </ul>
After 500 cleaning cycles or thermal cycles, after one year at the latest	Pump casing and mechanical seal	Technical staff	<ul style="list-style-type: none"> <li>→ Replace all O – rings → chapter 9</li> </ul>

Period	Assembly	Who	Jobs
According to the specifications of the drive manual	Drive	Technical staff	→ Grease bearings (→ Drive manual)
In continuous operation after 3000 operating hours	Bearing housing	Technical staff	→ → Change gear oil → chapter 7
<u>Recommended</u> after 10'000 operating hours:	Bearing housing	Processtec (Technical staff)	→ Replacement of bearings and gear wheels. See also chapter 7.4
Mandatory for pumps installed in Ex-area after 10'000 hours	Bearing housing	Processtec (Technical staff)	→ Replacement of bearings and gear wheels. See also chapter 7.4
Into Ex – area: check contact resistance of the grounding -	Complete pump unit	Technical staff	→ Check contact resistance of pump parts to electrical ground. This resistance must be less than 10 <sup>9</sup> ohm, see Chapter 1

### 7.3 Inspection of sanitary pumps for food processing

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

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 spare parts list and explosion drawing).

Subsequently, no corrosion or seizure marks may 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 seals 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 spare parts list and explosion drawing). Subsequently, no corrosion or seizure marks must be visible; otherwise the affected parts must be replaced.

### 7.4 Lubrication

Pump bearings and gear run in an oil bath. Replacement of these bearings and gear wheels is recommended after 10,000 hours of operation. These bearings **must be replaced** after 10,000 hours if the pump is operated in an **Ex – area**.

In order to enable long pump life-cycle, you should set shorter change intervals for particularly difficult operating conditions, such as:

- large temperature variations
- large pressure fluctuations

The gear has been factory provided with food-compatible high-performance gear oil.

The table below represents the necessary quantity of lubricant. Change this gear oil after 3,000 operating hours or after 1 year latest.

Grease the drive bearings following the manufacturer's specifications (→ drive documentation).

#### 7.4.1 Checking the oil level

Check the oil level in the gear housing weekly. Top up the gear oil if necessary. Switch – off pump and wait for 3 minutes until the oil has calmed. Then read off the oil level.

Check oil quality also by the means of its colour. Dark and nearly untransparent oil must be replaced. The locking screws have a magnetic core. Clean them after each opening.

#### 7.4.2 Topping up gear oil

1. Switch -off pump.
2. Open locking screw 2233 on the upper side of the gear housing.
3. Clean the locking screw thoroughly.
4. Fill in gear oil until reaching maximum in the oil-level gauge glass.
5. Screw in the locking screw.

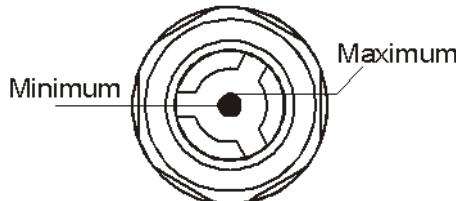


Fig. 7-1 Oil-level gauge glass

#### 7.4.3 Changing gear oil

1. Switch -off pump.
2. Open locking screw 2233 on top of the gear housing. Then open lower locking screw 2233 and drain the gear oil into a collecting vessel.
3. Clean the locking screws thoroughly.
4. Screw in lower locking screw and fill in fresh gear oil.
5. Fill up to the oil-level gauge glass (maximum).
6. Screw in the upper locking screw.

**ATTENTION**
**Possible damage to property**

**Only use gear oil approved for the food industry.**

**Use correct type of gear oil. (See list of lubricants)**

### 7.5 Lubricating agents

#### 7.5.1 Gear oil with NSF or USDA H1 approval

The following gear oil suitable for food products to the FDA guideline NSF-H1 and viscosity of ISO VG 68 is factory-used in the screw pump for 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 qualification can be alternatively used. (e.g.)

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

## 7.6 Lubricants filling quantity (Gear oil)

Gear oil filling quantity is 0.6 L

## 7.7 Lubricating grease

A lubricant to NSF-H1 that is approved for the food industry is used at the factory during the installation of the pump components. Use this or equivalent lubricant during assembly.

Product	Lubricant
Fuchs Lubritech	CASSIDA GREASE RLS 2

**ATTENTION**
**Possible damage to property**

**Do not mix together synthetic lubricants and do not mix with mineral lubricants.**

## 7.8 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 which being operated under counter-pressure need also to be checked for this counter-pressure or monitored via a corresponding monitoring equipment. (Level switch).

## 7.9 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.

## 7.10 Shipping pump for repair



**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.


**Warning!**

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

**Potential consequences: Severe or fatal injuries.**

**In case of a fault stop pump immediately!**

**Disconnect system from mains and prevent unintentional restart/reclosing!**

**After fault clearance check pump and plant carefully before restarting pump!**

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 Shut-off devices partly shut, pipe line clogged	Compare pump pressure rating with system conditions, change project planning if necessary Open shut-off devices fully, eliminate clogging
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
	Screws 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

Type of disturbance	possible cause	Elimination
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
	Foreign objects in medium	Remove foreign matter and check the pump for damage, repair as needed.
	Bearing damage	Renew bearing and check the pump for damage, repair as needed.

## 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.


**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 protective guard protection!**

**Disconnect system from mains and prevent unintentional restart/reclosing.**

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

**Let cool the pump.**


**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.**


**Caution**

**Wear protective gloves when disassembly / assembly of sharp-edged screw spindles and other machine parts!**

## 9.1 General notes on disassembly and assembly



**Always replace the removed gaskets, O-rings and shaft sealing rings after disassembly.**

**The numbers stated in the following figures are the Position-numbers of the spare parts list.**

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

The employed special tools and assembly sleeves (tools) are listed in the chapter itself, as well as in the appendix under **Special keys and tools**.

## 9.2 Protective guard ViscoTwin

The reach-in protection 2286 on the sealing casing of the ViscoTwin reliably prevents any reaching into the pumps. With maintenance work, it can be dismantled and mounted over bolts 2287 at the seal.

**The pump must not be operated without a mounted protective guard.**

### 9.3 Disassembling and installing the pump

#### 9.3.1 Driving elements

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

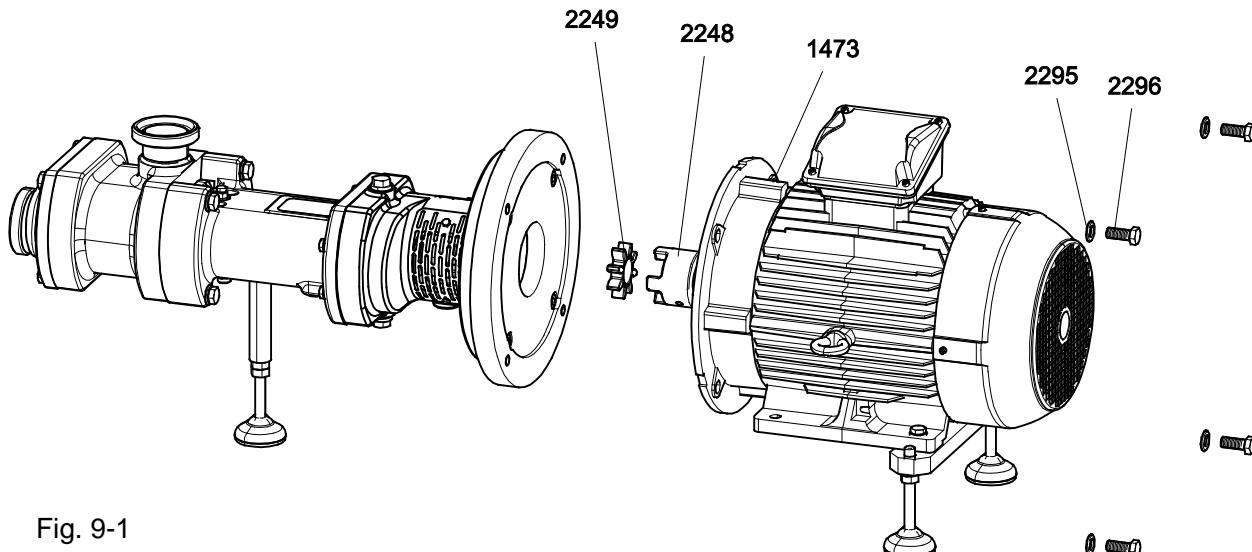


Fig. 9-1

#### Dismounting:

1. Undo the connections of the pump to the pipeline system.
2. If the pumping aggregate was mounted on a base plate, loosen the connections to the base plate.
3. Loosen the screws connecting of the pump to the drive. Remove the pump from the drive. Remove the elastic coupling element 2249. Keep this in a safe place.

<b>ATTENTION</b>	<b>Possible damage to property</b>
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**Adjust the drive unit on a suitable support safely.**

**Use a lifting device to remove the pump from the drive.**

4. Set off the pump and drive on appropriate supports. (E.g. wooden blocks).

#### Mounting:

1. Put the elastic coupling element into the coupling (on pumps side). Connect pump and drive unit. The drive unit should now sit safely on a suitable support. Screw in the screws 2296 with washers 2295 and tighten it. (according to specified tightening torque of the drive manufacturer)
2. Install the pump assembly in the plant. (Use a lifting device).

### 9.3.2 Gear housing

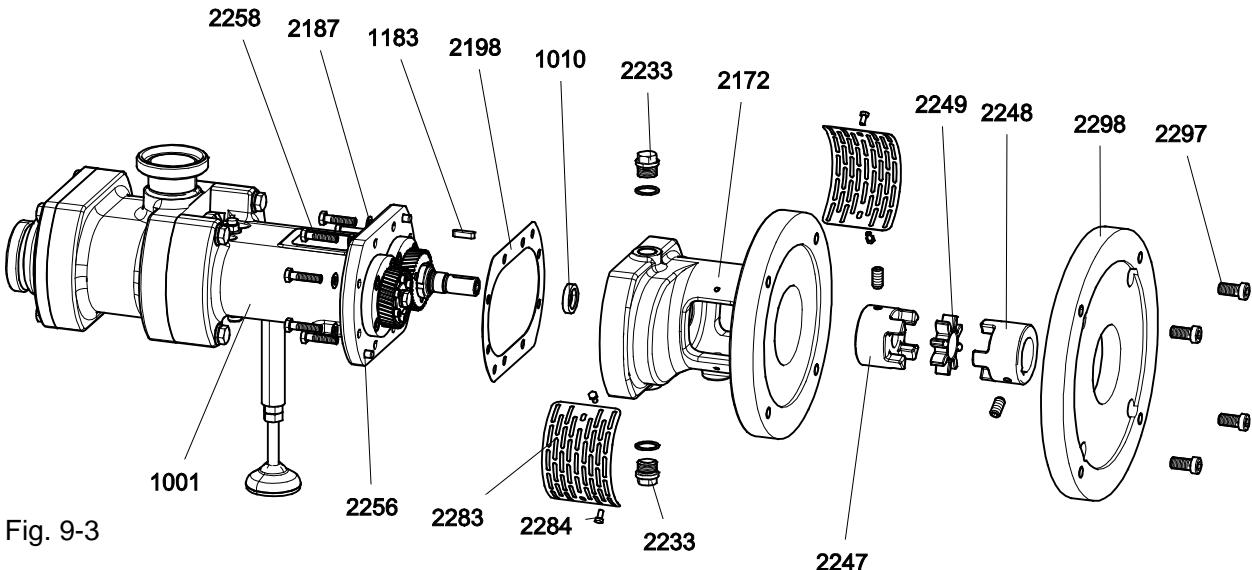


Fig. 9-3

#### Dismounting:

1. Loosen the screws connecting of the pump to the drive (see 9.3.1). Remove pump from the dive unit. Remove the elastic coupling element 2249. Keep this in a safe place.
2. Loosen cylindrical cap screws 2297 from the flange adapter 2298 and remove it.
3. Undo screws 2284 from protecting cover 2283 and take it off.
4. Turn drive shaft so that the set screw is achieved in the coupling part 2247. Loosen the setscrew in the coupling part of the pump 2247. With a suitable extractor pull down the clutch part 2247 of drive shaft 1000.
5. Remove parallel key 1183 from the drive shaft.
6. Open the top and the locking plug 2233 and the collect leaking gear oil.
7. Loosen the screws 2258 and remove them together with the washers 2187. Carefully pull off the gear housing. This may require slight hammer blows by a plastic mallet because the gear housing has been fitted with cylindrical pins 2258. Take off gasket 2198 carefully.



The locking screws have a magnetic core. Clean them after each opening.  
Possible existing metallic contaminants and wear debris in oil can be collected.  
On that occasion check the shaft seal in the gearbox 1010. Press out with a suitable mounting tube. (T 1) Renew this shaft seal periodically (at least annually).

#### Mounting:

1. Clean the sealing surfaces between the bearing and gear housing, the seat of rotary shaft seal 1010 and drive shaft carefully. Put on a new gasket 2198 to bearing housing 1001.
2. Lightly grease the rotary shaft seal ring 1010 outsides and to the sealing lips. Carefully press into the gearbox with a mounting tube (T 1). (The spiral ring of the rotary shaft seal ring shows into the housing.) Place on the drive shaft 1000 mounting sleeve (T46). Screw in to 2 opposite threaded holes of the gear housing 2172 the centering rods (T49) (4 pieces).

## 9. Disassembly and assembly

3. Insert gear housings 2172 with centering rods into the parallel pins 2256. Unscrew centering rods (**T49**) and remove mounting sleeve (**T46**). Insert machine screws 2258 with the washers 2187 and tighten alternately crosswise. (Torque 20 Nm).

### ATTENTION

### Possible damage to property

**The Mounting Tube T1 prevents damages of the shaft seal ring 1010 for installation in the gearbox housing.**

**The mounting sleeve T46 and the centering rods T 49 prevent damages to the sensitive sealing lips of rotary shaft seal ring.**

4. 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.
5. Screw in upper locking screw and tighten.
6. Mount coupling part of the pump, apply hexagon socket set screw with a liquid screw-locking, screw in and tighten.

### 9.3.3 Cover

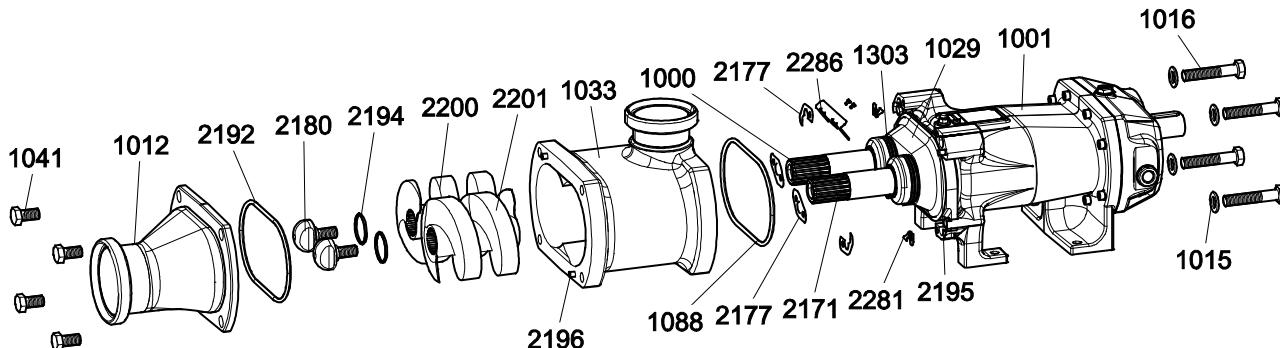


Fig. 9-5

#### Dismounting:

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



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

#### Mounting:

4. Insert seal 2192 into the cover. Place covers over the parallel pins on the pump housing 1033. Check the correct seating of the O-ring in the cover. This may not be pressed out from the slot during installation, either externally or internally. Screw in bolts 1041 and tighten alternately and crosswise. (Torque M12 = 70 Nm)

### 9.3.4 Removing and installing screws

	<b>Caution</b>
<b>Wear protective gloves when disassembly / assembly of sharp-edged screw spindles!</b>	

#### Dismounting:

1. Relieve existing locking pressure system / flushing system, drain quench fluid, unscrew and remove connections.
2. Loosen and unscrew hexagonal screws 1016 and remove them with washers 1015. Remove pump housing.
3. Loosen spindle bolt 2180 and unscrew. Place a locking mandrel (**T 4**) into the bore of the pump-sided coupling and in this way hold the drive shaft fixed and carefully take off the O-ring 2194.
4. Remove screw spindles 2200 + 2201 from the shaft. (Use puller)
5. Check the screw spindles, shafts as well as the pump housing for damage and carefully clean all parts. Replace O-ring 2198 on seal housing 1029.

#### Mounting:

	<b>The pump housing must be clean.</b> <b>Screw spindles must also be meticulously clean.</b> <b>Apply lubricant to shafts and hubs of the screw spindles</b>
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1. Carefully slide the screw spindles (imperative in pairs) onto the shafts. For the arrangement of the screw spindles refer to chapter 9.3.6 Arranging spindles
2. Observe correct seat of the O-rings when sliding the spindle onto the seal.
3. Insert O-ring 2194 into the greased groove of the spindle nuts.
4. Screw in spindle screws 2180 on both shafts and slightly tighten alternating, manually at first, then using a special key **T 35 or T 36**. In this process, just hold shafts and spindles in place manually.

	<b>The seals are pre-stressed when slightly tightening the spindle nuts. Check to see that exterior stator 11 is slowly pushed into the seal housing against its spring.</b>
---	--

5. Insert a locking arbor, **T 4**, into the bore of the coupling and hold back. (Torque 100 Nm)
6. Tighten spindle bolt 2180 of driven shaft spindle 2171 while hold in place with steel pin in the hole of the drive shaft 1000 (torque 100 Nm)
7. Insert O-ring 1088 into the sealing casing.
8. Allow pump housing 1033 to slide over the screw spindles into the dowel pins, in this case check the correct seating of the O-ring 1088 in the upper side and in the lower side, insert bolt 1016 with washer 1015 over the bearing housing and tighten bolt 1016 with washer 1015 alternately and crosswise.(Torque M 12 = 70 Nm)
9. Mount cover (see chapter 9.3.3)

<b>ATTENTION</b>	<b>Possible damage to property</b>
------------------	------------------------------------

**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).**

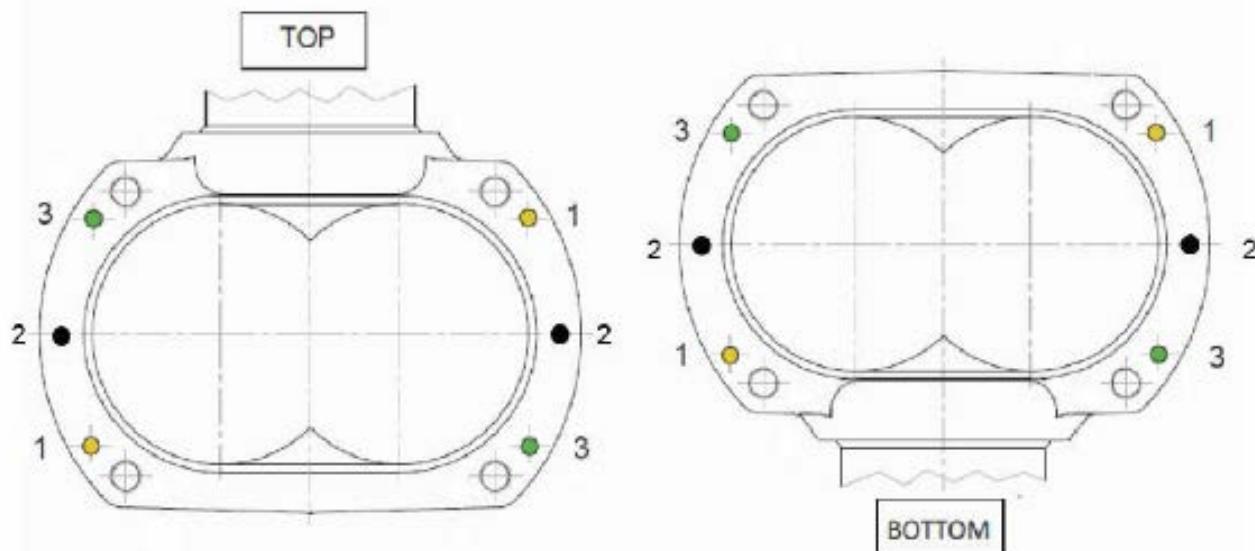
**Observe the required tightening torques (Chapter 4)**

**When replacing screw spindles, you will also need to synchronize them via the pinion gear drives (see Chapter 9.6)**

### 9.3.5 Arranging pump housing

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

**NOTE: Figure 9-6 (below) shows VIEW ON PUMP HOUSING and NOT on bearing housing.**



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

Fig. 9-6: Spindle configuration ViscoTwin 70

#### ATTENTION

#### Possible damage to property

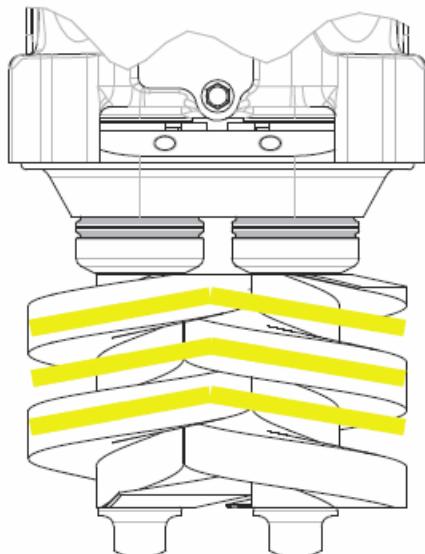
- Wrong combination of dowel pin arrangement and wrong direction of rotation may result in damage to pump housing and spindles.
- See data sheet for correct arrangement of dowel pins (direction of rotation, spindle arrangement and position of housing nozzle).



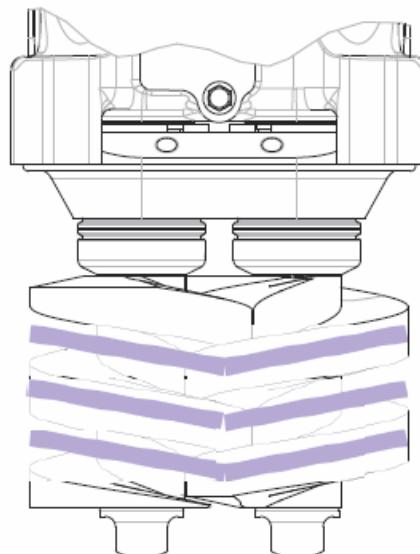
- The pump casing must be clean.
- Screw spindles must also be meticulously clean.
- Apply lubricant to shafts and hubs of the screw spindles (factory uses Geralyn® 2).

### 9.3.6 Arranging spindles

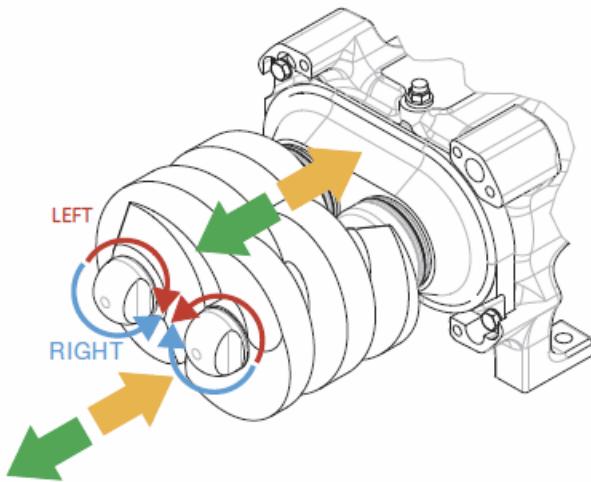
Right-hand and left-hand spindles can be swapped but this will change the flow direction of the pump as well as reversal of drive rotation direction.



V



A

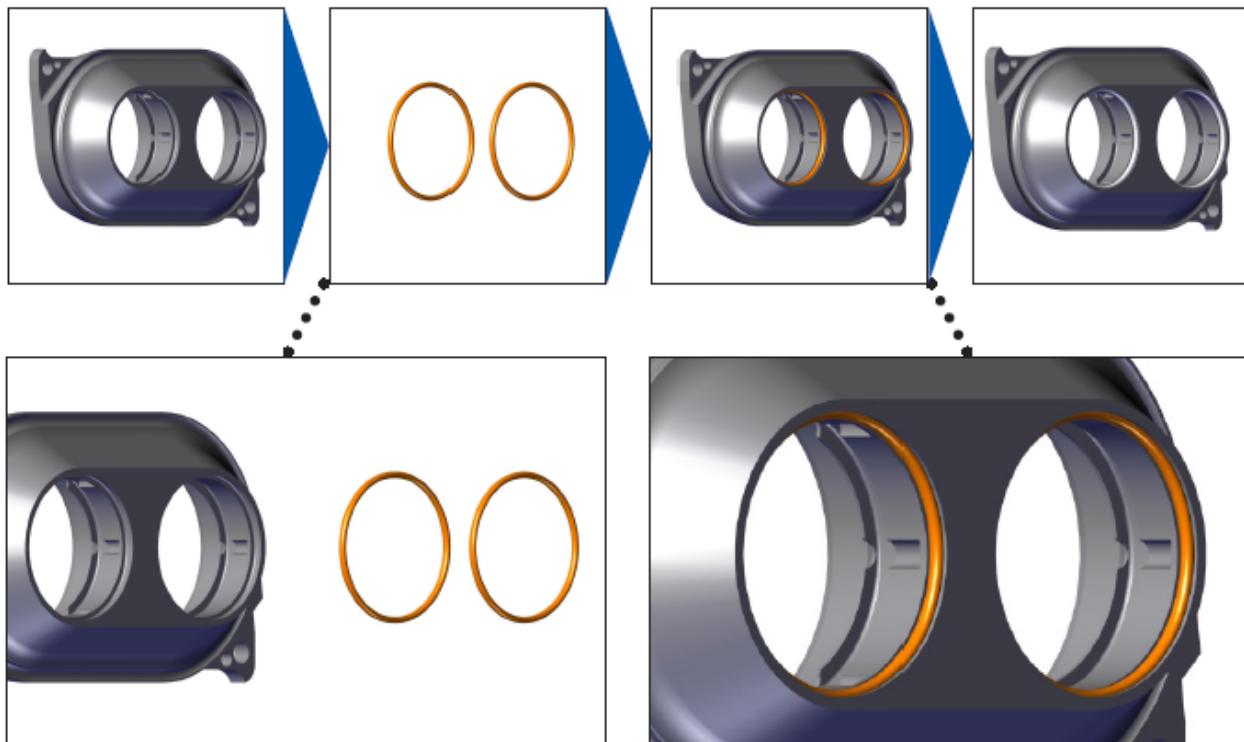


		Flowdirection	
		V	A
Rotation-direction	LEFT	Red	Green
	RIGHT	Green	Yellow

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

### 9.3.7 Double Acting Mechanical seals (shaft seals)

#### Step 1: Placing O-Rings



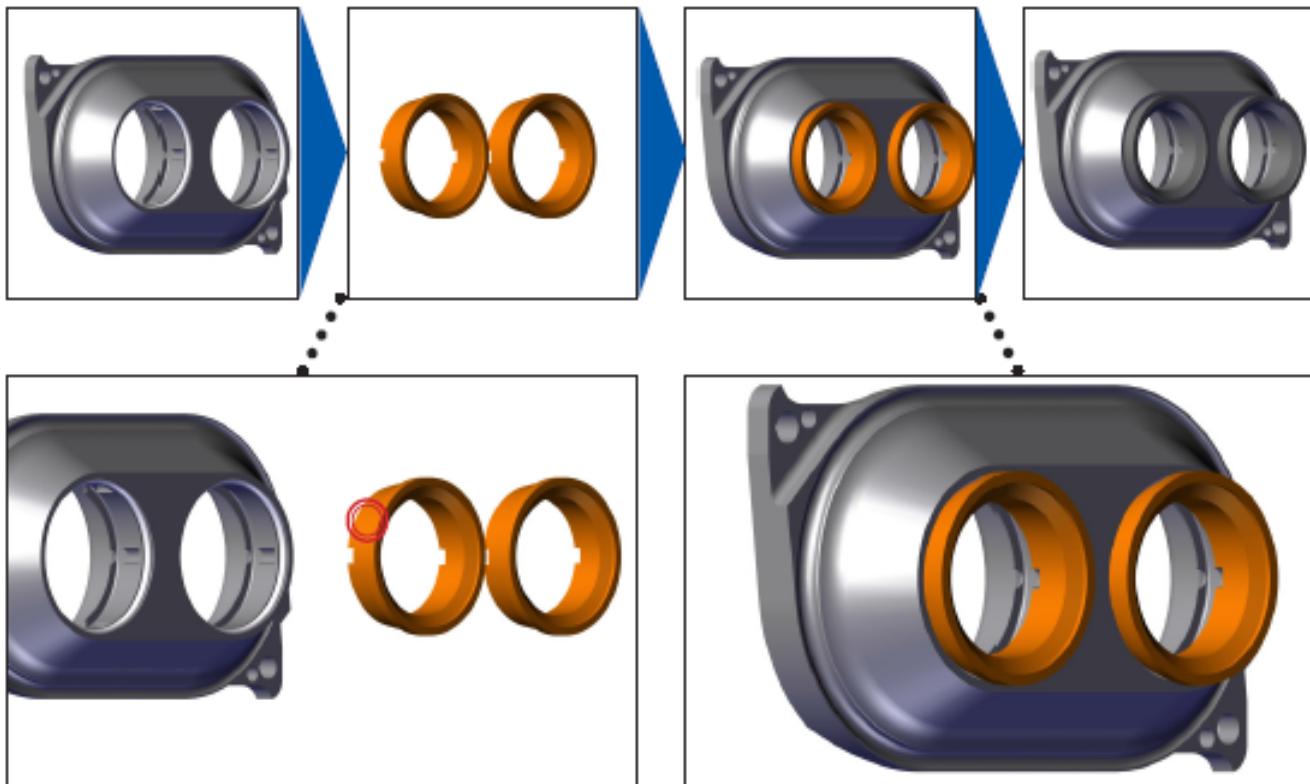
##### Tool/ Components:

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:**

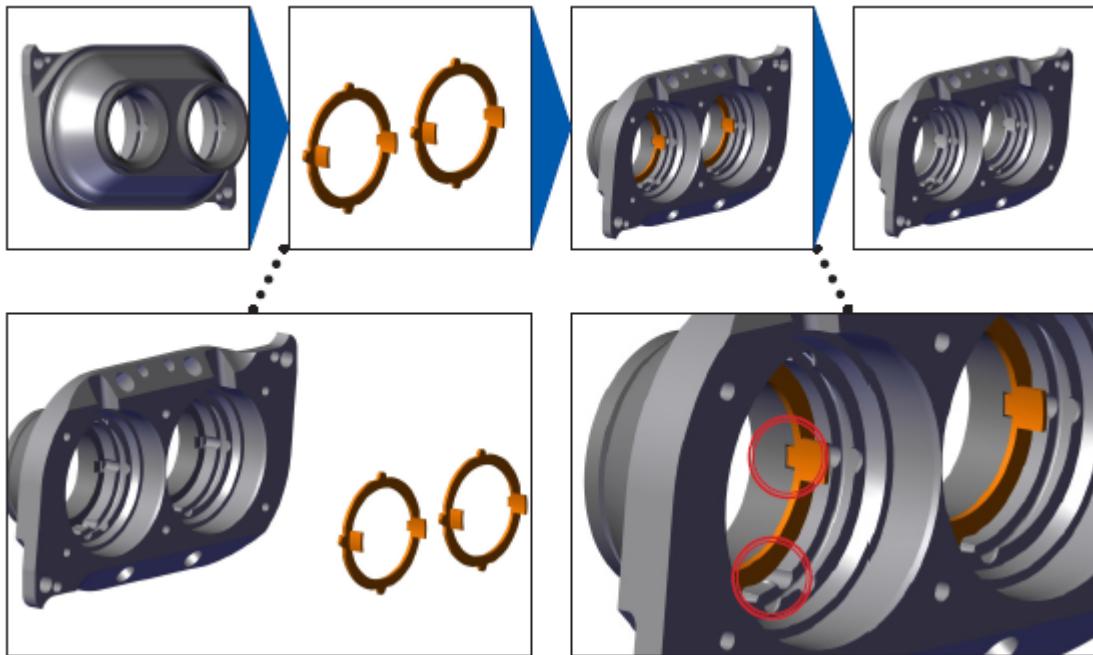
Outer surface of seal faces cover with thin layer of lubricant

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:**

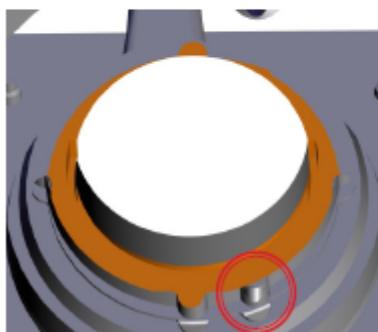
Pressure Ring Pos. 7 (2x)

**Steps:**

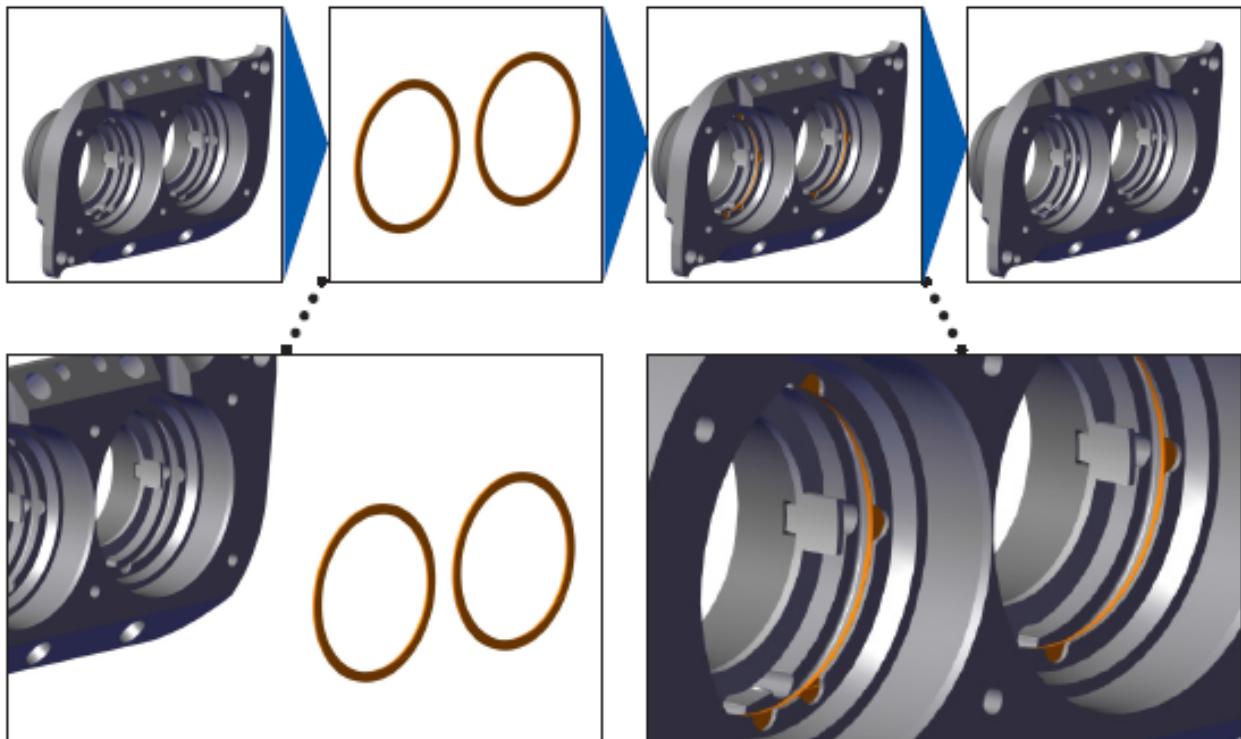
Place pressure ring into grooves  
place into grooves in positions:

12-3-6-9

Keep flushing grooves clear!



**Step 4: place plastic safety rings**



**Tools / Components:**

Safety rings Pos.13 (2x)

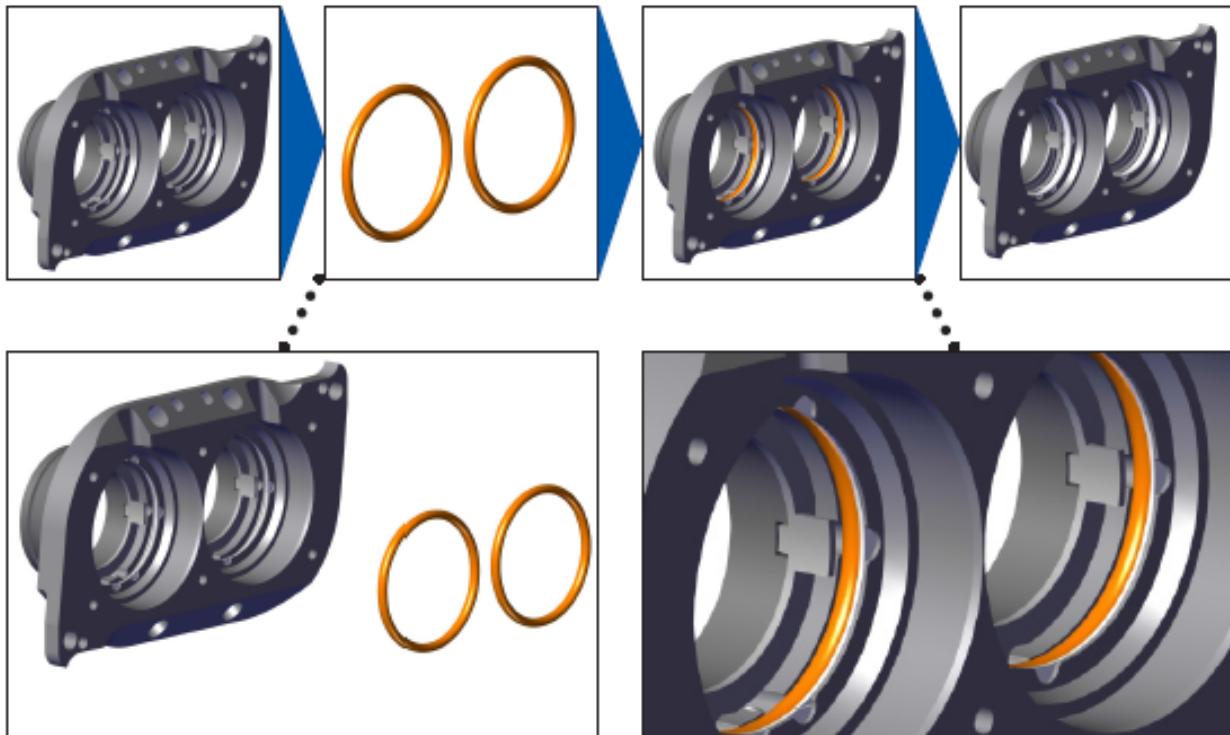
**Steps:**

Clean grooves thoroughly

insert safety rings and insure snug fit to rim

Do not rip safety ring apart

**Step 5: place O-Rings 43x2**



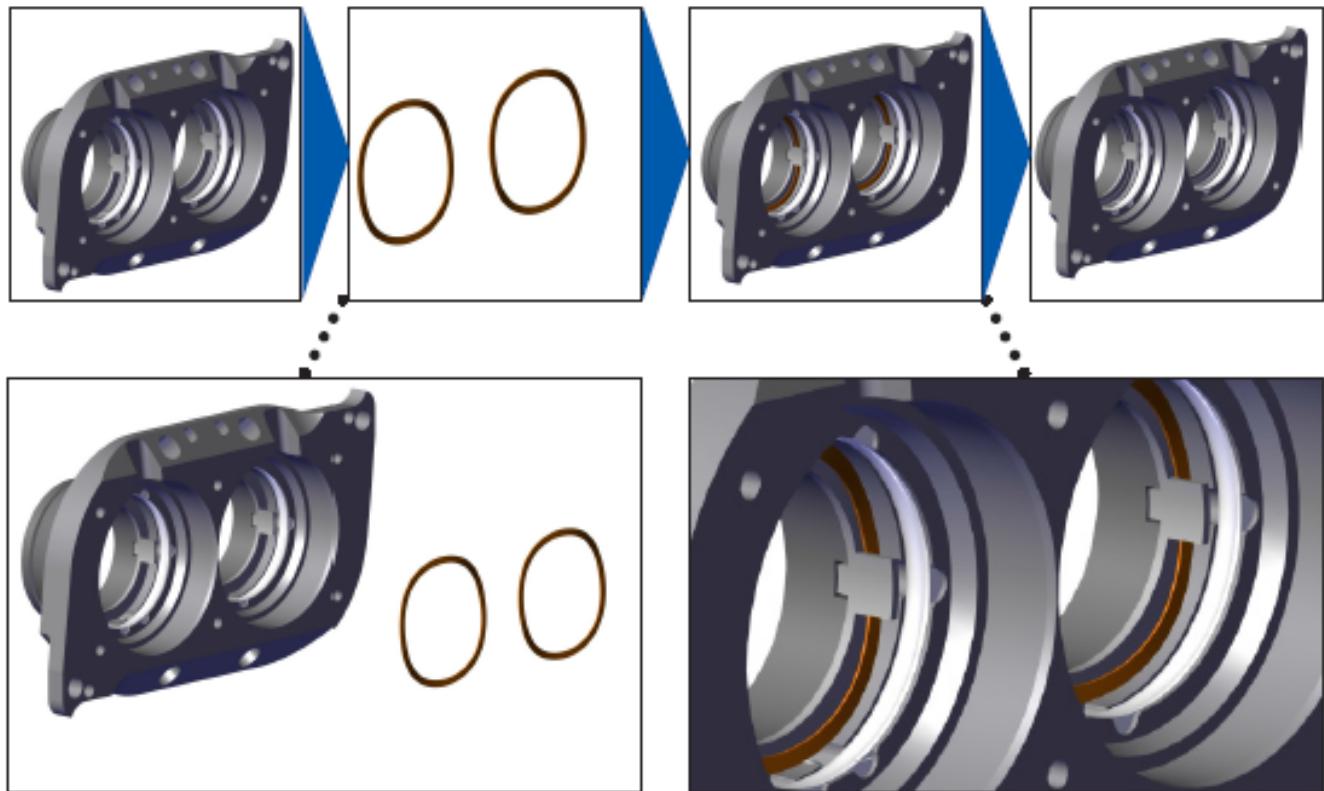
**Tools/Components:**

O-Rings Pos. 4 (2x)

**Steps:**

Place O-ring behind safetyring

**Step 6: Insert Sinus-spring 43x2**

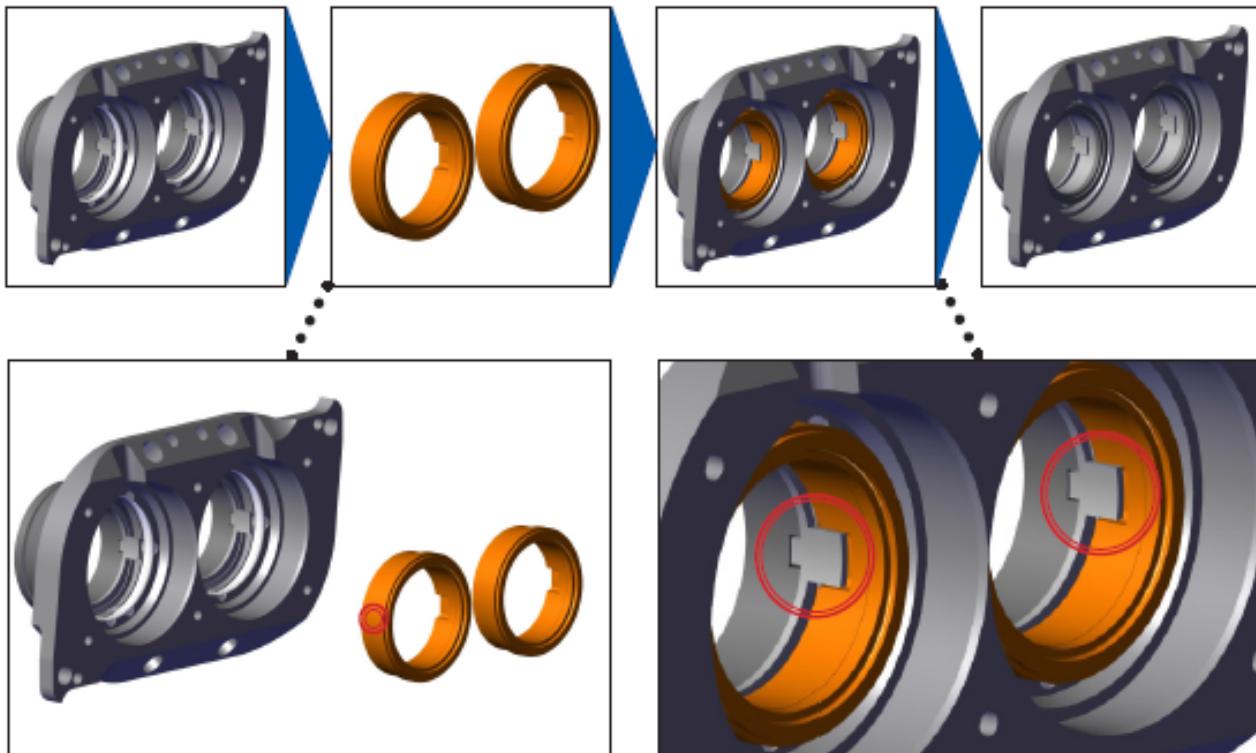


**Tools / Components:**

Sinus spring Pos. 8 (2x)

**Steps:**

Place Sinus spring at Pos. 8

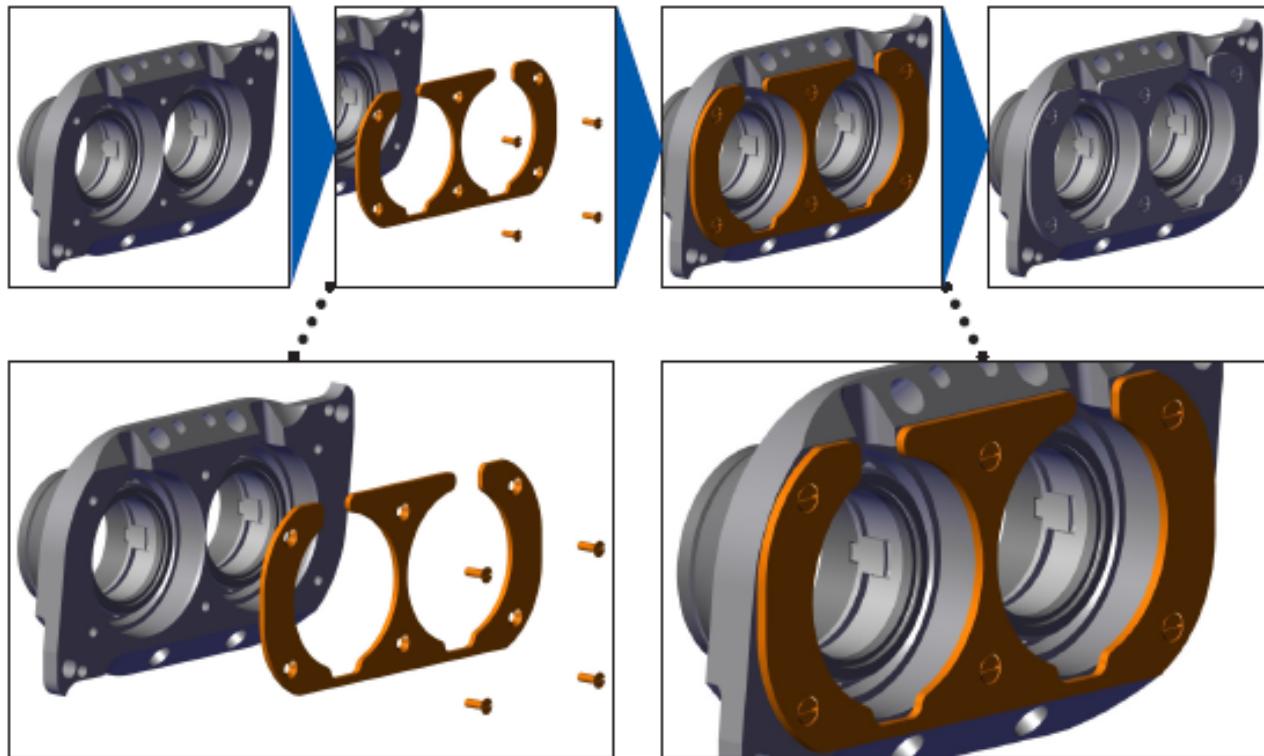
**Step 7: placing seal face atmospheric****Tools / Components:**

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

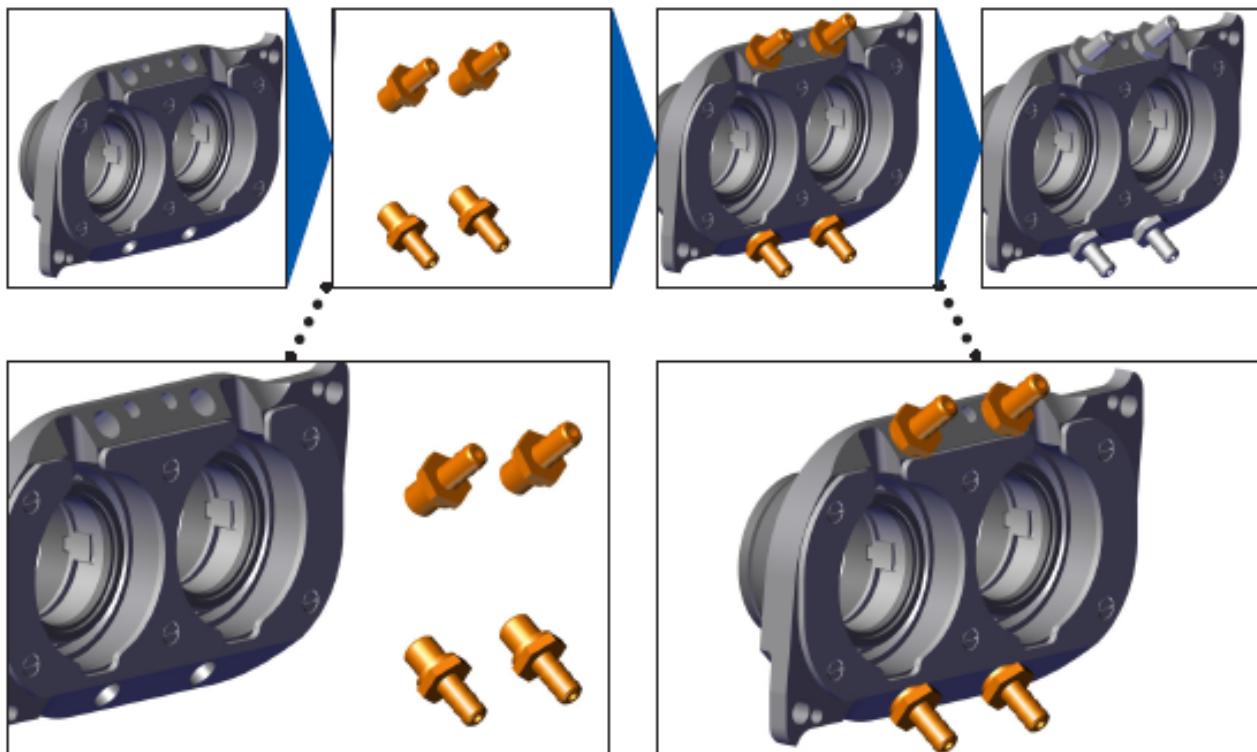
Clean locking plate

mount locking plate 2324 on sealing body 1029

with countersunk head screws

torque to 7.375 lb/ft (10 Nm)

**Step 9: mounting 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)

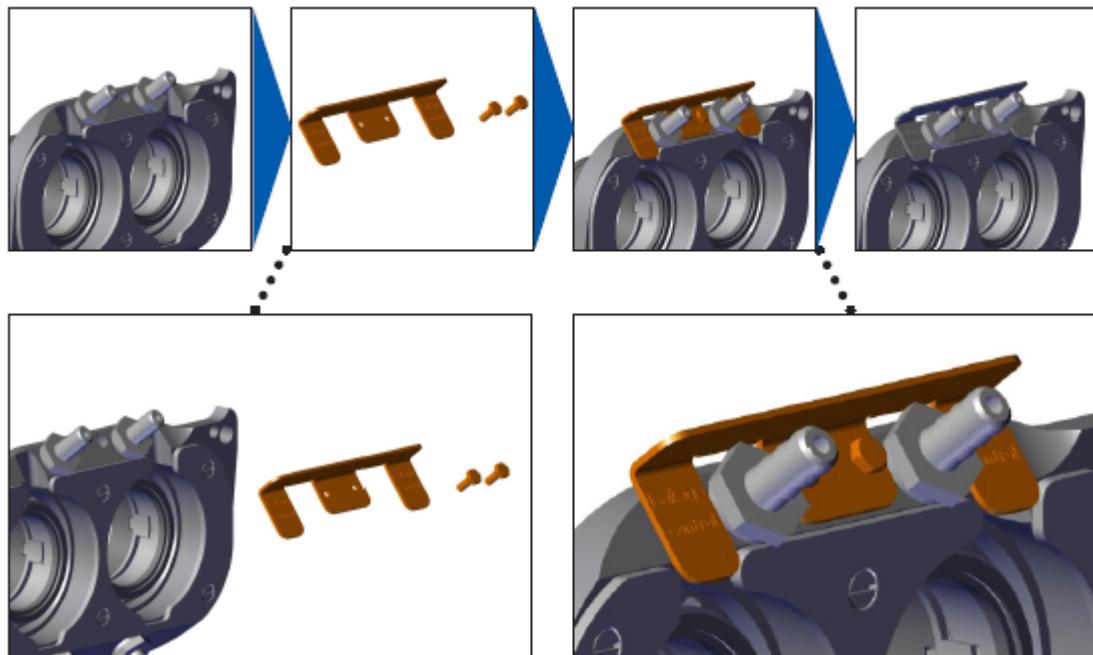
**Steps::**

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)

**Step 10: mounting of guard plate**



**Tools / Components:**

Locktite, blue (medium hard))  
Wrench SW8

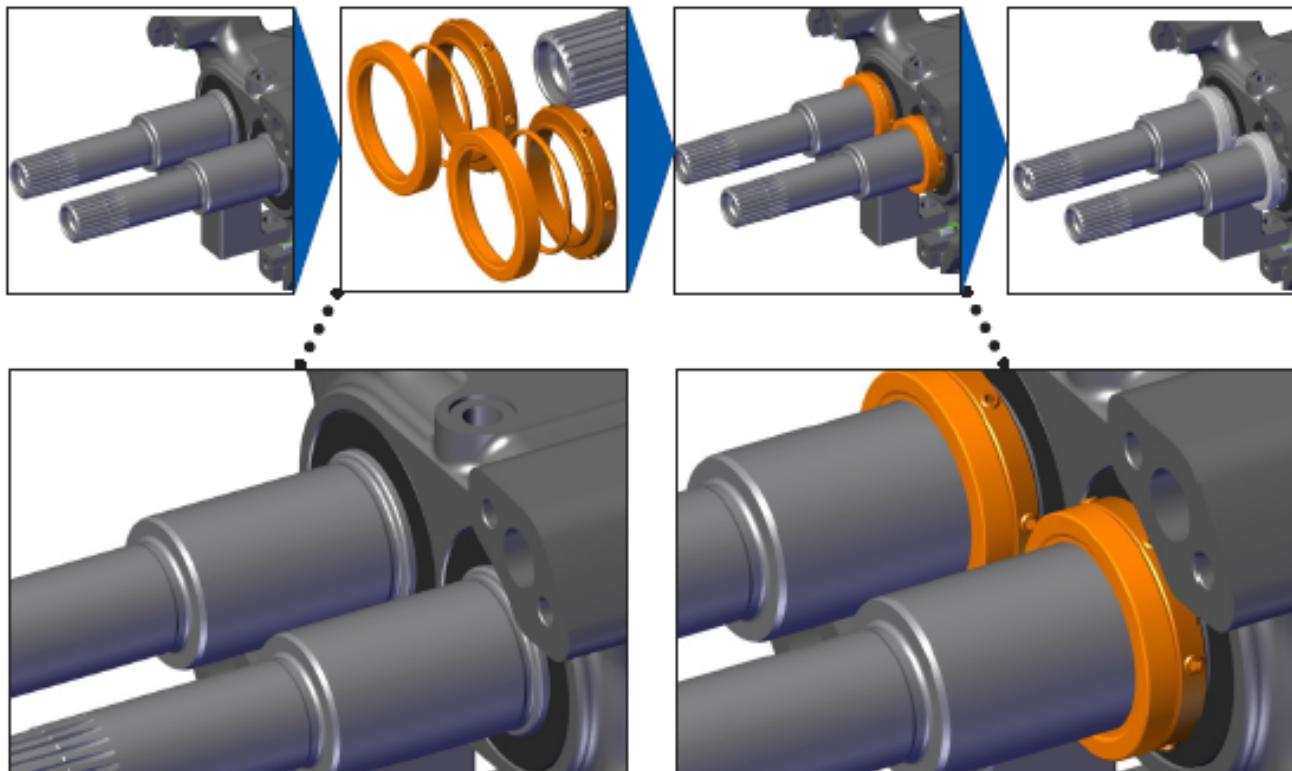
guard plate 2286  
Hexhead bolt 2287 (2)

**Steps:**

Drip a small amount of locktite blue  
on hexhead thread

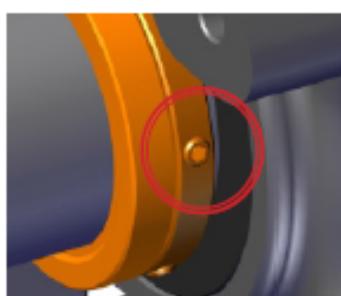
Torque: 7.375 lb/ft ( 10Nm)

**Step 11: mounting of stationary seat rings**



**Tools / Components:**

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



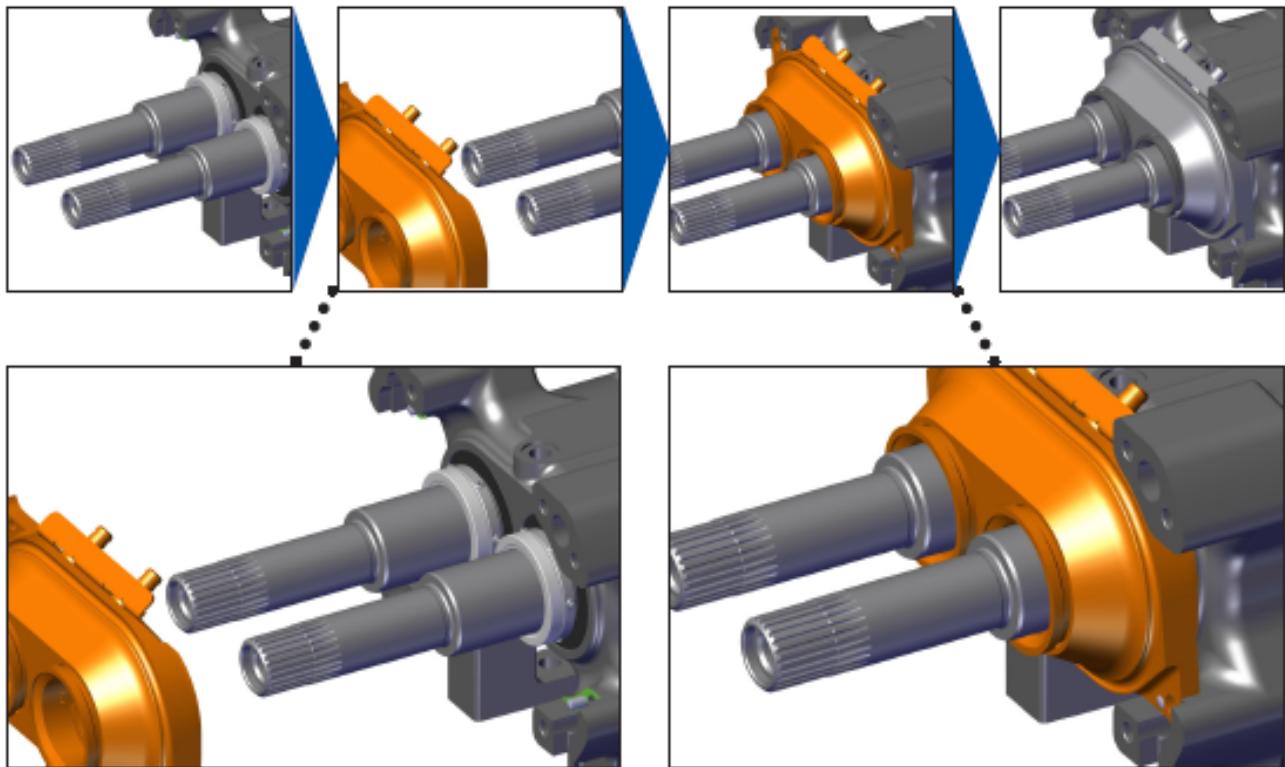
**Steps:**

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)

**Step 12: set sealing body in place**



**Tools / Components:**

Double acting mechanical seals premounted  
cleanser & cleaning cloth

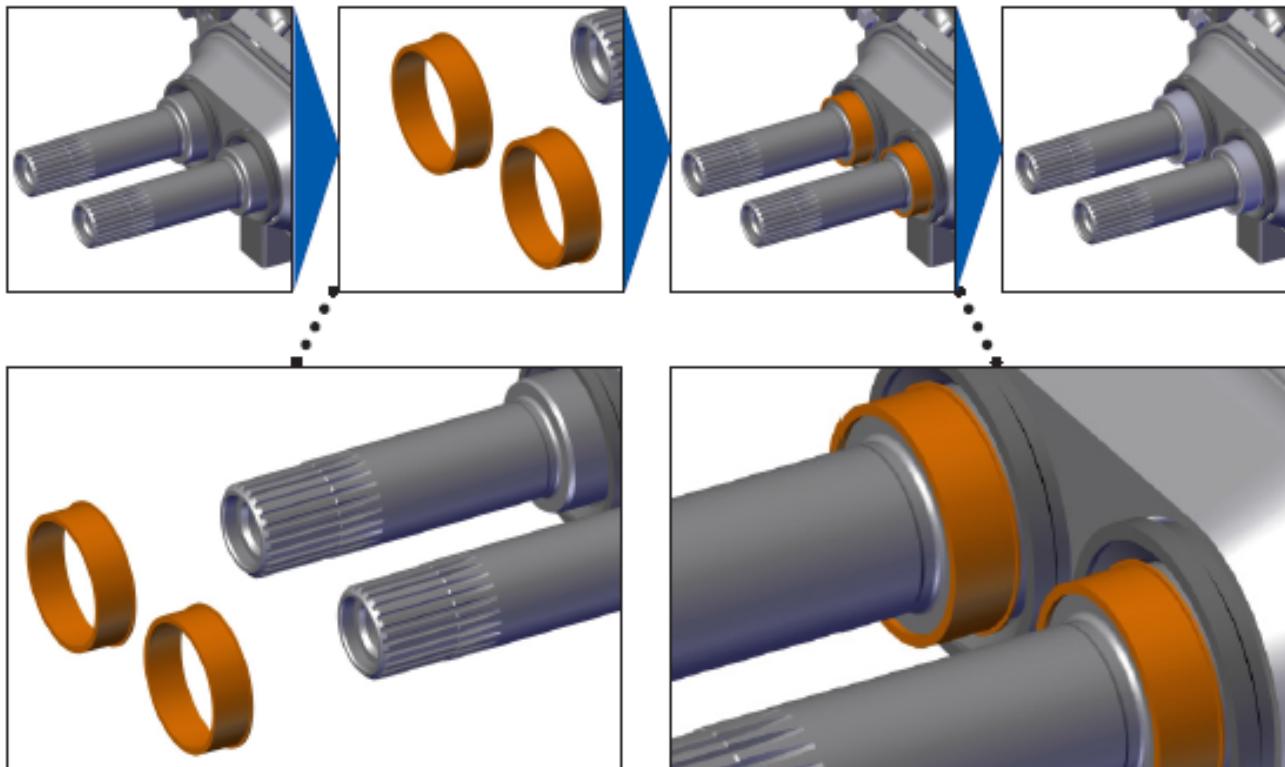
**Steps:**

Degrease and clean seal face surfaces Pos.2 + Pos.6  
Implement sealing body

## Manual ViscoTwin 70-xx 3A

## 9. Disassembly and assembly

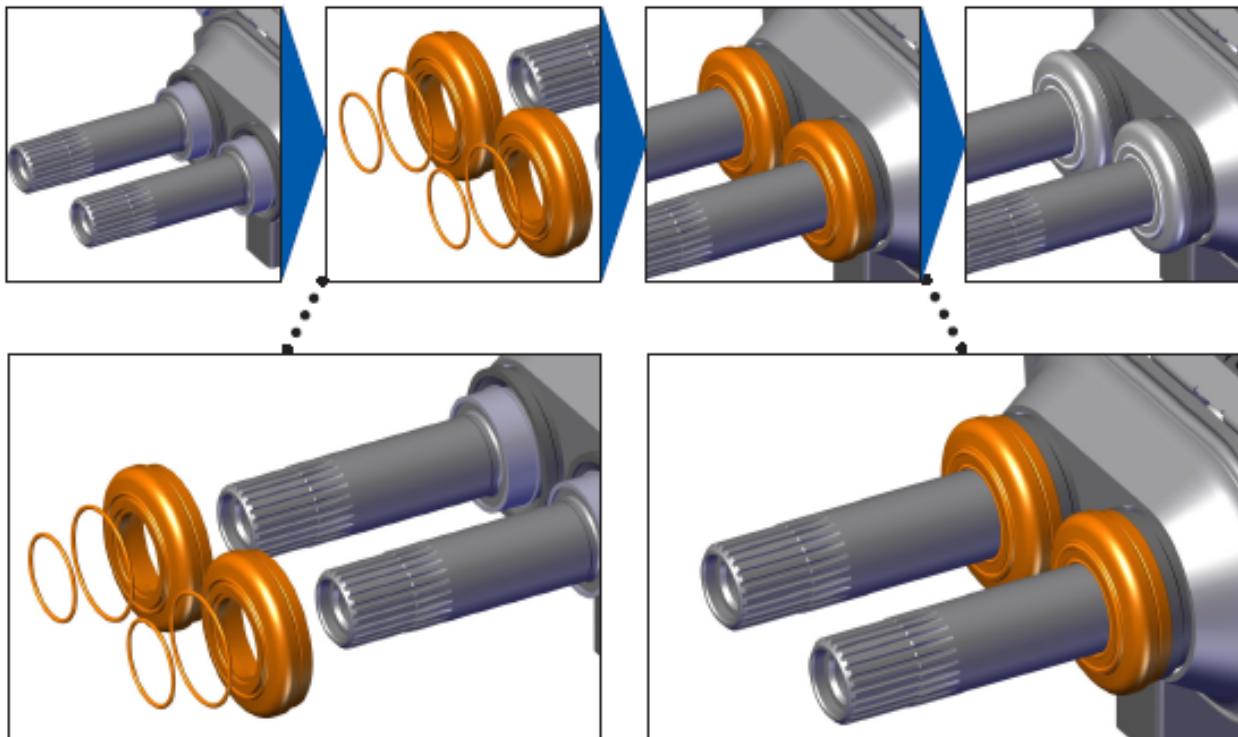
(Step 13: does not apply to ViscoTwin 70 → proceed with step 14)

**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

**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)

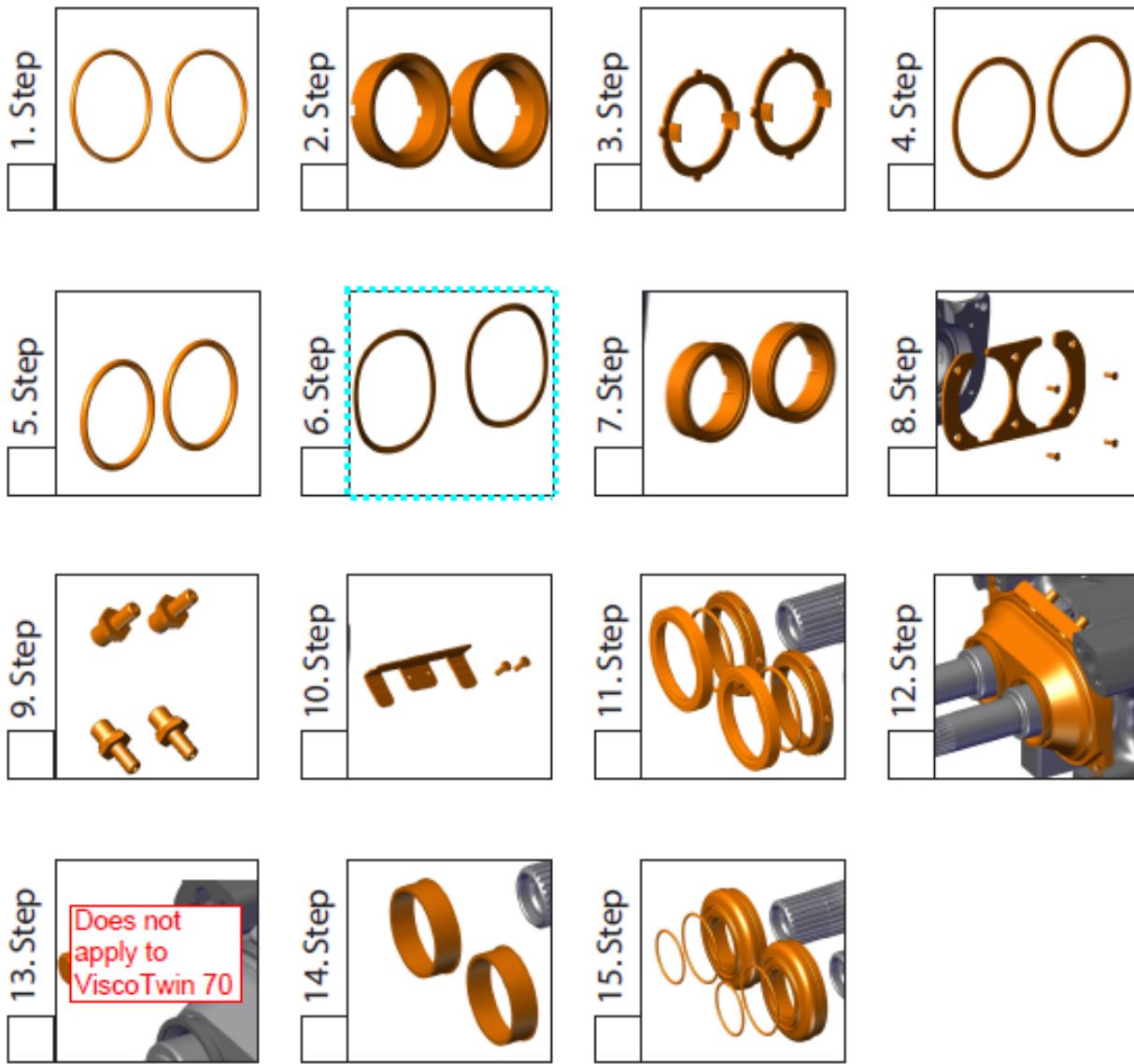
**Steps:**

Lubricate O-ringe 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.

## 9. Disassembly and assembly

**Checklist mounting double acting mechanical seals**

### 9.3.8 Bearing housing



**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.**

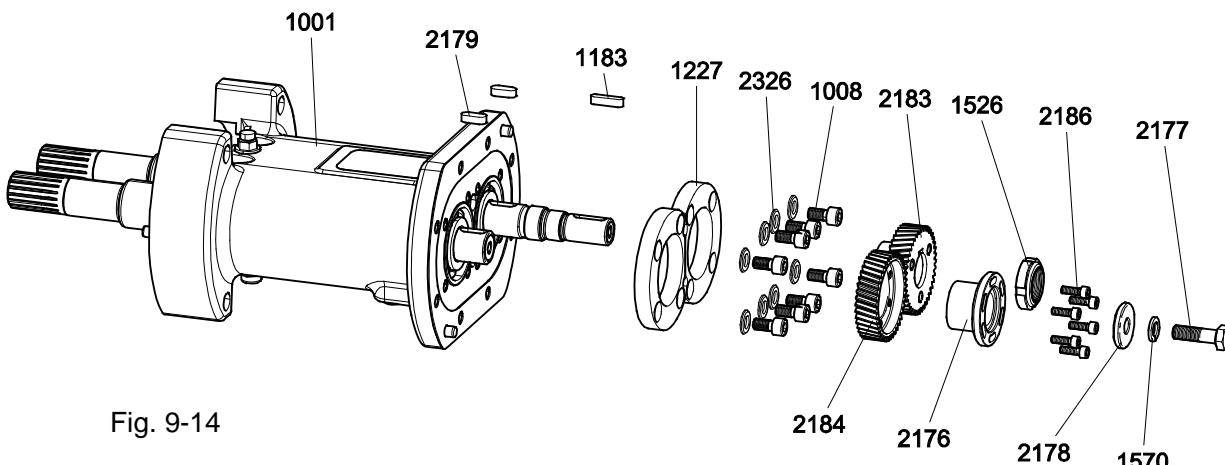


Fig. 9-14

#### Dismounting:

#### Special tools:

**Hook spanner for shaft nut, Allen key, steel mandrel for counter holding, assembly press, various mounting sleeves and other tools**

1. Loosen hexagon screw 2177 of driven shaft 2171 and remove it incl. washer 2178. Hold up drive shaft by a bush T 39 or block the shafts with a copper or bronze wedge in the teeth of the gears.
2. Loosen the threaded pin in the shaft nut 1526 by one revolution by means of an Allen key 2.5 mm.

#### ATTENTION

#### Possible damage to property

3. **Ever loosen the threaded pin before disassembling the shaft nut; otherwise the thread of the drive shaft is damaged.**
4. Loosen and remove shaft nut 1526 of the drive shaft.
5. Pull gear 2183 from the shaft with wheel puller T9.
6. Pull off gear wheel 2184 incl. hub 2176 from the driven shaft.
7. Remove keys 2179.
8. Loosen socket head bolts 1008 of the bearing crown 1227, take off bearing crown and socket head bolt with spring washer 2326.

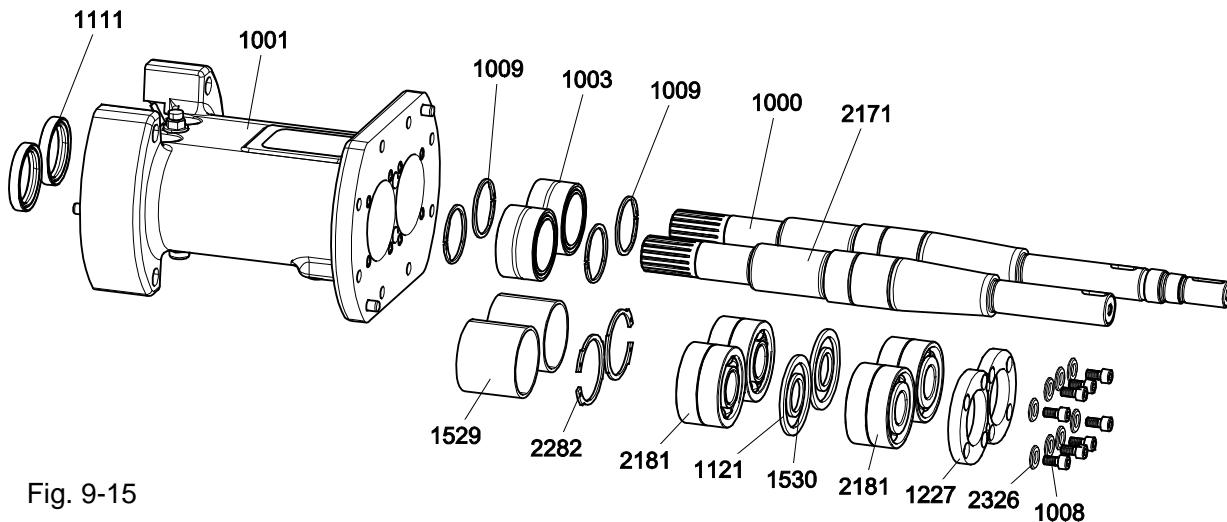


Fig. 9-15

9. Remove rotary shaft seals 1111 with a hook remover from the bearing housing. The shaft seals are destroyed now, and these must be renewed by a new one.
10. Remove front circlips in 1009 with a snap ring plier.
11. Using a press, press out the shafts incl. bearings and distance rings toward the drive end. Afterwards, remove rear circlips 1009 and remove the inner rings of 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 spacer rings 1530, 1121 and spacer bush 1529. Remove circlips 2282 with a snap ring plier from bearing housing. Using a puller, pull out the outer race of the needle bearings from the bearing housing.

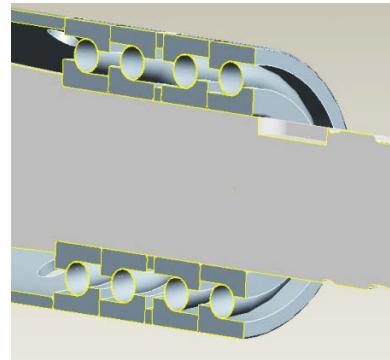
### ATTENTION

### Possible damage to property

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

#### Mounting:

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. Press inner sleeve of needle bearing 1003 onto the shafts using a pressure plate **T 10**. Insert inner snap ring 1009 into the shaft.
5. Press in outer rings of the needle bearings with a suitable tube **T 11**. (From the driving side.)
6. Place spacer bush 1529 onto the shaft. Place retaining ring 2282 with a circlip plier into the housing.
7. 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 spacer rings 1121 and 1530 into the middle between the 4 angular ball bearings **T 12 und T 13**.
8. 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 **T 14**. The last bearing will then only protrude approx. 1 mm from the bearing housing.



Angular ball bearing in O arrangement

ATTENTION	Possible damage to property
-----------	-----------------------------

**Align the distance bushes and rings precisely when pressing them in otherwise they will be destroyed.**

9. Put in the outer circlip 1009. In this case protect the drive shaft with the mounting tube **T42** and sliding tube **T43**.
10. Install the driven shaft 2171 in the same way.
11. Lubricate rotary shaft seal rings 1111, slide them over the toothed shaft ends and carefully fit them into the seat in the bearing housing using a mounting tube **T15 and T16**. (The spiral ring of the sealing lip shows in the pump housing).
12. Insert the two bearing crowns 1227, apply socket head bolt 1008 with a thread lock fluid (Loctite 270 is used by manufacturer) screw in with placed-on spring washer 2326 and tighten. M8 torque = 20 Nm.
13. Insert keys 2179 into the shafts on the drive side.
14. Slide gear wheel 2183 onto the drive shaft, screw in and tighten shaft nut 1526.
15. 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 45 Nm).
16. Tighten the bolt 2177 likewise with a torque of 45 Nm on **T17**.
17. Tighten the threaded pin in the shaft nut. (torque Twin 070 Nm = 4 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.**

18. Put on a new gasket 2198 to bearing housing 1001.
19. Place on the drive shaft 1000 mounting sleeve (**T46**).
20. Screw in to 2 opposite threaded holes of the gear housing 2172 the centering rods (**T49**) (4 pieces).
21. Insert carefully gear housings 2172 with centering rods into the parallel pins 2256. Unscrew centering rods (**T49**) and remove mounting sleeve (**T46**). Insert hexagon screws 2258 with the washers 2187 and tighten alternately crosswise. (Torque 20 Nm)

ATTENTION	Possible damage to property
-----------	-----------------------------

**The mounting sleeve **T46** and the centering rods **T 49** prevent damages to the sensitive sealing lips of rotary shaft seal ring.**

22. Install shaft seal and screw spindles, mount pump housing (torque: 70 Nm). Install cover (torque 70 Nm).
23. Mount driving elements (coupling guard).
24. Fill in gear oil. Check the oil level via the sight glass. (torque 45 Nm)

#### 9.4 Adjusting screw spindles

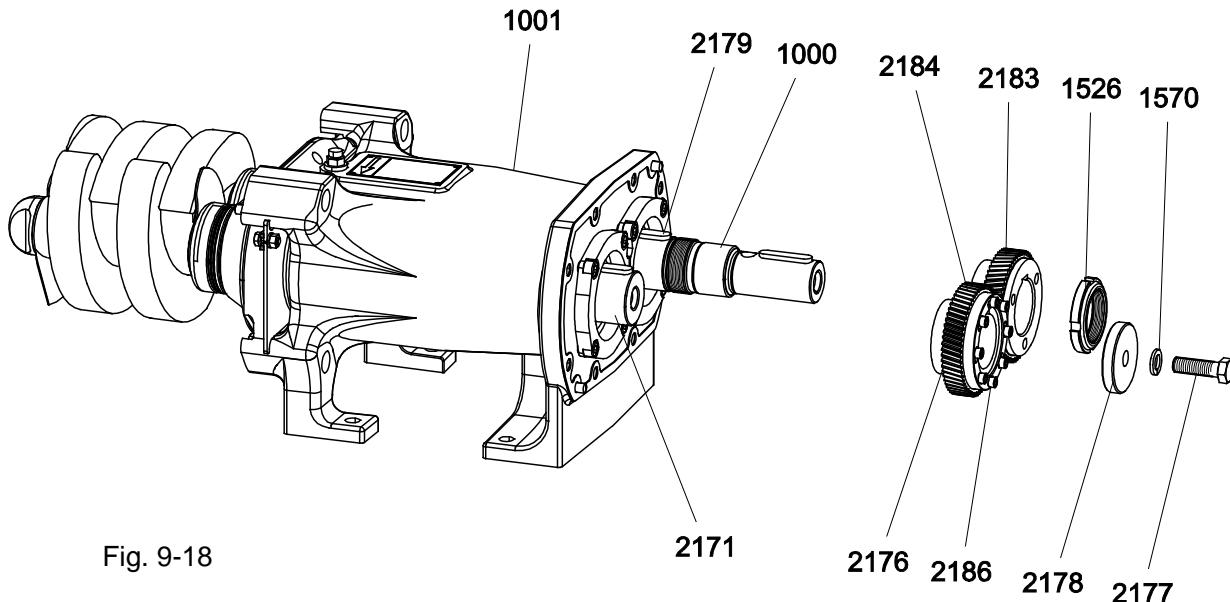


Fig. 9-18

##### Installation:

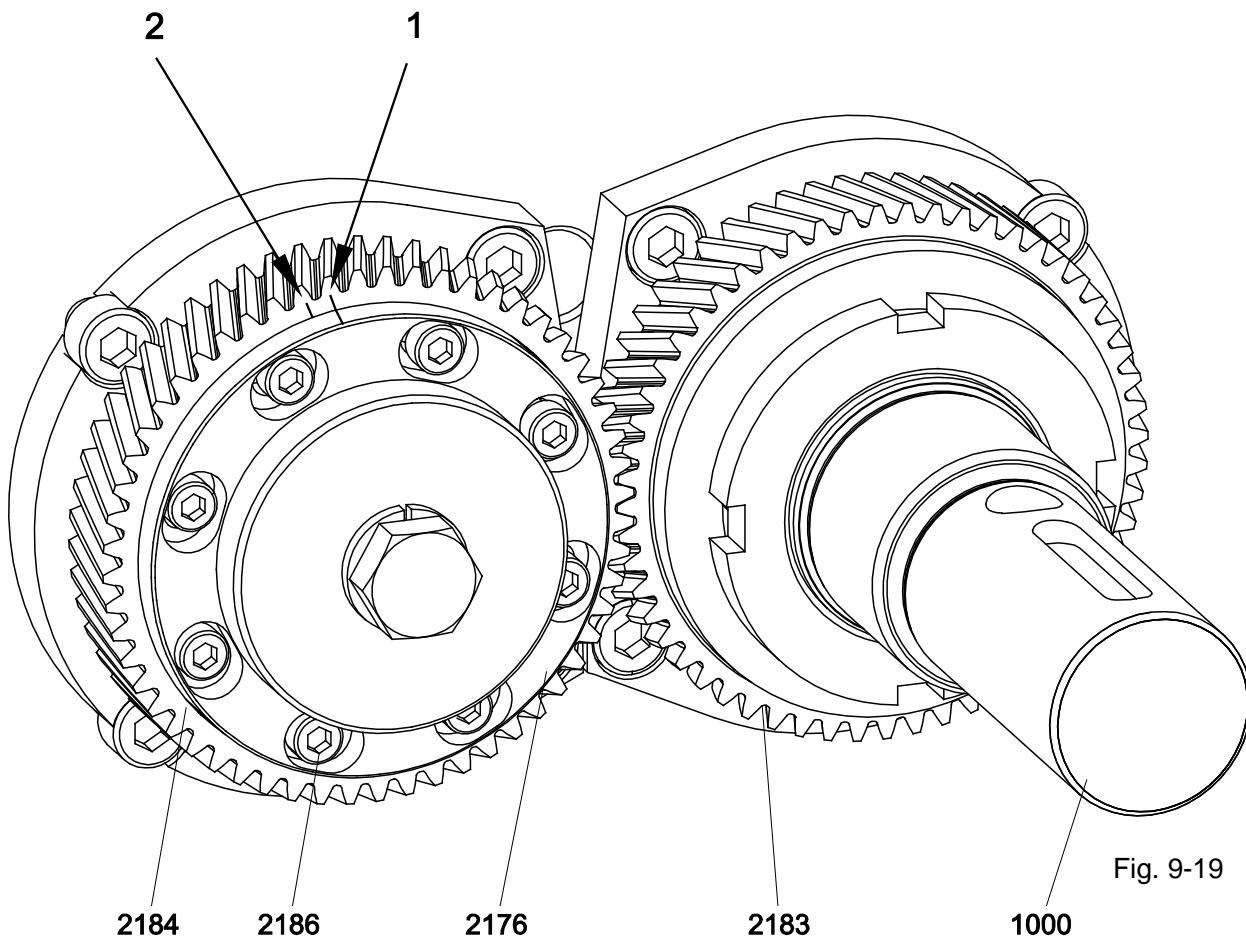
1. Insert keys 2179.
2. Slide gear 2183 onto the drive shaft 1000, turn on shaft nut 1526 and tighten with a groove nut wrench. **T 17** (Tightening torque 45 Nm for M25H). Hold shaft by means of a locking mandrel in the bore in the pump-sided coupling part.
3. Tighten set screw in shaft nut 1526 (torque: 4 Nm)
4. Slide gear wheel 2183 onto the drive shaft 1000, screw on and tighten shaft nut 1526. (Tightening torque 45 Nm for M25). Hold shaft in place with a steel mandrel.
5. Tighten set screw in grooved nut 1526 (torque 4 Nm)
6. 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.
7. Screw in cylinder head screws 2186 by hand.
8. 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.**



**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 contact.
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**

## 10. Spare parts

### 10.1 Stocking of 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.

Unless otherwise advised (e.g. by pump of TAG specific spare part list), 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	Pos.- number	up to 2 pumps	From 3 pumps
Shaft sealing ring gear housing	1010	1	2
Shaft sealing ring bearing housing	1111	2	4
O-ring pump seal housing	1088	1	2
O-ring spindle bolts	2194	4	8
O-ring pump cover	2192	1	2
Flat seal gasket gear housing	2198	1	1
O-rings mechanical seals	2261-BF, 2261-BC	2	4
Seal faces of mechanical seals (set)	2327-BF, 2328-BC	2	4
Spider and coupling hubs	2249, 2247, 2248	1 ea	2 ea
Gear oil, 1 L	2294	1	2
Parallel pin	2195, 2196	2	4
Key for coupling pump head shaft	1183	2	4

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

#### ATTENTION

#### Possible damage to property

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

### 10.2 Ordering spare parts

- Please report to your personal contact of the ViscoTwin team or consult [www.viscotwin.com](http://www.viscotwin.com).
- A pump specific spare part list and/or pump specific spare part explosion drawing is provided by Processtec as part of technical documentation together with the ViscoTwin pump or prior to delivery on request. Please provide **eData-ID** of pump and of spare part to order when ordering. **eData-ID**s are listed in both spare part list and explosion drawings.
- If **eData-ID** is not known, please indicate serial number, type and configuration code of ViscoTwin. Required data are on the pump type label. Most convenient way to collect required data from pump type label is by means of the QR code, which can be read by means of most QR code reader, e.g. on a smart phone. No liability will be assumed for wrong deliveries on account of insufficient data.

## Appendix

- **Tools, expendables and lubricants required for maintenance and servicing**
- **Explosion drawings with index**
- **The Engineering Design and Technical Construction File**
  - o **CIP | SIP | Manual Cleaning**
  - o **Oil change**
- **Tightening torque values**

## Tools and expendables required for maintenance and servicing

Maintenance and servicing of ViscoTwin 70 requires US standard, metric as well as specific tools as listed in tables below.

### Definition of maintenance levels

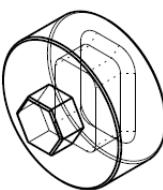
All tools required are categorized by maintenance levels ranging from 1 to 3, whereas maintenance levels are defined as follows:

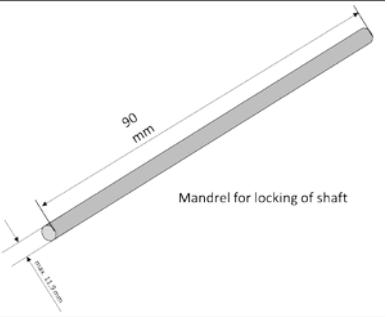
- Maintenance level 1 tools are required for standard operation and other procedures as follows:
  - Sanitary inspection
  - Removal and assembly of pump cover (position 1012) and pump casing (position 1033)
  - Maintenance and exchange of mechanical seals
  - Gear oil filling level adjustment and gear oil exchange

**→ Maintenance level 1 tools must be available on site for proper work conditions**
- Maintenance level 2 tools are required for:
  - All processes requiring removal or mounting of gear housing (position 2172)
  - Adjustment of spindles (positions 2200 and 2201)

**→ It is highly recommended to have maintenance level 2 tools available on site.**
- Maintenance level 3 tools are required for maintenance of bearing housing  
**→ It is not necessary to have maintenance level 3 tools on site. Maintenance level 3 tasks are supposed to be processed in Processtec shop.**

### Maintenance level 1 tools

Description, Purpose <i>3<sup>rd</sup> party solution</i>	Related position	Maintenance level	eData-ID	Material
Spindle bolt socket with hexagon to loosen and tighten spindle bolts.    	2180 / Spindle screw	1	12566	Aluminium

Description, Purpose <i>3<sup>rd</sup> party solution</i>	Related position	Maintenance level	eData-ID	Material
<p>Locking rod to block drive shaft</p>  <p>Note: identical rod for all ViscoTwin types</p>	1000 / Drive shaft	1	18793	AISI: 304
<p>Torque wrench <u>small</u> for metric sockets to tighten bolts and screws torque controlled.</p> <p>Requirements:</p> <ul style="list-style-type: none"> <li>- Min. torque: &lt;= 3.68 lb-ft   5 Nm *</li> <li>- Max. torque: &gt;= min. torque of 'torque wrench BIG'</li> <li>- Compatible with all sockets (hexagon or Allen key) as specified by related positions</li> </ul>  <p>Helpful notice:</p> <ol style="list-style-type: none"> <li>1. *) In case a <b>torque screw driver</b> (see <b>Torque screw driver</b> below) is available on site, lowest torque value to handle by means of the <u>small</u> torque wrench is increased accordingly</li> <li>2. No second wrench is required if whole torque range can be handled by means of 1 torque wrench</li> </ol>	1304 Dual Acting Mechanical Seals  2258 , 2186 1008	<i>1 only</i> <i>if <b>Dual Acting</b></i> <i>Mechanical</i> <i>Seals -</i> <i>else:</i>	-	-
<p>Torque wrench <u>BIG</u> for metric sockets to tighten bolts and screws torque controlled.</p> <p>Requirements:</p> <ul style="list-style-type: none"> <li>- Min. torque: &lt;= max torque of 'torque wrench 'small'</li> <li>- Max. torque: &gt;= 73.6 lb-ft   100 Nm</li> <li>- Compatible with all sockets (hexagon or Allen key) as specified by related positions</li> </ul> 	2180, 1016, 1041 2205, 2279, 1526 2177	1 2 2	-	-

Description, Purpose <b>3<sup>rd</sup> party solution</b>	Related position	Maintenance level	eData-ID	Material
(torque wrench BIG continued)  Helpful notice: <ol style="list-style-type: none"> <li>1. In case one or more ViscoTwin 104 or 130 have to be serviced and maintained as well, it might be sensible to select a torque wrench for torque values up to 111 lb-ft (150 Nm)</li> <li>2. No second wrench is required if complete torque range can be handled by means of 1 torque wrench</li> </ol>				
Best practise for dual acting mechanical seals: <a href="#">Torque screw driver</a> (see also <a href="#">"For dual acting mechanical seals only"</a> :/ Allen key solutions 1 and 2 below)  Requirements: <ul style="list-style-type: none"> <li>- Torque min: &lt;= 3.68 lb-ft   5 Nm</li> <li>- Torque max: see 'helpful notice' below</li> <li>- Compatible to <a href="#">Allen key</a> solution 1 or 2 as defined <a href="#">below</a> (see <i>For dual acting mechanical seals only</i>: below)</li> </ul>   Helpful notice: <ol style="list-style-type: none"> <li>1. 'Torque max': in case torque screw driver shall be made available on site, it might be sensible to select a torque screw driver for torque values of up to 5.9 lb-ft (8 Nm).</li> <li>2. In case that also one or more ViscoTwin 104 or 130 have to be maintained, it might be sensible to select a torque screw driver for torque values of even up to 8.85 lb-ft (12 Nm) and being suitable for hexagon nut sockets (consider wrench drive).</li> <li>3. In case torque screw driver meeting requirements as defined by point 1 or 2 are available on site, min. torque value to handle by means of the <u>small</u> torque wrench is increased accordingly.</li> </ol>	1304 Anga positions 6,11,14,15  2186	1 1  2	-1	-

Description, Purpose <i>3<sup>rd</sup> party solution</i>	Related position	Maintenance level	eData-ID	Material
<p>Hexagon nut sockets for</p> <p>Bolts M12    Socket size:    19 mm</p> <p>Bolts M18    Socket size:    27 mm</p> <ul style="list-style-type: none"> <li>- Compatible with torque wrench drive</li> </ul> 	1016 , 1041 2180	1 1	-	-
<p><u>For dual acting mechanical seals only:</u></p> <p>Allen key to tighten hexagon socket screws of outboard rotor holder of double acting mechanical seals.</p> <p>3 different solutions:</p> <ol style="list-style-type: none"> <li><u>1. Best practise solution</u> Allen key bit (size 2.5 mm ) compatible to <a href="#">torque screw driver</a>:   Allen key bit with hexagon drive</li> <li><u>2. Good practice solution</u> Allen key socket (size 2.5 mm) compatible to <a href="#">torque screw driver</a> (possibly adaptor required) <a href="#">or torque wrench small</a> (extension and adaptor required)  </li> <li><u>3. Minimum solution</u> Allen key (size 2.5 mm)  </li> </ol>	1304 Anga 6,11,14,15	1	-	-

Description, Purpose <i>3<sup>rd</sup> party solution</i>	Related position	Maintenance level	eData-ID	Material
<p>Various hooks to remove O-rings gently from grooves and to clean threads of shafts and spindle bolts (removing Loctite)</p>  <p><i>3<sup>rd</sup> party solution:</i>  <i>Brand: Craftsman</i>  <i>Name: 4PC Hook and Pick Set</i>  <i>Item #: 00904981000P</i>  <i>Model: 4981</i></p>	1303 1304 2261 2262 2180, 1000, 2171	1 1 1 1	-	-
<p>Metric feeler gage to measure clearance between spindles</p> <ul style="list-style-type: none"> <li>- Min. : 0.04 mm</li> <li>- Max:: 0.3 mm or more</li> </ul>  <p>(Metric feeler gage continued)</p> <p><i>3<sup>rd</sup> party solution:</i>  <i>Brand: Eastern Industries</i>  <i>Type: MFG-25-T-76 GC SERIES</i></p>	2200 , 2201	1	-	Steel
Quick and second but best solution to loosen spindles from shaft: rubber mallet (rubber hammer).	-2200 , 2201	1	-	rubber

Description, Purpose <i>3<sup>rd</sup> party solution</i>	Related position	Maintenance level	eData-ID	Material
Best practise to loosen spindles from shaft: gear wheel puller with 2 clamps. Minimum nominal size: 3" 	2200 , 2201	1	-	-
Support for gear wheel puller to loosen spindle from shaft: hexagon bolts M12 specifically modified 	2200 , 2201	1	18987	Stainless or steel
Protection of spindle when loosening spindle from shaft by means of a gear wheel puller 	2200, 2201	1	-	Rubber plastic
Tap to remove Loctite from threaded hole of shafts. ISO M12 metric standard thread. 	1000 , 2170	1	-	

Description, Purpose <i>3<sup>rd</sup> party solution</i>	Related position	Maintenance level	eData-ID	Material
Tap wrench to drive tap to remove Loctite from threaded hole of shafts	- 1000 , 2170	1	-	
				
Wet or Dry Sandpaper CAMI grit 800 or Emery cloth grit > 220 to polish shafts before mounting spindles	2200 , 2201	1	-	-
				
3M Scotch Brite to polish surface of spindles and shafts	2200 , 2201 1000 , 2171	1 1		
				
Paper towels free of lint to clean seal faces of mechanical seals	2327, 2328	1	-	Paper
				
Regular paper towels for cleaning	general	1,2,3	-	paper
				

Description, Purpose <i>3<sup>rd</sup> party solution</i>	Related position	Maintenance level	eData-ID	Material
Acetone to clean seal faces, shafts and spindles	2327, 2328 1000, 2171 2200, 2201	1 1 1	-	Acetone
Thread-locking fluid Loctite blue 242    (or any other thread-locking fluid with identical properties)	2180 1008	1 3	-	-

## Maintenance level 2 tools

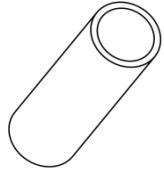
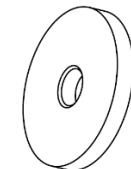
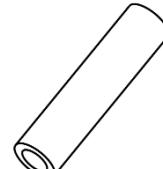
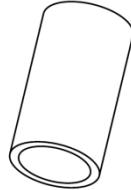
Please note: tools already listed under maintenance level 1 are not listed under ML2 tools or ML3 tool anymore.

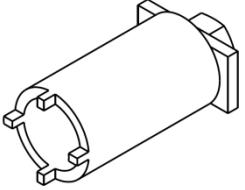
Description, Purpose <i>3<sup>rd</sup> party solution</i>	Related position	Maintenance level	eData-ID	Material
End cutting pliers to remove key 1183 	1183	2	-	-
Hexagon nut sockets for Bolts M10   Socket size: 16 mm - Compatible with torque wrench drive 	2177	2	-	-
Allen key sockets for Hexagon socket screw M5 Allen key size: 4 mm  Hexagon socket screw M8 Allen key size: 6 mm  Hexagon socket screw M10 Allen key size: 8 mm 	2186 1008, 2258 2297 (intermediate flange)	2 2 2	-	-
Mandrel to press shaft sealing ring 1010 into cast iron gear housing 	1010	2	12555	AISI: 304 EN: 1.4301

Description, Purpose <i>3<sup>rd</sup> party solution</i>	Related position	Maintenance level	eData-ID	Material
Mandrel to mount shaft sealing ring 1010 in stainless gear housing VT70	1010	2	18775	AISI: 304 EN: 1.4301
Sleeve to protect shaft seal ring 1010 when mounting gear cover	1010	2	12586	AISI: 304 EN: 1.4301
Installation pipe to press shaft sealing ring 1111 into bearing housing	1111	2	12561	Aluminium
Mounting sleeve for mounting shaft sealing ring 1111 on shaft	1111	2	12568	AISI: 304 EN: 1.4301
Gear wheel puller	2184	2	12574	AISI: 304 EN: 1.4301
Socket to lock shaft(s) to tighten bolt 2177 or groove nut 1526	2177, 1526	2	12579	AISI: 304 EN: 1.4301

Description, Purpose <i>3<sup>d</sup> party solution</i>	Related position	Maintenance level	eData-ID	Material
<p>Sealing ring extractor Removal of shaft sealing rings / position 1111</p>  <p><i>Solution:</i></p> <p>Manufacturer or brand: Kukko Name: Seal pulling set (gasket) in case Part no: K-222-1/7</p>	1111	2	-	-

**Maintenance level 3 tools**

Description, Purpose <i>3<sup>d</sup> party solution</i>	Related position	Maintenance level	eData-ID	Material
Pressure plate for needle bearing inner ring 1003  	1003	3	12543	AISI: 304 EN: 1.4301
Installation pipe for needle bearing outer ring 1529  	1529	3	12558	AISI: 304 EN: 1.4301
Pressure plate to mount ball bearing 2181 on shaft  	2181	3	12546	AISI: 304 EN: 1.4301
Installation pipe to mount ball bearing 2181 on shaft (pressure on inner ring)  	2181	3	12549	AISI: 304 EN: 1.4301
Installation pipe to press shafts into bearing housing (pressure on outer ring of ball bearing 2181)  	2181, 2200, 2201	3	12552	AISI: 304 EN: 1.4301

Description, Purpose <i>3<sup>d</sup> party solution</i>	Tool No. <i>Related position</i>	Maintenance level	eData-ID	Material
Socket spanner for groove nut 1526 	1526	3	12576	AISI: 304 EN: 1.4301
Sleeve to protect shaft while mounting retaining ring 1009 of inner ring of needle roller bearing 	1009	3	12582	AISI: 304 EN: 1.4301
Sleeve to protect shaft while mounting retaining ring 1009 of inner ring of needle bearing 	1009	3	12585	AISI: 304 EN: 1.4301

## Lubricants

### Gear oil

Since shipment of gear oil is related to high transportation costs (for safety reasons), Processtec, Inc. recommends that customer procures gear oil at a local representative / distributor for appropriate gear oils.

ViscoTwin requires gear oil meeting following requirements:

1. Complying with FDA guideline NSF-H1
2. Complying with ISO VG 220 viscosity specifications
3. 100 % synthetic. NO MINERAL OIL (neither 100 % nor partly)! Mineral oil may reduce interval time between oil change significantly.

Following products meet requirements specified above:

- Castrol Optileb Hy 68 (procurement information see below)
- Avia Food Gear 220
- Mobil DTE FM 220

#### Product numbers of Castrol Optileb Hy 68

Packaging	Castrol product numbers	eData-ID*
5 gal / 36.8 lb pail	68949-AGPO CASTROL OPTILEB HY 68 36.8 LB PAIL	18548
55 gal / 383 lb drum	68949-AGDR CASTROL OPTILEB HY 68 383 LB DRUM	18549

\*) [www.edata-id.com](http://www.edata-id.com)

### Grease to lubricate shafts prior to mount spindles

Following grease is recommended by Processtec:

Basic requirement: Food grade NSF-H1  
 Brand: CASSIDA GREASE RLS 2  
 Manufacturer: Fuchs Lubritech GmbH  
                   67661 Kaiserslautern / Germany  
 Contact, ordering: Fuchs Lubritech Co  
                   17050 Lathrop Avenue  
                   Harvey, Illinois 60426  
                   Phone: +1 708-333-8900  
                   Fax:   +1 708-333-9180  
<http://www.fuchsus.com>  
[cassida.lubricants@fuchsus.com](mailto:cassida.lubricants@fuchsus.com)

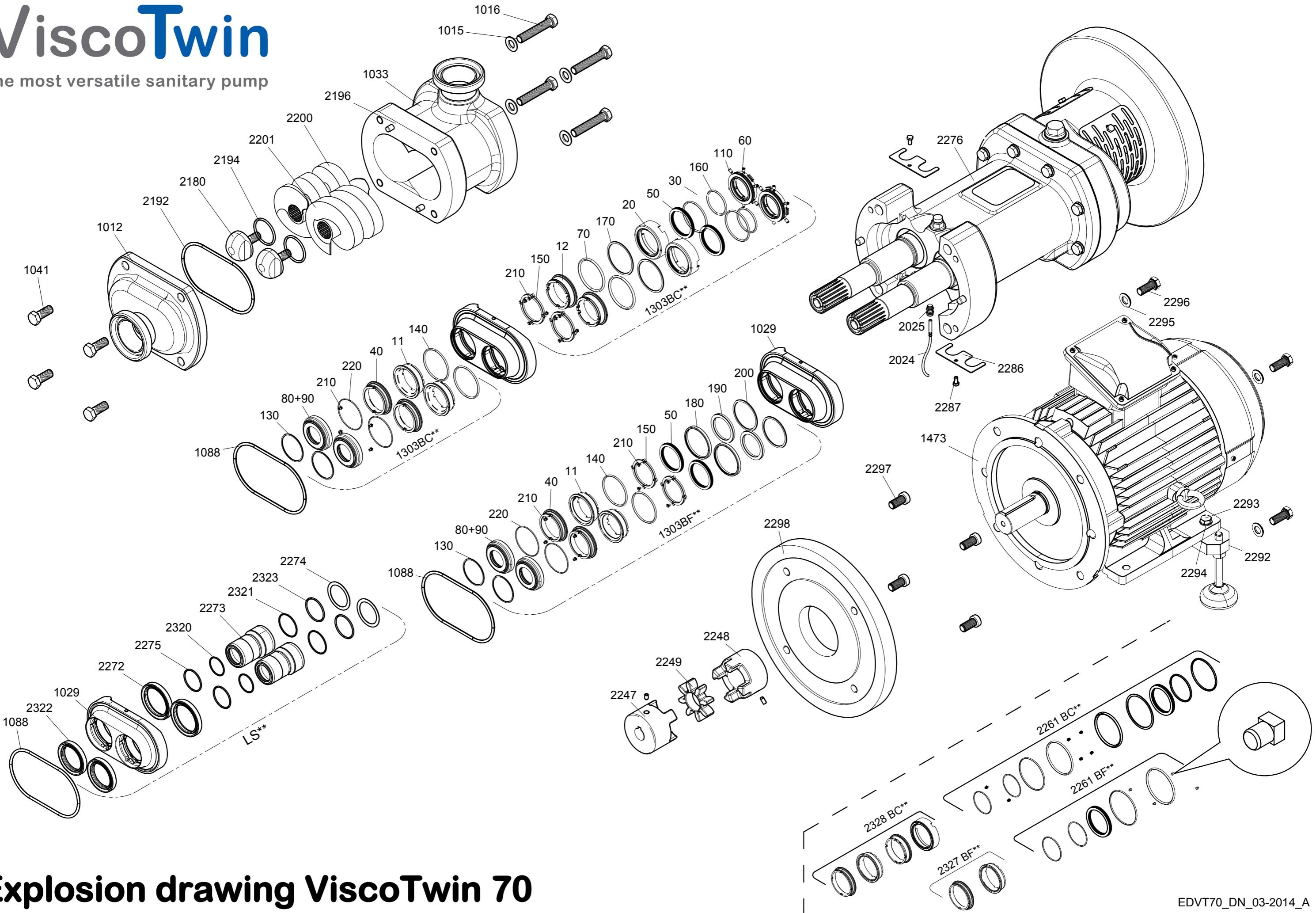
#### Product numbers of Cassida Grease RLS 2

Packaging	MPN	Designation	eData-ID*
Case of 12 cartridges of 13.4oz (380g) each	80142500085	CASSIDA GREASE RLS 2	19017
41.8 lb (19 kg) pail	80142500035	CASSIDA GREASE RLS 2	19018

\*) [www.edata-id.com](http://www.edata-id.com)

# ViscoTwin

## the most versatile sanitary pump



# Explosion drawing ViscoTwin 70

# Index explosion drawing ViscoTwin 70

		<b>Einzelteilliste</b>	<b>Parts list</b>	<b>Pièces détachées</b>
<b>Pos.</b>	<b>Qty.</b>	<b>Benennung</b>	<b>Description</b>	<b>Description</b>
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
1009	4	Sicherungsring	Snap ring	Circlip
1012	1	Deckel	Cover	Couvrir
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
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
1303**	2	Gleitringdichtung (komplett)	Mechanical seal (Complete)	Garniture mécanique (complet)
1473	1	Antrieb	Drive unit	Entrainement
1538	1	Typenschild	Type plate	Plaque signalétique
1543	1	Getriebeöl	Gear oil	Huile à engrenages
2024	1	Temperaturfühler	Temperature sensor	Sonde de température
2025	1	Kabelverschraubung	Cable gland	Passe-câble à vis
2171	1	Abtriebswelle	Driven shaft	Arbre de sortie
2180	2	Spindelmutter	Nut for spindle	Écrou pour le fuseau
2181	8	Schrägkugellager	Angular ball bearing	Roulement en biais
2192	1	O-Ring	O-ring	O-ring
2194	2	O-Ring	O-ring	O-ring
2195	2	Passstift	Dowel pin	Goupille de serrage
2198	1	Flachdichtung	Flat seal	Joint

		<b>Einzelteilliste</b>	<b>Parts list</b>	<b>Pièces détachées</b>
<b>Pos.</b>	<b>Qty.</b>	<b>Benennung</b>	<b>Description</b>	<b>Description</b>
2200	1	Schraubenspindel, linksgängig	Screw spindle, left handed	Vérin, fileté à gauche
2201	1	Schraubenspindel, rechtsgängig	Screw spindle, right handed	Vérin, fileté à droite
2247	1	Kupplungsteil, Pumpe	Clutch part, pump	Elément d'accouplement, pompe
2248	1	Kupplungsteil, Antrieb	Clutch part, drive	Elément d'accouplement, Entraîner
2249	1	Zahnkranz	Sprocket	Pignon
2256	2	Passstift	Dowel pin	Goupille de serrage
2258	8	Sechskantschraube	Hexagonal screw	Vis à tête hexagonal
2261**	2	O-Ring Dichtungssatz	O-ring seal kit	Joint torique set
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
2275	2	O-Ring	O-ring	O-ring
2286	2	Eingreifschutz	protective cover	Couvercle de protection
2287	2	Sechskantschraube	Hexagonal screw	Vis à tête hexagonal
2292	1	Motortraverse	Motor traverse	Moteur traverse
2293	2	Sechskantschraube	Hexagonal screw	Vis à tête hexagonal
2294	2	Scheibe	Washer	Rondelle
2295	4	Scheibe	Washer	Rondelle
2296	4	Sechskantschraube	Hexagonal screw	Vis à tête hexagonal
2297	4	Zylinderschraube	Socket head cap screw	Boulon à six pans creux
2298	1	Adapter	Adaptor	Adaptateur
2320	2	O-Ring	O-ring	O-ring
2321	2	O-Ring	O-ring	O-ring
2322	2	Wellendichtring	Shaft sealing ring	Joint d'étanchéité de l'arbre
2323	2	O-Ring	O-ring	O-ring
2327	2	Verschleißteilsatz	Set of wearing parts	Ensemble de pièces d'usure
2328	2	Verschleißteilsatz	Set of wearing parts	Ensemble de pièces d'usure

\* wenn erforderlich

\*\* LS: Lippendichtung

BC : doppeltwirkend

BF : einfachwirkend

\* if necessary

\*\* LS: Lip seal

BC double acting

BF: single acting

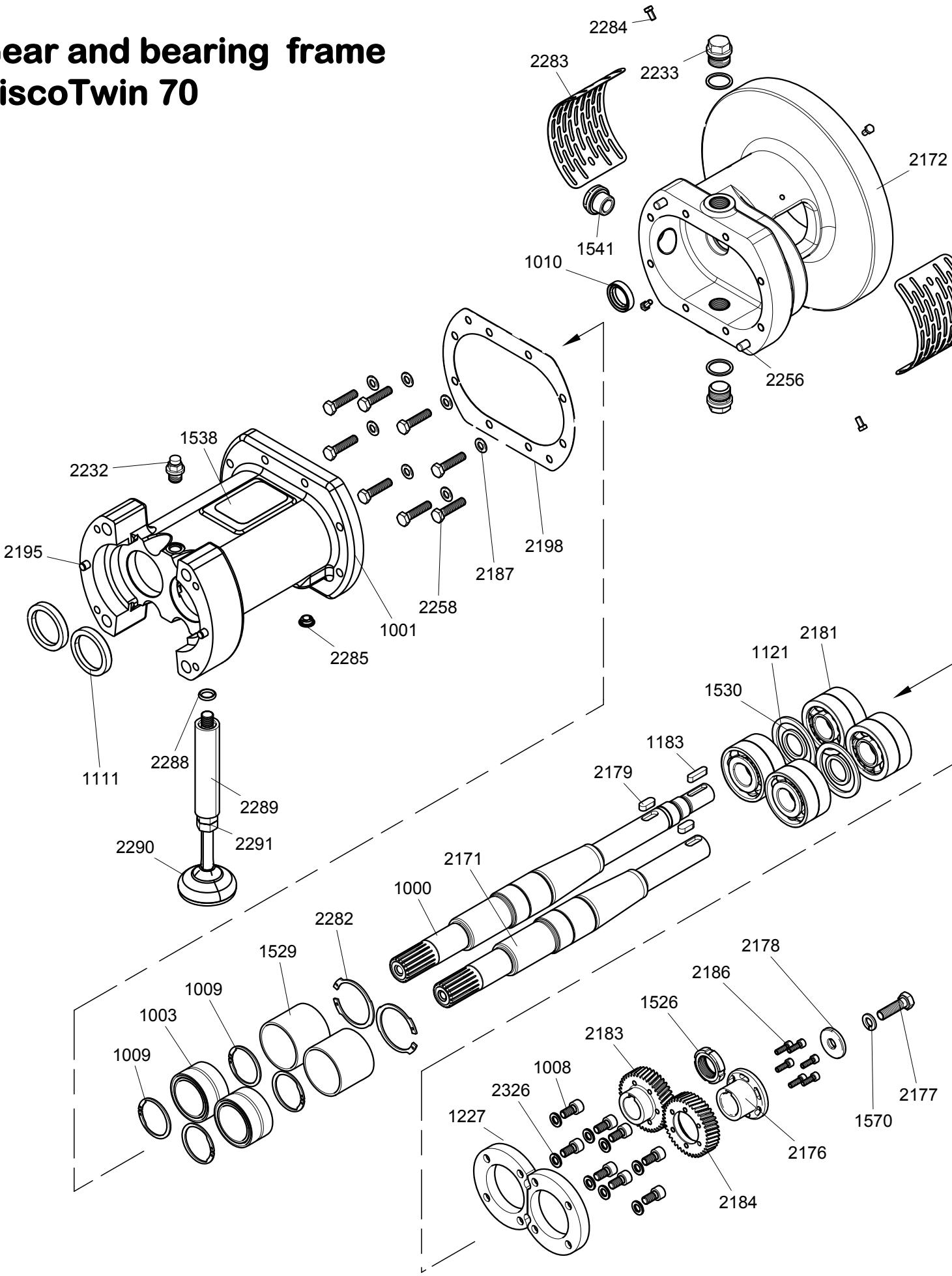
\* le cas échéant

\*\* LS : Joint à lèvres

BC: à double effet

BF: à simple effet

# **Gear and bearing frame ViscoTwin 70**



# ViscoTwin

the most versatile sanitary pump

		Einzelteilliste	Parts list	Pièces détachées
Pos	Qty.	Benennung	Description	Designation
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
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
1526	1	Wellenmutter	Groove nut	Écrou en T
1529	2	Distanzhülse	Spacer ring	Manche
1530	2	Distanzring	Distance ring	Bague d'écartement
1541	1	Ölstandsauge	Oil level glass	Voyant de niveau d'huile
1570	1	Federring	Spring ring	Circlip
2171	1	Abtriebswelle	Driven shaft	Arbre de sortie
2172	1	Getriebegehäuse	Gear housing	Logement d'entraînement
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
2181	8	Schrägkugellager	Angular ball bearing	Roulements à billes à contact oblique
2183	1	Stirnrad Antrieb	Spur gear, drifty	Engrenage, flottante
2184	1	Stirnrad Abtrieb	Spur gear, propelled	Engrenage, actionnée
2186	8	Zylinderschraube	Socket head cap screw	Boulon à six pans creux
2187	8	Scheibe	Washer	Rondelle
2195	2	Passstift	Dowel pin	Goupille de serrage
2198	1	Flachdichtung	Flat seal	Joint
2232	1	Entlüftungsschraube	Breather plug	Bouchon évент
2233	2	Verschlusschraube	Plug screw	Vis d'arrêt
2256	2	Passstift	Dowel pin	Goupille de serrage
2258	8	Sechskantschraube	Hexagonal screw	Vis à tête hexagonal
2282	2	Sicherungsring	Snap ring	Circlip
2283	2	Schutzabdeckung	Protective cover	Couvercle de protection
2284	4	Sechskantschraube	Hexagonal screw	Vis à tête hexagonal
2285	2	Blindstopfen	Blind plug	Plot de remplissage
2288	1	O-Ring	O-ring	O-Ring
2289	1	Distanz	Distance	Distance
2290	3	Gelenkfuß	Hinged foot	Pied articulant
2291	3	Sechskantmutter	Hexagon Nut	Écrou hexagonal
2326	8	Scheibe	Washer	Rondelle

## 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 than atmospheric. The system shall only be able to be restarted after it is re-sterilized.

	<p><b>Warning!</b></p> <p><b>Risk of injuries through rotating machine parts or from liquids escaping under pressure.</b></p> <p><b>Potential consequences: Severe or fatal injuries.</b></p>
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##### 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.

	<p>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.</p> <p>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.</p>
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## 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)

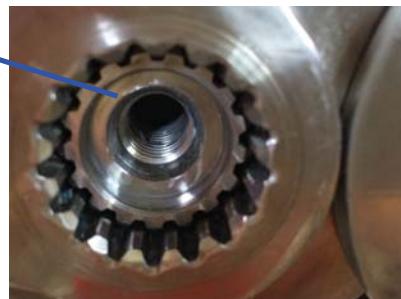
Subsequently, no corrosion or seizure marks must be visible; otherwise the affected parts must be replaced.

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

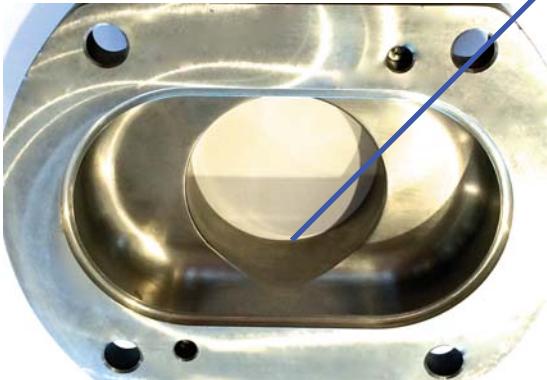
4. Remove residue from bolts with the use of a sturdy brush

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

	<b>Warning!</b>
<p><b>Do not operate against closed shut-off devices.</b> <b>Bursting of the pipe line or downstream system components is possible.</b> <b>Potential consequences: Severe or fatal injuries.</b></p>	

Secure the pump through an approved overpressure protection.

<b>ATTENTION</b>	<b>Possible damage to property</b>
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## The Engineering Design and Technical Construction File

### 12. Gear Oil – maintenance

#### 12.1 Gear-Oil Type

Use only designated food – grade gear lubricant, such as:

- Castrol Optileb Hy 68
- AVIA AVIAFOOD GEAR 220
- Mobil Mobil DTE FM 220

#### 12.2 Fill-Level

Please take manual page 22 fig. 7-1 Oil-level gauge for reference.

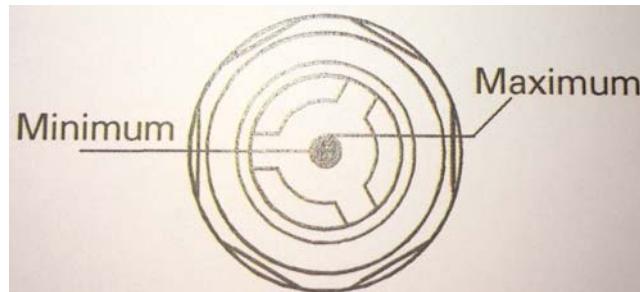


Fig. 7-1 Oil-level gauge

#### 12.3 First Oil Change:

First Oil Change is due after 250 hours of operation

#### 12.4 Check Oil Level:

Check Oil level at least weekly and top level up if necessary to Maximum level  
As per fig. 7-1 under point 12.2

(turn pump off, wait 3 min. to cool down the oil to show the actual level in the sight glass of the level gauge)

#### 12.5 Oil changes

Oil changes have to take place every 3000 hours of operation

In case the oil shows color-changes, oil has to be changed immediately and the change rhythm has to be adjusted based on the need through excessive use of the pump.

**General recommendation: Please put the recommended maintenance routine of the Manual on page 21 to set up a service-routine for your ViscoTwin.**

**Your Pump will show its great performance for a longer time on a high level.**

# Tightening torque values ViscoTwin 70

**ViscoTwin**  
the most versatile sanitary pump

