

Instruction Handbook Wangen Twin



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Screw pump

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Instruction Handbook WANGEN Twin



Chapter 1

1. Safety notes

1.1 Important notes

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

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

Symbol	Signal word	Meaning	Consequences of disregard
Example. 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
ATTENTION	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.

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Chapter 1

1.3 Further applicable documents

Heed the following additional documents:

Document	Description
Data sheet	Technical data, performance and operating limitations, service conditions
Dimensional drawing	Pump dimensions and connections with mounting points
Spare parts lists	Exploded drawing with spare parts
Assembly instructions	Special models or incomplete machine
ATEX supplementary instructions	Operating the pump in explosion hazardous area
Drive documentation	Drive Operating Manual
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.
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- 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.
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- The pump or parts of it may be very heavy and need to be moved using appropriate lifting gear.

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Chapter 1

1.5 Intended Use

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

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

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

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 FPM	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.

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.

Chapter 1

1.7 Operating Restrictions

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

ATTENTION	Possible damage to property
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- **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 (HNO₃) up to 3%.

Chapter 1

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.

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

- Access into the pump during operation must not be possible.
- The running screw spindles can cause serious hand and personal injuries.
- Only operate the pump when mounted (connected to a piping system).
- Be sure to secure the openings (pressure and suction port) when running a possibly necessary test run.
- Only perform manual cleaning and maintenance work after disconnecting the drive (system control) from mains and protecting it from inadvertent and unauthorised reclosure.

1.9 Specific safety notes on pumps with heating jacket

The housing of these pumps is of double jacket design and has connections for heating medium flow.

The housing has been designed for **6 bar** overpressure if no other internal pressure has been approved in the data sheet.

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

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

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Chapter 2

2. Construction and general description

2.1 WANGEN Twin pump construction

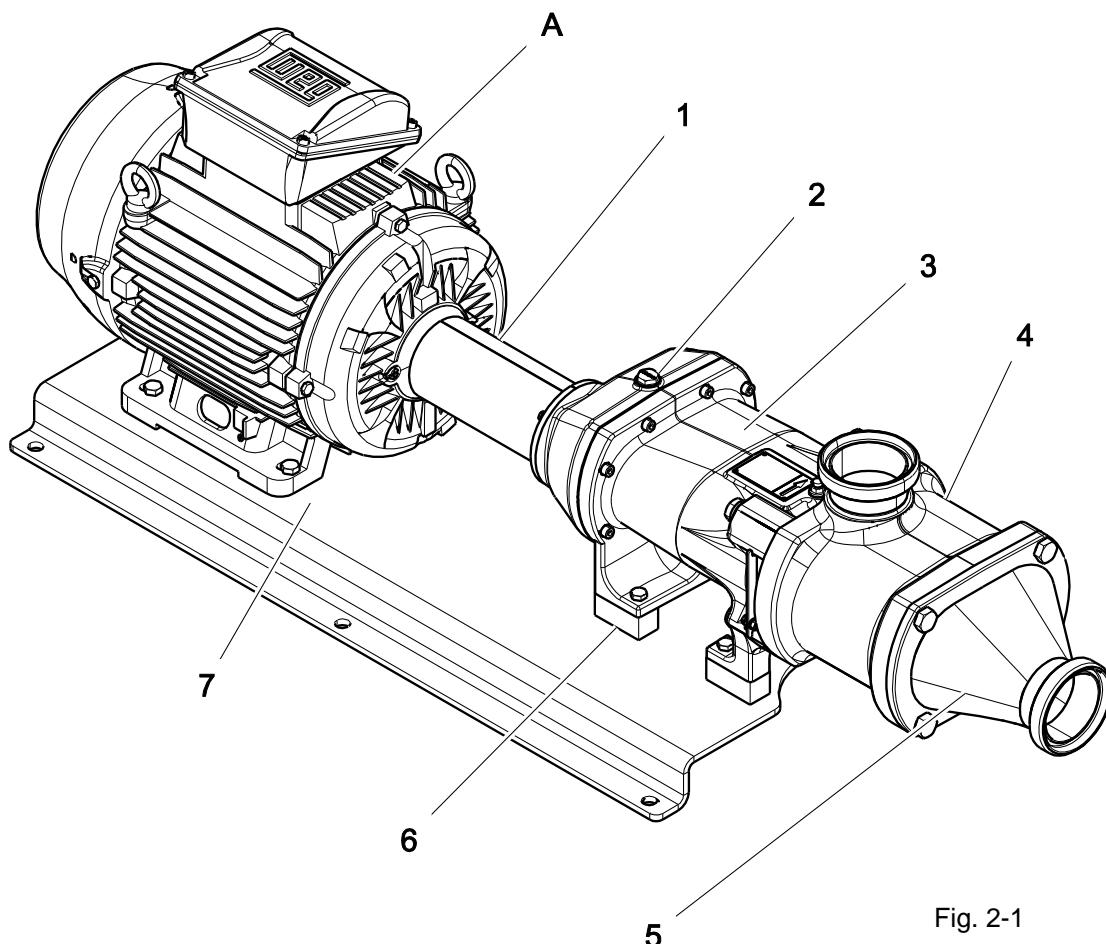
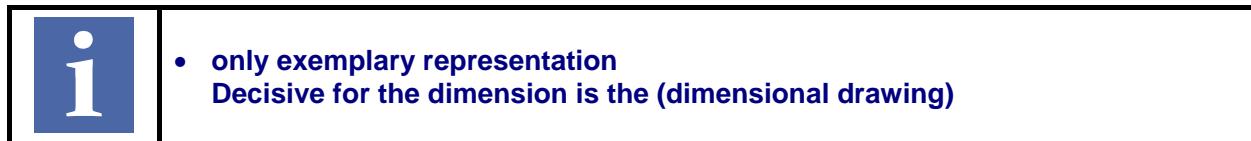


Fig. 2-1

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

Chapter 2

2.2 General description

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 Pumpenfabrik Wangen 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.

2.3 Sound emission

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

Chapter 3

3. Transport, packaging, storage

3.1 Transport / packaging

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

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

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

	The pictures used are example pictures
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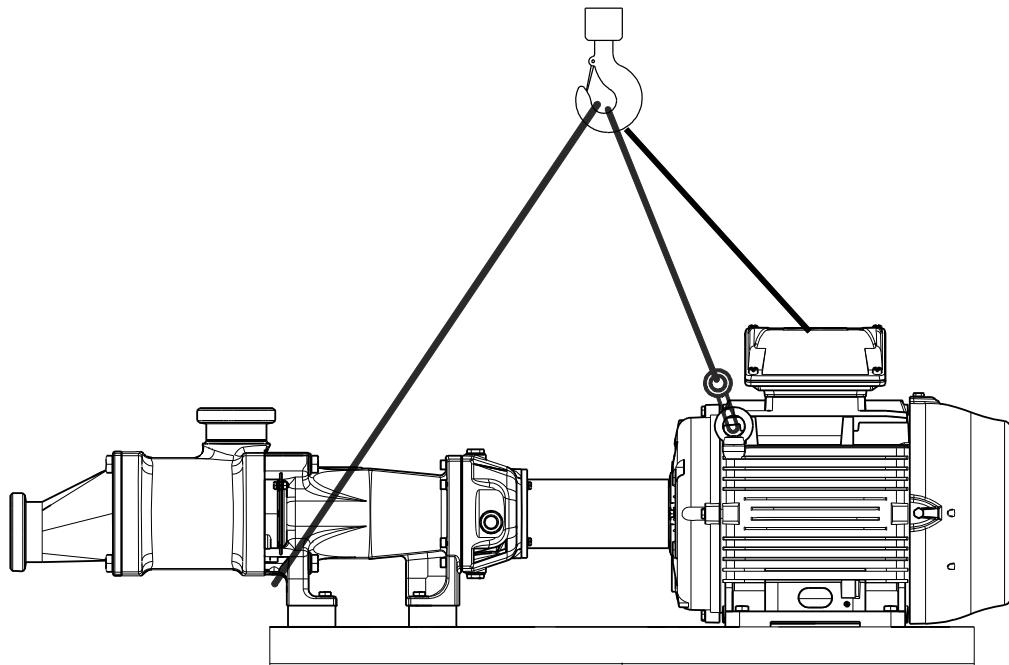


Fig. 3.1 WANGEN Twin 130 with baseplate and drive

ATTENTION	Possible damage to property
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- 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.

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Chapter 3

3.2 Storage

WANGEN pumps are sufficiently preserved under normal environmental conditions.

Take the following measures when storing for a longer period;

- **Protect pump from dust, dirt, water, and other harmful environmental influences. Coat all non-painted surfaces with acid-free and resin-free grease.**
- **Do not grease stainless steel parts and non-metallic parts.**
- **Cover all openings of pressure and suction ports.**
- **Drain water when using it as quench medium for shaft seal.**

1. Make sure that the storage room meets the following conditions:
 - frost-protected and dry.
2. Check the preservation regularly.

3.3 Disposal

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

3.3.1 Final decomposition of the pump, sorting

Check parts 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 |

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Chapter 4

4. Assembly / installation

4.1 Rotational direction

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

4.2 Speed and torque of the pump

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

Type of pump	Min. Rotation	Max.	Maximum torque on the clutch shaft
WANGEN Twin 70	100 rpm	3600 rpm	120 Nm
WANGEN Twin 104	100 rpm	3600 rpm	200 Nm
WANGEN Twin 130	100 rpm	2900 rpm	400 Nm

4.3 Mounting

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

Provide for a solid and level ground, such as:

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

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

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



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

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

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

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

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

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

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

Chapter 4

4.3.1 Tightening torques for specified components

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

Designation	ScrewØ	Tightening torque
Fitting screws 2259 of the seal housing	M 8	12 Nm
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
Driven shaft hexagon screw 2177	M 12	80 Nm
Cover hexagon screw 1041	M 12	70 Nm
Cover hexagon screw 1041	M 16	150 Nm
Spindle screw 2180	M 12	100 Nm
Spindle screw 2180	M 16	150 Nm
Pump housing hexagon screw 1016	M 12	70 Nm
Pump housing hexagon screw 1016	M 16	150 Nm
Pump foot mounting	M 10	44 Nm
Gear housing screws	M 8	20 Nm
Groove nut	M 25	45 Nm
Groove nut	M 35	70 Nm
Groove nut	M45	90 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
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- **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.

Chapter 4

ATTENTION
Possible damage to property

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

4.4.2 Permissible forces and torques on the pump flanges

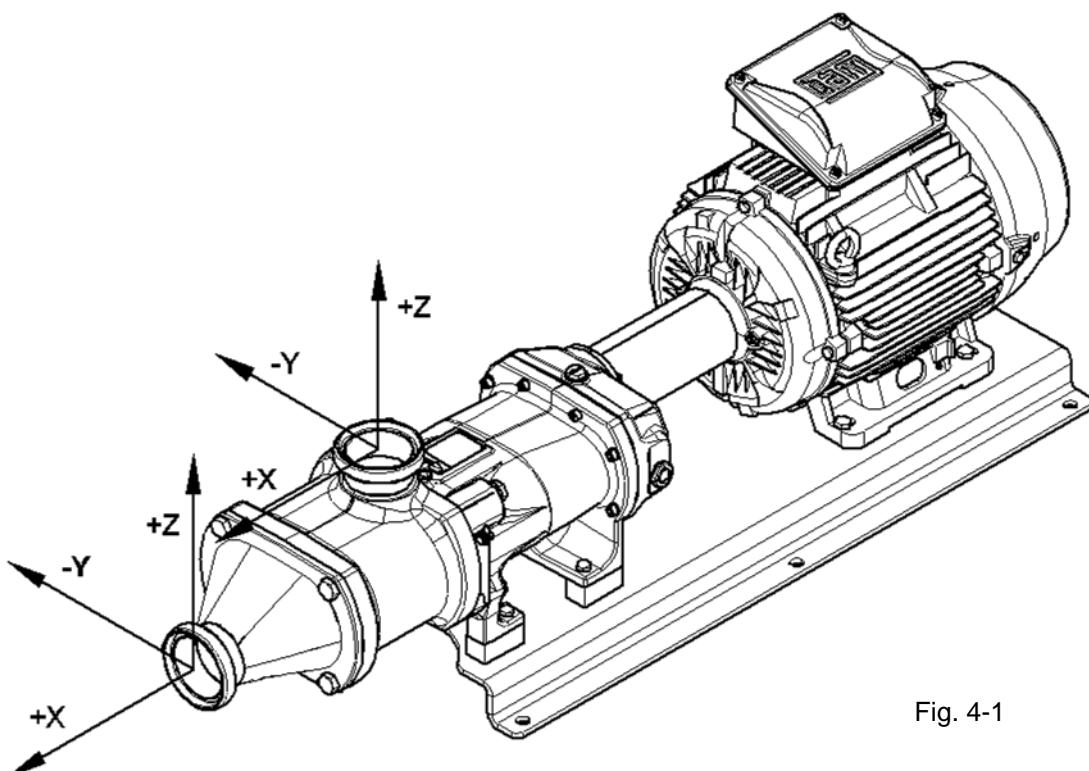


Fig. 4-1

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

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 casing

The permissible internal compressive stress is specified in the datasheet.

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Chapter 4

4.6 Operation and maintenance space requirements



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

4.7 Electric connection



Danger!

Danger to life through electric shock!

Potential consequences: Severe or fatal injuries.

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

Three-phase current squirrel-cage motor

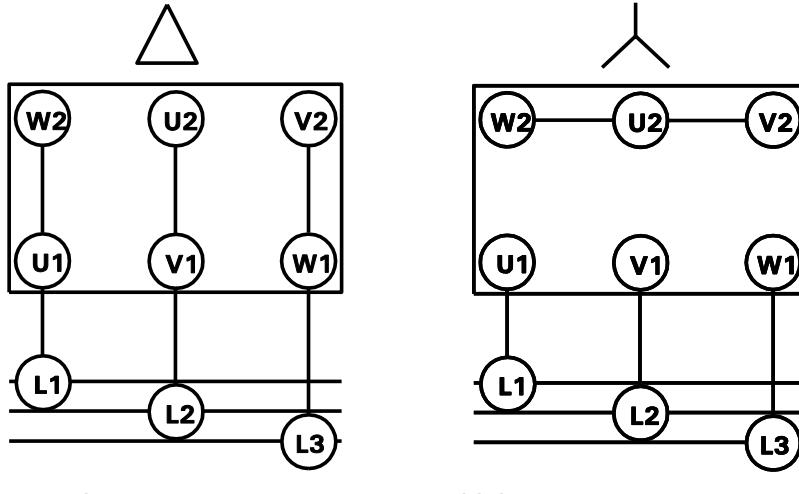


Fig. 4-2

voltage stated on the type plate.

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

4.7.1 Driving elements



Warning!

Driving elements are quickly moving during operation.

**Bullying elements are quite
They can squash hands**

Potential consequences: Severe or fatal injuries.

Always cover driving elements with a protective guard.

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Chapter 4

4.7.2 Coupling elements

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

ATTENTION	Possible damage to property
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- **Do not mount using a hammer**
- **Use a pull-on device or heat the coupling half to approx. 80 °C. (Remove rubber parts before) and mount the coupling in hot condition.**

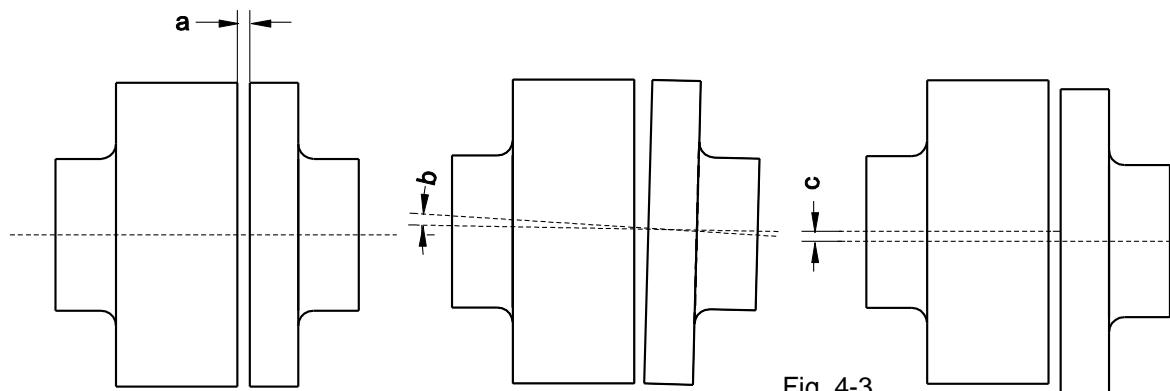


Fig. 4-3

	<ul style="list-style-type: none">• 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 offsetacc. to the coupling manufacturer's specifications. (Annex)

The coupling of the WANGEN Twin 070 is aligned over the central arrangement.

The coupling of the WANGEN Twin 104 and 130 was done in the works with corresponding care, according to the specifications of the coupling manufacturer (arranged maximum displacement values, see Table 8 and 9 operating/assembly instruction of the coupling manufacturer, system).

In case of a new adjustment (e.g. motor attachment, after maintenance, fault removal), proceed as described in the following:

1. Loosen the fastening screws of the drive 2276, as well as those of the pump housing 2205.
2. Underlay fastening flange of the drive 1473 with contact surface protection 2266.
3. For the adjustment of the axis height of the aggregate, underlay the bottom flange of the pump housing with a contact surface protection in the corresponding thickness.
4. Check compliance with the permissible displacement values with dial gauge, ruler or feeler gauge.
5. Tighten the fastening screws of the drive 2279 and the pump housing 2205.
(Tightening torque M10 = 44 Nm, M12 = 90 Nm)

Chapter 4

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:

- | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <ul style="list-style-type: none">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. |
| <ol style="list-style-type: none">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)Then install a line from the upper outlet of the seal to the lower input of the second seal. (A 1 → E 2).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)All lines and seals should be vented carefully, especially the bridge line between the two seals when connected in series. | |

Chapter 4

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

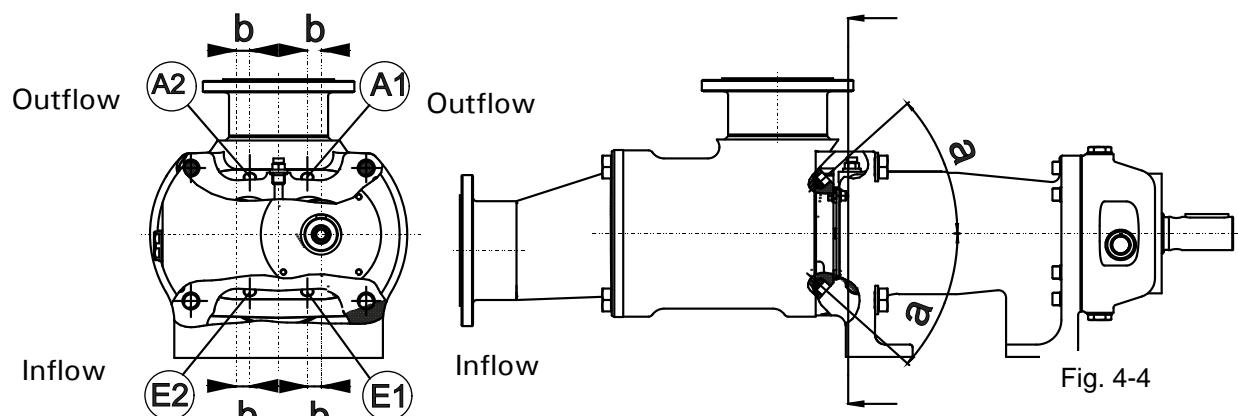
Both pressure and flow through the seal can be adjusted using a flow meter and two control valves. This flow should be adapted to the heat generation on the seal depending on pressure, speed and media temperature.

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



- 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



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

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.

Glycerine/water mix

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

Glycol/water mix

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

Distilled water

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

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

Solid particles max. 10 mg/l

Particle size max. 50 µm

Permanganate value max. 30 (humus-free)

Iron content max. 1 mg/l

Water hardness max. 10 ° of German hardness (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.

Chapter 5

5. Commissioning

5.1 Preparing commissioning

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

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

5.1.1 Pump

Clean the pump prior to initial commissioning.

5.1.2 Sealing system

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

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

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

5.1.3 Pumps for handling foodstuffs

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

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

A 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 of the Pumpenfabrik Wangen**
- **After operations, i.e. before a fairly long idleness of the pump**
- **After long idleness, before re-operation**

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

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

Instruction Handbook WANGEN Twin



Chapter 5

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 Wangen 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. Cleaning 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 FPM / FKM is 135° C.

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

- **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.

Chapter 5

	<ul style="list-style-type: none">• C.I.P. cleaning must conform to the hygiene of foodstuffs regulations as amended from time to time. The specifics pertaining to material stability must be strictly observed.• In case you have developed own C.I.P. cleaning methods for your pumping media, ensure pump suitability for the selected method by consulting the pump supplier.
-----------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

ATTENTION	Possible damage to property
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- Avoid abrupt changes in temperature during the cleaning process. With the pump in stationary state, fill in hot medium and wait until the pump has warmed up.

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

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

- Secure the pump through an approved overpressure protection.

ATTENTION	Possible damage to property
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- The pump needs to be cleaned for handling foodstuffs (→ Commissioning pumps for handling foodstuffs)

Instruction Handbook WANGEN Twin



Chapter 6

6. Placing out of operation

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

- **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.

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

6.2 Drainage

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

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

6.3 Decommissioning

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

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

6.4 Final decommissioning of the pump

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

Chapter 7

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"> → Check oil level → If necessary, top up/change oil, Chapter 7
	Slip-ring seal	Operator Technical staff	<ul style="list-style-type: none"> → Check for leakage → In case of stronger leakage Coordinate with manufacturer. Replace slip rings or sealing rings Chapter 9
	Shaft sealing rings	Operator Technical staff	<ul style="list-style-type: none"> → Check for leakage → In case of stronger leakage Coordinate with manufacturer. Replace shaft sealing rings Chapter 9
	Counter-pressure system Quench system	Operator Technical staff	<ul style="list-style-type: none"> → Check for leakage → Refill counter-pressure/quench medium if necessary. → Check slip-ring seal and replace counter-pressure/quench medium if quench medium is contaminated.
After 100 hours of operation or at least semi-annually	Spindle screw	Technical staff	<ul style="list-style-type: none"> → Check spindle screws and O-rings, If contaminated or medium is leaking through Chapter 7
After the first 250 operating hours	Gear housing	Technical staff	<ul style="list-style-type: none"> → Changing gear oil Chapter 7

Instruction Handbook WANGEN Twin



Chapter 7

Period	Assembly	Who	Jobs
monthly	Pump housing	Technical staff	→ Check tightening moment of the spindle nut Chapter 4
6 months	Counter-pressure system Quench system	Technical staff	→ Change counter-pressure and quench medium Chapter 7
After 500 cleaning cycles or thermal cycles, after one year at the latest	Pump casing and mechanical seal	Technical staff	→ Replace all O - rings Chapter 9
According to the specifications of the drive manual	Drive	Technical staff	→ Grease bearings (Drive manual)
In continuous operation after 3000 operating hours	Gear housing	Technical staff	→ Change gear oil Chapter 7
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 ⁹ ohms, Chapter 1

7.3 Inspection of hygienic pumps for food processing.

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

Chapter 7

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 **have to be changed** after 10,000 hours if the pump is operated in an **Ex – area**.

You should set shorter change intervals for particularly difficult operating conditions, such as:

- large temperature variations
- large pressure fluctuations

In the interest of a long pump life-cycle.

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 the 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.

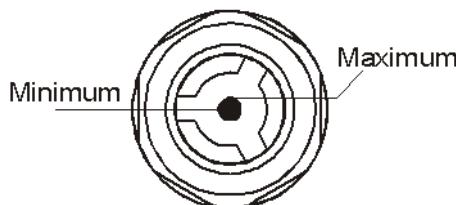


Fig. 7-1 Oil-level gauge glass

7.4.3 Changing the 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)

Instruction Handbook WANGEN Twin



Chapter 7

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 quantities (Gear oil)

Table 1: Quantity of lubricant for installation sizes

Pump series	Quantity of lubricant (litres)
WANGEN Twin 70	0.6
WANGEN Twin 104	0.8
WANGEN Twin 130	1

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	Geralyn ® 2

ATTENTION	Possible damage to property
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- Do not mix together synthetic lubricants and do not mix with mineral lubricants.**

Chapter 7

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 the pump for repair

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

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

Chapter 8

8. Disturbances and their elimination

	<p>Warning!</p> <p>Risk of injuries through rotating machine parts or from liquids escaping under pressure.</p> <p>Potential consequences: Severe or fatal injuries.</p>
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- **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	
	Medium hardens (due to temperature/chemical action)	Immediately clean pump
	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
	Spindles mounted incorrectly	mount spindles correctly
	Suction line clogged	clean
	Pump or filter clogged	Clean pump / filter
	Suction line draws air.	Seal line / Increase filling level when sucking from tank

Chapter 8

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

Instruction Handbook WANGEN Twin



Chapter 9

9. Disassembly and assembly

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

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

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

9.1 General notes on disassembly and assembly

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

The reach-in protection 2286 on the sealing casing of the WANGEN Twin 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.

Instruction Handbook WANGEN Twin



Chapter 9

9.3 Disassembling and installing the pump

9.3.1 Driving elements WANGEN Twin 70

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

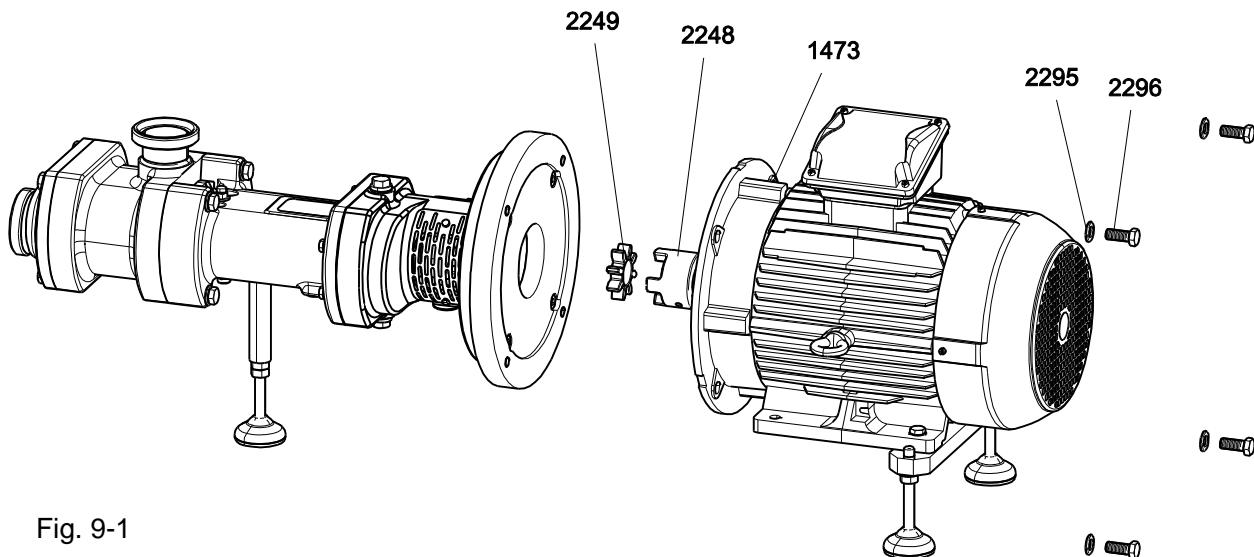


Fig. 9-1

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.

ATTENTION	Possible damage to property
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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).

Chapter 9

9.3.2 Driving elements

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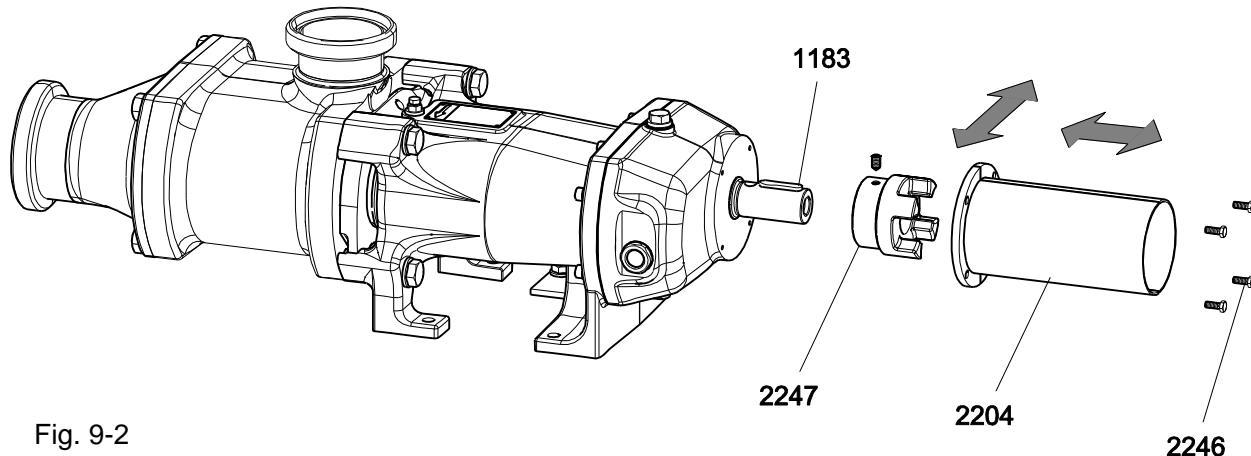


Fig. 9-2

Dismounting:

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

Mounting:

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

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

- Do not mount the coupling using a hammer.
- Use a pull-on device or heat the coupling to approx. 80 °C (remove rubber parts before) and mount the coupling in hot condition.

Chapter 9

9.3.3 Gear housing WANGEN Twin 70

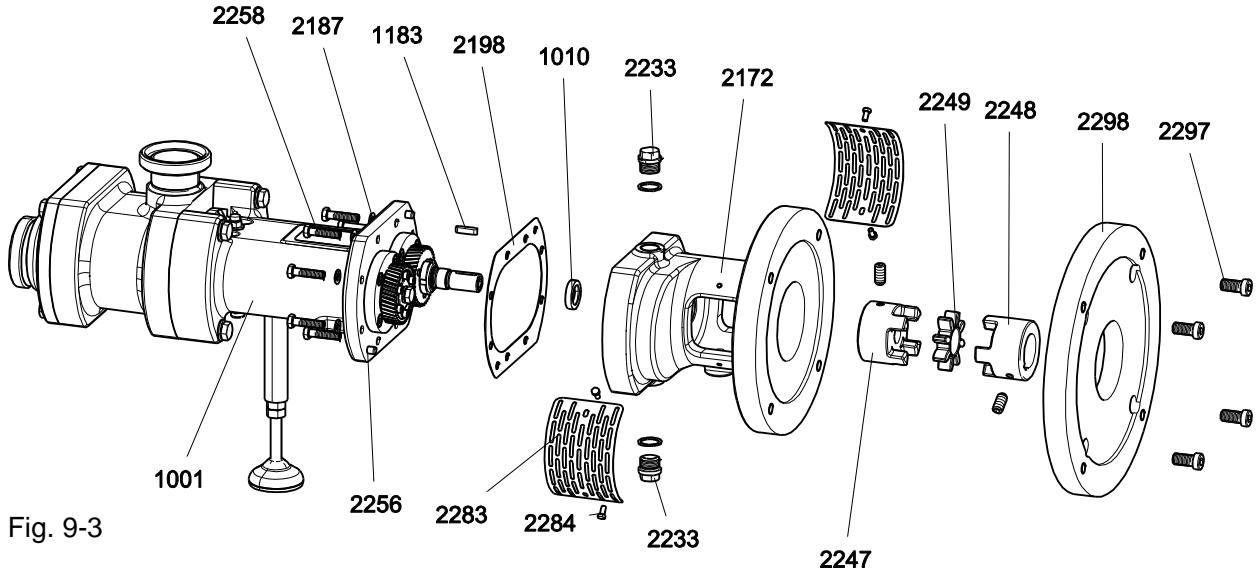


Fig. 9-3

Dismounting:

1. Undo screws 2296 of drive unit 1473, remove Drive 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.

	<ul style="list-style-type: none"> • 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).
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Instruction Handbook WANGEN Twin



Chapter 9

Mounting:

1. Clean the sealing surfaces between the bearing and gear housing carefully. Put on a new gasket 2198 on the bearing housing.
2. Lightly grease the rotary shaft seal ring 1010. Press in with a mounting tube (T 1) in the gearbox. (The spiral ring of the rotary shaft seal ring shows into the housing.)
3. Insert transmission casings 2172 into the parallel pins 2256, insert machine screws 2258 with the washers 2187 and tighten alternately crosswise.
(Torque 20 Nm).
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.

9.3.4 Gear housing WANGEN Twin 104 and 130

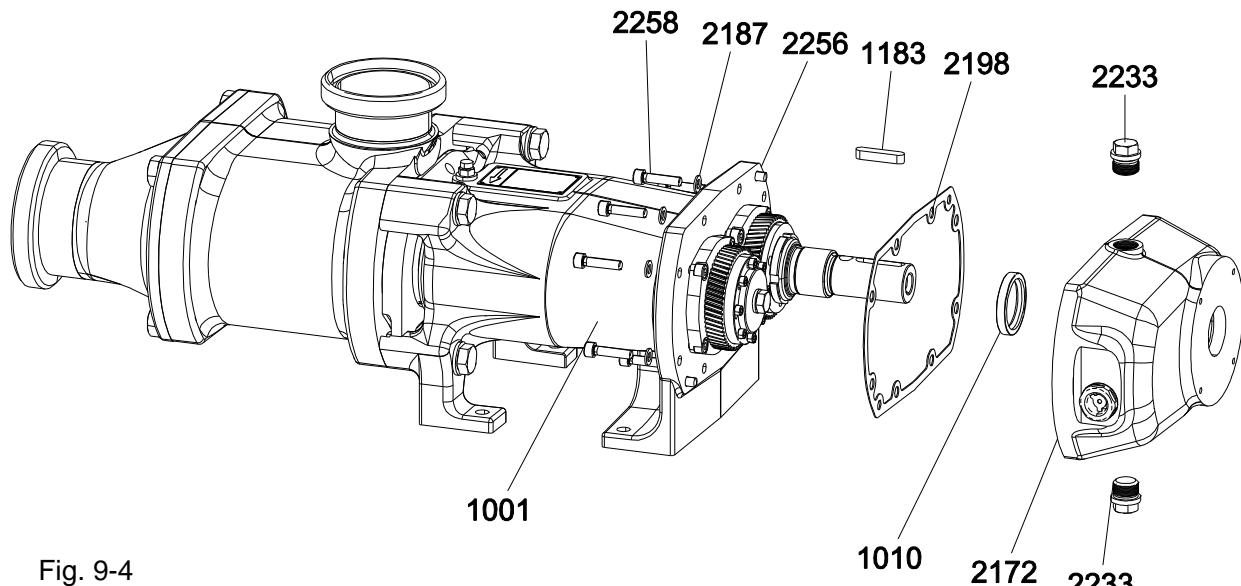


Fig. 9-4

Dismounting:

1. Remove key 1183.
2. Open the upper locking screw 2233 and then the lower locking screw 2233 in gear housing 2172 and drain the gear oil into a sump tray.
3. Loosen the screws 2258 and remove them together with the washers 2187. Carefully pull off the gear housing. This may require slight hammer blows (plastic mallet) since the gear housing has been fitted with cylindrical pins 2258. Carefully remove gasket 2198.
4. Check the rotary shaft seal 1010 in gear housing. Replace these at regular intervals (at least every year). Pull out with a suitable mounting pipe.

	<ul style="list-style-type: none">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 2 Twin 104, T3 Twin 130) Renew this shaft seal periodically (at least annually).
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Instruction Handbook WANGEN Twin



Chapter 9

Mounting:

1. Clean the sealing surfaces between bearing housing 1001 and gear housing 2172.
2. Insert new gasket 2198.
3. Lightly grease the rotary shaft seal 1010. Press in with a mounting tube (**T 2 Twin 104, T 3 Twin 130**) in the gear housing. (Spiral ring of the rotary shaft seal shows into the case)
4. Insert transmission casings 2172 into the parallel pins 2256, insert machine screws 2258 with the washers 2187 and tighten alternately crosswise. (Torque 20 Nm)
5. 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.
6. Screw in and tighten upper locking screw 2233.
7. Kupplungsteil der Pumpe montieren, Gewindestift mit einer flüssigen Schraubensicherung bestreichen, eindrehen und festziehen.

9.3.5 Cover

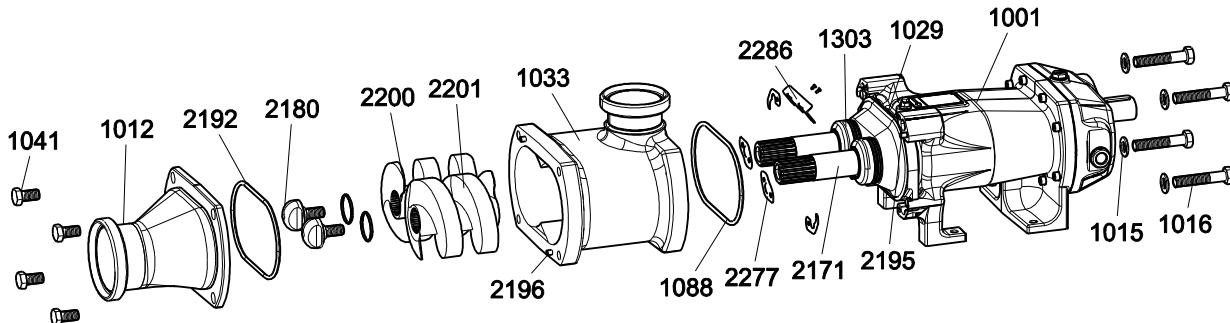


Fig. 9-5

Dismounting:

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



- If necessary, loosen the cover using slight blows of a hammer (plastic 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.

9.3.6 Removing and installing screw spindles



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

Instruction Handbook WANGEN Twin



Chapter 9

Dismounting:

1. Loosen and unscrew hexagonal screws 1016 and remove them with washers 1015. Remove pump housing.
2. Loosen spindle bolt 2180 and unscrew, in this case hold the drive shaft 1000 using the locking bore with a steel mandrel, **WANGEN Twin 70**, 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.
3. Remove screw spindles 2200 + 2201 from the shaft. (Use puller)
4. 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:



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

1. Carefully slide the screw spindles (imperative in pairs) onto the shafts. For the arrangement of the screw spindles refer to chapter 9.4.8 "Arranging the spindles". Observe correct seat of the O-rings when sliding the spindle onto the seal.
2. Insert O-ring 2194 into the greased groove of the spindle nuts.
3. Screw in spindle nuts on both shafts and slightly tighten alternating, manually at first, then using an open-end spanner. In this process, just hold shafts and spindles in place manually.



- The seals are prestressed when slightly tightening the spindle nuts. Check to see that exterior stator 11 is slowly pushed into the seal housing against its spring.

4. Tighten spindle bolt 2180 on the drive shaft 1000 (long shaft), hold back the shaft with the steel arbor inserted into the bore in the drive shaft. (Torque 150 Nm.) In case of the **WANGEN Twin 70**, insert a locking arbor, **T 4**, into the bore of the coupling and hold back. (Torque 100 Nm)
5. Tighten driven shaft spindle nut using torque of 150 Nm while hold in place with steel pin in the hole of the drive shaft. (Torque 100 Nm at WANGEN Twin 70.)
6. Insert O-ring 1088 into the sealing casing.
7. 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, M 16 = 150 Nm)
8. Mount cover (see Chap 9.3.5)

ATTENTION

Possible damage to property

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

Chapter 9

9.3.7 Arranging the pump casing

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

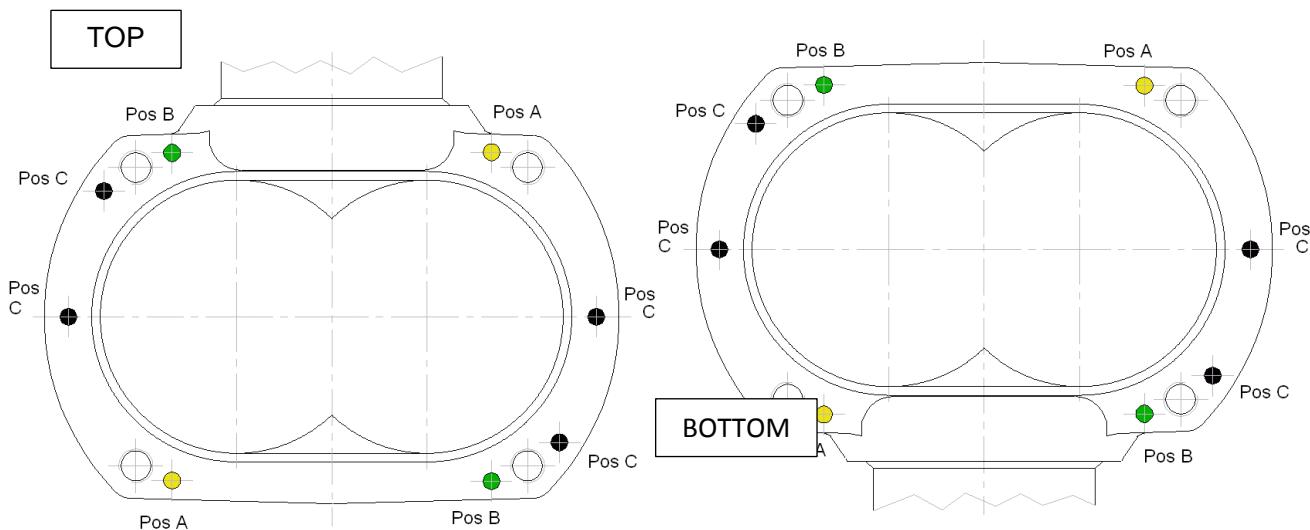


Fig. 9-6

		Pos. of housing nozzle	
		TOP	BOTTOM
Rotating direction	LEFT	Pos A	Pos B
	LEFT/RIGHT	Pos C	Pos C
	RIGHT	Pos B	Pos A

ATTENTION

Possible damage to property

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

9.3.8 Incorrect arrangements of the pump casing

The following table shows incorrect arrangements of pump housing relative to the mounting orientation. Incorrect arrangements are marked in red. These Incorrect arrangements occur only with the here degradation specified series and nominal diameter combinations.

Twin 104	DN 80/3"	Spindle arrangement	
Twin 130	DN 125/5"	A	B
Position of housing nozzle	TOP	:(:(
	BOTTOM	:(:(

ATTENTION

Possible damage to property

- Use of an incorrect arrangement of pump housing will result in loss of performance.

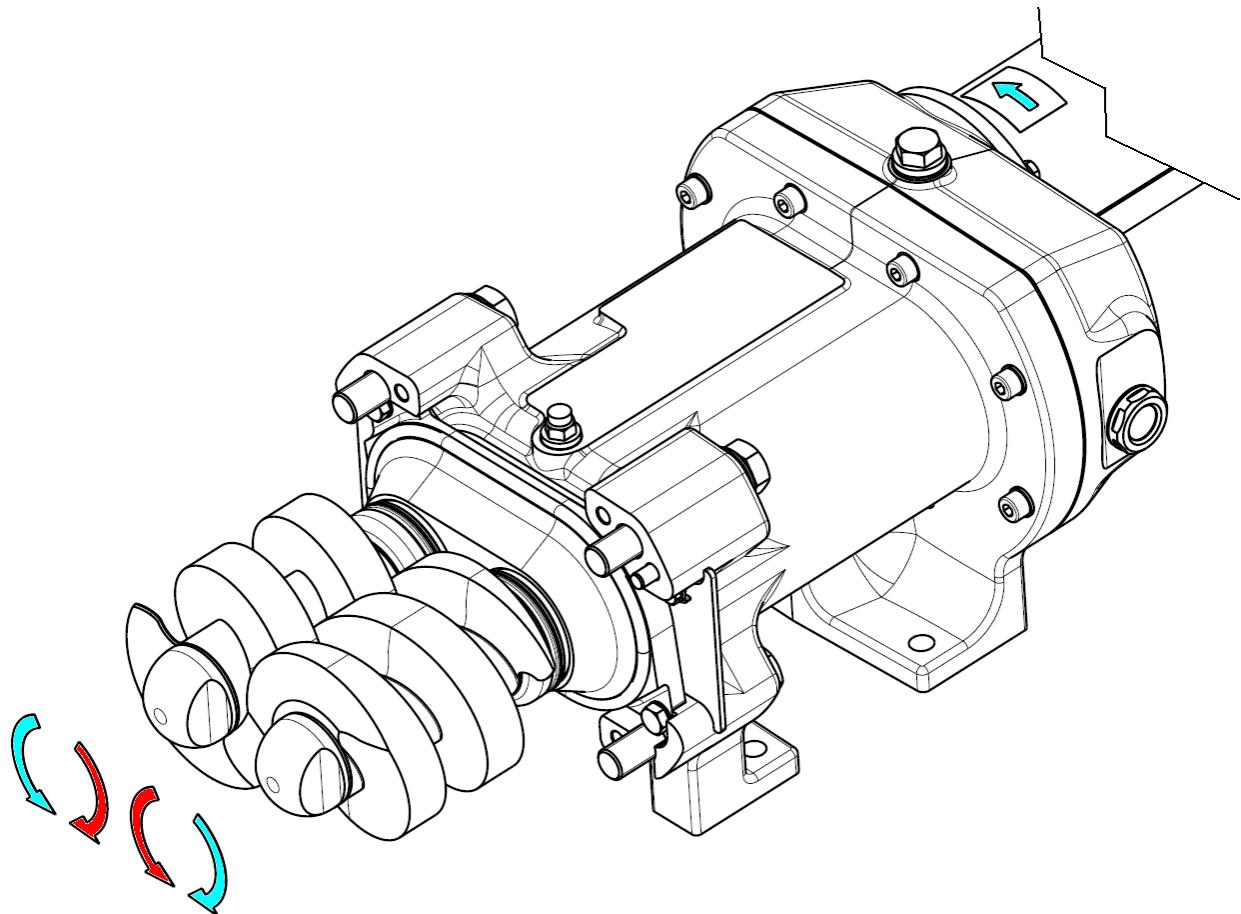
Instruction Handbook WANGEN Twin



Chapter 9

9.3.9 Arranging the spindles

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



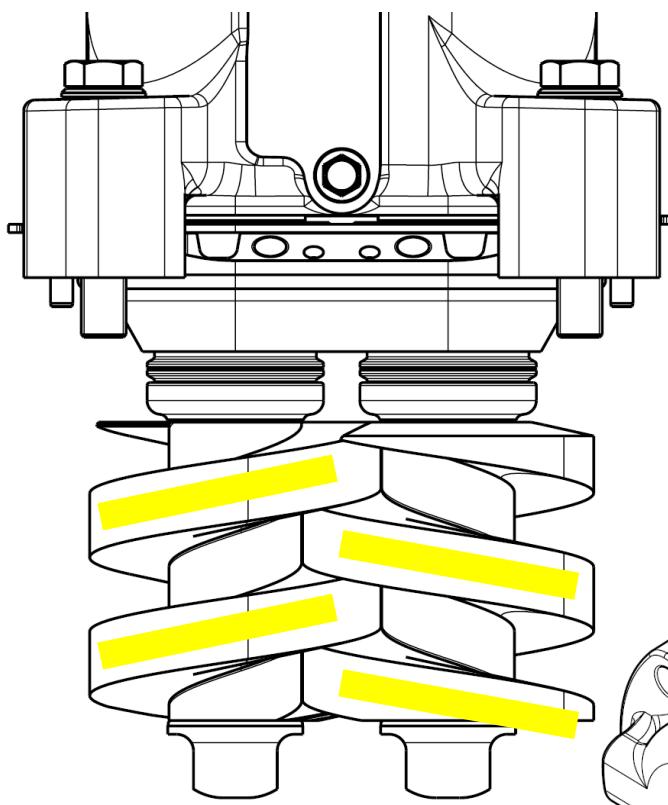
Naming the rotating direction (See rotating direction arrow attached to the coupling guard):

rotating direction right hand
rotating direction left hand

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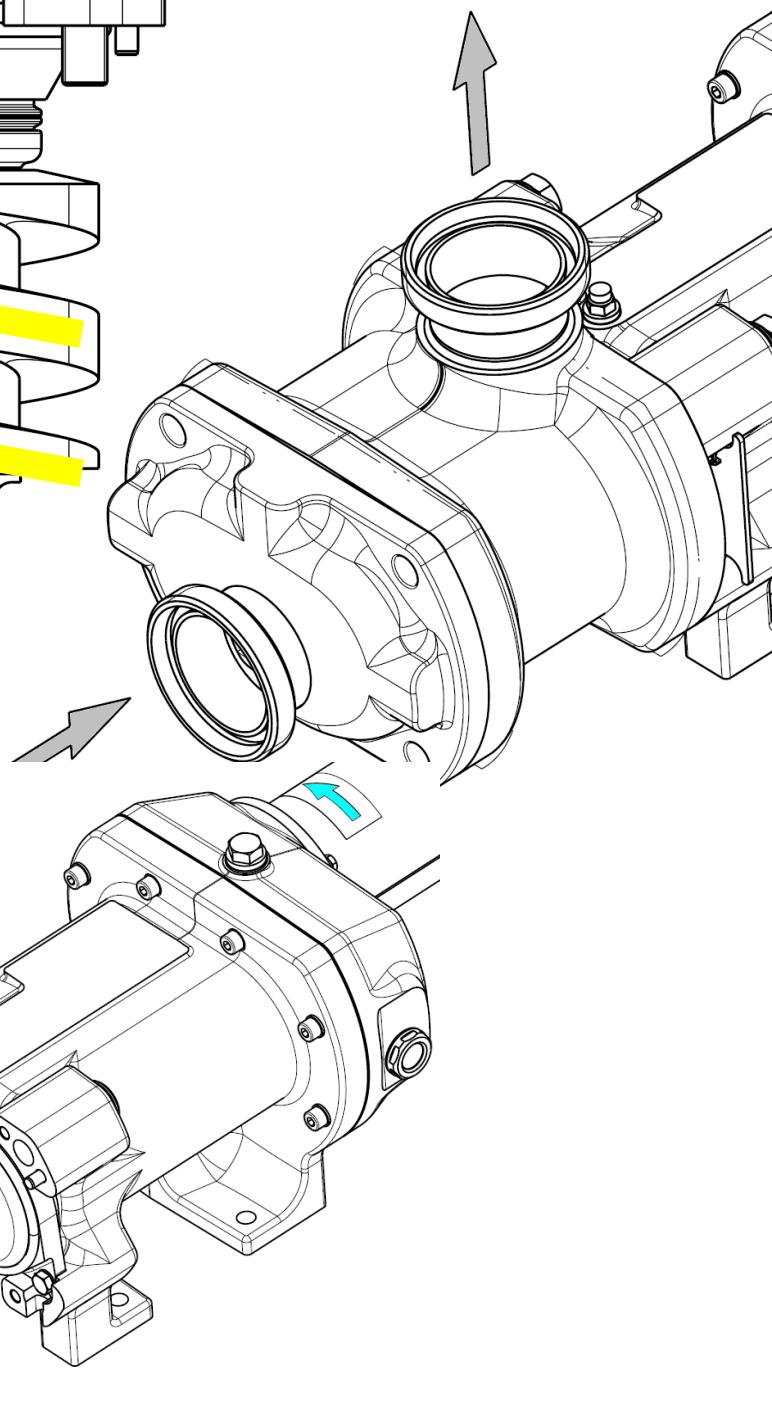
Chapter 9



Spindle arrangement A

Rotating direction right hand

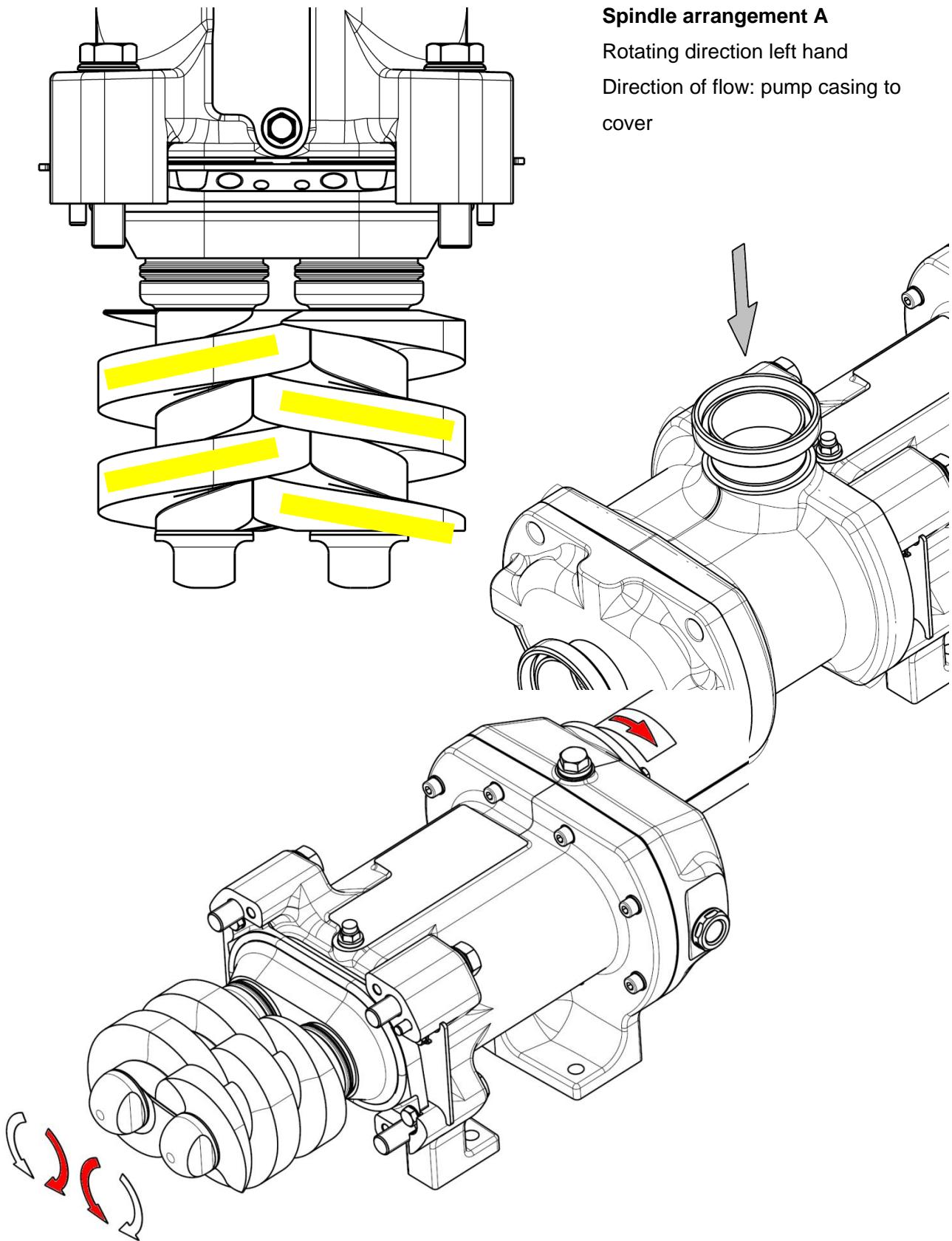
Direction of flow: cover to
pump casing



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Spindle arrangement A

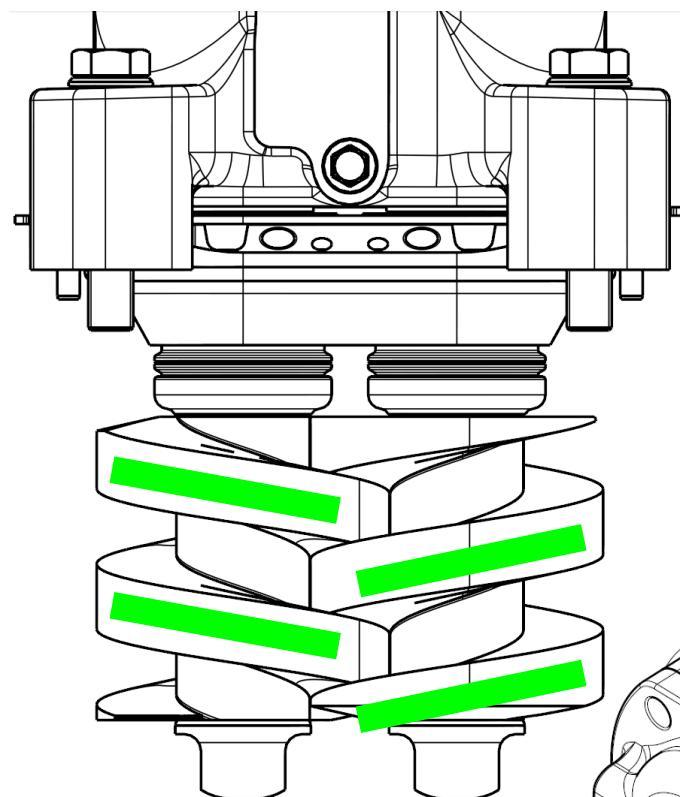
Rotating direction left hand

Direction of flow: pump casing to cover

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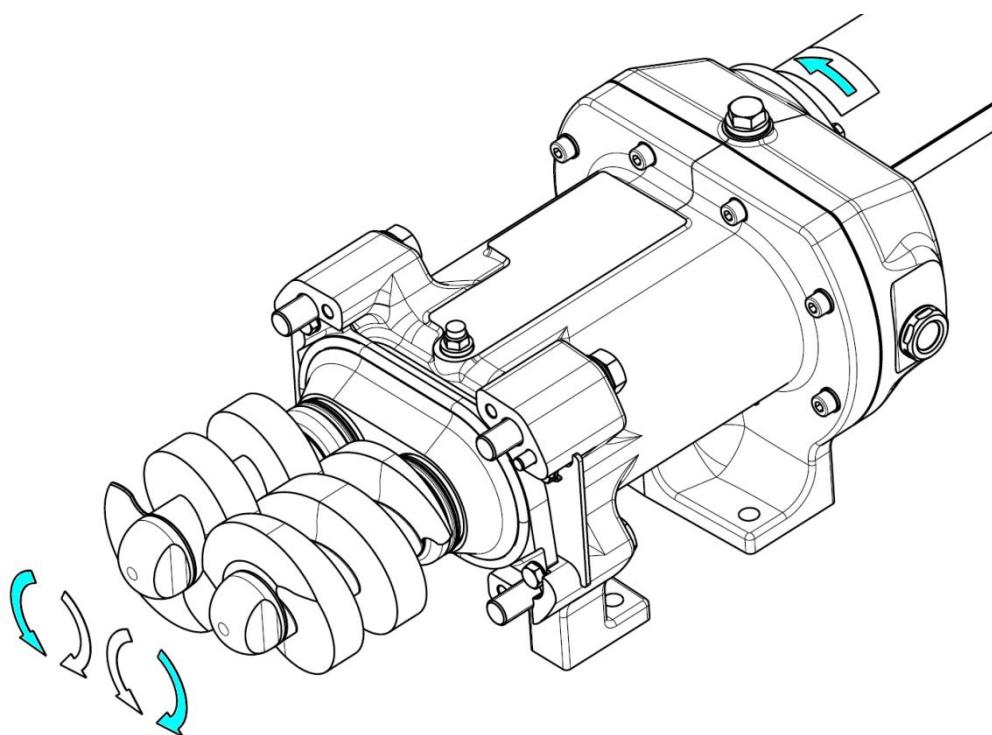
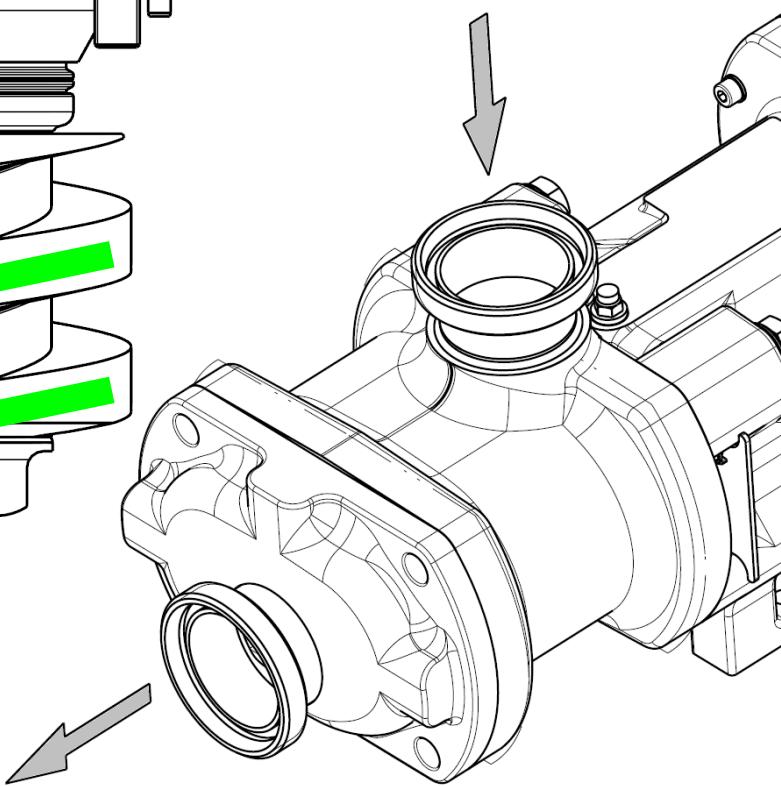
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Spindle arrangement B

Rotating direction right hand

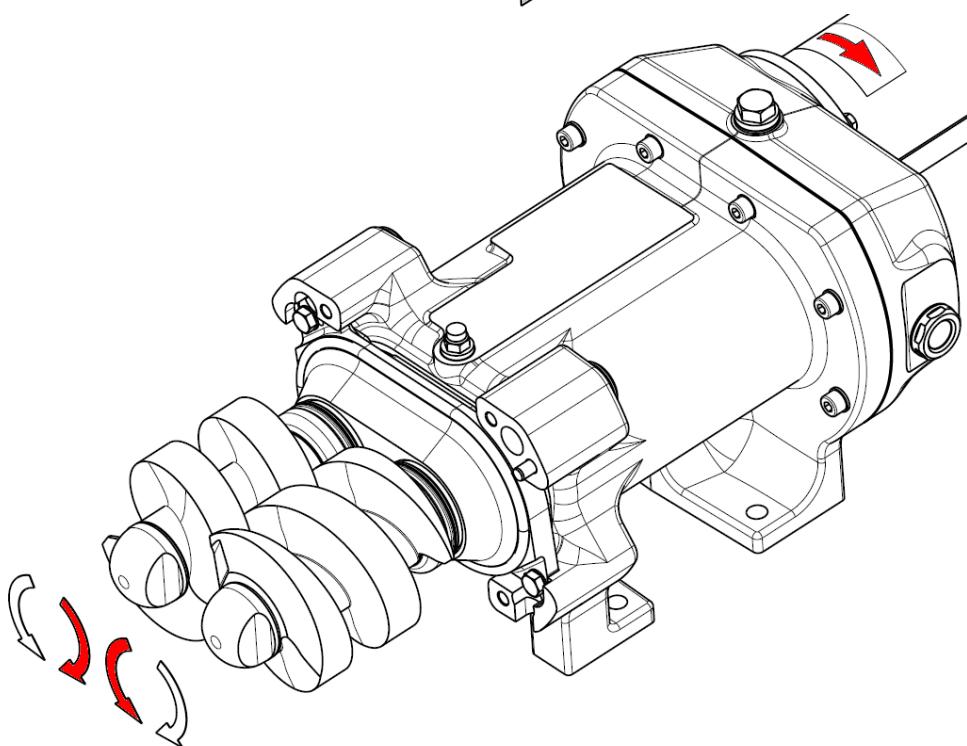
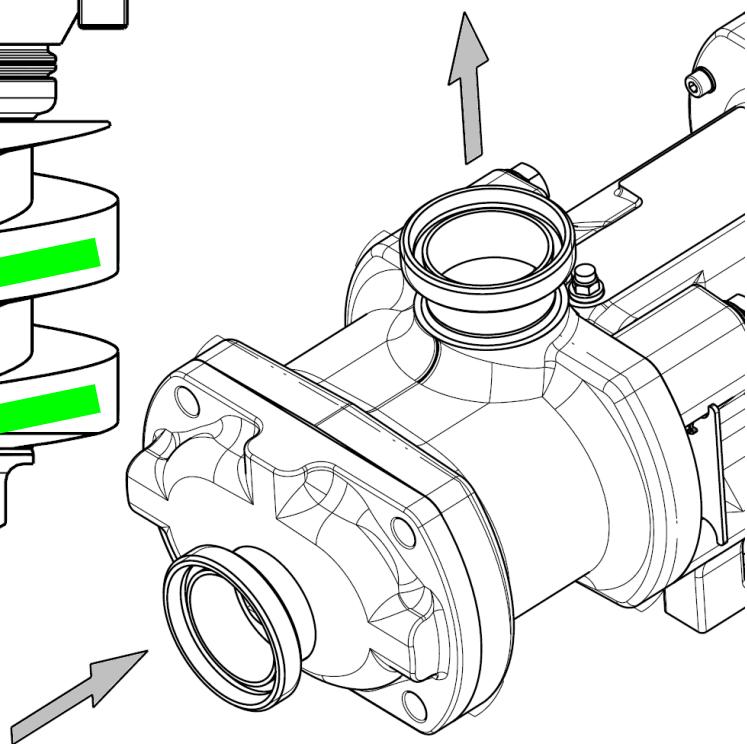
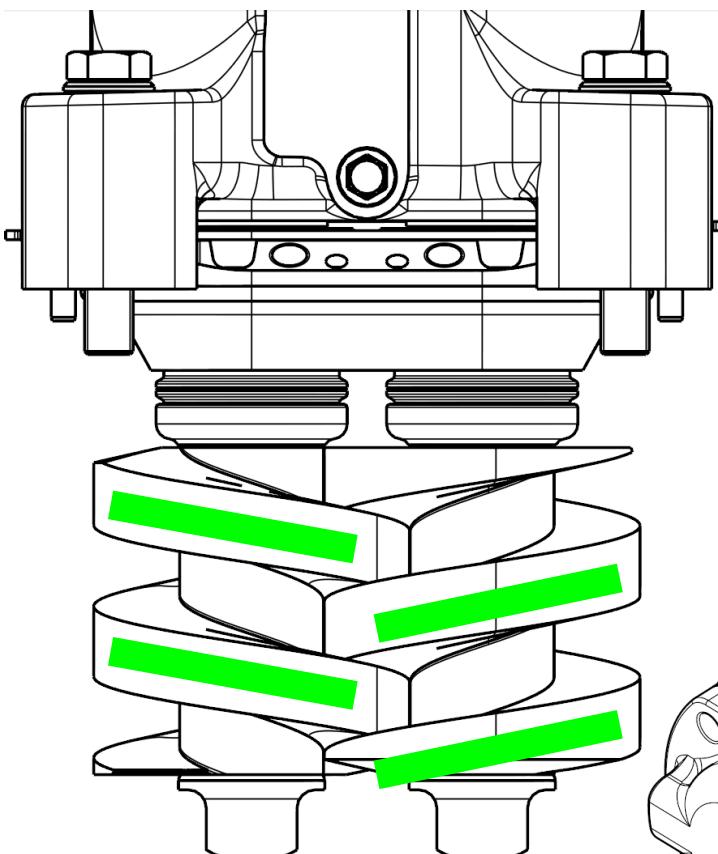
Direction of flow: pump casing to cover



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Spindle arrangement B

Rotating direction left hand

Direction of flow: cover to
pump casing

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Chapter 9

9.4 Shaft seal

9.4.1 Shaft seal (single-acting) WANGEN Twin 70

Dismounting:

1. Disassemble cover 1012.
2. Disassemble pump housing 1033.
3. Disassemble both screw spindles 2200 and 2201.
4. Loosen bolts 2287 and remove reach-in protection 2286.
5. Pull down inboard rotor holders 80 from the shaft. Inserted in it are seal face 40, drive pins 210 as well as O-rings 90, 130 and 220. Twist the inboard rotor holder quickly while pulling to separate the seal faces.
6. Pull off the seal housing in 1029 with remaining seals from the shafts.
7. Remove the inboard stators 11 from the seal housing. Remove O-rings 140 located in the front section of the seal housing.
8. Using circlip pliers grasp and remove the retaining rings 200 on the rear of the seal housing. In addition, remove spacers 190, backup rings 180 as well as wave rings 50 in backward direction.
9. Finally, remove drive disc 150 along with drive pins 210 from the seal housing.

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

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

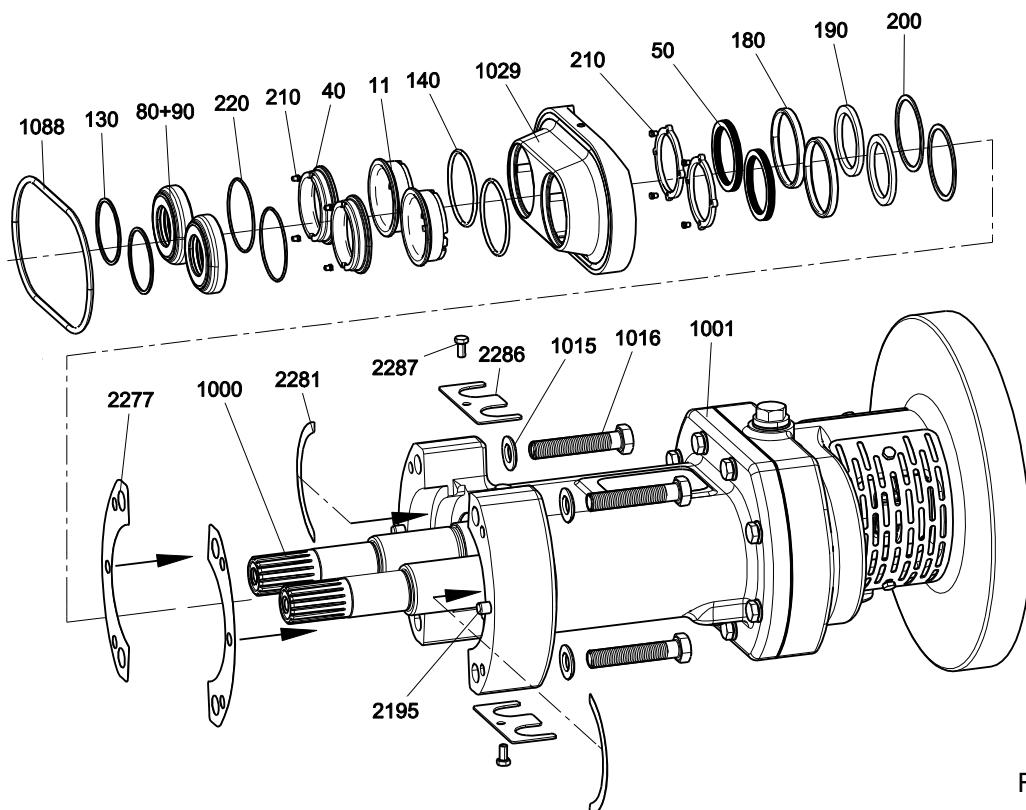


Fig. 9-7

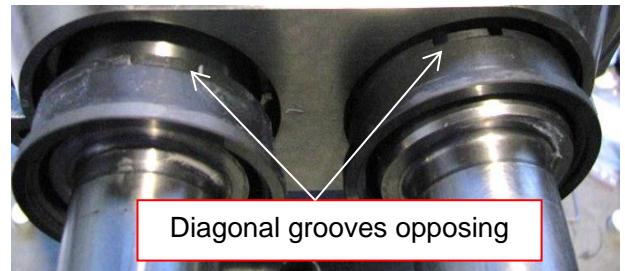
Instruction Handbook WANGEN Twin



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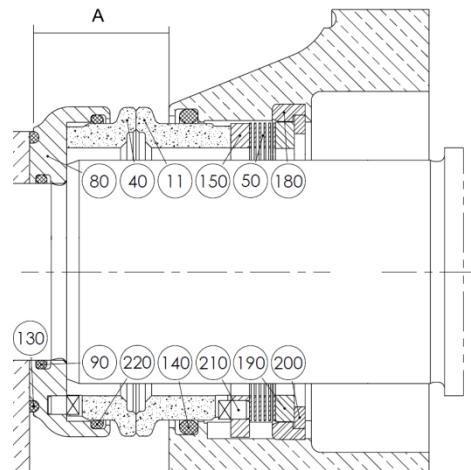
Mounting:

1. Insert drive disks 150 with the pre-assembled drive pins 210 (glue them into the disc ring using grease) into the seal housing from behind. The drive pins must be directed to the front
2. Fit backup rings 180 into the rear groove of the seal housing. Push wave ring 50 against it from behind. Slide spacers 190 against it.
3. Insert retaining rings 200 using circlip pliers.
4. Insert O-rings 140 into the front groove of the seal housing.
5. Insert contact surfaces insulation 2281 onto bearing housing 1001. (not in case of bearing housing type P and PC)
6. Carefully insert the seal housing 1029 on the shaft into the bearing housing.
7. Carefully slide inboard stators 11 into the seal housing via the shaft. The stator groove must engage with drive pins 210 of drive disc 150. (see picture)
8. Place inboard rotors 80 incl. seal faces 40 and built-in O-rings onto the shaft.



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

- Check the free room of motion of the sealing by pushing the inboard rotor holder and spinning it bidirectional. During spinning a small gap shall be noticeable, coming from the gap between the drive pins 210 and the grooves they are positioned in the seal faces. During pushing the gap between the stator 11 and the seal housing 1029 shall stay circular constant.
 - Therefore dimension A in the drawing showing the sealing cross section shall be controlled. (depth gauge)
 $A = 22.5 \pm 0.3 \text{ mm}$ (WANGEN Twin 70)
9. When installing the screw spindles make sure that the O-rings 130 (are located to the front of the inboard rotor holders) are correctly placed in their receptacle. The seals will now be prestressed during the installation of the screw spindles. (see 9.3.4)
 10. Insert O-ring 1088 in seal housing.
 11. Insert contact surfaces insulation 2277 onto bearing housing 1001. (not in case of bearing housing type P and PC)
 12. Slide on pump housing 1033, in this case check again the correct seating of the O-ring 1088 with the fingers in the upper and lower side. The O-ring may not protrude from the slot either externally or internally.
 13. Screw in bolt 1016 with washer 1015 and tighten alternately and crosswise. (Tightening torque 60 Nm)
 14. Insert reach-in protection 2286 and fix with the bolts 2287.
 15. Insert the O-ring 2192 into the cover and place on cover. Check that the O-ring does not protrude from the slot either externally or internally, screw in bolt 1041 and tighten alternately and crosswise. (Torque 70 Nm)



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

9.4.2 Shaft seal (single acting) WANGEN Twin 104 and 130

Dismounting:

1. Disassemble cover 1012.
2. Disassemble pump housing 1033.
3. Disassemble both screw spindles.
4. Loosen bolts 2287 and remove reach-in protection 2286.
5. Pull down inboard rotor holders 80 from the shaft. Inserted in it are seal face 40, drive pins 210 as well as O-rings 90, 130 and 220. Twist the inboard rotor holder quickly while pulling to separate the seal faces.
6. Loosen screws 2259 of seal housing 1029 and remove it from the shafts along with the remaining seals. Loosen flat-head screws 2325 and remove security plate 2324. (Twin 104)
7. Remove the inboard stators 11 from the seal housing. Remove O-rings 140 located in the front section of the seal housing.
8. Using circlip pliers grasp and remove the retaining rings 200 on the rear of the seal housing. In addition, remove spacers 190, backup rings 180 as well as wave rings 50 in backward direction.
9. Finally, remove drive disc 150 along with drive pins 210 from the seal housing.

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

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

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Mounting:

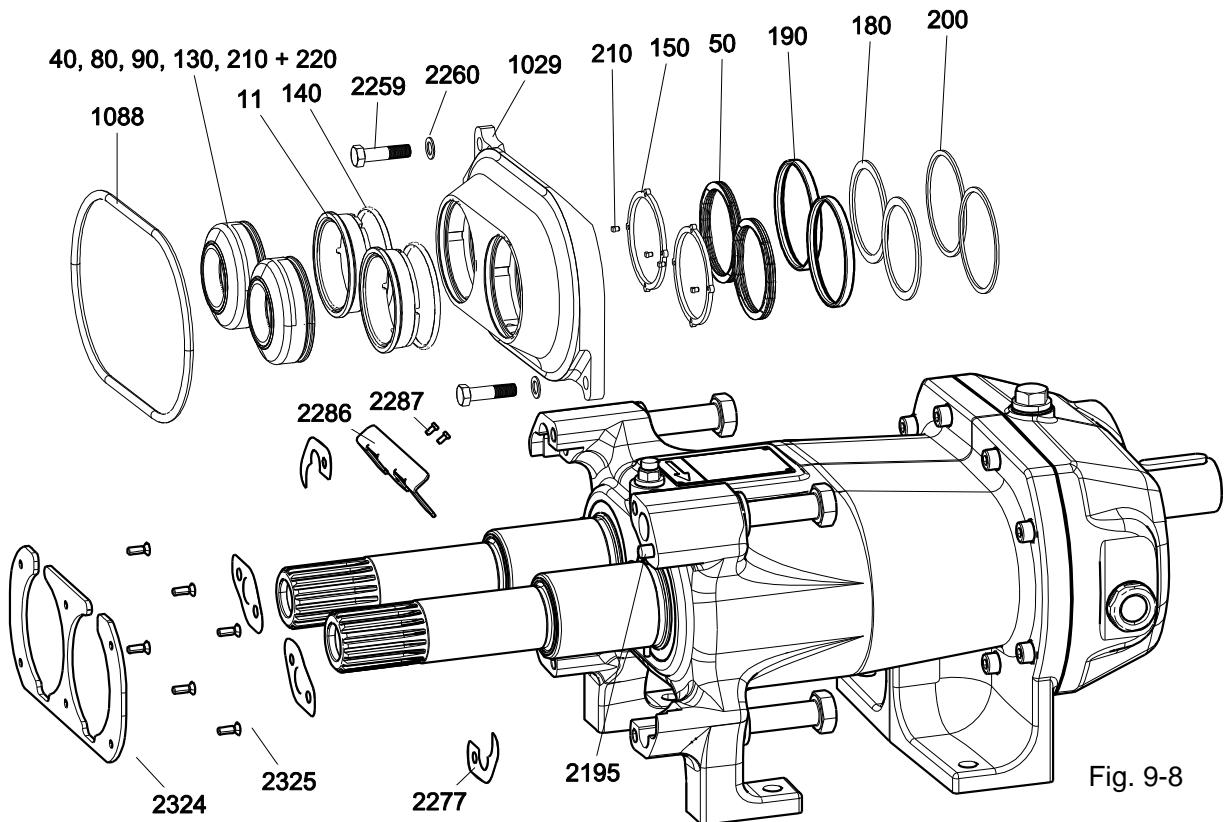
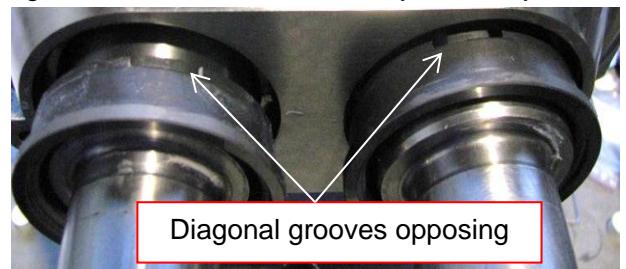


Fig. 9-8

1. Insert drive disks 150 with the pre-assembled drive pins 210 (glue them into the disc ring using grease) into the seal housing from behind. The drive pins must be directed to the front
2. Fit backup rings 180 into the rear groove of the seal housing. Push wave ring 50 against it from behind. Slide spacers 190 against it.
3. Insert retaining rings 200 using circlip pliers.
4. Insert O-rings 140 into the front groove of the seal housing.
5. Insert security plate 2324 into the sealing casing and fix with the bolts 2325. (**Twin 104**)
6. Carefully slide the seal housing onto the shafts. Position screws 2259 with washers 2260 and screw them into the pump casing. Tighten the fitting screws (10 Nm torque).
7. Carefully slide inboard stators 11 into the seal housing via the shaft. The stator groove must engage with drive pins 210 of drive disc 150. (see picture)
8. Place inboard rotors 80 incl. seal faces 40 and built-in O-rings onto the shaft.



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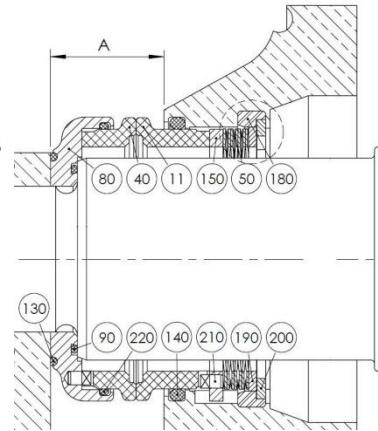


Chapter 9

ATTENTION

Possible damage to property

- Check the free room of motion of the sealing by pushing the inboard rotor holder and spinning it bidirectional. During spinning a small gap shall be noticeable, coming from the gap between the drive pins 210 and the grooves they are positioned in the seal faces. During pushing the gap between the stator 11 and the seal housing 1029 shall stay circular constant.
- Therefore dimension A in the drawing showing the sealing cross section shall be controlled. (depth gauge)
 $A = 25.2 \pm 0.3 \text{ mm (WANGEN Twin 104); } 33.3 \pm 0.3 \text{ mm (WANGEN Twin 130)}$



9. When installing the screw spindles make sure that the O-rings 130 (are located to the front of the inboard rotor holders) are correctly placed in their receptacle. The seals will now be prestressed during the installation of the screw spindles.
10. Insert O-ring 1088 in seal housing.
11. Insert contact surface insulation 2277 into bearing housing. (Not in case of bearing housing type P and PC.)
12. Slide on pump housing 1003, in this case check again the correct seating of the O-ring 1088 with the fingers in the upper and lower side. The O-ring may not protrude from the slot either externally or internally.
13. Screw in bolt 1016 with washer 1015 and tighten alternately and crosswise. (torque 150 Nm)
14. Insert reach-in protection 2286 and fix with the bolts 2287.
15. Insert the O-ring 2192 into the cover and place on cover. Check that the O-ring does not protrude from the slot either externally or internally, screw in bolt 1041 and tighten alternately and crosswise. (torque 150 Nm)

ATTENTION

Possible damage to property

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

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9.4.3 Shaft seal (single-acting with quench) WANGEN Twin 104 and 130

Dismounting:

1. Drain the quench fluid. Disassemble the auxiliary systems.
2. Disassemble cover 1012.
3. Disassemble pump housing 1033.
4. Disassemble both screw spindles.
5. Loosen bolts 2287 and remove reach-in protection 2286.
6. Pull down inboard rotor holders 80 from the shaft. Inserted in it are seal face 40, drive pins 210 as well as O-ring 90, 130 and 220.
7. Loosen screws 2259 of seal housing 1029 and remove it from the shafts along with the remaining seals. Loosen flat-head screws 2325 and remove security plate 2324. (**Twin 104**)
8. Remove the inboard stators 11 from the seal housing. Remove O-rings 140 located in the front section of the seal housing.
9. Press out the shaft seals 2272 from seal housing.
10. Using circlip pliers grasp and remove the retaining rings 200 on the rear of the seal housing. In addition, remove spacers 190, backup rings 180 as well as wave rings 50 in backward direction.
11. Remove drive disc 150 along with drive pins 210 from the seal housing.
12. Loosen sets screws 1064 in shaft sleeves and pull off of from shafts.

Remove Centrifugal disk 2275. Renew shaft seal 2272 and the centrifugal disk 2274.

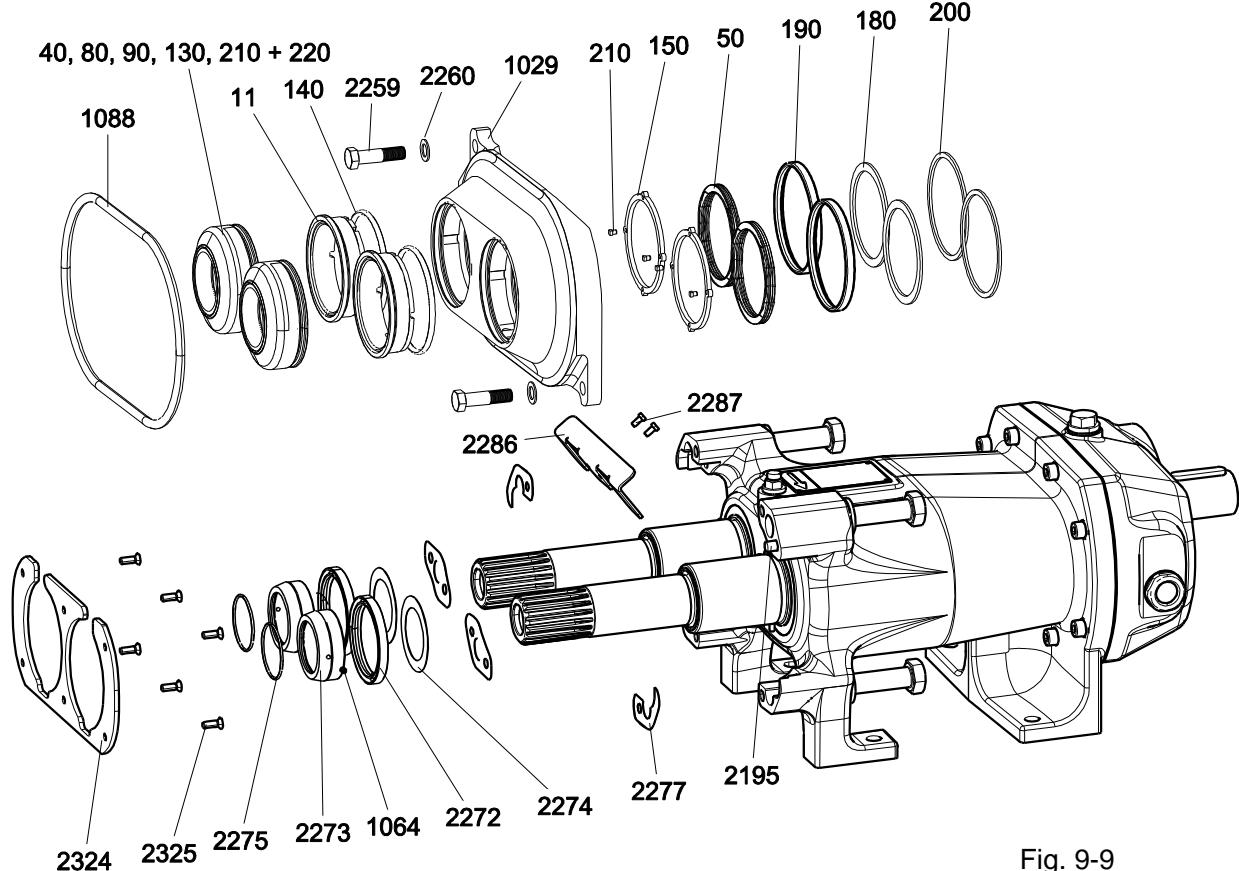


Fig. 9-9

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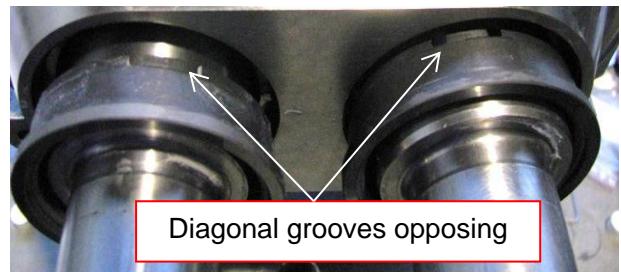
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ATTENTION	Possible damage to property
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- Equally clean the seal housing as well as the shafts and seal seats and carefully check the removed parts. Replace any damaged parts as well as all O-rings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

Mounting:

1. Insert disc rings 150 with the pre-assembled drive pins 210 (glue them into the disc ring using grease) into the seal housing from behind. The drive pins must be directed to the front.
2. Fit backup rings 180 into the rear groove of the seal housing.
Push wave ring 50 against it from behind.
3. Slide spacers 190 against it.
4. Insert retaining rings 200 using circlip pliers.
5. Insert O-rings 140 into the front groove of the seal housing.
6. Insert centrifugal disk 2274 onto both shafts (against the shaft, shoulder its must be tight)
7. Insert O-rings into shaft sleeves 2273. Lightly grease the shaft sleeves 2273 and push against the centrifugal disk 2274. Screw in set screws 1064 into the shaft sleeves while keeping pushed towards the centrifugal disk and fix it. (1.5 Nm torque)
8. Press in shaft seals 2272 into seal housing 1029.
9. Insert security plate 2224 into the sealing casing and fix with the bolts 2325. (**Twin 104**)
10. Carefully slide the seal housing 1029 onto the shafts. Position screws 2259 with washers 2260 and screw them into the pump casing. Tighten the fitting screws (10 Nm torque).
11. Carefully slide inboard stators 11 into the seal housing via the shaft. The stator groove must engage with drive pins 210 of drive disc 150. (see picture)
12. Place inboard rotor holders 80 incl. seal faces 40 and built-in O-rings onto the shaft.



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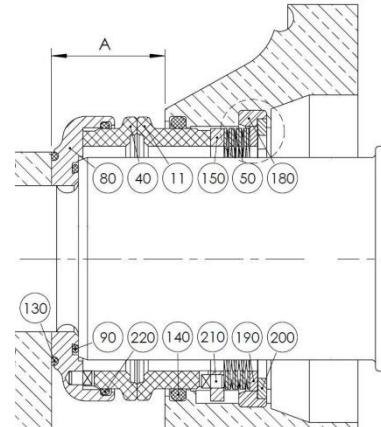
Chapter 9

ATTENTION

Possible damage to property

- Check the free room of motion of the sealing by pushing the inboard rotor holder and spinning it bidirectional. During spinning a small gap shall be noticeable, coming from the gap between the drive pins 210 and the grooves they are positioned in the seal faces. During pushing the gap between the stator 11 and the seal housing 1029 shall stay circular constant.
- Therefore dimension A in the drawing showing the sealing cross section shall be controlled. (depth gauge)
 $A = 25.2 \pm 0.3 \text{ mm (WANGEN Twin 104); } 33.3 \pm 0.3 \text{ mm ; (WANGEN Twin 130)}$

13. When installing the screw spindles make sure that the O-rings 130 (are located to the front of the inboard rotor holders) are correctly placed in their receptacle. The seals will now be prestressed during the installation of the screw spindles.
14. Insert O-ring 1088 into the sealing casing.
15. Insert contact surface insulation 2277 into bearing housing.
(Not in case of bearing housing type P and PC.)
16. Slide on pump housing 1033, in this case check again the correct seating of the O-ring 1088 with the fingers in the upper and lower side. The O-ring may not protrude from the slot either externally or internally.
17. Screw in bolt 1016 with washer 1015 and tighten alternately and crosswise. (Torque 150 Nm)
18. Insert reach-in protection 2286 and fix with the bolts 2287.
19. Insert the O-ring 2192 into the cover 1012 and place on the cover. Check that the O-ring does not protrude either externally or internally. Screw in bolt 1041 and tighten alternately and crosswise.
(Torque 150 Nm)
20. Connect quench chamber, fill up fluid and vent the shaft seal.



ATTENTION

Possible damage to property

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

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9.4.4 Lip sealing Twin 070

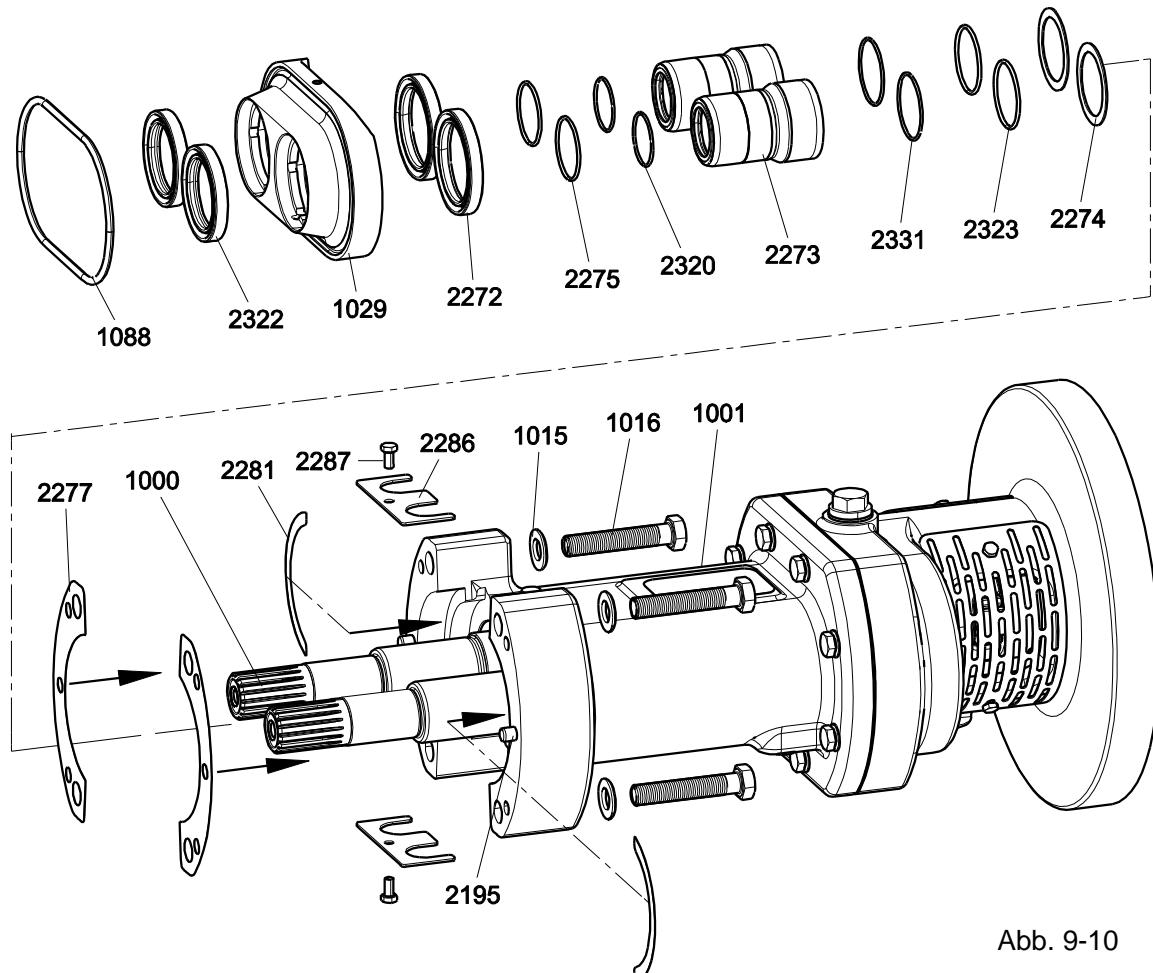


Abb. 9-10

Dismounting:

1. Drain the quench fluid. Disassemble the auxiliary systems.
2. Disassemble cover 1012. Remove O-ring 2192.
3. Disassemble pump casing 1033.
4. Mark position of the dowel pins 2195. (Important for the re-installation)
5. Dismantle both screw spindles 2200 + 2201.
6. Loosen bolts 2287 and remove reach-in protection 2286.
7. Pull sealing casing 1029 with the shaft ring gaskets include in that from the shafts 1000+2171.
8. Press out the shaft ring gaskets 2322 and 2272.
9. Pull off the shaft protective sleeves 2273 from drive shaft 1000 and output shaft 2171.
10. Remove the centrifugal washers 2274 with the O-ring positioned 2323 before it.
11. Remove the O-rings 2320 and 2321 from the shaft protective sleeves.

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ATTENTION**Possible damage to property**

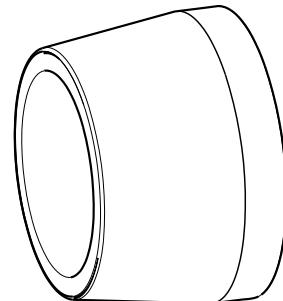
- **Equally clean the seal housing as well as the shafts and seal seats and carefully check the removed parts. Replace any damaged parts as well as all O-rings and shaft lip type seals.**

Mounting:

1. Slide centrifugal washers 2274 onto the shafts 1000 and 2171, in this case slide against the shaft attachment. (The centrifugal washers must sit fixed on the shafts).
2. Slide the O-ring 2323 against this.
3. Insert O-rings 2320 and 2321 into the shaft protective sleeves 2273.
4. Grease both shaft protective sleeves 2273 lightly and press both shaft protective sleeves 2273 over the shafts against the centrifugal washers.

ATTENTION**Possible damage to property**

- **It is absolutely necessary to use matching assembly sleeves for the installation of the sealing casing. (T 6) in this way you prevent that the sensitive sealing lips of the lip sealing are damaged.**
5. For the installation of the sealing casing, slide the assembly sleeves **T6** onto the shafts against the shaft attachment. Slide sealing casings carefully onto the shafts. After this, remove the assembly sleeves and keep them.
 6. Insert O-ring 2275 before the shaft protective sleeves.
 7. Insert contact surface insulation 2277 and 2281 into the bearing housing 1001. (Not in case of bearing housing type C and PC)
 8. Insert O-ring 1088 into the sealing casing.
 9. With installation of the screw spindles, note that the O-ring 2275 (seated in front before the shaft protective sleeves) is located correctly in its receptacle. The seals will now be prestressed during the installation of the screw spindles.
 10. Slide on pump housing 1033, in this case check again the correct seating of the O-ring 1088 with the fingers in the upper and lower side. The O-ring may not protrude from the slot either externally or internally.
 11. Screw in bolt 1016 with washer 1015 and tighten alternately and crosswise. (Torque 70 Nm)
 12. Insert the O-ring 2192 into the cover 1012 and place on the cover. Check that the O-ring does not protrude either externally or internally. Screw in bolt 1041 and tighten alternately and crosswise. (Torque 70 Nm)
 13. Insert reach-in protection 2286 and tighten bolts 2287.
 14. Connect quench receiver, fill with quench liquid and vent seal



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ATTENTION

Possible damage to property

- Observe correct seat of the O-rings when moving the screw spindles toward the inboard rotor holders.
- Slide the screw spindles together onto the shafts.
- Before screwing in the spindle screws, wet both spindle screws 2180 on the thread using 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 9.4)
- Keep the sliding surfaces free from dust and grease. Avoid any contact with the hands. If necessary, clean with a soft, clean cloth and acetone.

9.4.5 Lip sealing Twin 104 and 130

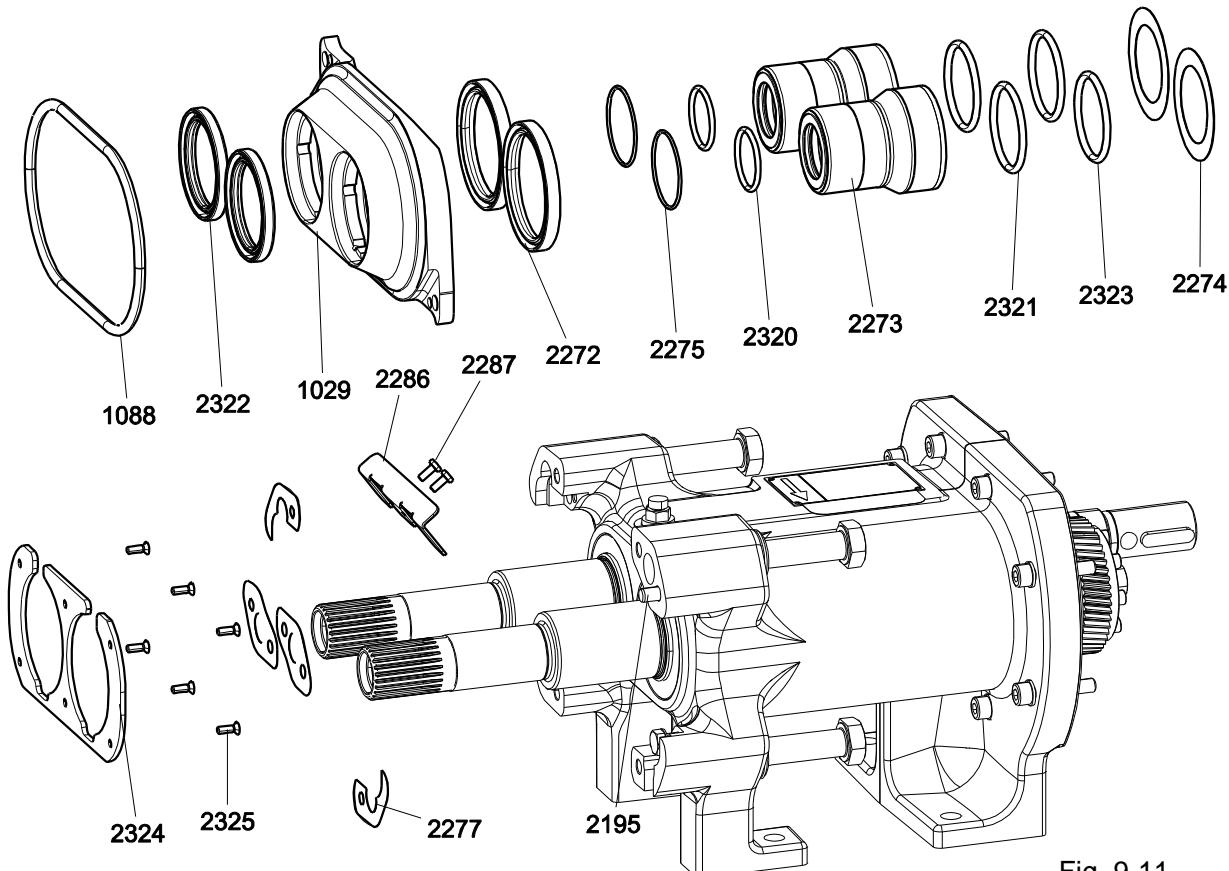


Fig. 9-11

Dismounting:

1. Drain the quench fluid. Disassemble the auxiliary systems.
2. Disassemble cover 1012. Remove O-ring 2192.
3. Disassemble pump casing 1033.
4. Mark position of the dowel pins 2195. (Important for the re-installation)
5. Dismantle both screw spindles 2200 + 2201.
6. Loosen bolts 2287 and remove reach-in protection 2286.
7. Pull sealing casing 1029, with the included shaft ring gaskets, from the shafts 1000+2171. Loosen flat-head screws 2325 and remove security plate 2324 of sealing casing. (**Twin 104**)
8. Press out the shaft ring gaskets 2322 and 2272.

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9. Pull off the shaft protective sleeves 2273 from drive shaft 1000 and output shaft 2171.
10. Remove the centrifugal washers 2274 with the O-ring positioned 2323 before it.
11. Remove the O-rings 2320 and 2321 from the shaft protective sleeves.

ATTENTION	Possible damage to property
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- **Equally clean the seal housing as well as the shafts and seal seats and carefully check the removed parts. Replace any damaged parts as well as all O-rings and shaft lip type seals.**

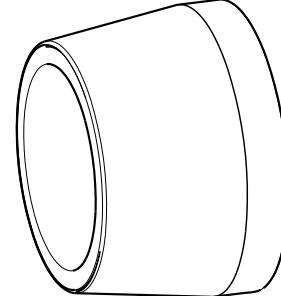
Mounting:

1. Slide centrifugal washers 2274 onto the shafts 1000 and 2171, in this case slide against the shaft attachment. (The centrifugal washers must sit fixed on the shafts).
2. Slide the O-ring 2323 against this.
3. Insert O-rings 2320 and 2321 into the shaft protective sleeves 2273.
4. Grease both shaft protective sleeves 2273 lightly and press both shaft protective sleeves 2273 over the shafts against the centrifugal washers.
5. Place security plate 2325 onto the sealing casing 1029 and fix with the flat-head screws 2324. **(Twin 104 only)**

ATTENTION	Possible damage to property
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- **It is absolutely necessary to use matching assembly sleeves for the installation of the sealing casing. T 7 (Twin 104), T 8(Twin130) In this way you prevent that the sensitive sealing lips of the lip sealing are damaged.**

6. For the installation of the sealing casing, slide the assembly sleeves **T7 (T8)** onto the shafts against the shaft attachment. Slide sealing casings carefully onto the shafts, place on bolt 2259 with washer 2260 and screw into the pump housing. Tighten dowel screws (torque 12 Nm), remove the assembly sleeves after that and keep.
7. Insert O-ring 2275 before the shaft protective sleeves.
8. Insert O-ring 1088 into the sealing casing.
9. Insert contact surface insulation 2277 into the bearing housing 1001. (Not in case of bearing housing type C and PC)
10. With installation of the screw spindles, note that the O-ring 2275 (seated in front before the shaft protective sleeves) is located correctly in its receptacle. The seals will now be prestressed during the installation of the screw spindles.
11. Slide on pump housing 1033, in this case check again the correct seating of the O-ring 1088 with the fingers in the upper and lower side. The O-ring may not protrude from the slot either externally or internally.
12. Screw in bolt 1016 with washer 1015 and tighten alternately and crosswise. (Tightening torque 150 Nm)
13. Insert the O-ring 2192 into the cover and place on the cover. Check that the O-ring does not protrude either externally or internally. Screw in bolt 1041 and tighten alternately and crosswise. (Torque 150 Nm).
14. Insert reach-in protection 2286, screw in bolts 2287 and tighten.
15. Connect quench reservoir, top up quench fluid and bleed the seal.



ATTENTION**Possible damage to property**

- Observe correct seat of the O-rings when moving the screw spindles toward the inboard rotor holders.
- Slide the screw spindles together onto the shafts.
- Before screwing in the spindle screws, wet both spindle screws 2180 on the thread using 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 9.4)
- Keep the sliding surfaces free from dust and grease. Avoid any contact with the hands. If necessary, clean with a soft, clean cloth and acetone.

9.4.6 Double-acting shaft seal WANGEN Twin 70

Dismounting:

1. Relieve quench system or counter-pressure device, drain quench fluid.
2. Disassemble cover.
3. Disassemble pump casing 1033.
4. Loosen bolts 2287 and remove reach-in protection 2286.
5. Disassemble screw spindles 2200 and 2201.
6. Pull out inboard rotor holder 80 incl. seal faces 40 from the shafts. This will also disassemble O-rings 90, 130 and 220 as well as drive pins 210.
7. Remove the seal housing via the shafts.
8. Remove Inboard stators 11 on the front side from seal housing 1029. Remove O-rings 140.
9. Pull out outboard stators 12 from the seal housing via the rear side of the seal housing. Remove O-rings 70 and backup rings 170.
10. Remove disk rings 150 along with built-in dive pins 210 from the seal housing.
11. Pull off outboard rotors 20 from the shafts.
12. Remove wave rings 50 from the shafts.
13. Loosen the threaded pins of stop rings 110 and pull off the stop rings 60 incl. O-rings 30 and 160 from the shafts.

ATTENTION**Possible damage to property**

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

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Mounting:

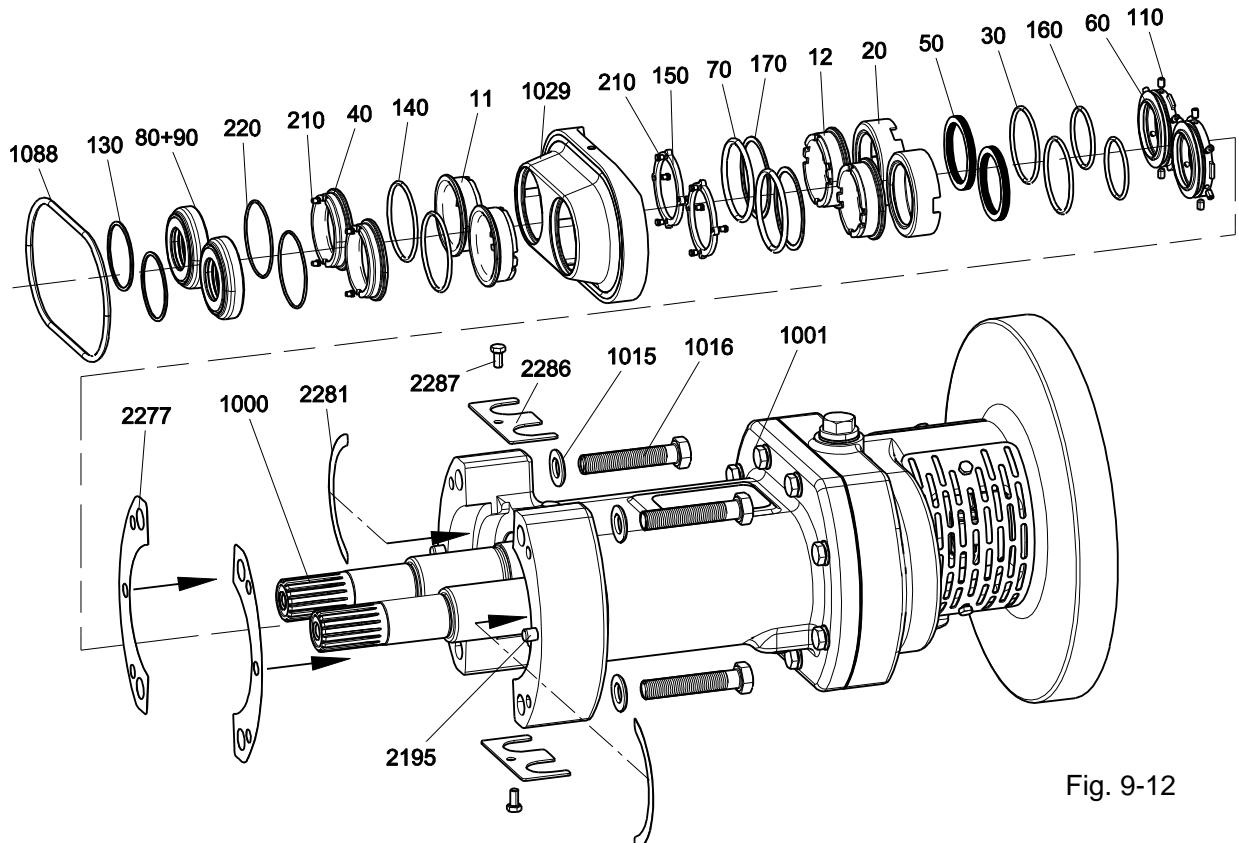
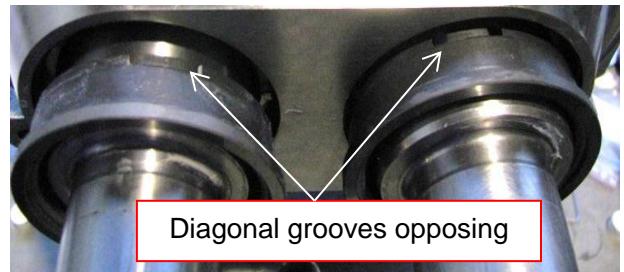


Fig. 9-12

1. Unpack new seals and place them onto a clean and soft pad.
2. Grease 4 drive pins 210 and insert them greased into drive disc 150 (2x) these drive pins 210 are inserted paired and that is 2 each on the front side and 2 each on the rear side of drive disc 150.
3. Insert drive discs 150 with the drive pins into the seal housing from the rear side.
4. Insert O-rings 70 into the first groove of the seal housing (seen from the rear side). Insert backup rings 170 in to this groove, too. (Viewed from the front side, the O-ring is positioned in front of the backup ring).
5. Insert outboard stators 12 into the seal housing from the rear side. The stator groove must engage with drive pins 210 of drive disc 150. Stators 12 are now held by O-rings 70. The diagonal grooves in the stators 12 must show to the respective other shaft, so that they form the passage to the quench channel. (see picture)
6. Insert O-rings 140 (grease them) into the front grooves of the seal housing now.
7. Turn back the threaded pins 110 at stop rings 60 until the inner rings are free. Insert O-rings 30 and 160 into the stop rings. Now, slide stop rings 60 onto the shaft all the way up to the shaft shoulder. Tighten each of the 6 threaded pins crosswise per ring.
8. Slide wave rings 50 against stop rings 60.
9. Lubricate outboard rotors 20 inside and slide them against wave rings 50. In the process, the grooves of the outboard rotor need to engage with the claws of stop rings 60. (Adjust carefully).



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10. Insert contact surfaces insulation 2281 onto bearing housing 1001.
11. Insert contact surface insulation 2281 into the bearing housing.
(Not in case of bearing housing type C and PC)
12. Slide the seal housing 1029 to the bearing housing via the shafts and place it in position.
Check on the back gap that the grooves of rotor 20 engaged in nicks of stop ring 60.

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

- **Crank the shafts by hand observing the seal.**
 - **The stop ring claws must at least protrude 1 mm into the grooves of the outboard rotor.**
13. Carefully slide stators 11 into the seal housing via the shafts. The respective stator 12 has 6 grooves. 2 grooves each of them should engage with drive pins 210. 2 further grooves clear the way for the rinsing liquid. These grooves must be exactly positioned above or below the rinsing ports.
There is only one correct position of these grooves. The two other grooves remain free.

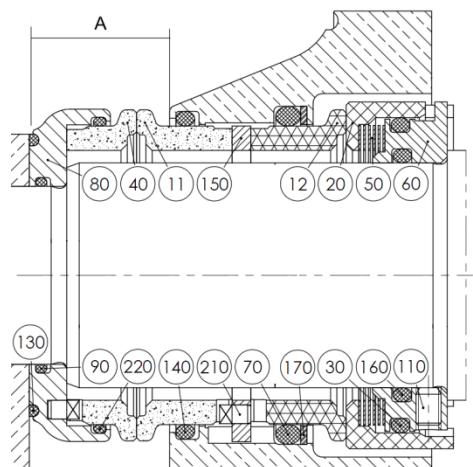
ATTENTION	Possible damage to property
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- **Incorrectly adjusted flushing grooves will result in seal overheating and destruction during pump operation.**
14. Insert O-rings 90, 130 and 220 into inboard rotor holders 80. (fix using grease). Fix drive pins 210 in inboard holder 80 using grease.
 15. Insert seal faces 40 into inboard rotor holders, whereby the grooves of the seal faces must thread in into the drive pins 210.
 16. Place inboard rotor holders 80 with inserted seal faces 40 onto the shafts.

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

- **Check the free room of motion of the sealing by pushing the inboard rotor holder and spinning it bidirectional.**
During spinning a small gap shall be noticeable, coming from the gap between the drive pins 210 and the grooves they are positioned in the seal faces. During pushing the gap between the stator 11 and the seal housing 1029 shall stay circular constant.
- **Therefore dimension A in the drawing showing the sealing cross section shall be controlled. (depth gauge)**
A = 22.5 ±0.3 mm (WANGEN Twin 70)

17. When installing the screw spindles make sure that the O-rings 130 (are located to the front of the inboard rotor holders) are correctly placed in their receptacle. The seals will now be prestressed during the installation of the screw spindles.
18. Insert the contact surface insulation 2277 into the bearing housing. (Not in case of bearing housing type C and PC)
19. Insert O-ring 1088 into the sealing casing.



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20. Slide on pump housing 1033, in this case check again the correct seating of the O-ring 1088 with the fingers in the upper and lower side. The O-ring may not protrude from the slot either externally or internally.
21. Screw in bolt 1016 with washer 1015 and tighten alternately and crosswise. (Torque 60 Nm)
22. Insert the O-ring 2192 into the cover 1012 and place on the cover. Check that the O-ring does not protrude either externally or internally. Screw in bolt 1041 and tighten alternately and crosswise. (Torque 60 Nm)
23. Insert reach-in protection 2286, screw in bolts 2287 and tighten.
24. Connect quench chamber, fill up fluid and vent the shaft seal.

ATTENTION

Possible damage to property

- Observe correct seat of the O-rings when moving the screw spindles toward the inboard rotor holders.
- Slide the screw spindles together onto the shafts.
- Before screwing in the spindle screws, wet both spindle screws 2180 on the thread using 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 9.4)
- Keep the sliding surfaces free from dust and grease. Avoid any contact with the hands. If necessary, clean with a soft, clean cloth and acetone.

9.4.7 Double-acting shaft seal WANGEN Twin 104 and 130

Dismounting:

1. Relieve quench system or counter-pressure device, drain quench fluid.
2. Disassemble cover.
3. Disassemble pump casing 1033.
4. Loosen bolts 2287 and dismantle reach-in protection 2286.
5. Disassemble screw spindles.
6. Pull out inboard rotor holder 80 incl. seal faces 40 from the shafts. This will also disassemble O-rings 90, 130 and 220 as well as drive pins 210.
7. Loosen fitting screws 2259 and remove them along with washers 2260.
8. Remove the seal housing via the shafts. Loosen flat-head screws 2325 and remove security plate 2324 from sealing casing. (**Twin 104 only**)
9. Remove Inboard stators 11 on the front side from seal housing 1029. Remove O-rings 140.
10. Pull out outboard stators 12 from the seal housing via the rear side of the seal housing. Remove O-rings 140 and backup rings 170.

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11. Remove disc rings 150 along with built-in dive pins 210 from the seal housing.
12. Pull off outboard rotors 20 from the shafts.
13. Remove wave rings 50 from the shafts.
14. Loosen the threaded pins of stop rings 110 and pull off the stop rings 60 incl. O-rings 30 and 160 from the shafts.

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

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

Mounting:

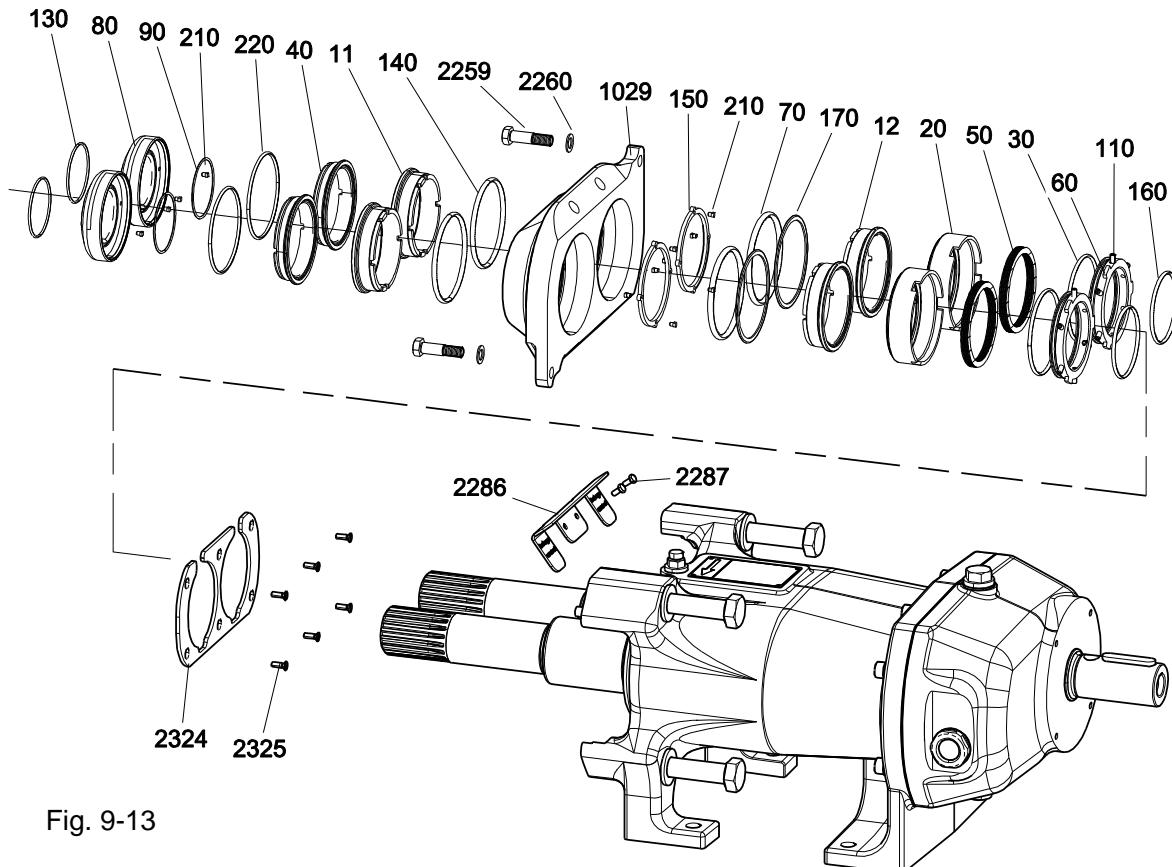


Fig. 9-13

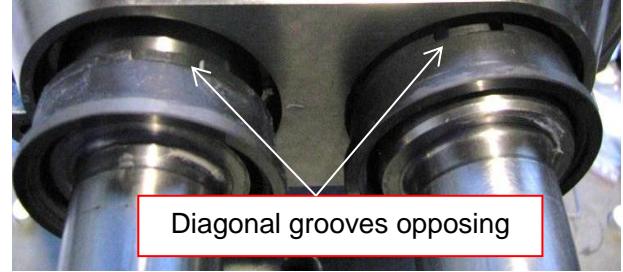
1. Unpack new seals and place them onto a clean and soft pad.
2. Grease 4 drive pins 210 and insert them greased into drive disc 150 (2x) these drive pins 210 are inserted paired and that is 2 each on the front side and 2 each on the rear side of drive disc 150.
3. Insert drive discs 150 with the drive pins into the seal housing from the rear side.
4. Insert O-rings 70 into the first groove of the seal housing (seen from the rear side). Insert backup rings 170 in to this groove, too. (Viewed from the front side, the O-ring is positioned in front of the backup ring).

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5. Insert outboard stators 12 into the seal housing from the rear side. The stator groove must engage with drive pins 210 of drive disc 150. Stators 12 are now held by O-rings 70. The diagonal grooves in the stators 12 must show to the respective other shaft, so that they form the passage to the quench channel. (see picture)
6. Insert O-rings 140 (grease them) into the front grooves of the seal housing now.
7. Turn back the threaded pins 110 at stop rings 60 until the inner rings are free. Insert O-rings 30 and 160 into the stop rings. Now, slide stop rings 60 onto the shaft all the way up to the shaft shoulder. Tighten each of the 6 threaded pins crosswise per ring.
8. Slide wave rings 50 against stop rings 60.
9. Lubricate outboard rotors 20 inside and slide them against wave rings 50. In the process, the grooves of the outboard rotor need to engage with the claws of stop rings 60. (Adjust carefully).
10. Place security plate 2324 onto the sealing casing 1029 and fix with the flat-head screws 2325. (**Twin 104 only**)
11. Slide the seal housing 1029 to the bearing housing via the shafts and place it in position. Screw in the fitting screws 2259 incl. washers 2260 and little by little tighten evenly. Check on the back gap that the grooves of rotor 20 engaged in nicks of stop ring 60.
12. Insert O-ring 1088 into the sealing casing.
13. Insert contact surface insulation 2277 into the bearing housing 1001. (Not in case of bearing housing type C and PC)



ATTENTION

Possible damage to property

- Crank the shafts by hand observing the seal.
 - The stop ring claws must at least protrude 1 mm into the grooves of the outboard rotor.
14. Carefully slide stators 11 into the seal housing via the shafts. The respective stator 12 has 6 grooves. 2 grooves each of them should engage with drive pins 210. 2 further grooves clear the way for the rinsing liquid. These grooves must be exactly positioned above or below the rinsing ports.
There is only one correct position of these grooves. The two other grooves remain free.

ATTENTION

Possible damage to property

- Incorrectly adjusted flushing grooves will result in seal overheating and destruction during pump operation.
15. Insert O-rings 90, 130 and 220 into inboard rotor holders 80. (fix using grease). Fix drive pins 210 in inboard holder 80 using grease.
 16. Insert seal faces 40 into inboard rotor holders, whereby the grooves of the seal faces must thread in into the drive pins 210.
 17. Place inboard rotor holders 80 with inserted seal faces 40 onto the shafts.

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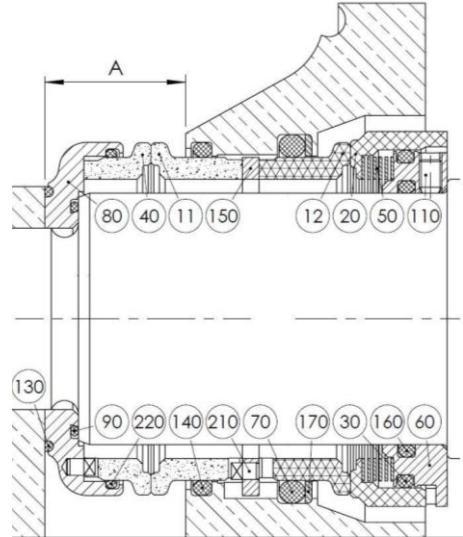
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ATTENTION

Possible damage to property

- Check the free room of motion of the sealing by pushing the inboard rotor holder and spinning it bidirectional. During spinning a small gap shall be noticeable, coming from the gap between the drive pins 210 and the grooves they are positioned in the seal faces. During pushing the gap between the stator 11 and the seal housing 1029 shall stay circular constant.
- Therefore dimension A in the drawing showing the sealing cross section shall be controlled. (depth gauge)
 $A = 25.2 \pm 0.3 \text{ mm (WANGEN Twin 104); } 33.3 \pm 0.3 \text{ mm (WANGEN Twin 130)}$

- When installing the screw spindles make sure that the O-rings 130 (are located to the front of the inboard rotor holders) are correctly placed in their receptacle. The seals will now be prestressed during the installation of the screw spindles.
- Slide on pump housing 1033, in this case check again the correct seating of the O-ring 1088 with the fingers in the upper and lower side. The O-ring may not protrude from the slot either externally or internally.
- Screw in bolt 1016 with washer 1015 and tighten alternately and crosswise. (Torque 150 Nm)
- Insert the O-ring 2192 into the cover 1012 and place on the cover. Check that the O-ring does not protrude either externally or internally. Screw in bolt 1041 and tighten alternately and crosswise.
(Torque 150 Nm)
- Insert reach-in protection 2286, screw in bolts 2287 and tighten.
- Connect quench chamber, fill up fluid and vent the shaft seal.



ATTENTION

Possible damage to property

- Observe correct seat of the O-rings when moving the screw spindles toward the inboard rotor holders.
- Slide the screw spindles together onto the shafts.
- Before screwing in the spindle screws, wet both spindle screws 2180 on the thread using 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 9.4)
- Keep the sliding surfaces free from dust and grease. Avoid any contact with the hands. If necessary, clean with a soft, clean cloth and acetone.

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9.4.8 Bearing WANGEN Twin 70



- 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.

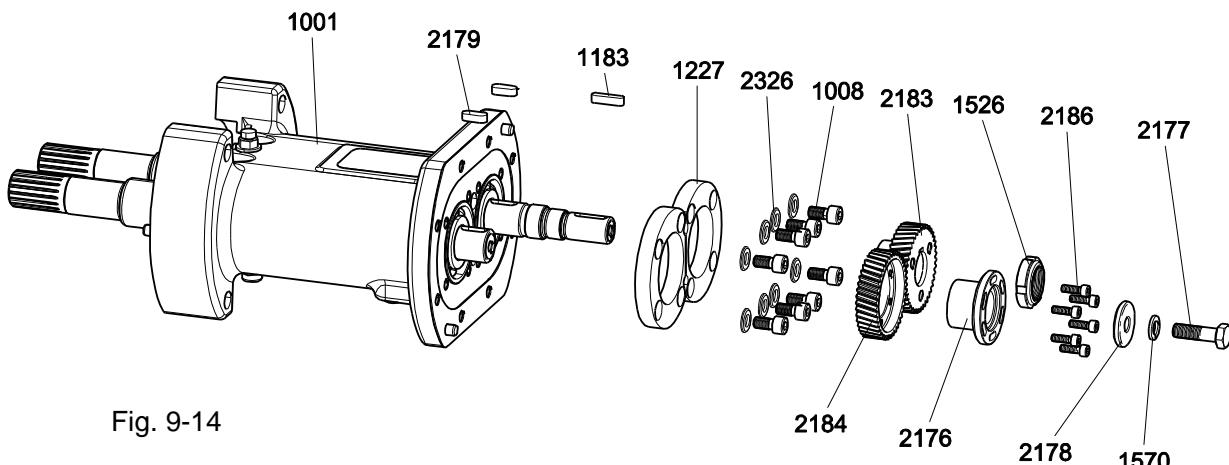


Fig. 9-14

Dismounting:

Special tools:

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

- Loosen hexagon screw 2177 of driven shaft 2171 and remove it incl. washer 2178.
(block the shafts with a copper or bronze wedge in the teeth of the gears)
- Loosen and remove shaft nut 1526 of the drive shaft
- Pull gear 2183 from the shaft with wheel puller T9.
- Pull off gear wheel 2184 incl. hub 2176 from the driven shaft.
- Remove keys 2179.
- Loosen socket head bolts 1008 of the bearing crown 1227, take off bearing crown and socket head bolt with spring washer 2326.

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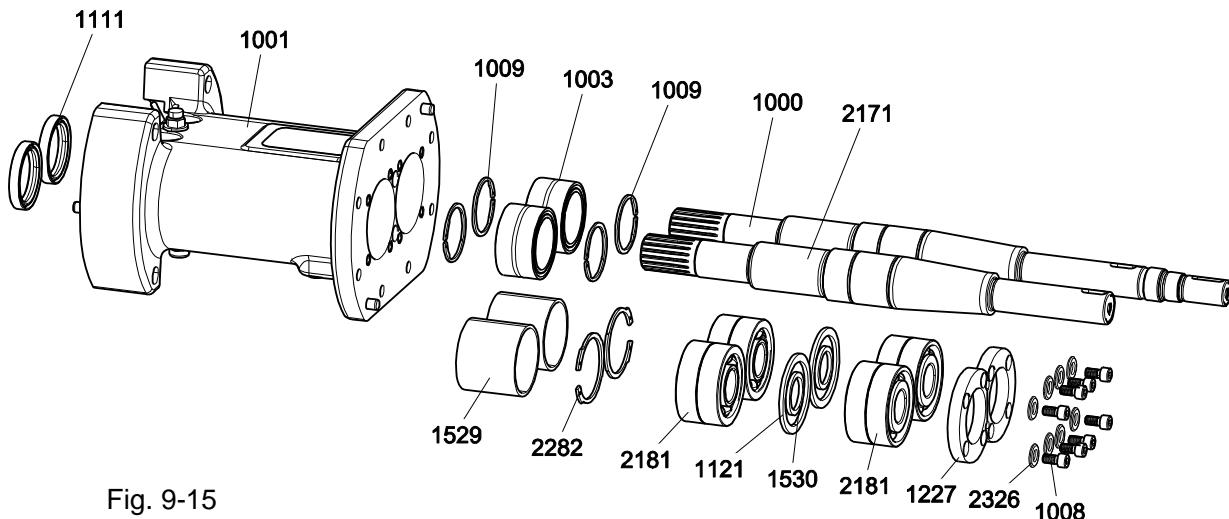


Fig. 9-15

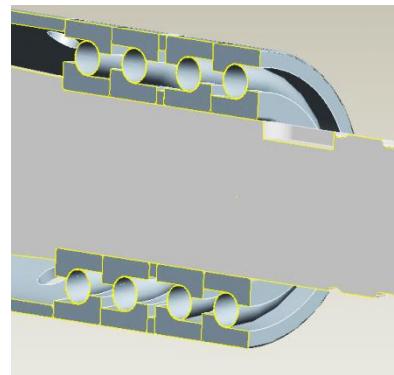
7. Remove rotary shaft seals 1111 with a hook remover from the bearing housing. The shaft seals are destroyed now, and these must be renewed by a new one.
8. Remove front circlips in 1009 with a snap ring plier.
9. Using a press, press out the shafts incl. bearings and distance rings toward the drive 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
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- 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. Insert inner snap all around 1009 into the shafts. Press inner sleeves of needle bearings 1003 onto the shafts using a pressure plate T 10.
5. Press in outer rings of the needle bearings with a suitable tube T11. (from the driving side.)
6. Place spacer bushes 1529 onto the shafts. Place retaining rings 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

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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.
 10. Install the driven shaft 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 **T 15** and **T 16**. (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 (torque 45 Nm).
 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. Insert a bronze or copper rod into the gearing shaft nut 1526 and tighten with a torque of 45 Nm. Tighten the bolt 2177 likewise with a torque of 45 Nm on **T17**.

ATTENTION	Possible damage to property
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- 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.
17. Place on gear housing 2172 incl. gasket 2198 (housing being centred through dowel pins), screw in and tighten hexagonal screws 2258. (Torque 20 Nm).
 18. Install shaft seal and screw spindles, mount pump housing. (Torque 70 Nm). Install cover (torque 70 Nm).
 19. Mount driving elements (coupling guard).
 20. Fill in gear oil. Check the oil level via the sight glass.

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9.4.9 Bearing WANGEN Twin 104 and 130

Dismounting:



- 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.

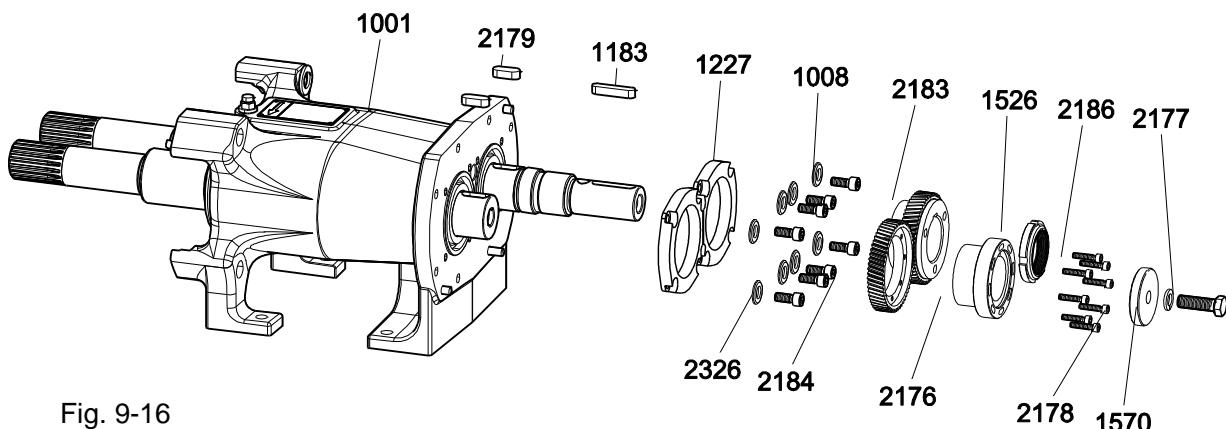


Fig. 9-16

Special tools:

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

1. Loosen hexagon screw 2177 of driven shaft 2171 and remove it incl. washer 2178.
2. Pull off gear 2184 with hub 2176 from the driven shaft with wheel puller **T18**.
3. Loosen and remove shaft nut 1526 of the drive shaft (counter hold via the locking hole in the shaft using a steel mandrel).
4. Pull gear 2183 from the shaft with wheel puller **T18**.
5. Remove and store keys 2179.
6. Loosen cylinder head screws 1008 of bearing caps 1227 and remove the bearing caps. Remove socket head bolts with spring washers 2326 and bearing crown.

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

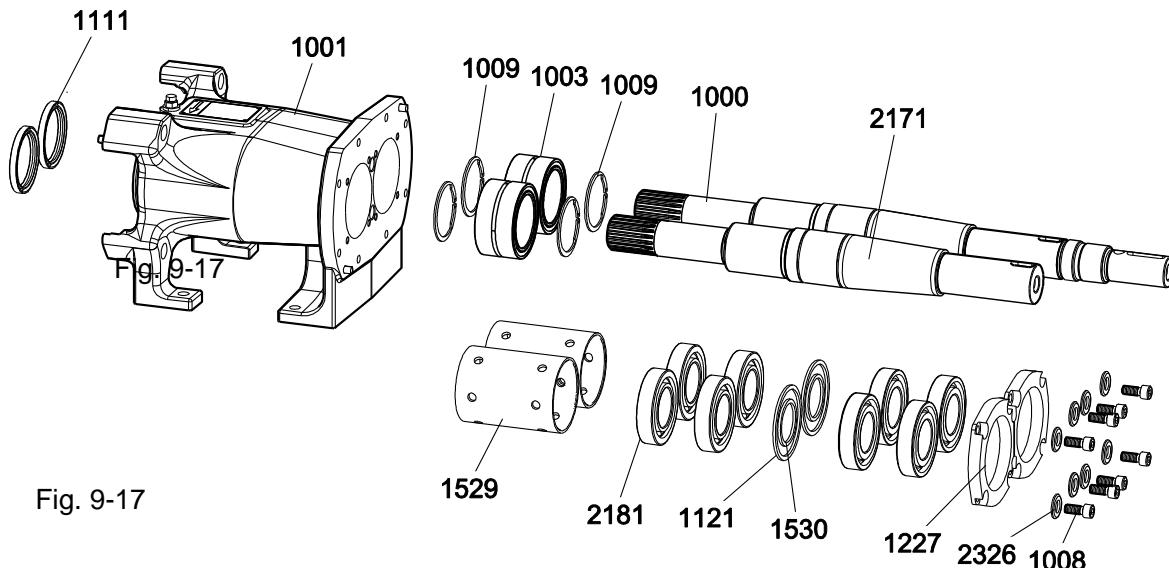


Fig. 9-17

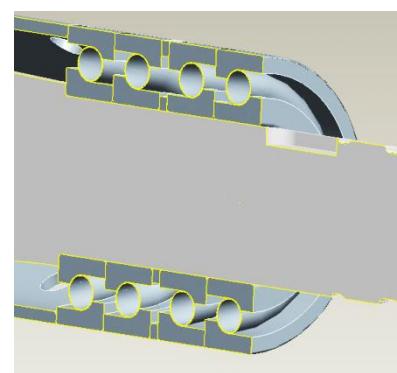
ATTENTION

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. Insert inner snap rings 1009 into the shafts. Press inner sleeves of needle bearings 1003 onto the shafts using a pressure plate T 19 (Twin 104), T 20 (Twin 130). Slide on needle bearings. Mount outer snap rings 1009.
 5. Place spacer bush 1529 onto the shaft.
 6. Press 2 each angular ball bearings 2181 with an assembly sleeve T 21 (Twin 104) T22 (Twin 130) 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.
 7. Carefully insert the drive shaft incl. fitted bearings into the bearing housing and carefully press fit the shaft with its bearings all the way up using the press and a mounting bush T 23 (Twin 104, T24 (Twin 130) that only presses onto the outer race of the bearing.
- The last bearing will then only protrude approx. 1 mm from the bearing housing.



Angular ball bearing
in O arrangement

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ATTENTION

Possible damage to property

- Align the distance bushes and rings precisely when pressing them in otherwise they will be destroyed.
8. Install the driven shaft in similar way.
 9. Grease shaft ring gaskets 1111, with an assembly sleeve **T 25 (Twin 104)**, slide **T 26 (Twin 130)** over the splined ends of the shafts and press carefully into the bearing housing with assembly pipe **T 27 (Twin 104) T28 (Twin 130)**. 28 (Twin 104) T (Spiral ring of the sealing lip in this case faces into the bearing housing)
 10. Insert both bearing covers 1227, apply thread lock fluid onto cylinder head screws 1008 (factory uses Loctite 270), screw in with placed-on spring washer 2326 and tighten. M8 torque = 20 Nm.
 11. Insert keys 2179 into the shafts on the drive side.
 12. Slide gear wheel 2183 onto the drive shaft, screw in and tighten shaft nut 1526 (torque 90 Nm). **T 29 (Twin 104), T 30 (Twin 130)**
 13. Slide gear wheel 2184 incl. hub 2176 onto the driven shaft. (**Observe mark**) Screw in bolt 2177 with washer 1570 and conical spring washer 2178 and tighten with tool **T 29 (Twin 104), T 30 (Twin 130)**. (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.
14. Place on gear housing 2172 incl. gasket 2198 (housing being centred through dowel pins), screw in and tighten cylinder head screws 2258. (Torque 20 Nm).
 15. Install shaft seal and screw spindles, mount pump housing. (Torque 150 Nm). Install suction housing (torque XY).
 16. Mount driving elements (coupling guard).
 17. Fill in gear oil. Check the oil level via the sight glass.

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Chapter 9

9.5 Adjusting screw spindles.

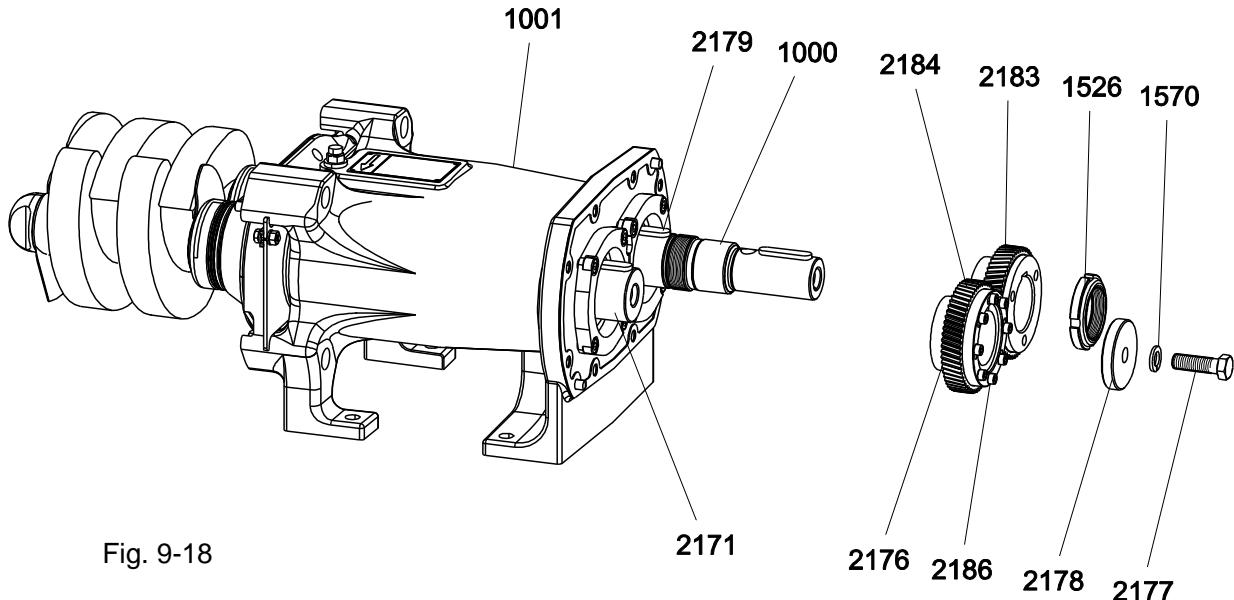


Fig. 9-18

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 (Twin 070, T 29 (Twin 104), T 30 (Twin 130)** (Tightening torque 45 Nm for M 25, 70 Nm for M 35, 90 Nm for M 45) (Stick steel mandrel through the shaft bore and hold when tightening the shaft nut) (In case of the **WANGEN Twin 70**, hold back over a locking mandrel in the bore in the pump-sided coupling part).
3. Slide gear wheel 2183 onto the drive shaft 1000, screw on and tighten shaft nut 1526. (Tightening torque 45 Nm for M25, 70 Nm for M35, 90 Nm for M45) (Hold in place with a steel mandrel).
4. 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.
5. Screw in cylinder head screws 2186 by hand.
6. Place lock washer 2178 onto the driven shaft, screw in and tighten hexagon screw 2177 incl. spring ring 1570. (Torque 80 Nm).

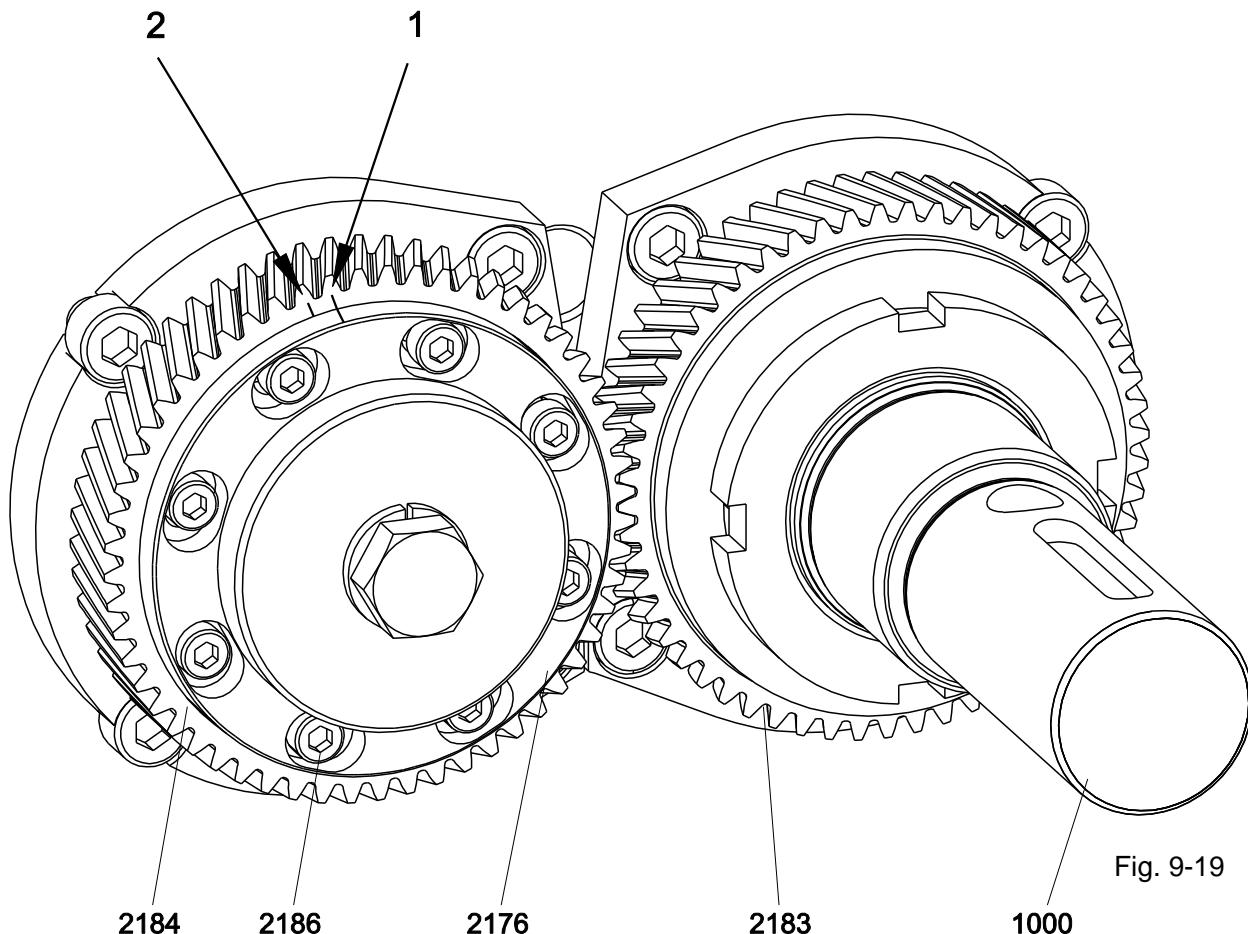
ATTENTION	Possible damage to property
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- Place a bronze or copper bar into gear teeth of the gear wheels when tightening screw 2177.
- Do not use hard metals, such as pry bars or steel bars keeping the sensitive tooth flanks in mind.

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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.

A blue square icon containing a white lowercase letter 'i'.	<ul style="list-style-type: none">• Tightening torque of the cylinder head screws = 8 Nm
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Instruction Handbook WANGEN Twin



Further applicable documents

10. Stocking of spare parts

10.1 Spare parts

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

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

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

Number of same pumps per system section			
Spare parts	F-number	up to 2 pumps	from 3 pumps
Gear housing shaft sealing ring	1010	1	2
Bearing housing shaft sealing ring	1111	2	4
Pump casing O-ring	1088	1	2
Spindle nuts O-ring	2194	4	8
Cover O-ring	2192	1	2
Gear housing flat gasket	2198	1	1
Shaft seal, set of O-rings	2261	2	4
Axial face seal wear part set	40, 11, 12, 20	2	4
Gear ring	2249	1	2
Gear oil, 1 L	2294	1	2
Pump housing contact surface insulation	2277	2	4
Sealed receptacle contact surface insulation	2281	2	4
Parallel pin	2196	2	4
Parallel key for coupling	1183	2	4

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

ATTENTION	Possible damage to property
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- Use only original WANGEN spare parts to avoid any adverse effects on the functionality of your pump.

10.2 Ordering spare parts

When ordering spare parts: state

- Pump type and
- Pump number, please.

The necessary data are on the pump type plate.

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

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

Pumpenfabrik Wangen GmbH
Simoniusstrasse 17
D - 88239 Wangen

Telephone: +49(0)7522/997-0
Fax: +49(0)7522/997-199
Email: mail@wangen.com

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Further applicable documents



Appendix Special Wrenches and Tools

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Further applicable documents

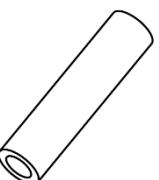
Appendix:

Special wrenches and tools for dismantling / installation of the WANGEN Twin pump

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

The indicated tools can be found under the designated article number with the WANGEN GmbH factory pump.

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

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

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Further applicable documents

Tool	Tool No.:	Drawing number	Pump model	Article Number	Material
Installation pin for bearing crown shaft ring gasket	T 1 T 2 T 3	1011-413 1011-414 1011-415	# 070 # 104 # 130	95544 95543 95542	3.1645
Installation pipe for needle roller bearing outer ring	T 11	1011-416 1011-417 1011-418	# 070 # 104 # 130	95553 95548 95551	1.4301
Installation pipe bearing housing shaft ring gasket	T 15 T 27 T 28	1011-419 1011-420 1011-421	# 070 # 104 # 130	955547 95545 95546	3.1645
Spindle key without hexagon		1010-823 1010-820	# 070# # 104 / # 130	40706 40705	3.1645
Spindle key with hexagon		1011-124 1011-125	# 070 # 104 / # 130	41106 41107	3.1645

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Further applicable documents

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

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Further applicable documents

Tool	Tool No.:	Drawing number	Pump model	Article Number	Material
Installation pipe for inner race retaining ring needle roller bearing 		1011-441	# 070	95561	1.4301
Sliding sleeve for inner race retaining ring needle roller bearing 		1011-446	# 070	95562	1.4301