Instruction Manual

ULTILOBE

Lobe pump

Translation of the original instructions 01.540.30.01EN · (0) 2025/09

EC Declaration of conformity

INOXPA S.A.U.
Telers, 60
17820 - Banyoles (Spain)

assume responsibility for declaring that

Machine:	**ROTARY LOBE PUMP**
Model:	**UltiLobe**
Type:	**UltiLobe-12, UltiLobe-13, UltiLobe-22, UltiLobe-23, UltiLobe-32, UltiLobe-33, UltiLobe-42, UltiLobe-43**
Serial number:	**IXXXXXXXXX** to **IXXXXXXXXX** **XXXXXXXXXIINXXX** to **XXXXXXXXXIINXXX**

complies with the applicable provisions in the following directives:

Machinery directive 2006/42/EC
Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment
Regulation (EC) No 1935/2004
Regulation (EC) No 2023/2006

and with the following harmonised standards and/or regulations:

EN ISO 12100:2010, EN 809:1998+A1:2009/AC:2010, EN 60204-1:2018, EN ISO 14159:2008, EN 1672-2:2005+A1:2009, EN 12162:2001+A1:2009, EN IEC 63000:2018

The person signing this document drafted this Technical File.

David Reyero Brunet
Engineering Manager
1 September 2025

Document: 01.540.30.03EN
Revision: (0) 2025/09

Declaration of Conformity

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complies with the applicable provisions of the following regulations:

Supply of Machinery (Safety) Regulations 2008
The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012 (as amended)

and with the following harmonised standards:

EN ISO 12100:2010, EN 809:1998+A1:2009/AC:2010, EN 60204-1:2018, EN ISO 14159:2008, EN 1672-2:2005+A1:2009, EN 12162:2001+A1:2009, EN IEC 63000:2018

The person signing this document drafted this Technical File.

David Reyero Brunet
Engineering Manager
1 September 2025

UKCA

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1. Table of contents

2. General considerations

2.1. INSTRUCTION MANUAL

This manual contains information regarding taking delivery of, installing, operating, assembling, disassembling and maintaining the UltiLobe pump.

Read the instructions carefully before starting up the pump, familiarise yourself with how the pump functions and operates, and follow the instructions closely. These instructions must be kept in a designated location near where it is installed.

The information published in the instruction manual is based on current data.

INOXPA reserves the right to amend this instruction manual without prior notice.

2.2. REGARDING COMPLIANCE WITH THE INSTRUCTIONS

Failing to comply with the instructions may prove hazardous for operators, the environment and the machine, and may lead to a loss of rights to damage claims.

Failure to comply may derive in the following risks:

- the machine and/or plant failing to operate,
- specific maintenance and repair procedure errors,
- potential electrical, mechanical and chemical risks,
- potential environmental harm from released substances.

2.3. WARRANTY

The warranty conditions are specified in the General Terms and Conditions of Sale provided when ordering.

The skid cannot be modified in any way without first checking with the manufacturer.
Use original spare parts and accessories for your own safety. The manufacturer will no longer be liable should other parts be used.
Any potential change to the service conditions requires written authorisation from INOXPA.

Failure to comply with the instructions in this manual means the machine has been used incorrectly from a technical and personal safety point of view, exempting INOXPA of any liability in the event of accidents or personal injury and/or material damage. Every fault resulting from improper machine use will not be covered by the warranty either.

Please do not hesitate to contact us if you have any queries or require more in-depth explanations about specific data (adjustments, assembly, disassembly, and so on).

3. Safety

3.1. WARNING SYMBOLS

General warning of danger to persons and/or the pump

Electrical hazard

ATTENTION A safety instruction to prevent damage to the skid and/or its functions

3.2. GENERAL SAFETY INSTRUCTIONS

Read the instruction manual carefully before installing and starting up the pump. If in doubt, contact INOXPA.

3.2.1. During installation

Always consider the Technical specifications of section 9.
Do not start up the pump before connecting it to the pipes.
Do not start up the pump if it has not been fully assembled.
Do not start up the pump if the pump cover has not been fitted.
Do not stand on the pump.
Check the specifications of the drive are correct, especially if there is a risk of an explosion due to the operating conditions.

Authorised staff must carry out all electrical work during installation.

3.2.2. During operation

Always consider the Technical specifications of section 9.
NEVER exceed the specified threshold values.
NEVER touch the pump and/or pipes during operation if the pump is being used for transferring hot fluids or during cleaning.
The pump contains moving parts. Do not put hands inside the pump during operation.
NEVER operate with the suction and discharge valves closed.
NEVER spray water directly onto the electric drive. The drive protection standard is IP-55: protection against dust and water jets.
Do not stand on the pump.

3.2.3. During maintenance

Always consider the Technical specifications of section 9.
NEVER disassemble the pump until the pipes have been emptied. Remember that fluid will always remain inside the body of the pump (if it does not come with a purge). Bear in mind that the fluid being pumped may be hazardous or extremely hot. Consult the regulations in effect in each country for these cases.
Do not leave loose parts on the floor.
Do not stand on the pump.

ALWAYS disconnect the electrical power supply to the pump before starting maintenance.
Remove the fuses and disconnect the cables from the drive terminals.
Authorised staff must carry out all electrical work.

4. General information

4.1. DESCRIPTION

UltiLobe pumps are positive displacement rotary lobe pumps for viscous fluids with or without suspended solids, suitable for a maximum operating pressure of 1600 kPa (16 bar).

They are hygienically-designed bare shaft pumps consisting basically of a stainless steel body, tri-lobe rotors and a balanced sealing system.

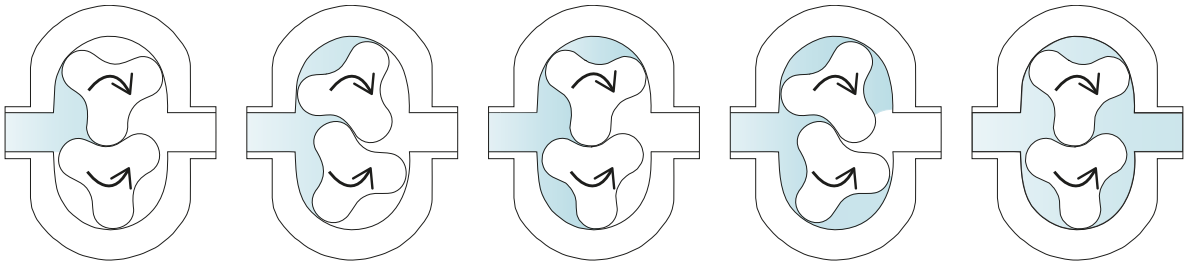
Any reference to pump size in these instructions should be understood as referring to the bearing bracket size, and therefore, every model for that bracket size is included. For example, when the UL-1 pump size is mentioned, it refers to the UL-12 (1200 kPa,12 bar) and UL-13 (700kPa, 7 bar) models.

4.2. HOW IT WORKS

Lobe pumps work based on synchronised movement of the rotors.

The rotors are inside the pump body. They are mounted onto two shafts, driven and synchronised by gears, and rotate in opposite directions without coming into contact with each other or the pump body.

As the rotors start to rotate, suction is created at the pump inlet which causes the fluid to be transferred inside the cavities formed between the rotors and the pump body.



4.3. APPLICATION

UltiLobe pumps are ideal for handling all types of fluids, including fluids with suspended solids, and for meeting the needs of the dairy, food, beverage, cosmetics, pharmaceutical and fine chemical industries.

ATTENTION

Each pump type has a limited field of use. The pump was selected for certain pumping conditions when ordering. Improper use or use beyond thresholds may be hazardous or cause permanent damage to the skid. INOXPA will not be liable for any potential damage should the purchaser have provided incomplete information (type of fluid, RPM, and so on).

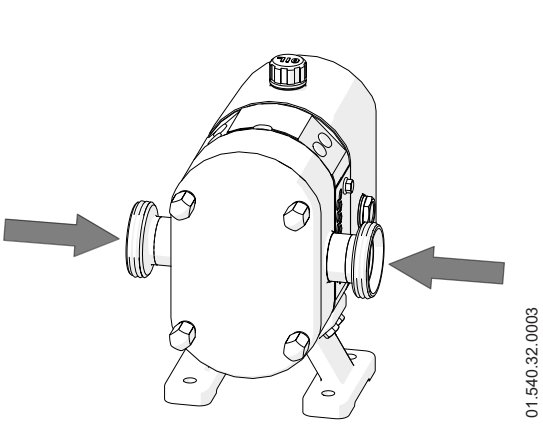
5. Installation

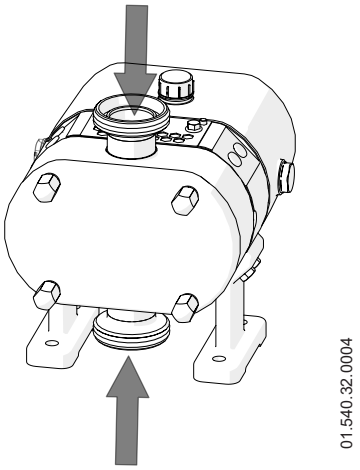
5.1. TAKING DELIVERY OF THE PUMP

INOXPA will not be liable for any material wear during shipping or unpacking. Visually check the packaging remains intact. If not, notify the carrier as soon as possible.

The following documentation comes with the pump:
- shipping documents,
- a quick installation guide with access to the full instruction manual.

Unpack the pump and check:
- the suction and discharge connections on the pump, removing any remaining packaging material,



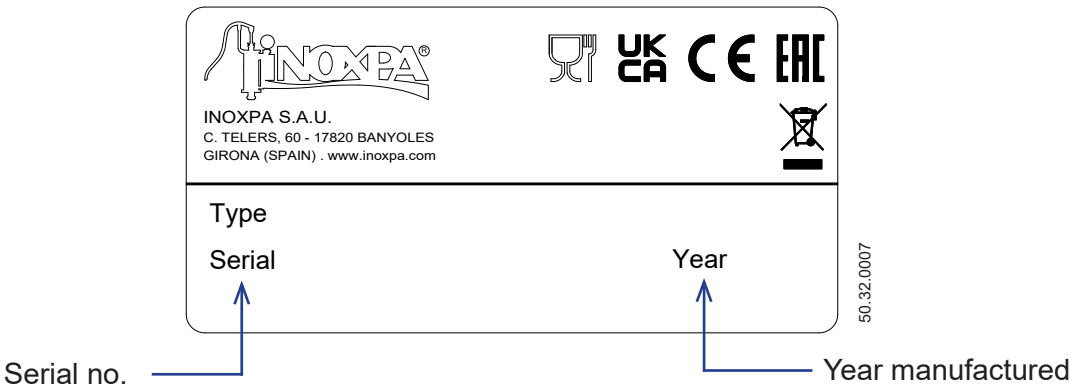


- that the pump and drive have not been damaged,
- that the package also contains a vent plug.

If the pump is not in good condition and/or not every part is present, notify the carrier as soon as possible.

5.2. IDENTIFYING THE PUMP

Each pump has a nameplate containing basic data to identify the model.



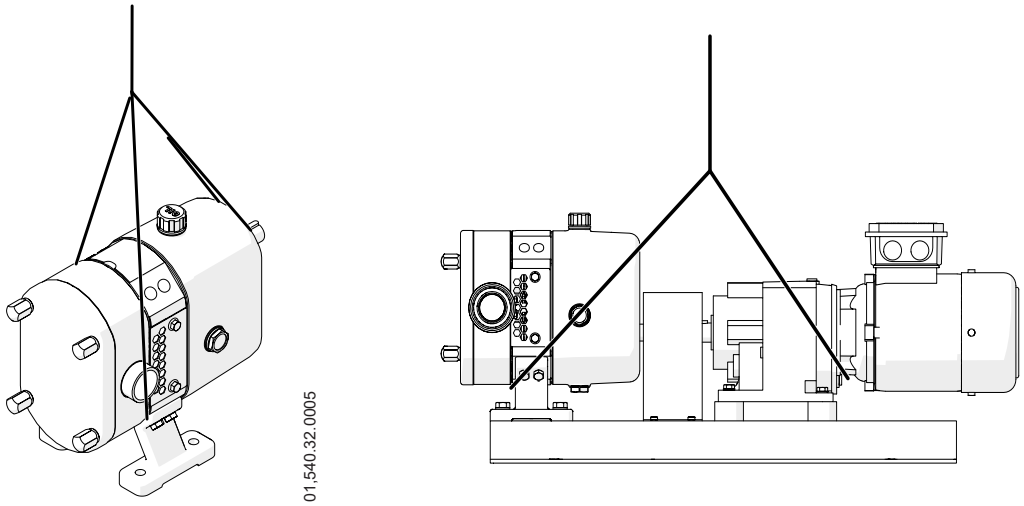
5.3. TRANSPORTATION AND STORAGE

ATTENTION

UltiLobe pumps are too heavy to be handled manually.
Use a suitable means of transportation.
Use a transport plug to transport the pump.
Use the points indicated in the figure below for lifting the pump.
Only authorised staff should transport the pump.
Do not work or walk underneath heavy loads.

Lift the pump as indicated below:

- always use two supporting points located as far away from each other as possible.



- secure the points to prevent slippage.

See section 9. Technical specifications for the dimensions and weights of the pump.

ATTENTION

There is a risk of loss of stability while the pump is being transported, assembled or disassembled, and the pump could fall and cause damage to the skid and/or operators. Ensure the pump is properly secured.

5.4. LOCATION

Place the pump so there is enough space around it to provide access to both the pump and the drive. Furthermore, place the pump as close as possible to the suction tank, and below the fluid level whenever possible.

Once the location has been chosen, the pump should be mounted on a flat and level surface. Said surface should be rigid, horizontal and vibration-protected, and is usually a baseplate or a frame.

Once placed on a baseplate or frame, the pump and its drive can be secured to a foundation or any other flat surface using levelling feet. Both the pump and drive must levelled properly.

ATTENTION

Ensure suitable ventilation when installing the pump.
Any outdoor pump installation must be under a roof. The location must allow for easy access for inspection or maintenance tasks.

5.4.1. Foundation

Once placed on a baseplate or a frame, the pump and drive must both be secured to a foundation to ensure the pump and drive are levelled properly.

The foundation must be strong, flat, level, and vibration-free to keep the pump unit aligned, and to ensure suitable start-up and operation.

Foundation bolts or expansion bolts can be used to secure the pump unit onto the foundation.

Attaching the pump unit to the foundation using expansion bolts:
- place the pump unit horizontally onto the foundation,
- secure the baseplate or frame using the expansion bolts,
- ensure that the coupling for the pump and drive comply with the specifications in section 5.5. Coupling.

Attaching the pump unit to the foundation using foundation bolts:
- drill holes into the foundation, place the bolts, and pour mortar to set them in place.
- once the mortar has completely set, place the pump unit horizontally onto the foundation,
- tighten the nuts onto the foundation bolts carefully,
- ensure that the coupling for the pump and drive comply with the specifications in section 5.5. Coupling.

ATTENTION

The pump shaft and drive shaft need to be aligned again once the pump unit is installed.

5.4.2. Installing on a flat surface using levelling feet

When securing the pump unit to any other flat surface, levelling feet must be used to ensure that the alignment of the pump unit complies with the specifications in section 5.5. Coupling.

5.4.3. Excessive temperatures

Temperatures inside and around the pump may become high depending on the fluid being pumped.

From 68°C upwards, protective measures must be taken for staff, and warnings posted regarding the potential hazard when touching the pump.
The selected protection type should not fully isolate the pump.

5.5. COUPLING

Refer to the manufacturer's manual when selecting and fitting the coupling.

The pump shaft and drive shaft for all drives supplied by INOXPA have been aligned accurately at our facilities. However, once the pump unit is installed, the alignment should be checked to ensure the maximum tolerances described in this section are met. If this is not the case, the pump unit coupling needs to be aligned again.

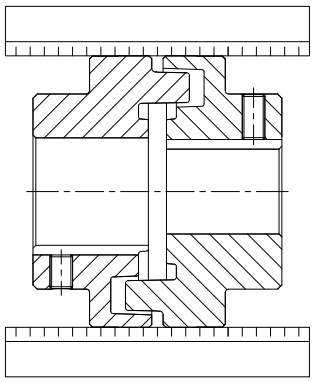
For high temperature applications, checking the pump unit alignment again after temporarily starting it up at the operating temperature is advisable.

ATTENTION

The pump shaft and drive shaft need to be aligned again once the pump unit is installed.

To check the alignment of the pump shaft coupling with the drive shaft:

- place a straight edge ruler over the coupling and check the ruler touches both halves of the coupling along its entire length, as shown in the following figure,
- repeat the check at four different points on the coupling located at 90° from each other,



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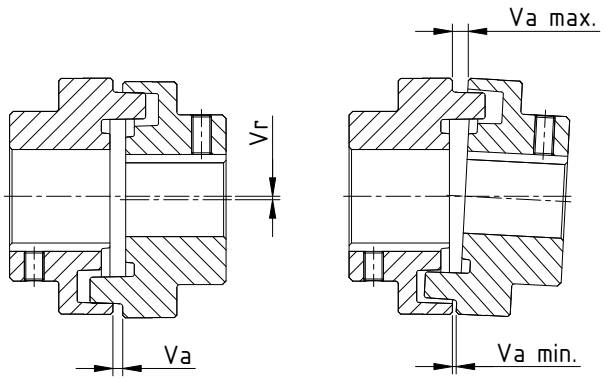
- check the maximum alignment deviations shown in the figure do not exceed those indicated in the table below:



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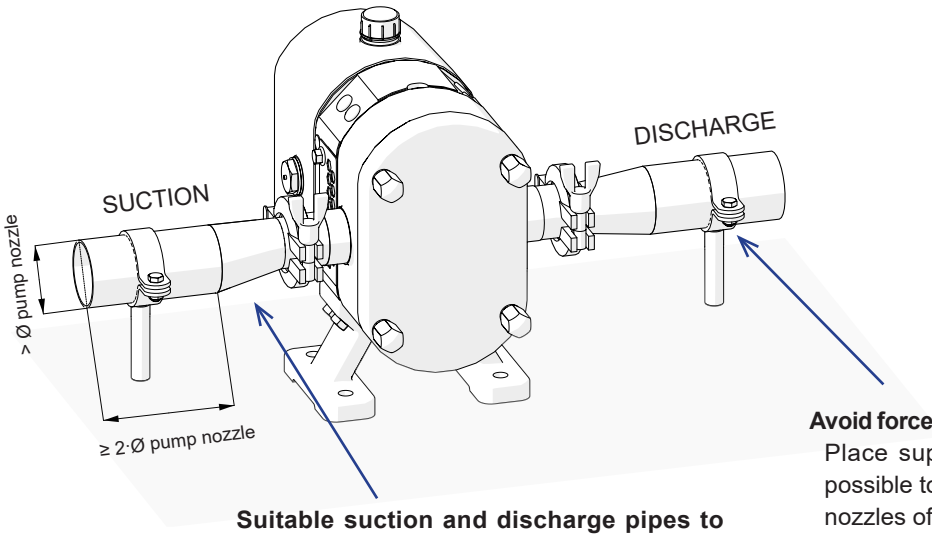
Coupling outer Ø	Va [mm]	Max. Va - Min. Va [mm]	Vr [mm]
69	3	1.2	0.20
87	4	1.5	0.25
96	4	1.7	0.25
129	5	2.2	0.30
140	5	2.4	0.35
182	5	3.0	0.40
200	5	3.4	0.45
224	6	3.9	0.50

The coupling must be suitably protected to prevent accidental access during pump operation.
Do not operate the pump without the guards installed as required.

5.6. PIPES

Ideal installation for maximum pump efficiency:



Suitable suction and discharge pipes to prevent air pockets forming:

Use as few elbows and connections as possible.
Suction pipes: elbows placed as far as possible from the suction and eccentric reduction.
Discharge pipe: concentric reduction.

Avoid forces or stresses on the pump:

Place support clamps as close as possible to the suction and discharge nozzles of the pump.
Expansion seals can be fitted between the pump and the suction/discharge pipes to absorb potential product volume changes, reduce mechanical stresses and reduce noise from vibrations.

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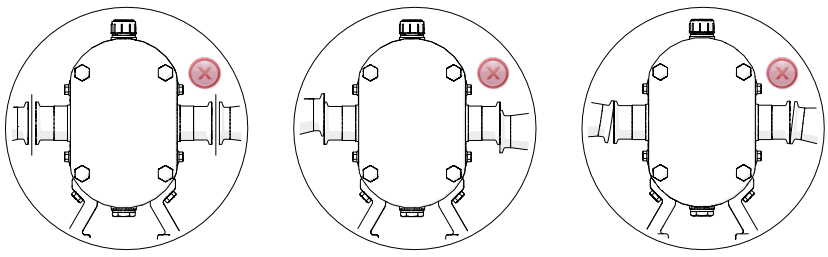
Aligning the pump to the pipes correctly:

Pump nozzle centre ↔ pipe centre



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ATTENTION

The expansion seals must NOT compensate for incorrect assembly or be used to correct for incorrect pipe alignment.
Ensure the expansion seal connections are properly secured.

Installing pressure sensors as close as possible to the pump inlet and pump outlet is recommended in order to know the pump operating conditions at all times and to easily detect any problems.

5.6.1. Shut-off valves

The pump can be isolated for maintenance. This involves installing shut-off valves in the suction and discharge connections of the pump.

ATTENTION

These valves must ALWAYS be open when the pump is operating

5.7. THE PRIMING PROCESS

UltiLobe pumps must be primed prior to start-up to ensure the pump body is completely filled with fluid and to prevent the pump from operating when dry.

If the suction tank is below the level of the pump and low viscosity fluid is to be pumped, a foot valve with the same or larger diameter than the suction pipe should be installed, or alternatively a U-shaped pipe.

ATTENTION

Using a foot valve is NOT recommended for viscous fluids if the suction tank is not below the level of the pump.

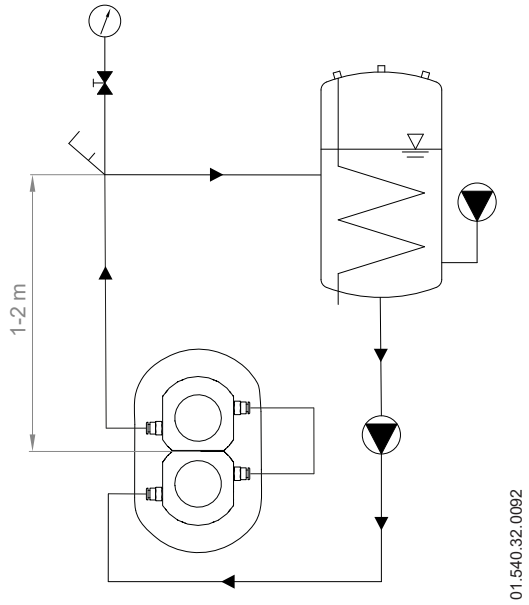
The counter pressure inside the discharge pipe must be decreased in order to eliminate air and gases from the suction pipe. When using the priming process, the pump must be started by opening the discharge pipe, which allows air and gases to escape at a lower counter pressure.

For long pipes or for installations with a check valve in the discharge pipe, bypass by using a shut-off valve on the pump discharge side. This must be opened during the priming process to allow air and gases to escape with minimum counter pressure. The bypass must return to the supply tank.

5.8. AUXILIARY SYSTEM FOR MECHANICAL SEALS

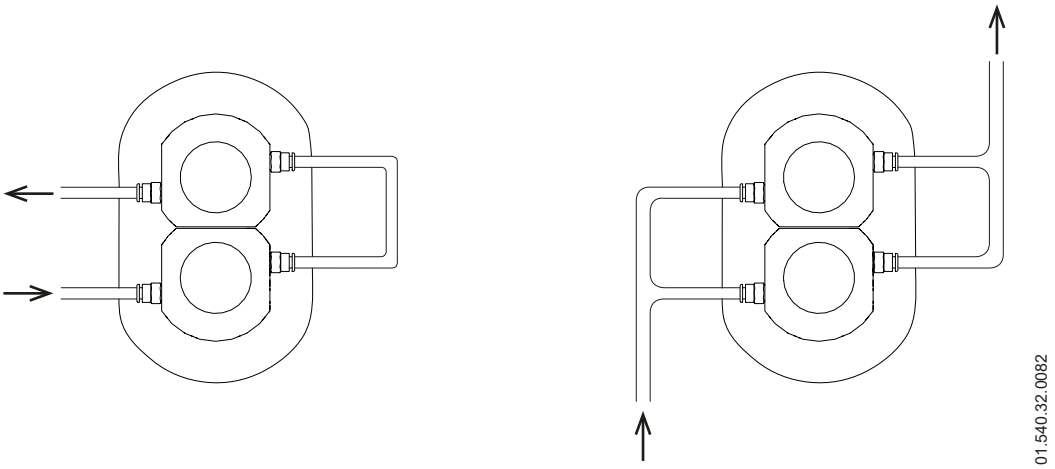
The auxiliary system for mechanical seals can be either external at low pressure (buffer fluid) or external at high pressure (barrier fluid), depending on the application.

The external fluid of the auxiliary system can be supplied using an open or closed circuit. If supplied using a closed circuit with a tank, the tank must be mounted vertically, within a maximum radius of 1 m from the double mechanical seal and 1 to 2 m above it. This distance can be smaller if a recirculation pump is installed.



Auxiliary fluid pipes are recommended to be made of stainless steel and as short and straight as possible so the auxiliary fluid can flow easily.

The auxiliary fluid should always enter at the bottom and exit at the top of the seal chamber to avoid creating preferential pathways and to ensure the chambers are constantly filled with product.



Series connection

Parallel connection

Check the fluid level regularly. A change in the fluid level may indicate a leak from the double mechanical seal or from the auxiliary system circuit.

In addition to having designated preventive maintenance, the auxiliary fluid must be drained and changed after each seal failure or replacement.

The end user is always responsible for the choice of auxiliary fluid. INOXPA are not liable for the choice of auxiliary fluid.

ATTENTION

The auxiliary fluid for mechanical seals must always circulate when the pump is running.

5.8.1. Buffer fluid: cooled mechanical seal (quench) or double mechanical seal

Fluid at low pressure (buffer fluid) can be used for both the cooled mechanical seal (quench) and the double mechanical seal. The maximum pressure of the auxiliary fluid for the cooled mechanical seal (quench) must be 50 kPa (0.5 bar). When used in a double mechanical seal, the pressure must always be lower than the pressure inside the pump. In both cases, the minimum flow rate of the auxiliary fluid must be 30 litres/hour.

It is important that the auxiliary fluid is filtered and impurity-free in order to extend the useful life of the mechanical seal as much as possible. Furthermore, it must be chemically compatible with the pumped product to avoid any undesired reaction in the event of accidental mixing or with the materials of the mechanical seal so it doesn't get damaged.

ATTENTION

The auxiliary fluid must be chemically compatible with the products requiring pumping and the materials of the mechanical seal.

5.9.1. Barrier fluid: double mechanical seal

The double mechanical seal in UltiLobe pumps enables operations both with low pressure auxiliary fluid (buffer fluid) and high pressure auxiliary fluid (barrier fluid). If needing to operate at high pressure, maintaining the auxiliary fluid at a pressure of 100 kPa (1 bar) higher than the pressure inside the pump is recommended. In any case, the maximum pressure permitted by the double mechanical seal must not be exceeded. The minimum flow rate of the auxiliary fluid must be 30 litres/hour.

Following tank manufacturer instructions when fitting the closed pressurisation system is recommended.

It is important that the auxiliary fluid is filtered and impurity-free in order to extend the useful life of the double mechanical seal as much as possible. Furthermore, it must be chemically compatible with the pumped product to avoid any undesired reaction in the event of accidental mixing or with the materials of the mechanical seal so it doesn't get damaged.

ATTENTION

The auxiliary fluid must be chemically compatible with the products requiring pumping and the materials of the double mechanical seal.

5.9. EXTERNAL PRESSURE BYPASS

The UltiLobe lobe pump must be protected against over pressure while in operation by installing an external bypass with an overflow valve.

ATTENTION

Positive displacement lobe pumps must be protected against over pressure while in operation.

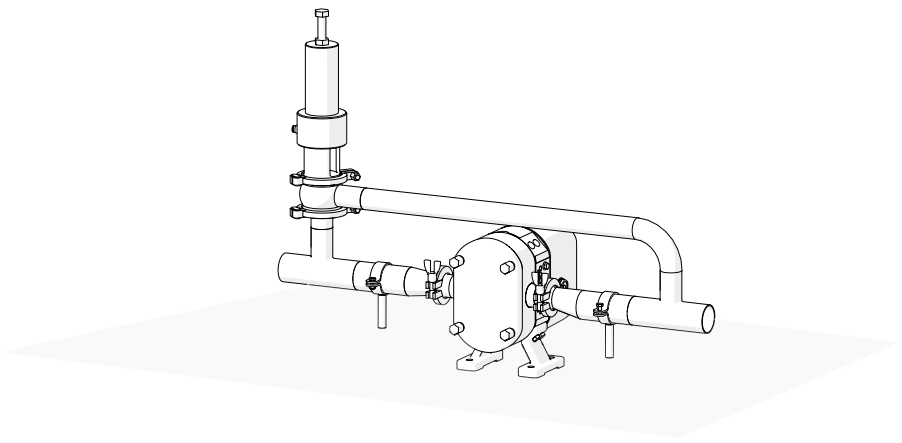
The external pressure bypass with an overflow valve protects the pump and prevents over pressure in the circuit by reducing the differential pressure (ΔP) between suction and discharge.

If for pump discharge nozzle becomes blocked for some reason and the fluid cannot be pumped, particularly high pressure levels can be reached inside the pump. This is when the bypass opens a passage from the discharge side to the suction side of the pump in order to protect the pump, as such opening an escape route that directs the flow back to the suction side.

The external pressure bypass does not reduce the maximum pressure inside the installation.

The external pressure bypass must limit the pressure to the maximum differential pressure for the pump indicated in section 9. Technical specifications.

Sanitary pressure bypass:



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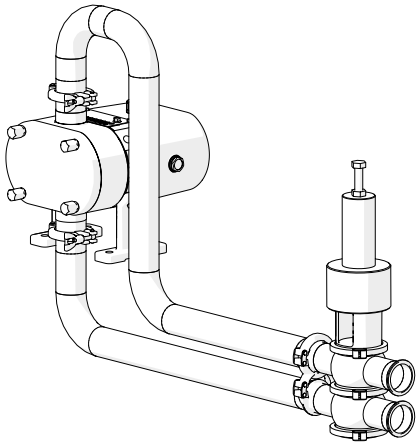
Hygienic pressure bypass:



ATTENTION

Do not use the external pressure bypass to protect the system against over pressure. The valve is designed to protect the pump only, it is not a safety valve.

ATTENTION

When the overflow valve is not working properly, the skid is not working properly and should be shut down immediately. DO NOT restart the pump until the problem has been solved.

ATTENTION

The overflow valve cannot be used to regulate the flow rate of the pump.

5.10. ELECTRICAL INSTALLATION

Qualified staff should connect the electric drives. Take whatever measures are necessary to prevent connection and cable faults.

ATTENTION

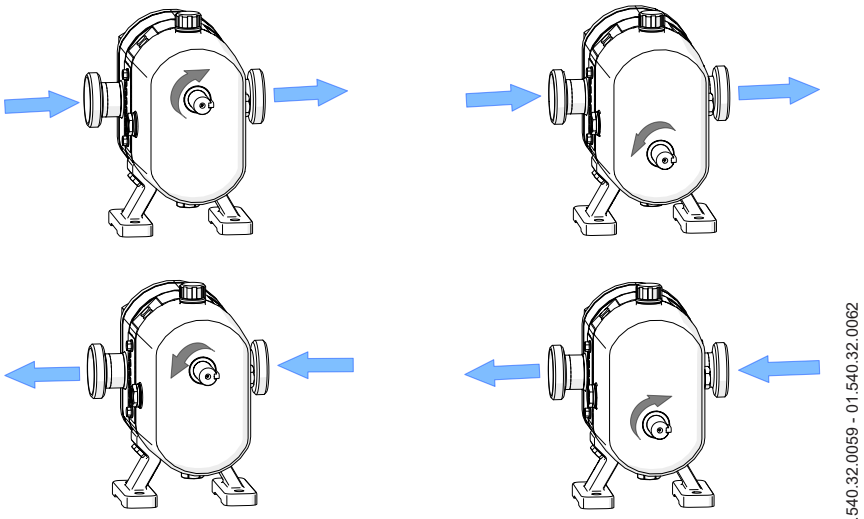
The electrical equipment and the terminals and components of the control system may still carry a charge even when they are disconnected. Coming into contact with them can jeopardise operator safety or cause irreversible damage to the material. Ensure the drive is stopped before handling the valve.

To perform the electrical installation:

- connect the drive in accordance with the instructions supplied by the drive manufacturer and in accordance with national law and the EN 60204-1 standard,
- check the rotation direction (see the label on the pump),
- start up and stop the drive momentarily. Ensure the pumping direction is correct

Shaft in upper position:

Shaft in lower position:



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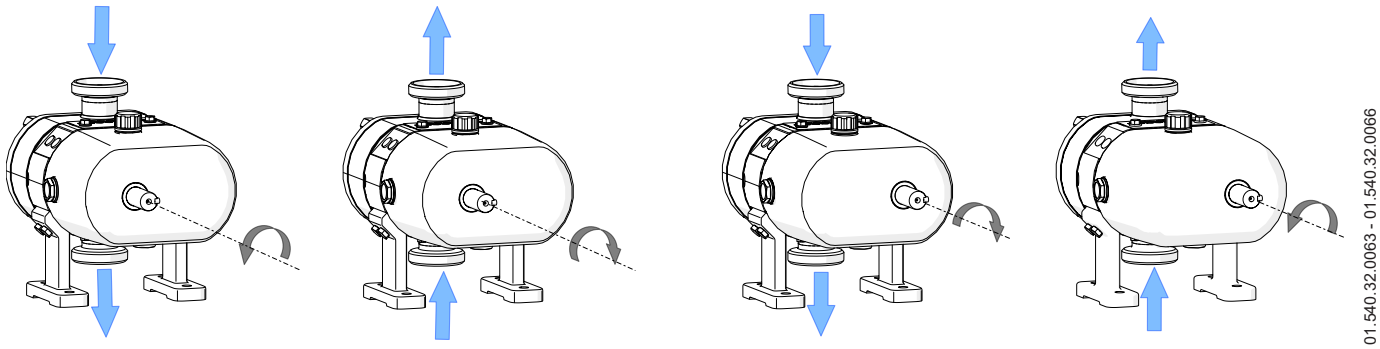
Shaft in the left position:

Shaft in the right position:



01.540.32.0063 - 01.540.32.0066

ATTENTION

See the label on the pump.
ALWAYS ensure there is fluid inside the pump when checking the direction of rotation of the drive.

6. Start-up

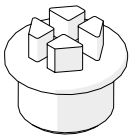
Read the instructions in section 5. Installationcarefully before starting up the pump. Read section 9. Technical specificationscarefully. INOXPA are not liable for the skid being used incorrectly.

NEVER touch the pump or the pipes if hot fluids are being pumped.

6.1. CHECKS BEFORE STARTING UP THE PUMP

Before starting up the pump:

- check the pump transport plug has been replaced by the vent plug supplied with the pump,



Transport plug

Vent plug

01.540.32.0097 - 01.540.32.0098

- open the suction and discharge pipe shut-off valves completely,
- check the oil level of the pump. If necessary, add enough oil to maintain the level in the centre of the sight glass.
- should fluid not flow towards the pump, fill it with the fluid to be pumped,

ATTENTION

The pump can only be operated without product if it has a cooled or double mechanical seal that is fed by auxiliary fluid.

- check the electrical power supply matches the power rating indicated on the drive nameplate,
- check the drive rotates in the right direction,
- should the pump have a double mechanical seal, fit the corresponding auxiliary connection with the values indicated in section 9. Technical specifications.

6.2. CHECKS WHEN STARTING UP THE PUMP

When starting up the pump, check:

- the pump is not making any strange noises,
- whether the absolute inlet pressure is enough to prevent cavitation in the pump. Check the curve to determine the minimum pressure required above the vapour pressure (NPIPr).
- the discharge pressure,
- there are no leaks around the seals.

ATTENTION

Do not use a shut-off valve to regulate the flow rate in the suction pipe. They must be fully open during operation.

ATTENTION

Monitor the consumption of the drive to prevent over-current.

Reduce the flow rate and the power consumed by the drive by decreasing the drive speed if needed.

Wear suitable personal protective equipment when the sound pressure level in the area of operation exceeds 85 dB(A).

7. Troubleshooting

Solutions to problems that may occur during pump operation can be found in the table below, assuming the pump is properly installed and selected correctly for the application. Please contact INOXPA if technical support is required.

Drive overload	The pump flow rate or pressure falls short	There is no pressure on the discharge side	Irregular discharge flow rate or pressure	Noise and vibrations	The pump gets clogged	Pump overheated	Abnormal wear	Mechanical seal leak	PROBABLE CAUSES	SOLUTIONS
	•		•						Rotating in the wrong direction	Reverse the rotation direction.
	•	•	•	•					NPIP falls short	Raise the suction tank. Lower the pump. Reduce the pump speed. Widen the diameter of the suction pipe. Shorten and simplify the suction pipe.
		•							Pump not purged	Purge or fill.
	•		•	•			•		Cavitation	Increase the suction pressure.
	•		•	•			•		The pumps sucks air	Check the suction pipe and every connection.
		•	•	•					Suction pipe blocked	Check the suction pipe and any filters.
		•		•		•			Pressure bypass valve set incorrectly	Inspect and correct the valve setting.
	•			•					Discharge pressure too high	Reduce the pressure losses if necessary, by increasing the pipe diameter for example.
•	•		•	•	•	•			Fluid too viscous	Reduce the viscosity, by heating the fluid for example. Reduce the pump speed.
•	•		•	•	•	•			Fluid viscosity too low	Increase the viscosity, by cooling the fluid for example. Increase the pump speed.
	•			•	•	•	•		Fluid temperature too high	Cool the fluid to reduce the temperature.
•			•	•		•			Pump speed is too high	Reduce the pump speed.
	•			•			•		The lobes are worn	Replace the lobes.
	•								Pump speed is too low	Increase the pump speed. Check the drive power is sufficient.
							•		Highly abrasive product	Fit toughened lobes.
•				•	•	•	•		Worn bearings	Replace the bearings and inspect the pump.
								•	Mechanical seal damaged or worn	Replace the seal.
								•	O-rings unsuitable for the fluid	Fit the correct O-rings after consulting the supplier.
				•	•		•		Worn gears	Replace and adjust the gears again.
•				•	•	•			Lubricating oil level too low	Fill with oil.
•				•	•	•			Unsuitable lubricating oil	Use suitable oil. See section 8.5. Lubrication
•				•	•	•			Friction in the lobes	Reduce the pump speed. Reduce the discharge pressure. Adjust the play.
•				•		•	•		Misaligned coupling	Align the coupling. See 5.5. Coupling.
				•	•	•	•		Stress in the pipes	Connect the pipes to the pump without being under stress.
				•	•	•	•		Foreign objects in the fluid	Place a filter in the suction pipe.
•				•	•	•			Pump and/or electric drive is not secured to the baseplate or foundation	Tighten and check the pipe is connected to the pump without stress and align the coupling.

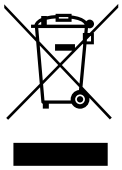
8. Maintenance

8.1. GENERAL CONSIDERATIONS

Just like any other machine, this pump requires maintenance. The instructions in this manual cover spare part identification and replacement. These instructions were drafted for maintenance staff and those responsible for spare part supply.

Read section 9. Technical specifications carefully.
Only qualified, trained persons equipped with the necessary means for the work can perform maintenance.
Every replaced part or material must be properly disposed of or recycled in accordance with the current directives in each area.

ALWAYS disconnect the pump before starting any maintenance work.



This symbol indicates the product should be taken to sorting facilities for recovery and recycling and not be disposed of as unsorted waste.

8.2. MECHANICAL SEAL CHECK

Check regularly for any leaks around the shaft. In the event of mechanical seal leaks, replace the seal in accordance with the instructions provided in section 8.9. Disassembling the pump and 8.10. Assembling the pump

8.3. SEAL MAINTENANCE

SEAL REPLACEMENT	
Preventive maintenance	Replace every 12 months. Replacing the seals when there is a change of mechanical seal is also recommended.
Maintenance after a leak	Replace them at the end of the process.
Scheduled maintenance	Regularly check there are no leaks and the pump operates correctly. Keep a record of pump maintenance. Use statistics to schedule inspections.
Lubrication	Lubricate the O-rings with soapy water or a food grade oil compatible with the O-ring material during assembly.

The interval between each preventive maintenance can vary depending on the operating conditions of the pump: temperature, flow rate, number of operating hours a day, cleaning solution used, and so on.

8.4. TIGHTENING TORQUE

Part	UL-1		UL-2		UL-3		UL-4		Spanner type
	Tightening torque [Nm]	Spanner [mm]	Tightening torque [Nm]	Spanner [mm]	Tightening torque [Nm]	Spanner [mm]	Tightening torque [Nm]	Spanner [mm]	
Domed cap nut (45)	18	13	35	17	61	19	147	24	fixed
Body screw (51)	7	5	7	5	18	6	35	8	Allen
Rotor screw (25)	18	19	35	24	63	27	105	32	fixed
Safety screw (50)	7	10	7	10	7	10	7	10	fixed
Gauge clamp screw (50A)	4	3	4	3	4	3	4	3	Allen
Conical tightening ring screw (51A)	6	4	10	5	10	5	10	5	Allen
Bearing cover screw (52)	4	8	7	10	7	10	18	13	fixed
Foot screw (52A)	7	10	18	13	18	13	35	17	fixed
Tightening screw (55)	4	5	4	7	4	7	18	10	fixed
Tightening screw stud (55A)	4	2.5	7	3	7	3	18	4	Allen
Bearing KM lock nut (62)	16	5-6	40	5-6	45	7	65	10-11	SKF HN
Gear KM lock nut (62A)	25	4	50	5-6	75	5-6	100	8-9	SKF HN

8.5. LUBRICATION

The bearings are lubricated by immersion in an oil bath.

The pumps are supplied with NSF H1 registered food grade oil, complying with the FDA, and are ISO 21469, Kosher and Halal certified. It is a synthetic PAO (polyalphaolefin) oil, miscible with other synthetic PAO and mineral oils.

To ensure correct lubrication:

- regularly check the oil level, weekly or after every 150 hours of operation,
- change the oil for the first time after 150 hours or operation,
- after the first oil change, the following changes should be done every 2500 hours of operation, or at least once a year.

Do not surpass the level when filling the bearing bracket with oil.

After the oil change, let the pump stand for a moment and then check the oil level again. Add more oil if necessary.
Oil for ambient temperatures from 5ºC to 50ºC: SAE 90 or ISO VG 150.

Recommended oil examples:

Brand	Type
Total	Nevastane XSH-150
Klüber	Klüberoil 4 UH1-150N

Amount of oil in the bracket:

Pump	Amount of oil in the bracket [litres]	
	Horizontal connections	Vertical connections
UL-1	0.38	0.36
UL-2	1.0	0.9
UL-3	1.4	1.3
UL-4	2.6	2.5

8.6. STORAGE

The hydraulic part of the pump must be emptied if the pump is to be stored. The mechanical seals must also be disassembled if it is expected to be stored for more than two months.
The pump must be stored under cover in a clean, dry and vibration-free location. If there is no location that fulfils those conditions, cover the pump appropriately.

8.7. CLEANING

Using aggressive cleaning products such as caustic soda and nitric acid can burn the skin.
Wear rubber gloves during all cleaning procedures.
Always wear safety glasses.

8.7.1. CIP (clean-in-place)

The pump will not need to be disassembled if it is installed into a system with a CIP process.
Disassemble the pump as indicated in section 8.9. Disassembling the pump and 8.10. Assembling the pumpif there isn't an automatic cleaning process.

Two types of solutions can be used for CIP processes:

a. **an alkaline solution**: 1% by weight of caustic soda (NaOH) at 70ºC (150ºF). To make this cleaning solution:
   1 kg NaOH + 100 litres of H_2O[1] = cleaning solution
   2.2 litres of 33% NaOH + 100 litres of H_2O = cleaning solution

b. **an acidic solution**: 0.5% by weight of nitric acid (HNO_3) at 70ºC (150ºF). To make this cleaning solution:
   0.7 litres of 53% HNO_3 + 100 litres of H_2O = cleaning solution

1) only use chloride-free water when making cleaning solutions

ATTENTION

Monitor the cleaning solution concentrations. The wrong concentration can cause the seals on the pump to deteriorate.

ALWAYS rinse with clean water to remove cleaning agent residues when completing the cleaning process.

8.7.2. COP

The following steps should be followed to perform this cleaning method:

- remove the rotors (02), the rotor screws (25) and the gaskets (80), and the body gasket (80A),
- pre-rinse the removed parts with hot water (45°C) until the surfaces are clean,
- immerse the removed parts in a caustic solution prepared according to manufacturer instructions (typically a 2% solution at 40°C) for 2 minutes,
- clean each part with a brush,
- rinse with water,
- immerse the removed parts in an acid disinfectant according to manufacturer instructions (typically for five minutes), and clean them again with a brush for at least two minutes,
- rinse and leave the parts to dry in the air,
- check the cleanliness of each part by performing an ATP test, involving rubbing the surfaces of the parts, the threads of the rotor screws (25) and the toothed holes of the rotors (02) with the swab,
- the cleaning process should be repeated if the ATP test result shows the surfaces are not clean enough,
- the parts can be fitted to the pump when the test is positive.

New parts should be fitted if there is not enough time to repeat the entire process when the cleaning tests are negative.

When the body gasket and/or rotor screw gaskets are damaged, the toothed part of the shafts and rotors, the shaft threads and screws and the grooves where the gaskets fit should be cleaned.

8.7.3. Automatic sterilisation-in-place (SIP)

The steam sterilisation process is used on the entire skid, including the pump.

ATTENTION

DO NOT start up the skid during the steam sterilisation process.
The parts and materials will not be damaged if the specifications in this manual are followed.
No cold fluid can enter the skid until the temperature is below 60°C (140°F).
The sterilisation process causes a significant pressure drop in the pump. Using a bypass circuit from a discharge valve to ensure the steam or superheated water sterilises the entire circuit is recommended.

Maximum conditions during the SIP process with steam or superheated water:

a. maximum temperature:	140ºC / 284ºF
b. maximum time:	30 minutes
c. cooling: sterile	air or inert gas
d. materials:	EPDM (recommended)
	FPM (use with caution)

8.8. DISASSEMBLING AND ASSEMBLING THE PUMP. GENERAL CONSIDERATIONS

Only qualified staff should assemble and disassemble pumps. The staff must read this instruction manual carefully, and especially the instructions regarding the work they are going to perform.

ATTENTION

Incorrect assembly or disassembly may damage the operation of the pump and result in expensive repair costs and long downtime.
INOXPA are not liable for accidents or damage caused by not complying with the instructions in this manual.

Preparations
Ensure the working environment is clean, as some parts, including the mechanical seal, may need careful handling and others have small tolerances.
Check the parts used were not damaged during transportation. This involves inspecting the adjacent faces, the coincident faces, the seal, for burrs, and so on.
Clean the parts and check for any damage after every disassembly. Replace all damaged parts.

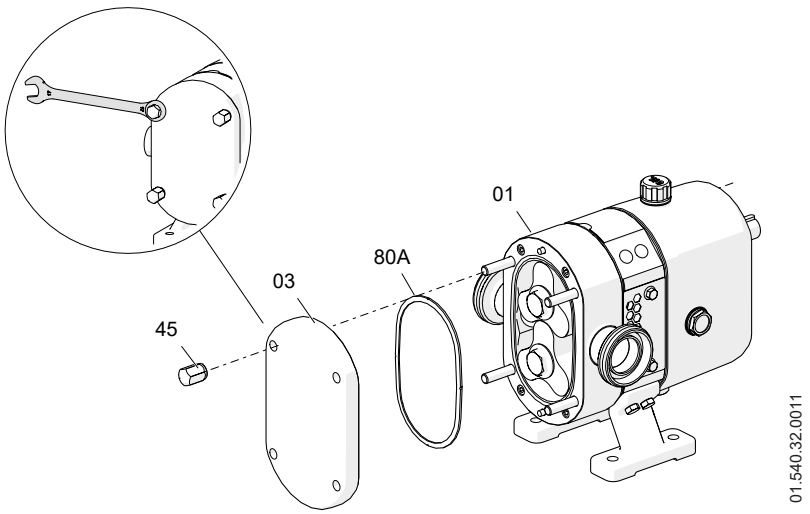
Tools
Use suitable tools for assembly and disassembly operations in the correct manner.

Cleaning
Clean the pump inside and out before disassembling it.

8.9. DISASSEMBLING THE PUMP

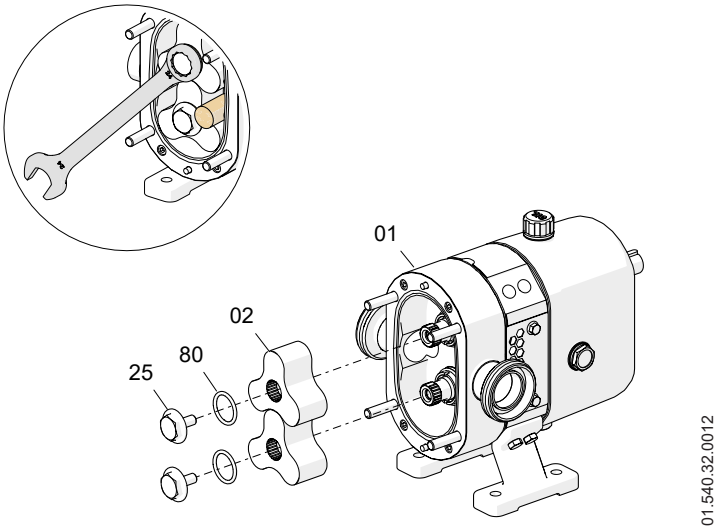
1 **Cover:**

Remove the pump cover (03) by unscrewing the domed cap nuts (45) using an open-ended spanner.
Remove the gasket (80A) from the pump body (01).



2 **Rotors and single mechanical seal**:

Remove the rotors (02) from the body (01) by unscrewing the rotor screws (25) using an open-ended spanner. Place a wooden or plastic block between the rotors to prevent them from rotating simultaneously. If the rotors are to be fitted into the same pump again, mark them before disassembly so their positions remain the same.
Remove the gasket (80) from the rotor screws (25).

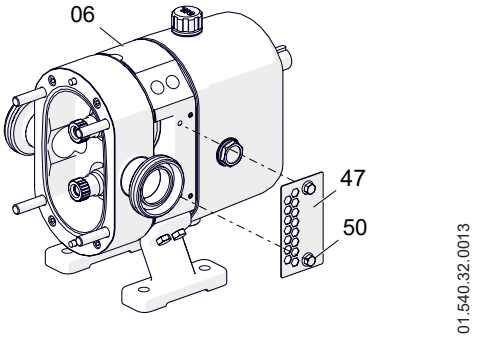


3 **Sealing:**

See the different sealing options in the section 8.11. Sealing options.

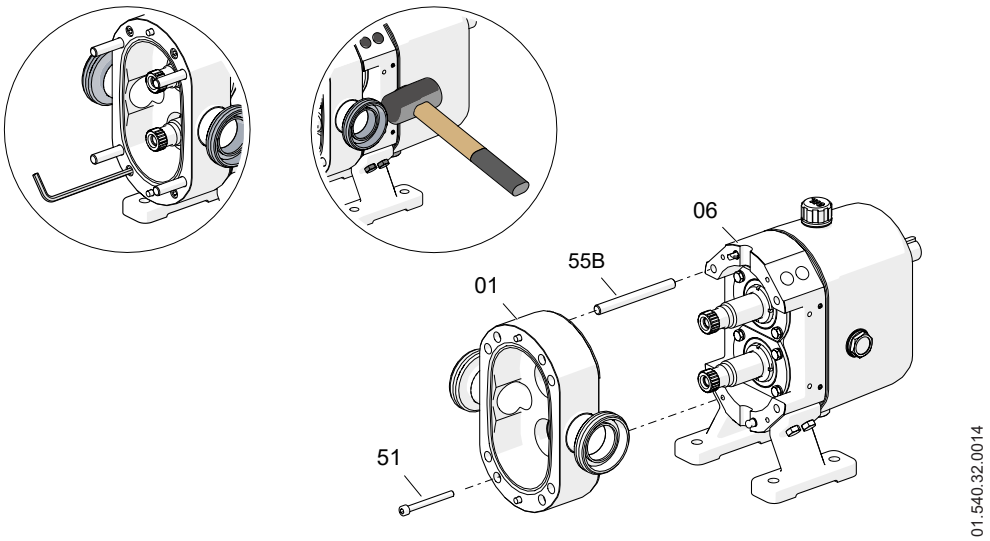
4 **Guards:**

Remove the guards (47) by unscrewing the screws (50) securing them to the pump bearing bracket (06).



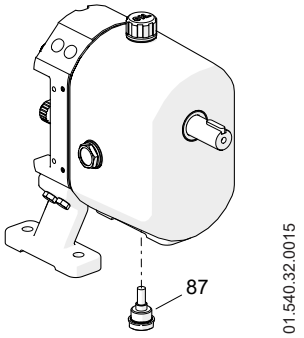
5 **Body:**

Separate the pump body (01) from the bearing bracket (06) by loosening the screws (51) connecting them. A rubber hammer can be used if help is needed.
Remove the stud bolts (55B) connecting the pump body (01) to the cover (03) if needed.



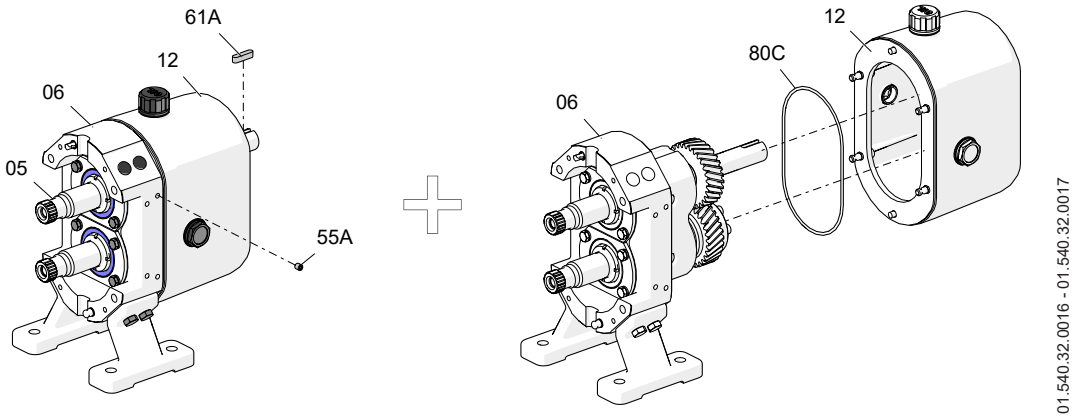
6 **Drainage:**

Drain the lubrication oil by removing the pump drain plug (87).

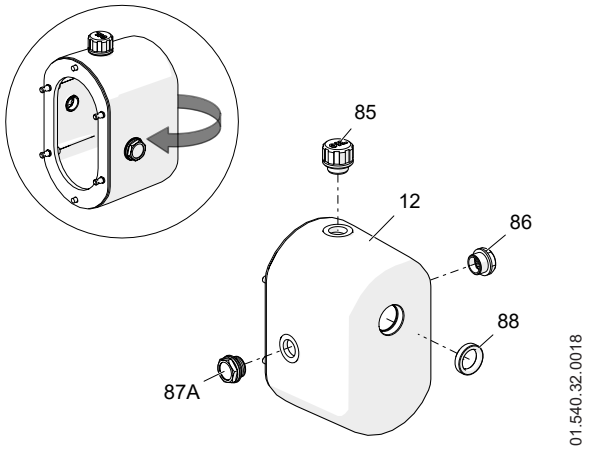


7 **Gear cover:**

Remove the cotter pin (61A) from the drive shaft (05).
Remove the studs (55A) securing the gear cover (12) to the pump bearing bracket (06).
Separate the gear cover (12) from the bearing bracket (06).
Remove the gasket (80C) from the bearing bracket (06).



Remove the oil plugs (85,87A), sight glass (86) and seal ring (88) if needed.



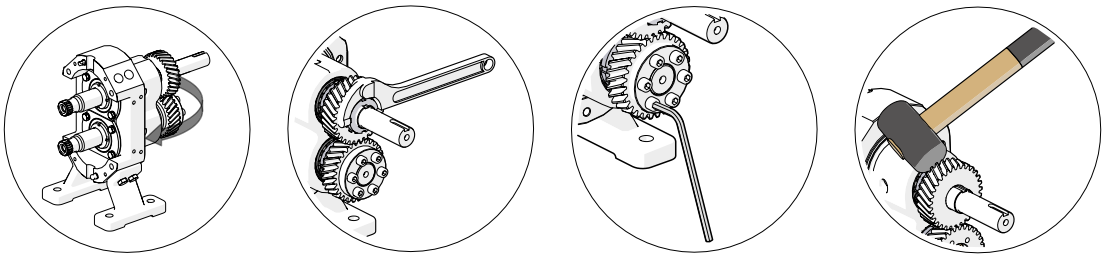
8 Gears

UL-1, UL-2, UL-3:

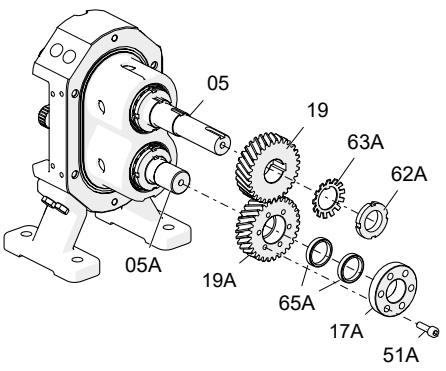
Immobilise the gears by placing a wedge between the teeth.
Remove the KM lock nut (62A) and the MB safety washer (63A) from the drive shaft (05) using a hook spanner for KM lock nuts.
Remove the drive bushing (17A) by loosening the Allen screws (51A) that fasten it to the driven gear (19A).
Remove the drive gear (19) and driven gear (19A) from the respective shafts (05,05A).
Remove the conical rings (65A) from the driven gear (19A).

UL-4:

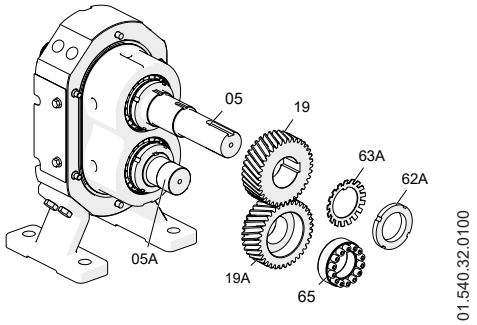
Immobilise the gears by placing a wedge between the teeth.
Remove the KM lock nut (62A) and the MB safety washer (63A) from the drive shaft (05) using a hook spanner for KM lock nuts.
Remove the Tollok conical tightening ring (65).
Remove the drive gear (19) and driven gear (19A) from the respective shafts (05,05A).



UL-1, UL-2, UL-3:

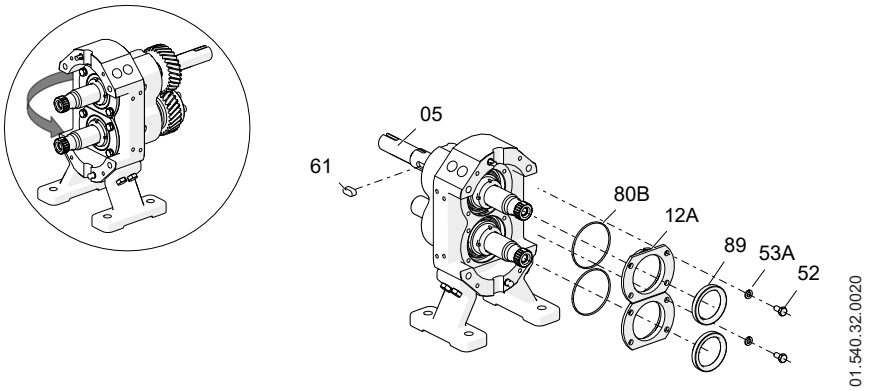


UL-4:



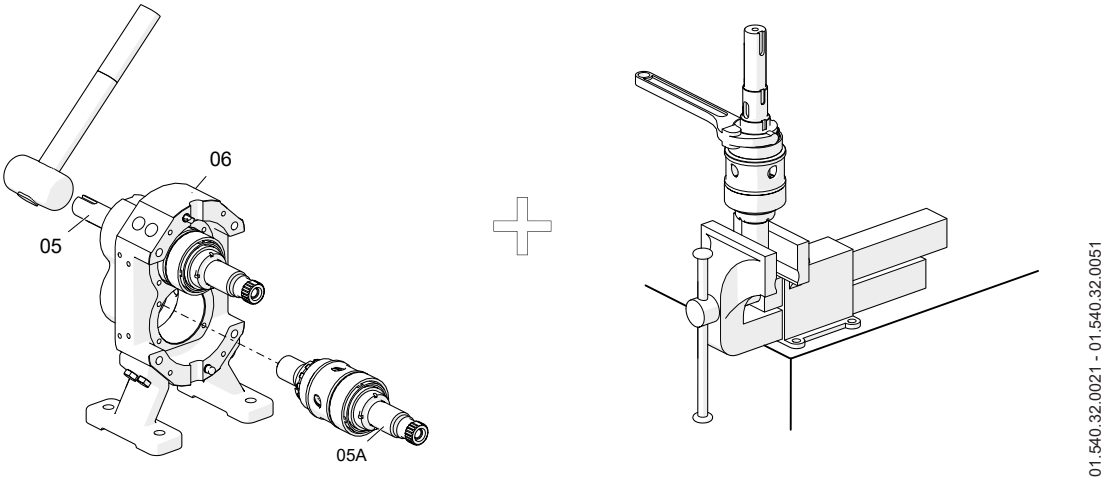
9 Bearing cover:

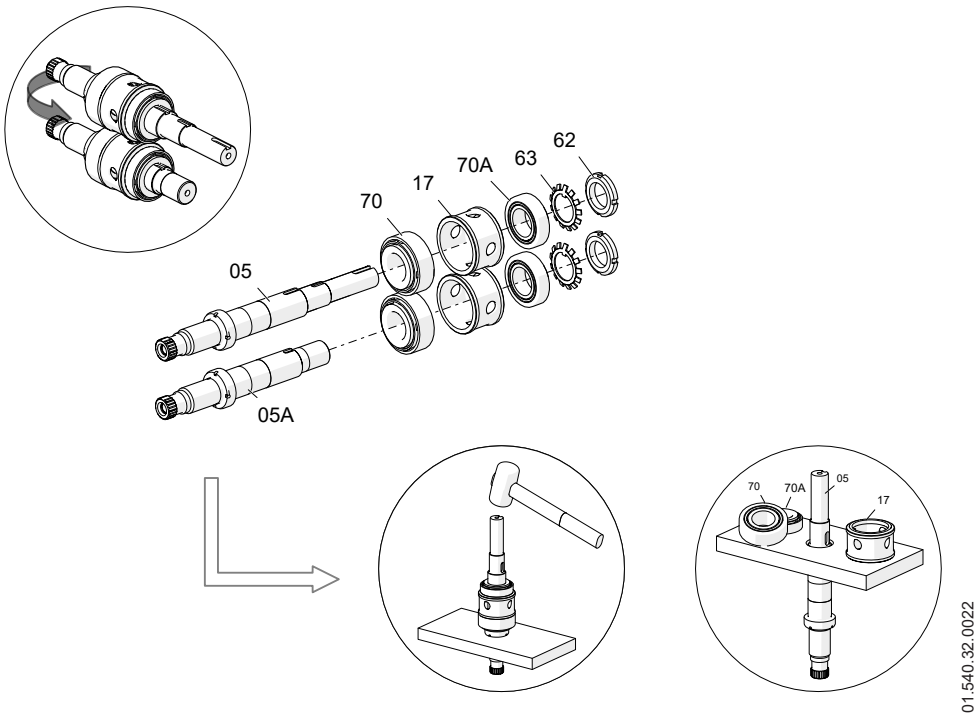
Remove the bearing covers (12A) by removing the screws (52) and washers (53A) that connect them to the pump bearing bracket (06).
Remove the seal rings (89) and O-rings (80B) from the bearing covers (12A).
Remove the cotter pin (61) from the drive shaft (05).



10 Bearings:

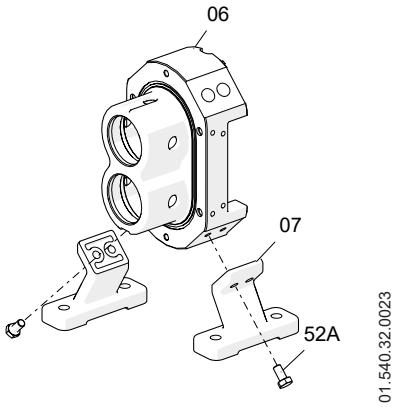
Identify where the drive shaft (05) is in the bearing bracket (06) (right or left, up or down).
Remove the shaft assembly from the bearing bracket (06) by pulling it out from the front.
Hold the shafts in a vice with the jaws protected.
Remove the KM lock nuts (62) and MB safety washers (63) from the shafts (05,05A) using a KM spanner.
Remove the bearings (70,70A) and bearing spacer (17) from the shafts (05,05A) using a press.





11 **Feet:**

If necessary, remove the feet (07) from the pump by unscrewing the screws (52A) to separate them from the bearing bracket (06).



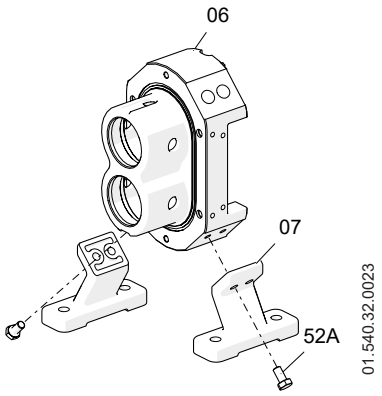
8.10. ASSEMBLING THE PUMP

ATTENTION

Put compatible food grade grease on every gasket to make them easier to slide.

1 **Feet:**

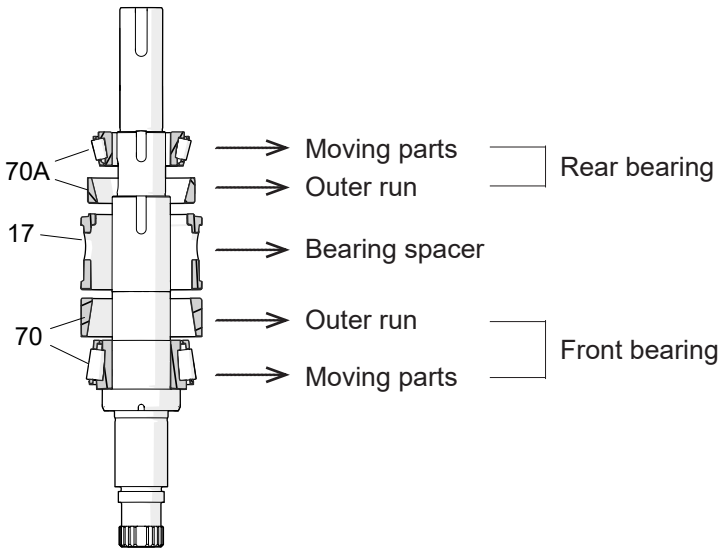
Fit the pump feet (07) by screwing the screws (52A) to secure them to the bearing bracket (06).



2 **Bearings:**

Clamp the shaft in a vice with the jaws protected.
Apply grease to the bearing housings to make them easier to slide.
Heat the moving parts of the front bearing (70) using a bearing heater (T = room T + 90°C).
Slide the rolling parts of the front bearing along the drive shaft (05). Pay particular attention it is facing the right way as shown in figure 01.540.32.0035.
Slide the outer run for the front bearing (70) along the drive shaft (05).
Slide the bearing spacer (17) along the drive shaft (05).
Slide the outer run for the rear bearing (70A).
Heat the moving parts of the rear bearing (70A) with a bearing heater (T = 90°C + room T).
Slide the moving parts of the rear bearing (70A) along the drive shaft (05). Pay particular attention it is facing the right way as shown in figure 01.540.32.0035.

Apply grease to the thread of the driven shaft (05A) where the KM lock nut (62) is threaded.
Place the MB safety washer (63) and the KM lock nut (62).
Tighten the KM lock nut (62) with a torque spanner or a hook spanner. The amount of force applied to the lock nut must allow the bearings to rotate slightly without exceeding the maximum torque for the bracket specified in section 8.4. Tightening torque.
Repeat the previous steps with the driven shaft (05A).
Insert the shafts (05,05A) into the bearing bracket (06).



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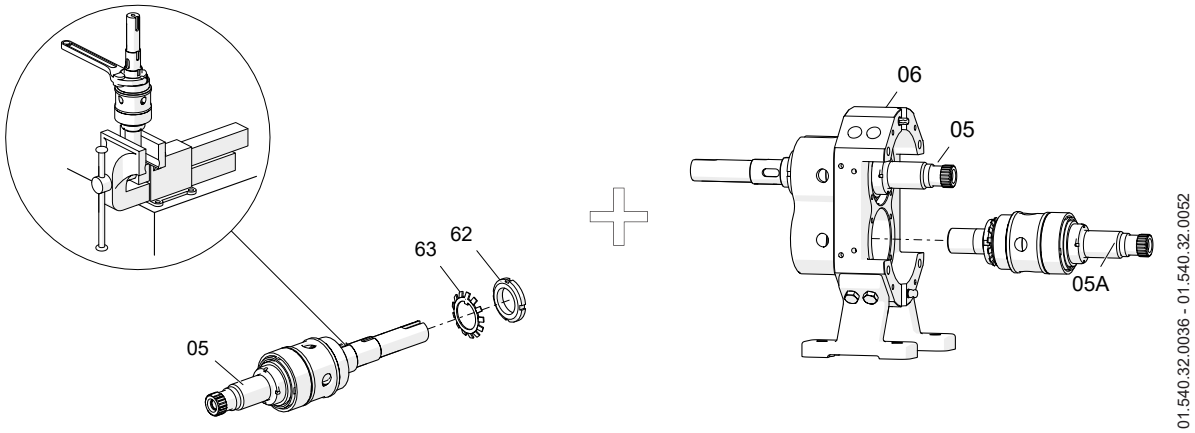
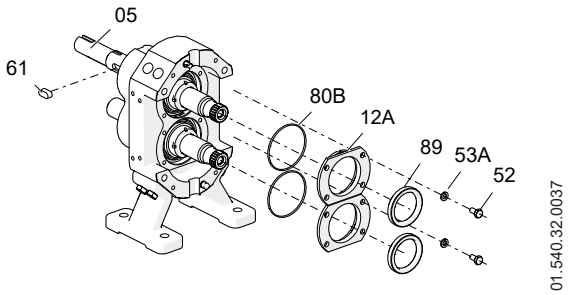


01.540.32.0036 - 01.540.32.0052

3 **Bearing covers:**

Place the seal rings (89) and O-rings (80B) onto the bearing covers (12A).
Place the bearing covers (12A) into the bearing bracket (06) and secure them using the screws (52) and washers (53A). Tighten the screws (52) in a criss-cross pattern.
Place the cotter pin (61) into the drive shaft (05).

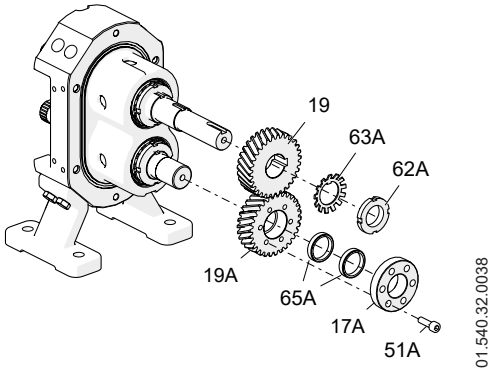


01.540.32.0037

4 **Gears**

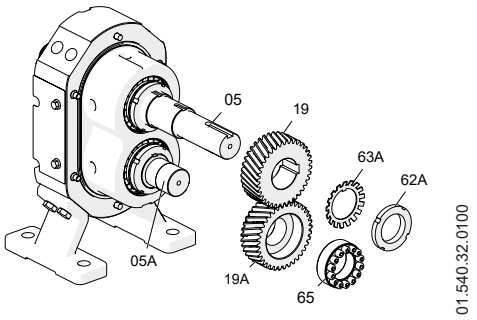
UL-1, UL-2, UL-3:

Place the conical rings (65A) onto the driven gear (19A).
Place the drive gear (19) onto the drive shaft (05).
Immobilise the drive shaft (05).
Place the KM lock nut (62A) and the MB safety washer (63A) onto the drive shaft (05). Tighten with a torque spanner according to the torque indicated in section 8.4. Tightening torque.
Place the driven gear (19A) onto the drive shaft (05A) applying a light film of oil.
Fit the drive bushing (17A) and secure it with the Allen screws (51A) without reaching the maximum tightening torque.



UL-4:

Place the drive gear (19) onto the drive shaft (05).
Immobilise the drive shaft (05).
Place the KM lock nut (62A) and the MB safety washer (63A) onto the drive shaft (05). Tighten with a torque spanner according to the torque indicated in section 8.4. Tightening torque.
Place the driven gear (19A) onto the drive shaft (05A) applying a light film of oil.
Place and tighten the Tollok conical tightening ring (65) without reaching the maximum tightening torque.



ATTENTION

Check there is no play in the gears (19,19A).

5 **Rotor synchronisation:**

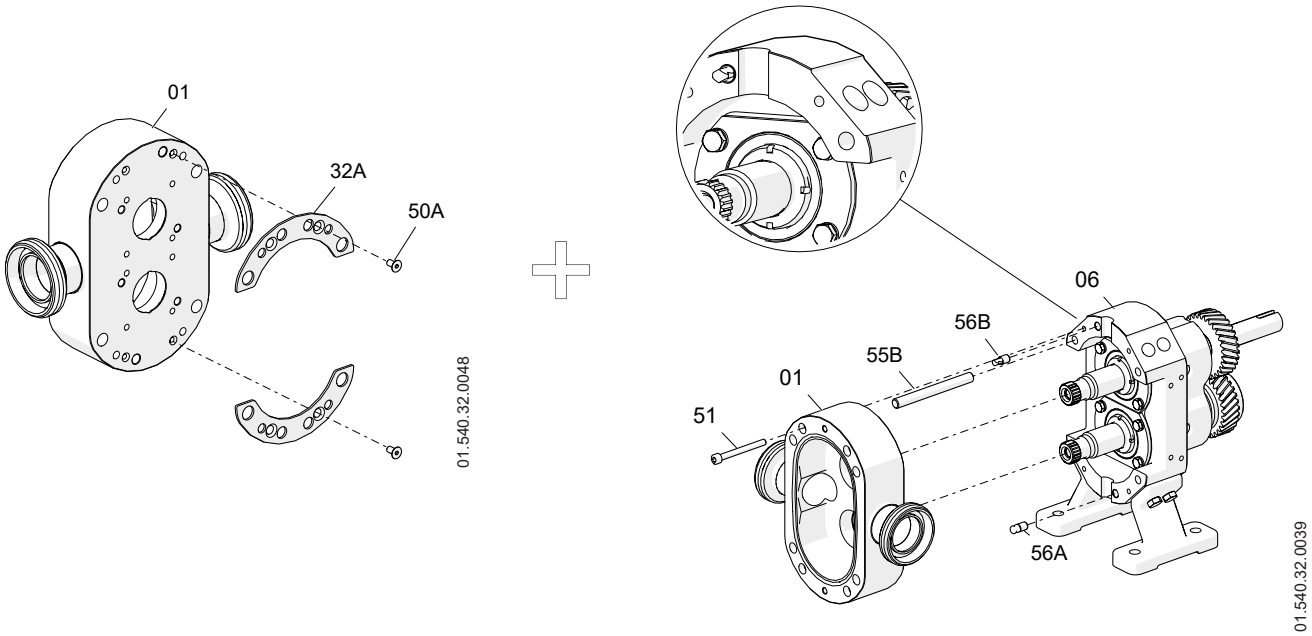
Perform the rotor synchronisation process by following the steps indicated in section 8.15. Rotor synchronisation.

6 **Body:**

Place the gauge clamp (32A) onto the back of the pump body (01) and secure it using the screws (50A).
Place the positioning pins (56A,56B) into the pump bearing bracket (06). Pay attention to the position where the upper positioning pin (56B) is fitted.
Place the stud bolts (55B) into the bearing bracket (06).
Place the pump body (01) into the bearing bracket (06). The positioning pins will ensure it remains in a vertical and radial position as required.
Secure the body (01) in an axial position using the Allen screws (51).

ATTENTION

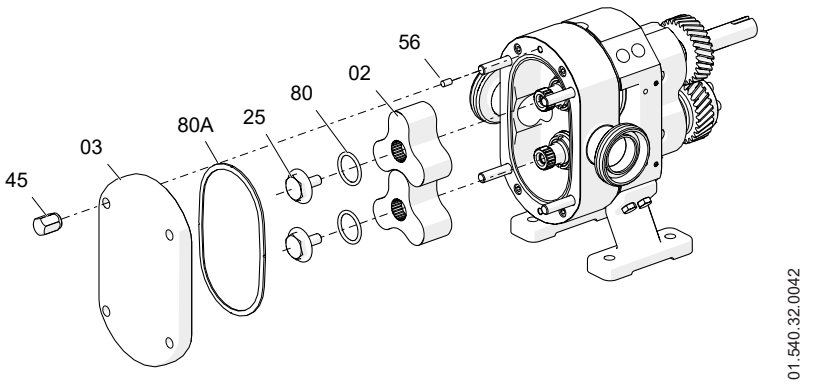
Use some threadlocker on the stud bolts (55B) to prevent any slippage.



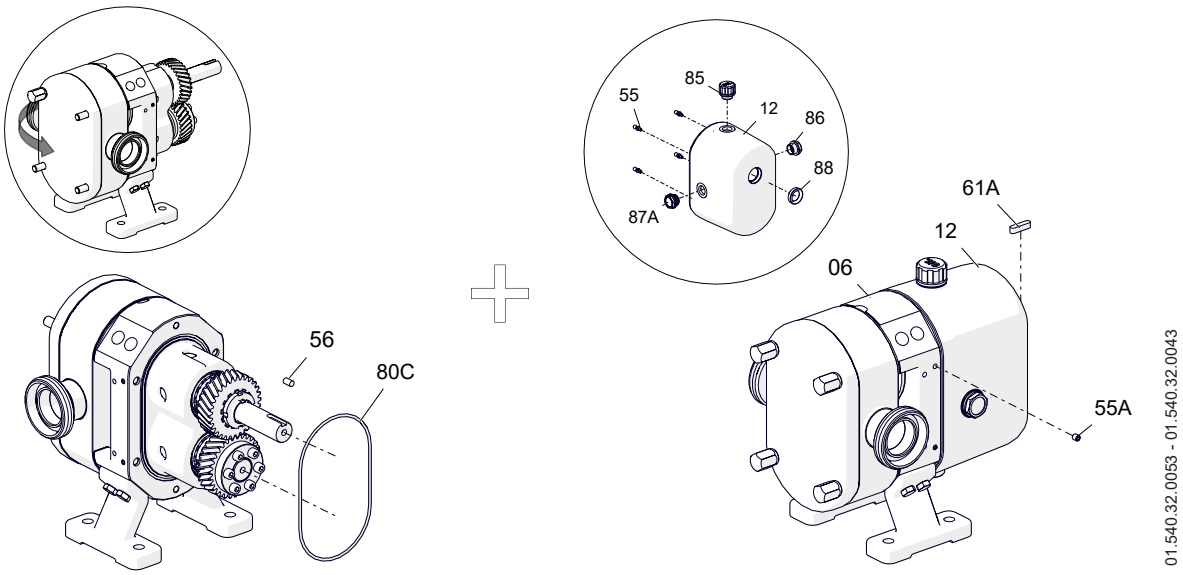
7 **Rotor adjustment:**
Adjust the rotors by following the steps described in section 8.16. Rotor adjustment.

8 **Sealing:**
See the different sealing options in section 8.11. Sealing options.

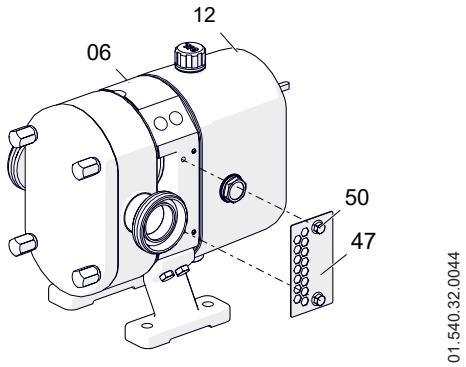
9 **Rotors and cover:**
Place the pins (56) in the body (01) if necessary.
Place the rotors (02) into the pump body (01).
Place the gasket (80) onto the rotor screws (25).
Fasten the rotors (02) to the body (01) using the rotor screws (25).
Place the gasket (80A) into the pump body (01).
Place the pump cover (03) on the body (01) and secure it with the domed cap nuts (45).



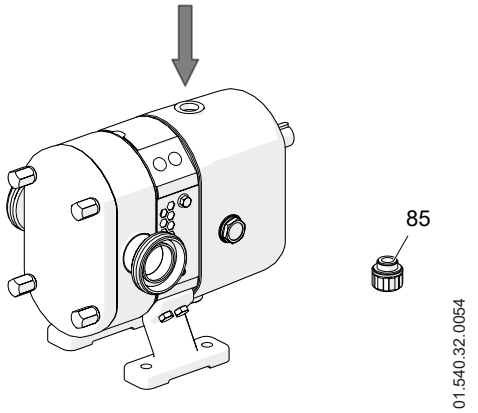
10 **Gear cover:**
Place the gasket (80C) on the bearing bracket (06).
Place the pins (56) and tightening screws (55) in the gear cover (12) if necessary.
Place the oil plugs (85,87,87A), sight glass (86) and seal ring (88) into the gear cover (12).
Place the gear cover (12) on the bearing bracket (06).
Secure the gear cover (12) by tightening the studs (55A).
Place the cotter pin (61A) into the drive shaft (05).



12 **Guards:**
Place the guards (47) and secure them using the safety screws (50).



13 **Oil filling:**
Fill the pump with food grade oil as described in section 8.5. Lubrication .

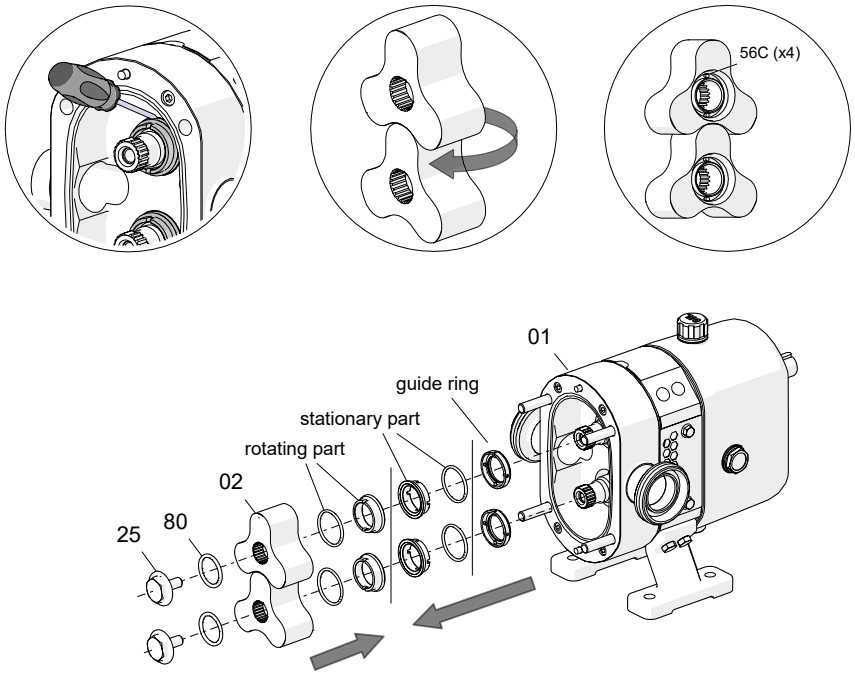


8.11. SEALING OPTIONS

8.11.1. Single mechanical seal

Disassembly

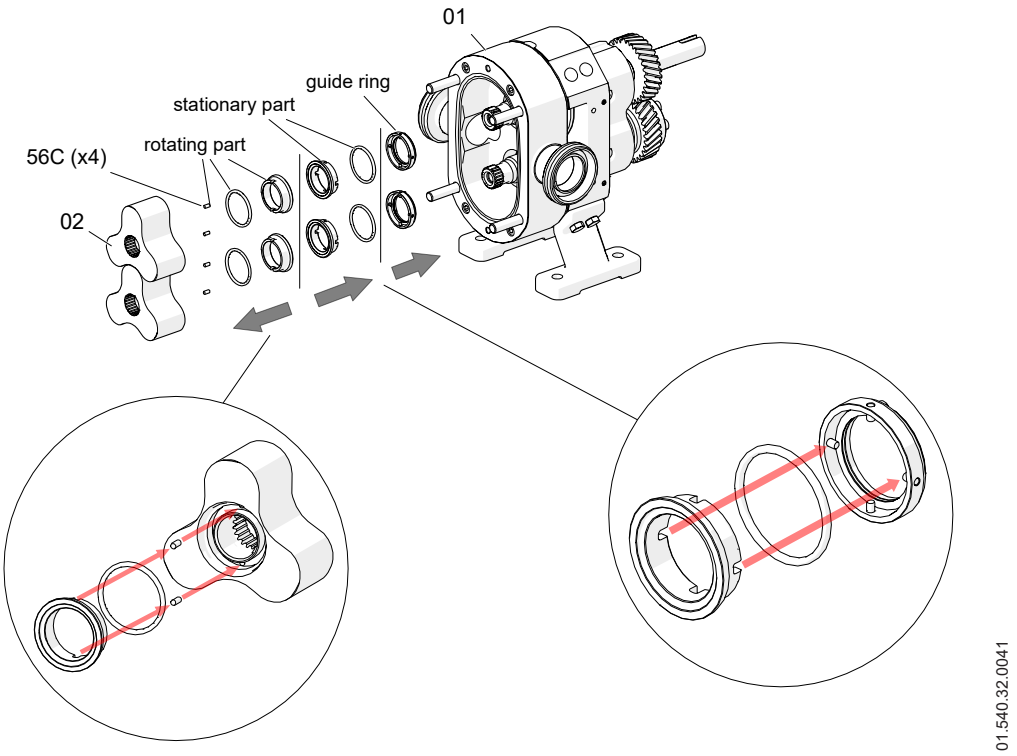
1. Remove the rotating part of the single mechanical seal (08) from the rear of the rotors (02).
2. Remove the stationary part and the guide ring of the single mechanical seal (08) from the pump body (01) using a screwdriver or a sharp tool.
3. Check the pins (56C) securing the rotating part of the mechanical seal (08) are fitted correctly at the rear of the rotors.



Assembly

1. Slide the mechanical seal (08) guide ring into the pump body (01). The guide ring must fit snugly into the bottom of the pump body (01) by matching the guide ring positioners with the body (01) grooves.
2. Place the gasket onto the stationary part of the mechanical seal (08).
3. Place the stationary part of the mechanical seal (08) into the body (01) by matching the grooves of the stationary part to guide ring pins.
4. Place the gasket onto the rotating part of the mechanical seal (08).
5. Replace the pins (56C) of the rotating part of the mechanical seal (08) in the rotor (02) if necessary.
6. Place the rotating part of the mechanical seal (08) inside the rotor (02) matching the grooves of the rotating part with the pins (56C).

By default, the mechanical seal materials for the UltiLobe pump are made from graphite (C) for the rotating part and silicon carbide (SiC) for the stationary part. To differentiate both parts from each other, note that the stationary part (SiC) has 4 grooves as opposed to the two on the rotating part (C). This prevents the graphite rotating part (C) from being fitted into the pump body.



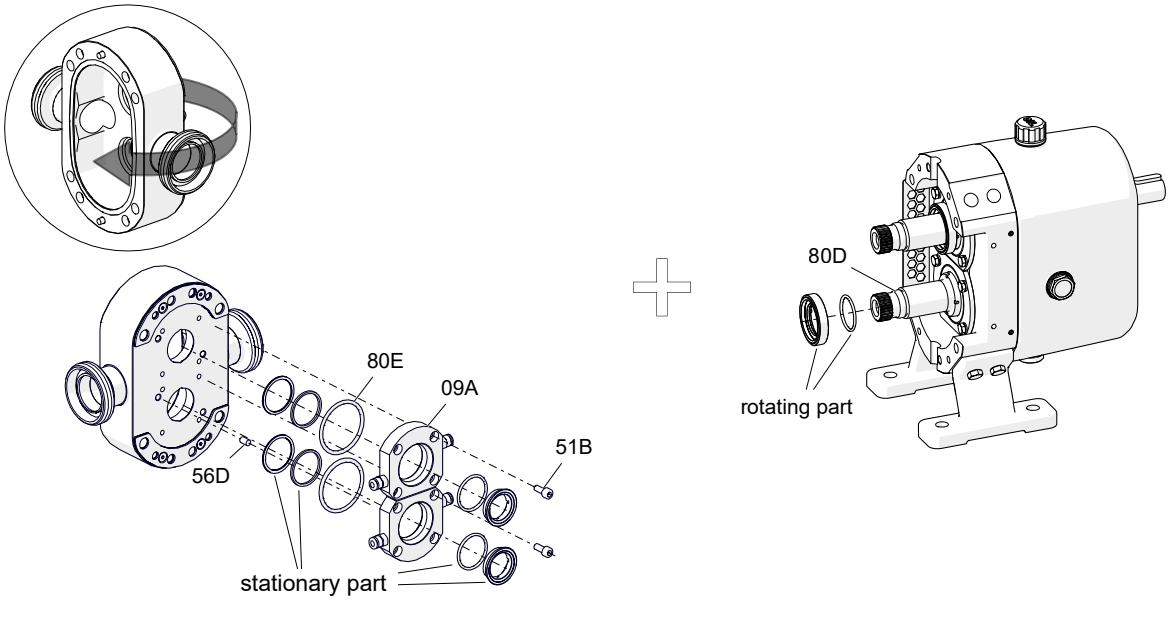
8.11.2. Double mechanical seal

The double mechanical seal consists of the single mechanical seal plus the secondary mechanical seal. The assembly and disassembly of the secondary mechanical seal will depend on the pump size.

UL-1, UL-2

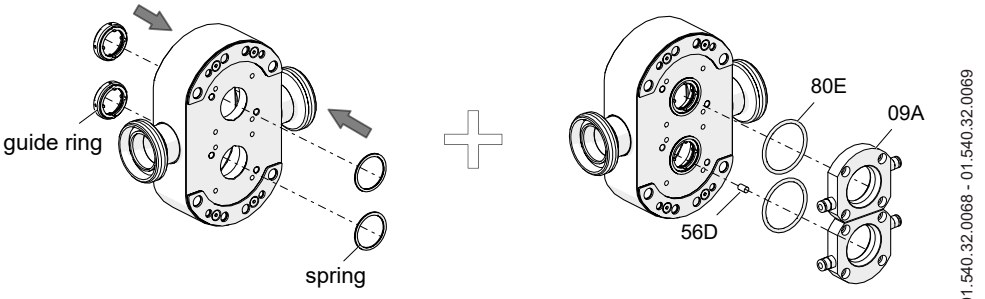
Disassembly

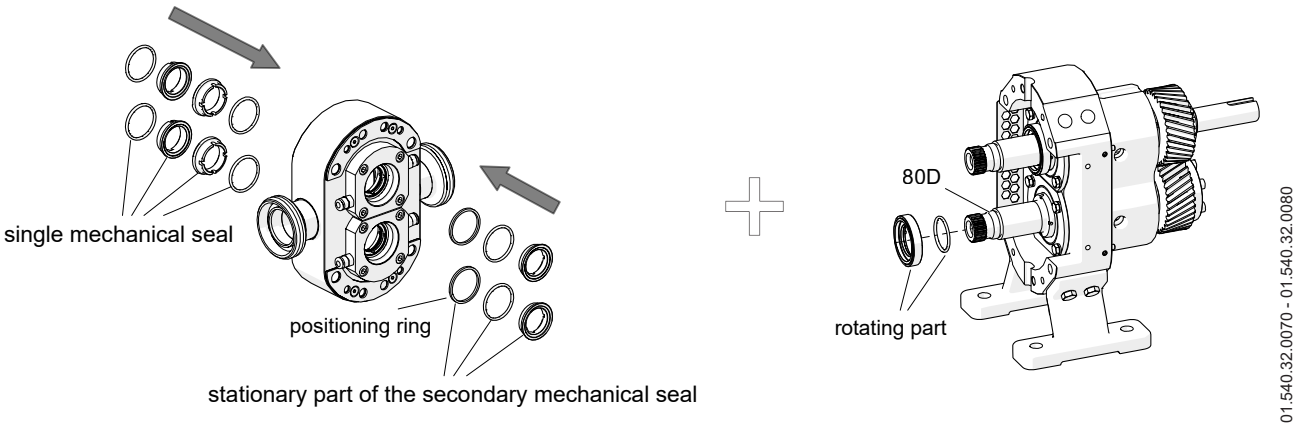
1. Disassemble the body (01) from the bearing bracket (06).
2. Remove the parts from the stationary part of the secondary mechanical seal (08A), which are housed in the secondary mechanical seal cover (09A).
3. Disassemble the cover (09A) from the secondary mechanical seal by loosening the screws (51B) securing it to the pump body (01).
4. Remove the spring and the positioning ring that are left up against the pump body (01).
5. Remove the rotating part of the secondary mechanical seal (08A) from the shafts (05,05A).
6. Remove the gasket (80E) from the cover (09A) of the secondary mechanical seal (08A).
7. Remove the gasket (80D) from the pump shafts (05,05A).



Assembly

1. Disassemble the body (01) from the bearing bracket (06) and place the pins (56D) in the pump body (01) if necessary.
2. Position the body horizontally so the secondary spring can be placed into the rear of the pump body (01).
3. Place the gaskets (80E) onto the covers (09A) of the secondary mechanical seal (08A).
4. Place the secondary mechanical seal covers (09A) onto the pump body (01) and secure them using the screws (51B).
5. Lift the body (01) and slide the mechanical seal (08) guide ring over the front of the pump body (01). It must fit snugly into the bottom of the body (01) by matching the guide ring positioners with the body (01) grooves.
6. At the rear of the body (01), place the positioning ring on the secondary mechanical seal cover (09A).
7. Place the stationary part of the secondary mechanical seal (08A) into the secondary mechanical seal cover (09A) by matching the grooves of the stationary part with the protusions on the guide ring.
8. Place the rotating part of the secondary mechanical seal (08A) onto the shafts (05,05A).
9. Place the gaskets (80D) onto the shafts (05,05A) if needed.
10. Fit the body (01) in the bearing bracket (06) by tightening the Allen screws (51).
11. Fit the stationary part of the main mechanical seal through the front of the pump body (01).
12. Fit the rotating part of the main mechanical seal into the rotors (02).

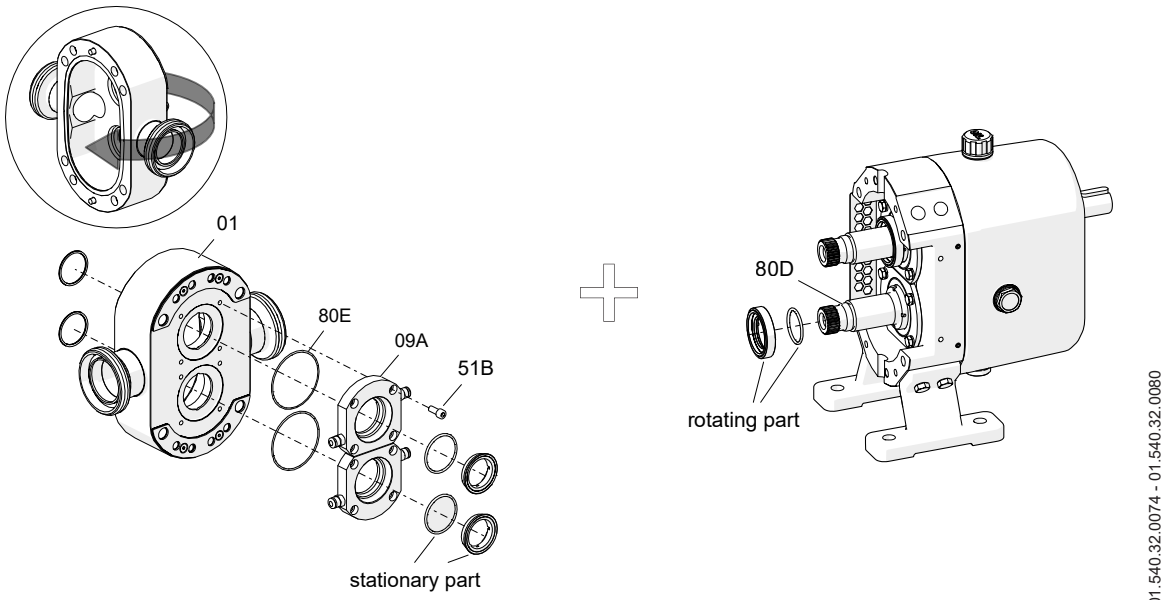




UL-3, UL-4

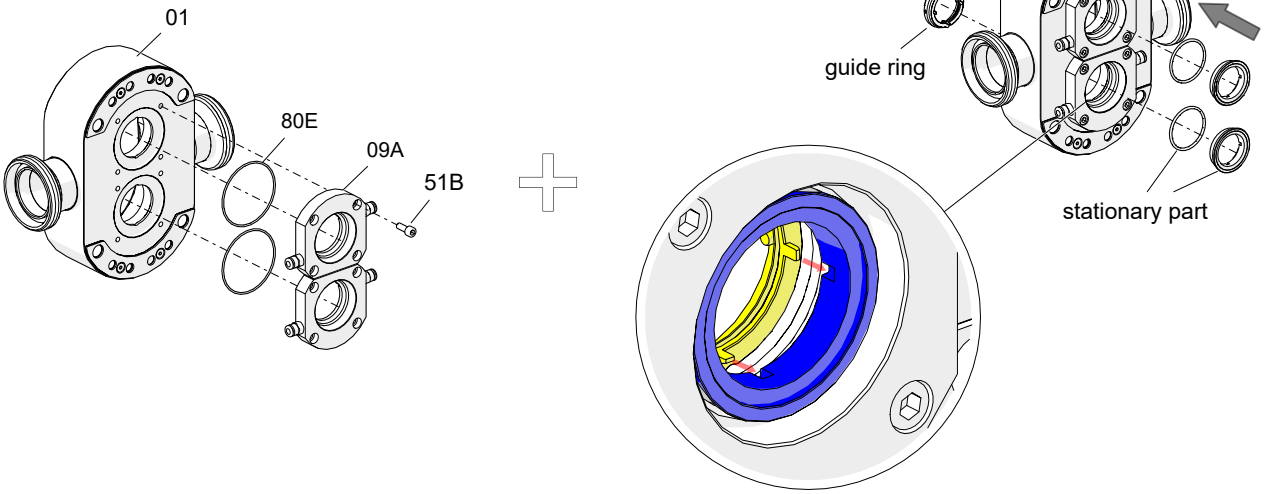
Disassembly

1. Remove the parts from the stationary part of the secondary mechanical seal (08A), which are housed in the secondary mechanical seal cover (09A).
2. Disassemble the secondary mechanical seal cover (09A) by loosening the screws (51B) securing it to the pump body (01).
3. Remove the spring from the stationary part of the secondary mechanical seal (08A) that remains in the rear part of the pump body (01).
4. Remove the rotating part of the secondary mechanical seal (08A) from the shafts (05,05A).
5. Remove the gasket (80E) from the secondary mechanical seal cover (09A).
6. Remove the gasket (80D) from the pump shafts (05,05A).



Assembly

1. Disassemble the body (01) from the bearing bracket (06).
2. Place the gaskets (80E) into the secondary mechanical seal covers (09A).
3. Place the secondary mechanical seal covers (09A) onto the pump body (01) and secure them using the screws (51B).
4. Slide the mechanical seal (08) guide ring into the pump body (01). It must fit snugly into the bottom of the body (01) by matching the guide ring positioners with the body (01) grooves.
5. Place the stationary part of the secondary mechanical seal (08A), except the spring, into the cover (09A) of the secondary mechanical seal (08A) by matching the grooves with the protrusions on the guide ring.
6. Remove the secondary mechanical seal (08A) guide ring from the body (01).
7. Place the spring of the secondary mechanical seal on the back of the guide ring and secure into position, placing two spots of food grade grease.
8. Place the guide ring into the body (01) again by fitting it to the stationary part of the pre-assembled secondary mechanical seal and the grooves of the body (01).
9. Place the rotating part of the secondary mechanical seal (08A) onto the shafts (05,05A).
10. Place the gaskets (80D) onto the shafts (05,05A) if needed.
11. Avoiding making sudden movements, fit the body (01) in the bearing bracket (06) by tightening the Allen screws (51).
12. Fit the stationary part of the main mechanical seal through the front of the pump body (01).
13. Fit the rotating part of the main mechanical seal into the rotors (02).



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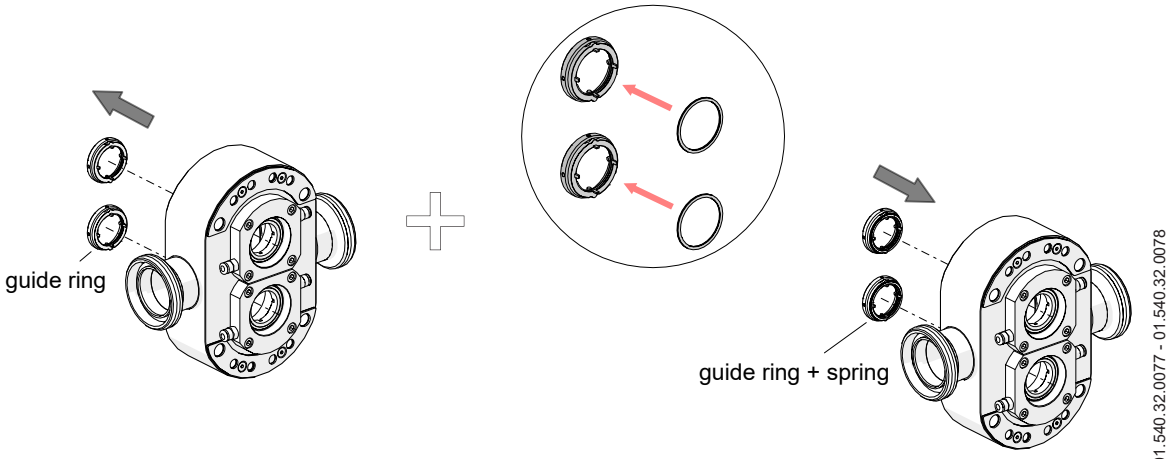
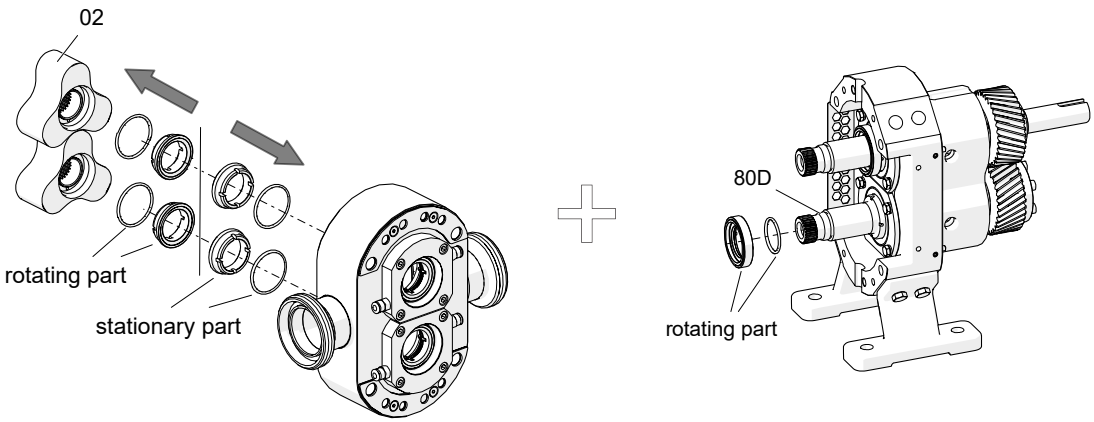


01.540.32.0077 - 01.540.32.0078



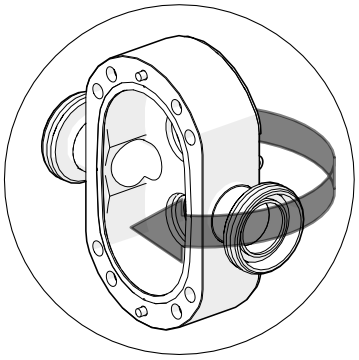
01.540.32.0079 - 01.540.32.0080

8.11.3. Cooled mechanical seal (quench)

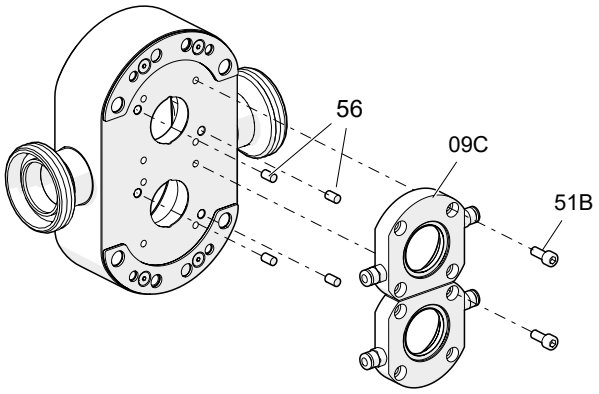
Disassembly

1. Disassemble the single mechanical seal as described in section 8.11.1. Single mechanical seal.
2. Disassemble the cooled mechanical seal covers (09C) by loosening the screws (51B) securing them to the pump body (01).
3. Remove the pins (56) from the pump body (01) on UL-1 and UL-2 models if necessary.
4. Remove the seal rings (88B) from the cooled mechanical seal cover (09C) using a plastic cylinder.
5. Remove the O-rings (80E) from the cooled mechanical seal covers (09C).
6. Separate the jackets (13A) from the shafts (05,05A) by loosening the stud bolts (55C).
7. Remove the pins (56D) from the jackets (13A) if necessary.
8. Remove the O-rings (80D) from the jackets (13A).
9. Remove the O-rings (80F) from the shafts (05,05A).

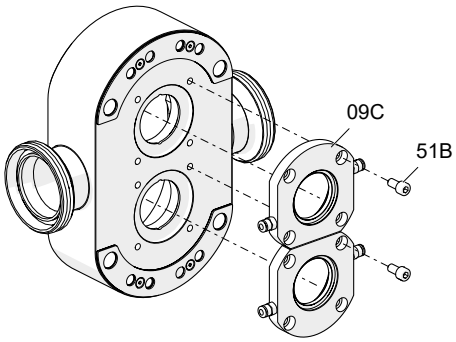
1



UL-1, UL-2

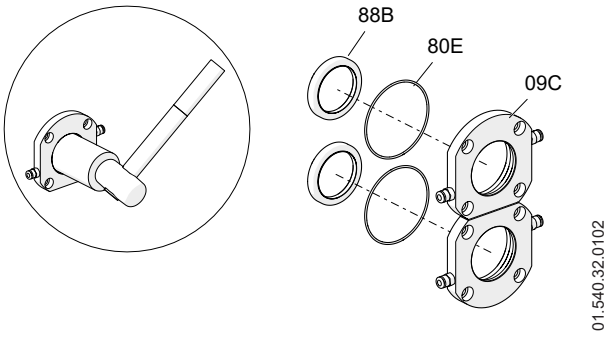


UL-3, UL-4



01.540.32.0111 - 01.540.32.0114

2



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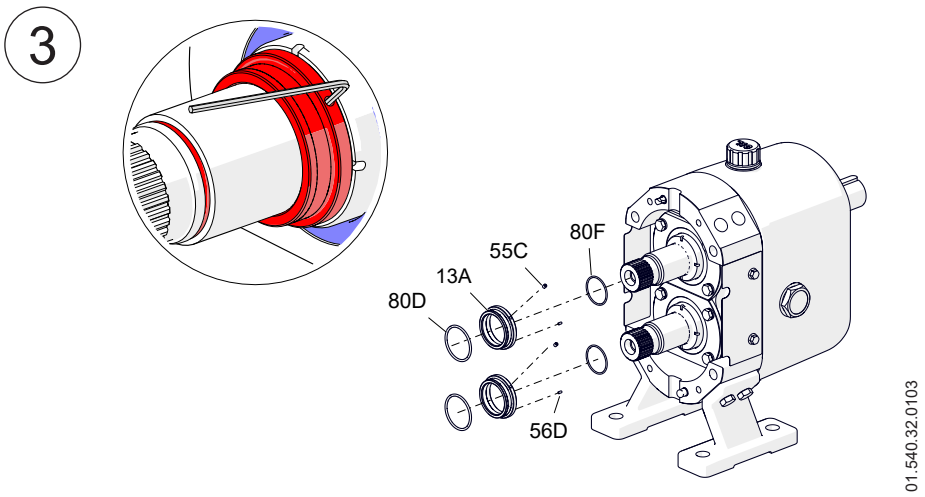
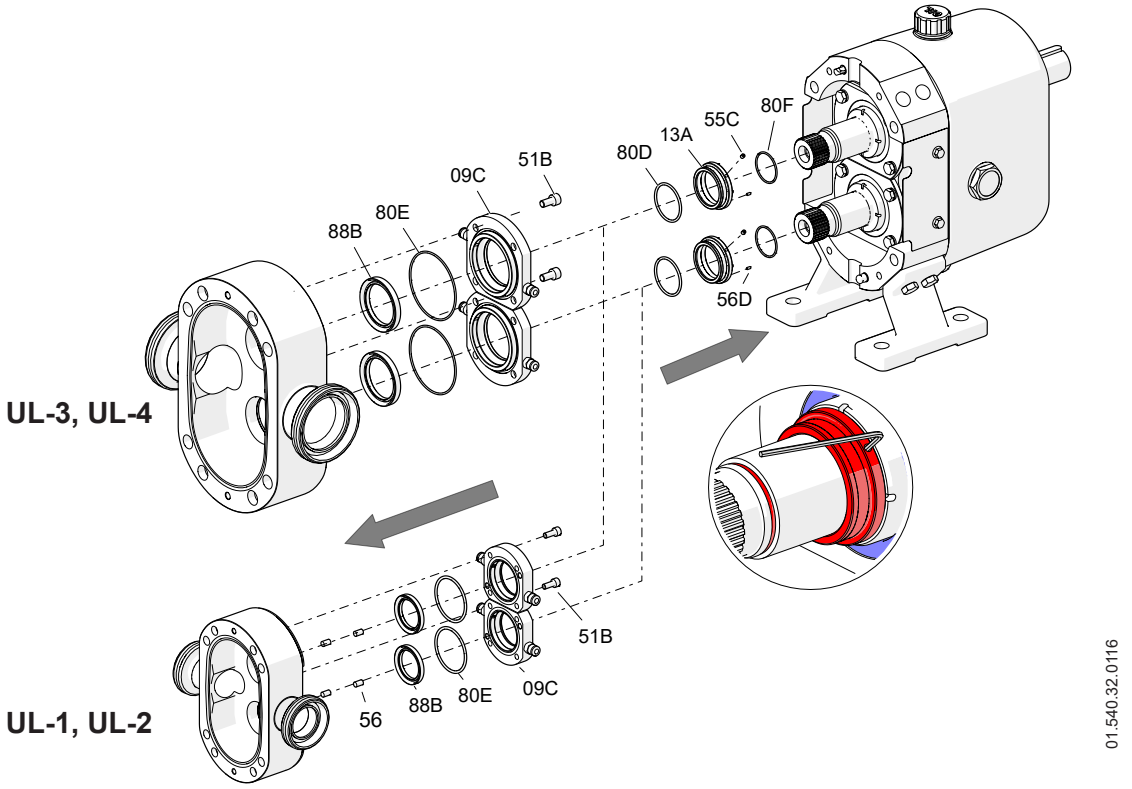


Assembly

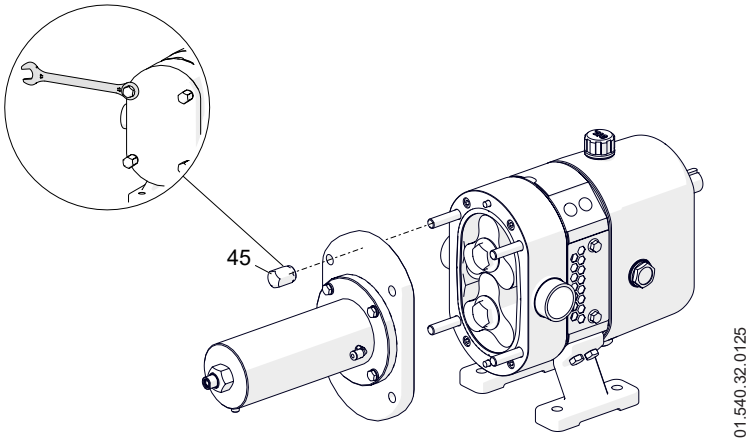
1. Place the seal rings (88B) into the cooled mechanical seal covers (09C).
2. Place the O-rings (80E) into the cooled mechanical seal covers (09C).
3. For the UL-1 and UL-2 models, place the pins (56) in the pump body (01).
4. Place the cooled mechanical seal covers (09C) on the pump body (01) and secure them using the screws (51B).
5. Place the pins (56D) into the jackets (13A).
6. Place the O-rings (80D) into the jackets (13A).
7. Place the O-rings (80F) on the shafts (05,05A).
8. Place the jackets (13A) on the shafts (05,05A) and secure them using the stud bolts (55C).
9. Fit the pump body (01) to the bearing bracket (06).
10. Fit the single mechanical seal as described in section 8.11.1. Single mechanical seal.



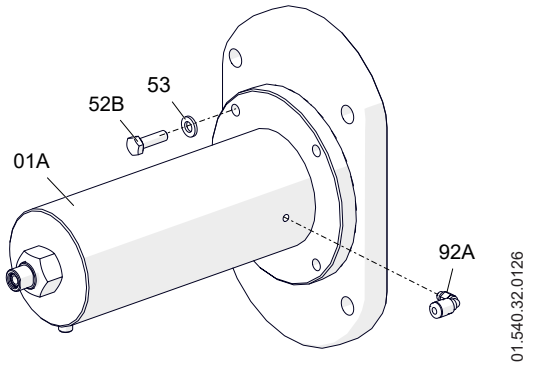
8.12. PRESSURE BYPASS

8.12.1. Pressure bypass disassembly

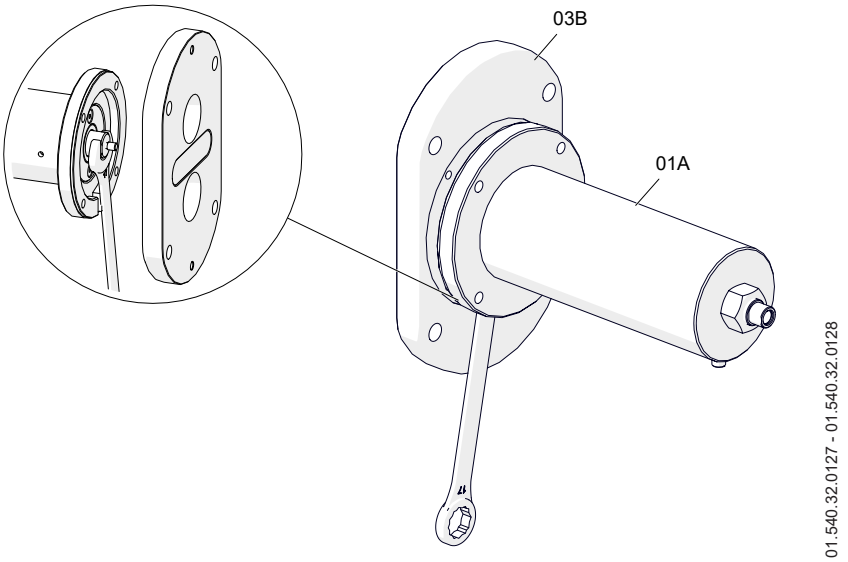
1. Disassemble the bypass from the pump by unscrewing the domed cap nuts (45) using an open-ended spanner.



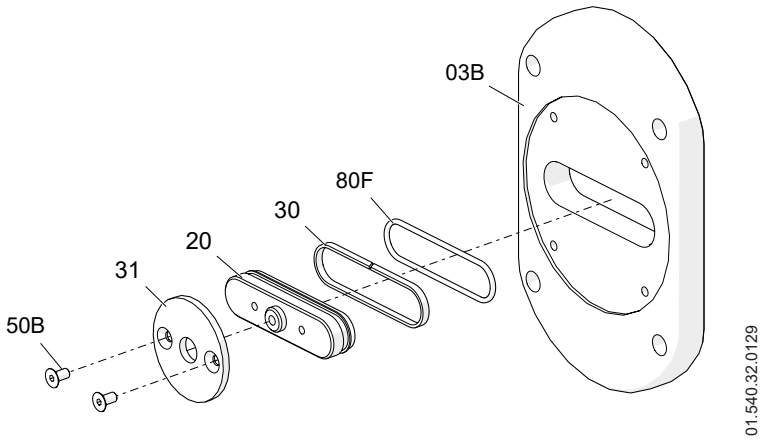
2. Unscrew the screws (52B) and the washers (53).
3. Disassemble the connector (92A) from the bypass body (01A).



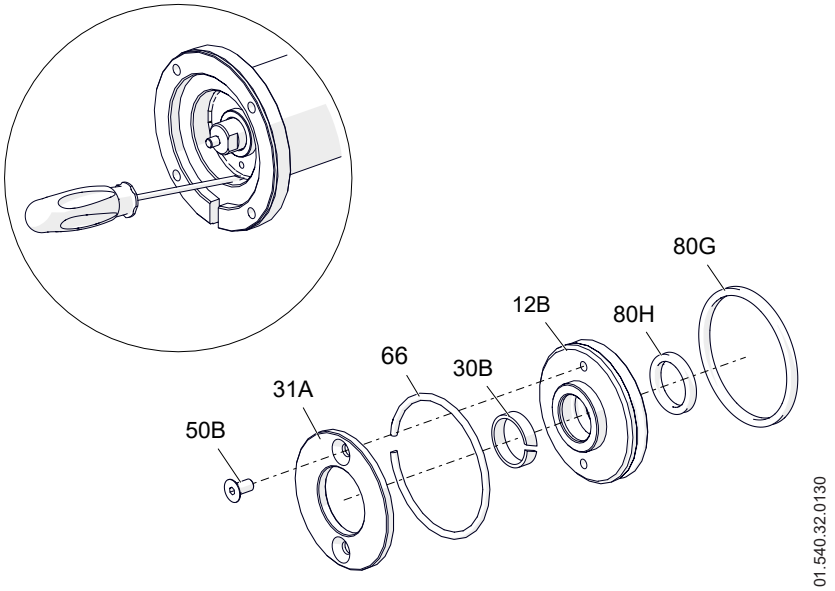
4. Separate the cover and the bypass body (01A) from each other until a 17 mm open-end spanner can be used to unscrew the cover + piston assembly from the rest of the bypass.



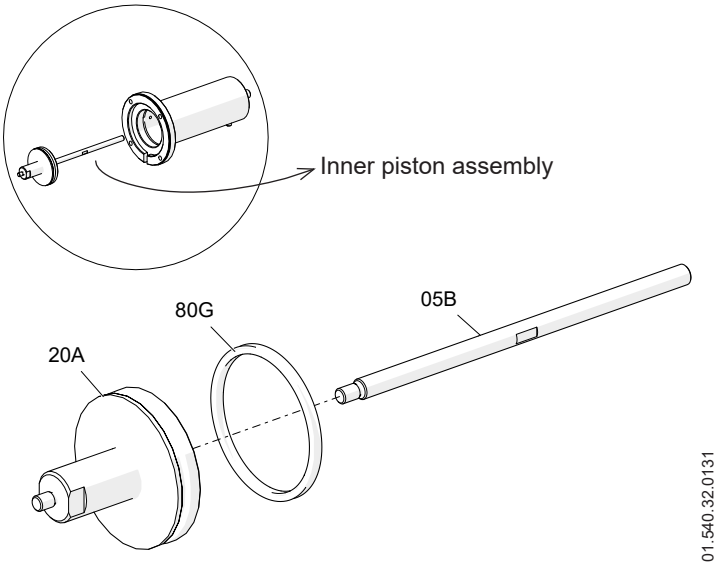
5. Separate the pump cover (03B) from the piston (20). A rubber hammer and a block of wood can be used if help is needed.
6. Disassemble the ring (31) from the piston (20) by unscrewing the screws (50B).
7. Separate the belt guide (30) and O-ring (80F) from the piston (20).



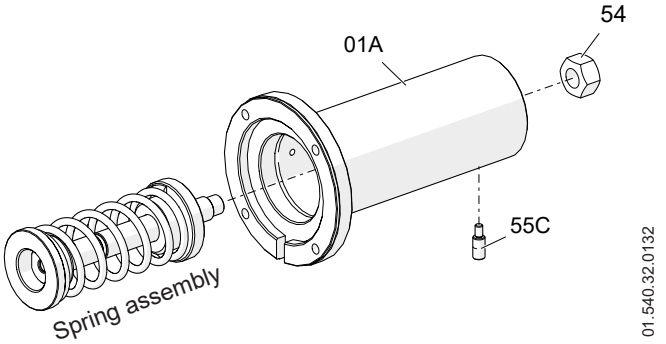
8. Unscrew the screws (50B) from the inner piston base ring (31A).
9. Pull the inner piston base ring (31A) forward to separate it from the body (01A).
10. Remove the retaining ring (66) from the bypass body (01A) with the help of a sharp tool.
11. Remove the inner piston base (12B) from the bypass body (01A).
12. Remove the O-rings (80G,80H) and the IGUS piston ring (30B) from the inner piston base (12B).



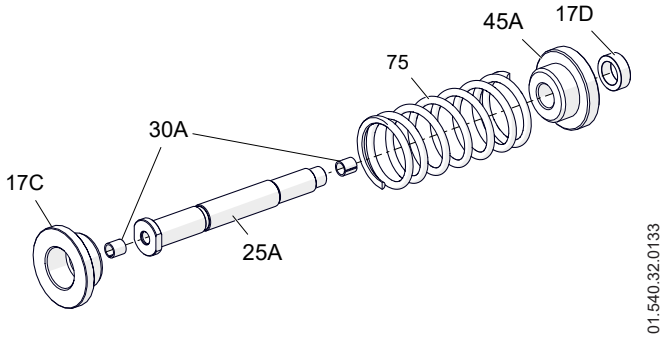
13. Remove the inner piston assembly (20A) from the bypass body (01A).
14. Unscrew the indicator shaft (05B) from the inner piston (20A).
15. Remove the O-ring (80G) from the inner piston (20A).



16. Unscrew the indicator screw (55C) and nut (54) from the bypass body (01A).
17. Remove the spring assembly from the bypass body (01A).

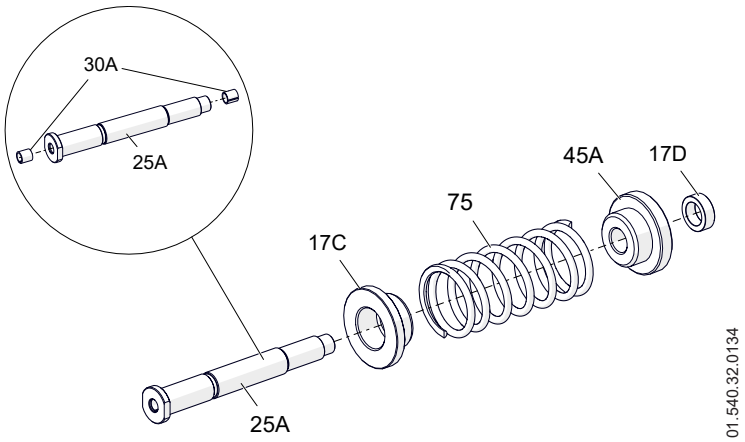


18. Remove the spacer (17D) from the shaft bolt (25A).
19. Unscrew the adjusting nut (45A) from the shaft bolt (25A) to separate the parts of the spring assembly: spring (75), spring bushing (17C) and shaft bolt (25A).
20. Remove the IGUS piston rings (30A) from the shaft bolt (25A).

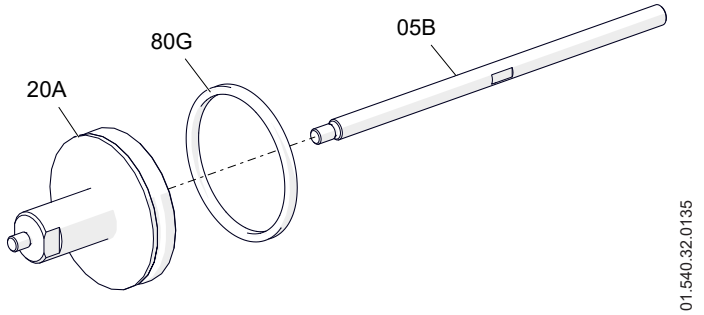


8.12.2. Pressure bypass assembly

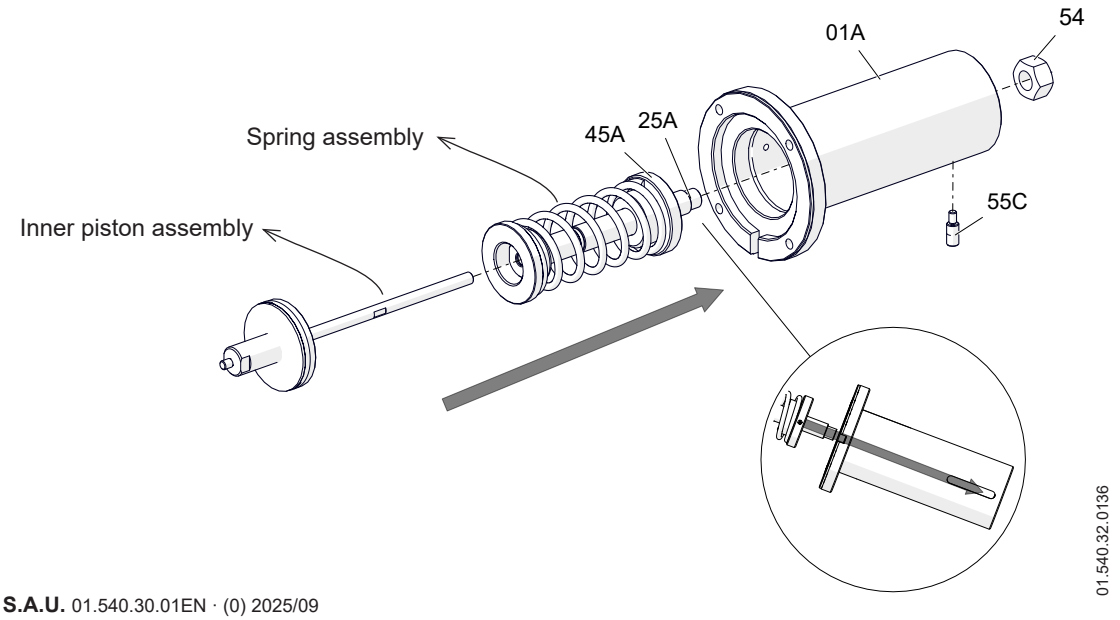
1. Place the IGUS piston rings (30A) onto the shaft bolt (25A).
2. Fit the spring assembly:
   - Pass the shaft bolt (25A) through the spring bushing (17C) and place the spring (75) over the shaft bolt (25A).
   - Screw the adjusting nut (45A) on to the shaft bolt (25A) completely.
   - Place the spacer (17D) onto the shaft bolt (25A).



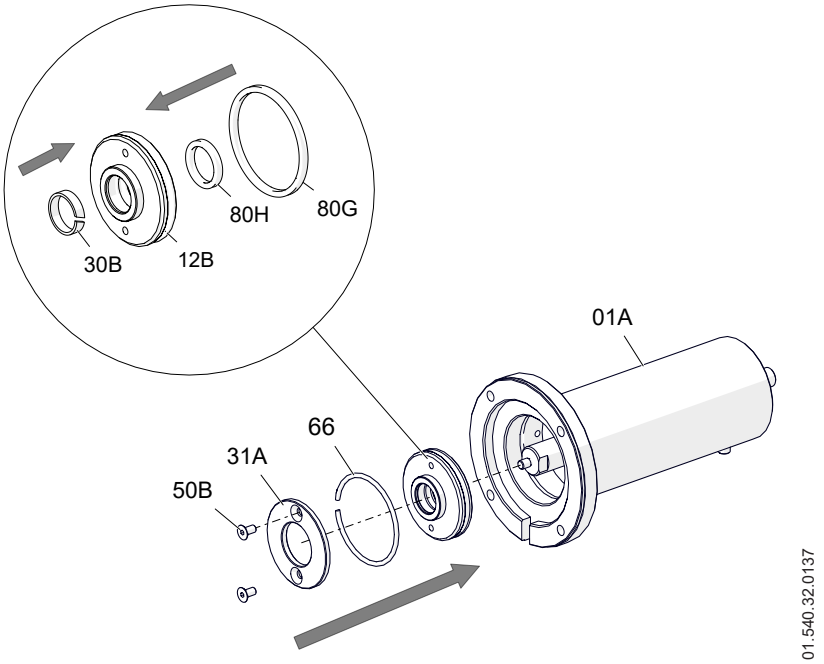
3. Fit the inner piston assembly by placing the O-ring (80G) on the inner piston (20A) and screwing it to the indicator shaft (05B).



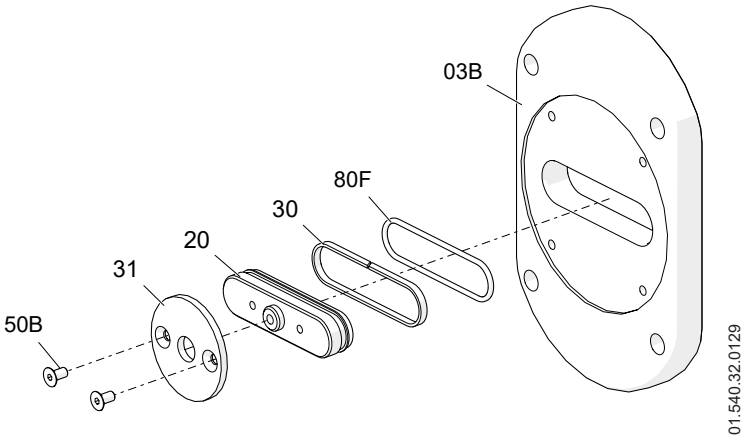
4. Insert the spring assembly into the bypass body (01A) taking into account that the adjusting nut (45A) must be aligned with the body (01A) groove.
5. Screw the indicator screw (55C) into the adjusting nut (45A) and the nut (54) onto the shaft bolt (25A).
6. Place the inner piston assembly into the bypass body (01A) by passing the indicator shaft (05B) through the inside of the shaft bolt (25A).



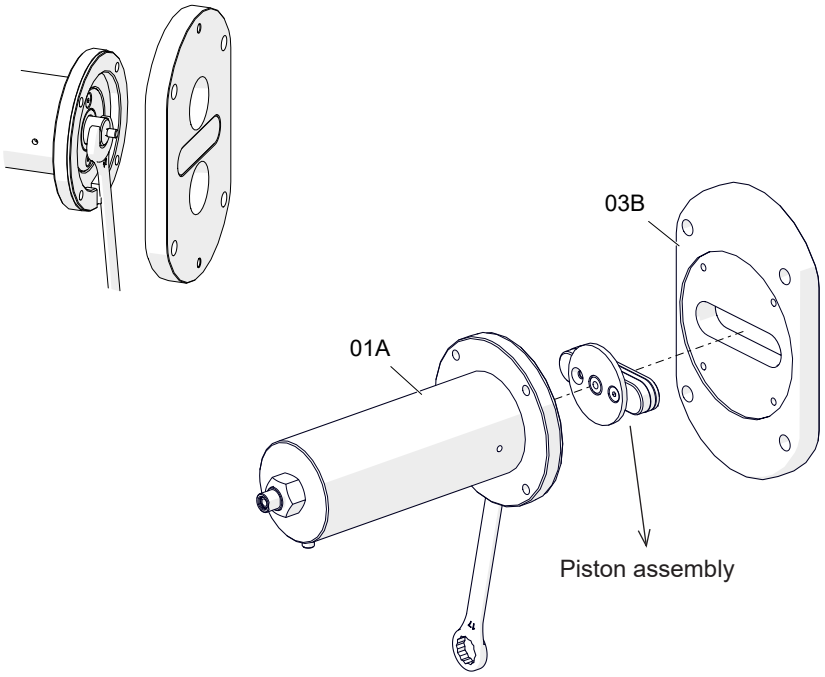
7. Fit the IGUS piston ring (30B) and O-rings (80H,80G) into the inner piston base (12B).
8. Place the inner piston base (12B) inside the bypass body (01) until it passes the retaining ring (66) groove.
9. Place the retaining ring (66) and the inner piston base ring (31A) and secure them using the screws (50B).



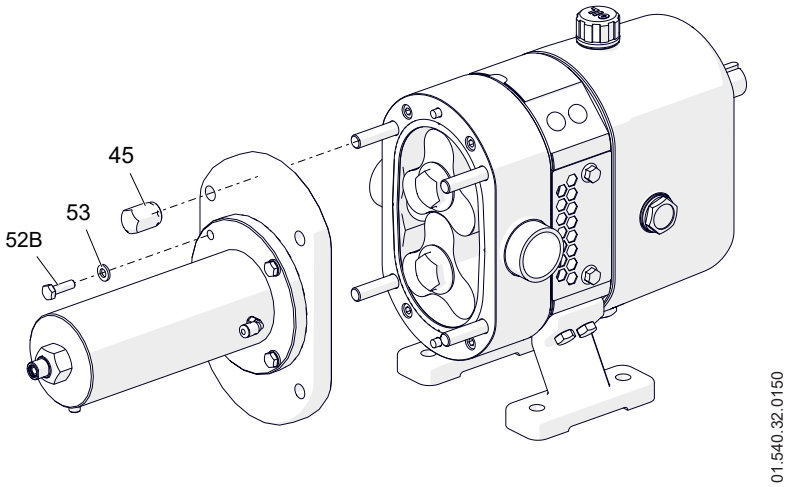
10. Fit the piston assembly by placing the O-ring (80F) and the belt guide (30) on the piston (20) and securing the piston ring (31) using the screws (50B).
11. Using a rubber hammer, place the piston assembly into the pump cover (03B) taking care not to damage the gasket.



12. Place the bypass body (01A) in the pump cover (03B) and screw the piston (20) to the inner piston (20A) using a 17 mm open-end spanner.

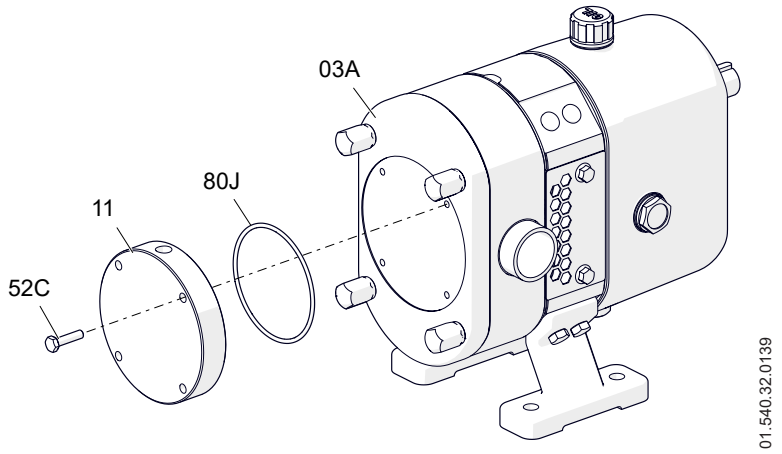


13. Secure the bypass body (01A) into the pump cover (03B) using the screws (52B) and nuts (53).
14. Secure the pump cover (03B) to the pump using the domed cap nuts (45).



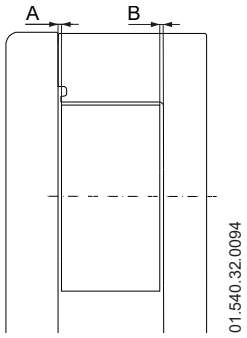
8.13. FRONT HEATING CHAMBER

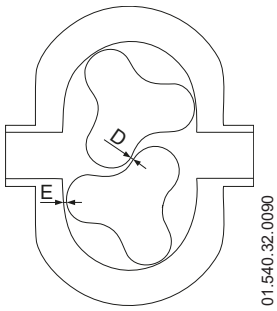
To disassemble the front heating chamber from the pump, the back cover (11) needs to be disassembled by unscrewing the screws (52C) and removing the O-ring (80J) from it.

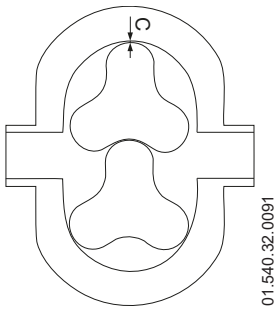


To fit the front heating chamber to the pump, the O-ring (80J) needs to be placed on the back cover (11) and secured to the cover (03A) using the screws (52C).

8.14. PLAY AND TOLERANCES REQUIRED FOR SYNCHRONISING AND ADJUSTING ROTORS







The following table details the distances required for synchronising and adjusting the rotors.
The included distances are:

- A: axial play between rotor and cover.
- B: axial play between rotor and rear of body.
- C: radial play between rotor and body.
- D: radial play between rotors.
- E: radial play between rotor and body during suction.

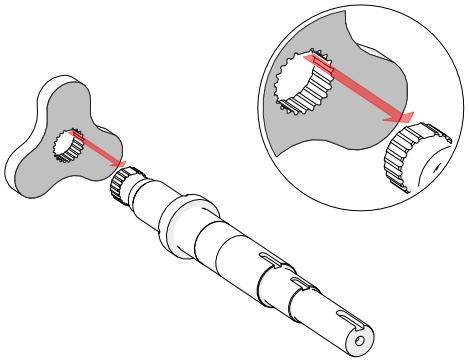
Pump	Dimensions [mm]				
	A	B	C	D	E
UL-12	0.15 ± 0.05	0.10 ± 0.05	0.15 ± 0.05	0.15 ± 0.05	0.35 ± 0.05
UL-13	0.15 ± 0.05	0.10 ± 0.05	0.20 ± 0.05	0.15 ± 0.05	0.40 ± 0.05
UL-22	0.20 ± 0.05	0.15 ± 0.05	0.15 ± 0.05	0.15 ± 0.05	0.35 ± 0.05
UL-23	0.20 ± 0.05	0.15 ± 0.05	0.20 ± 0.05	0.15 ± 0.05	0.40 ± 0.05
UL-32	0.25 ± 0.05	0.20 ± 0.05	0.20 ± 0.05	0.20 ± 0.05	0.45 ± 0.10
UL-33	0.30 ± 0.05	0.20 ± 0.05	0.30 ± 0.05	0.20 ± 0.05	0.55 ± 0.10
UL-42	0.25 ± 0.05	0.20 ± 0.05	0.30 ± 0.05	0.20 ± 0.05	0.55 ± 0.10
UL-43	0.30 ± 0.05	0.20 ± 0.05	0.35 ± 0.10	0.20 ± 0.05	0.65 ± 0.10

8.15. ROTOR SYNCHRONISATION

In lobe pumps, the rotors need synchronising to ensure they rotate without touching each other and to maintain specific distances between them and the pump body.

Once the gears have been assembled into the pump, the rotors must be synchronised by the following these steps:

1. Loosen the screws (51A) that secure the drive bushing (17A) to the gear (19A) for the driven shaft (05A).
2. Fit the rotors (02) onto the shafts (05,05A) and secure them using the rotor screws (25), maintaining their original positions. Pay attention to the grooved form of the rotor and the shaft for correct coupling.



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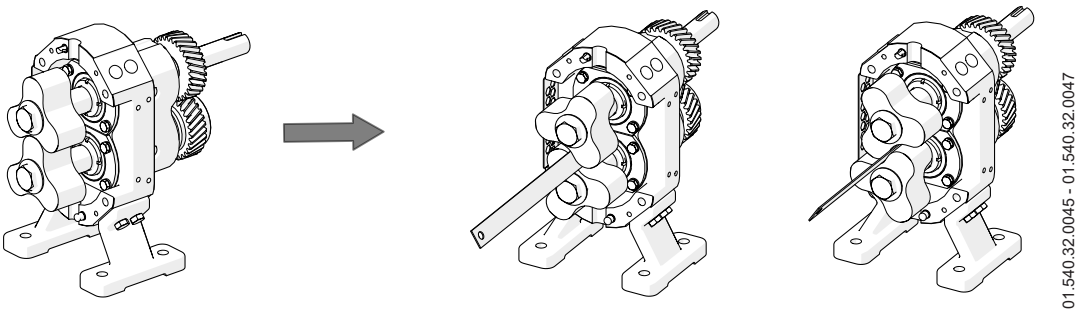
3. Turn the rotors (02) to position 1 and check the distance between the rotors is within the tolerances indicated in section 8.14. Play and tolerances required for synchronising and adjusting the rotors. This distance corresponds to the dimension D shown in that section.
4. Tighten the screws (51A) without reaching the maximum tightening torque.
5. Turn the rotors (02) about 60° to position 2 and check the distance in this position is equal to the distance in position 1.
6. If the distances are not equal, secure one rotor and slightly rotate the other until the distance is equal.
7. Repeat the last two steps for each combination of different rotor lobes.
8. When the distances are equal, place a wooden or plastic block between the rotors to prevent them from turning and tighten the screws (51A) in a criss-cross pattern to the maximum torque indicated in section 8.4. Tightening torque.
9. Disassemble the rotors (02) from the pump shafts (05,05A). Mark the rotors before disassembly so that they can be kept in the same position for final assembly.



Position 1 Position 2

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8.16. ROTOR ADJUSTMENT

The rotors must be adjusted once synchronised, checking that the distances between them and the pump body and cover are correct. The distances requiring checking are the A and B dimensions shown in section 8.14. Play and tolerances required for synchronising and adjusting the rotors.

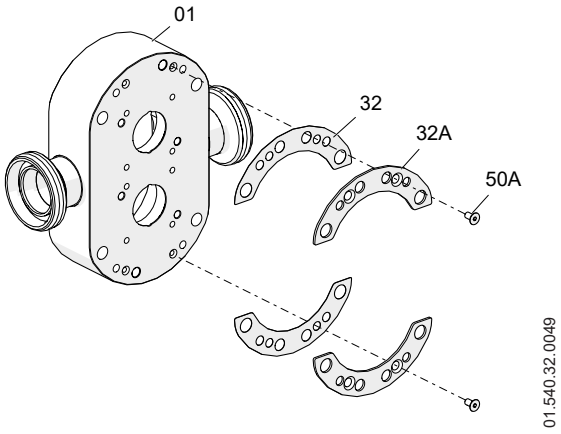
Follow the steps below to ensure the rotors are adjusted properly:

1. Check that the gauge clamps (32A) are fitted onto the body (01).
2. Place the body (01) into the bearing bracket (06) and secure it using the screws (51).
3. Place the rotors (02) on the shafts (05,05A) and secure them using the rotor screws (25) and their gaskets (80).
4. Check the distances between the rotors and the body. In particular, dimensions A and B shown in section 8.14. Play and tolerances required for synchronising and adjusting the rotors must be checked. Distance A should be measured using a depth gauge and distance B using a set of feeler gauges. If the pump is fitted properly, adjusting the distance A within the tolerances indicated in section 8.14. Play and tolerances required for synchronising and adjusting the rotors also adjusts distance B.
5. If distance A does not fall within the required tolerances when checked, a gauge (32) of a certain thickness to rectify said distance must be fitted between the gauge clamps (32A) and the body (01). The available gauges are 0.10 - 0.15 - 0.20 mm.

If the distance A is less than the required distance, the distance must be compensated using the available gauges. The sum of the thickness of the gauges placed top and bottom must not differ by more than 0.10 mm.

For example, if distance A is 0.05 mm in a UL-22 pump, it does not comply with the required tolerances. To achieve this distance, a 0.15 mm gauge must be placed between the gauge clamps (32A) and the body (01). This will mean distance A becomes 0.20 mm.

If the distance A is bigger than the required distance, check the pump assembly.



7. Check distance B with a set of feeler gauges.
8. Check distances C and E with a set of feeler gauges.
9. Disassemble the rotors and proceed with the assembly described in section 8.10. Assembling the pump.

9. Technical specifications

Maximum operating pressure	1600 kPa (16 bar)
Operating temperature range	-10ºC to 120ºC (EPDM)
Maximum viscosity (recommended)	100,000 mPa.s
Maximum connections	100 mm
Suction/pressure connections	DIN 11851 - SMS - Clamp OD

Materials

Parts in contact with the product	1.4404 (AISI 316L)
Bearing bracket	1.4307 (AISI 304L)
Gaskets in contact with the product	EPDM - standard
Exterior finish	matte
Internal finish	Ra ≤ 0.8 µm

Mechanical seal

Rotating part material	graphite (C)
Stationary part material	Silicon carbide (SiC)
Gasket material	EPDM - standard

Double mechanical seal

Maximum operating pressure	1600 kPa (16 bar)
Operating pressure	150 - 200 kPa (1.5 - 2 bar) over the pump operating pressure
Minimum flow rate	30 litres/hour

Cooled mechanical seal (Quench)

Maximum operating pressure	50 kPa (0.5 bar)
Circulation flow rate	30 litres/hour

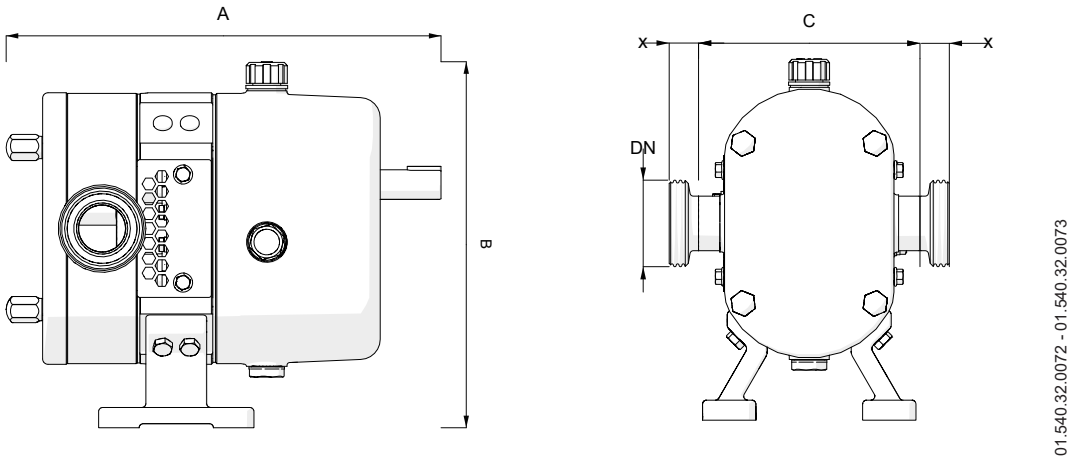
Size	Volume at 100 rev. [litres]	Maximum flow rate [m³/hour]	Differential max. p [bar]	Maximum speed [rpm]
UL-12	6.9	5.8	12	1400
UL-13	10.3	8.7	7	1400
UL-22	17.8	12.8	12	1200
UL-23	26.8	19.3	7	1200
UL-32	25.2	15.1	12	1000
UL-33	39.0	23.4	7	1000
UL-42	57.2	34.3	12	1000
UL-43	85.9	51.5	7	1000

Use specific protection if the noise level in the working area exceeds 85 dB (A)

9.1. WEIGHT

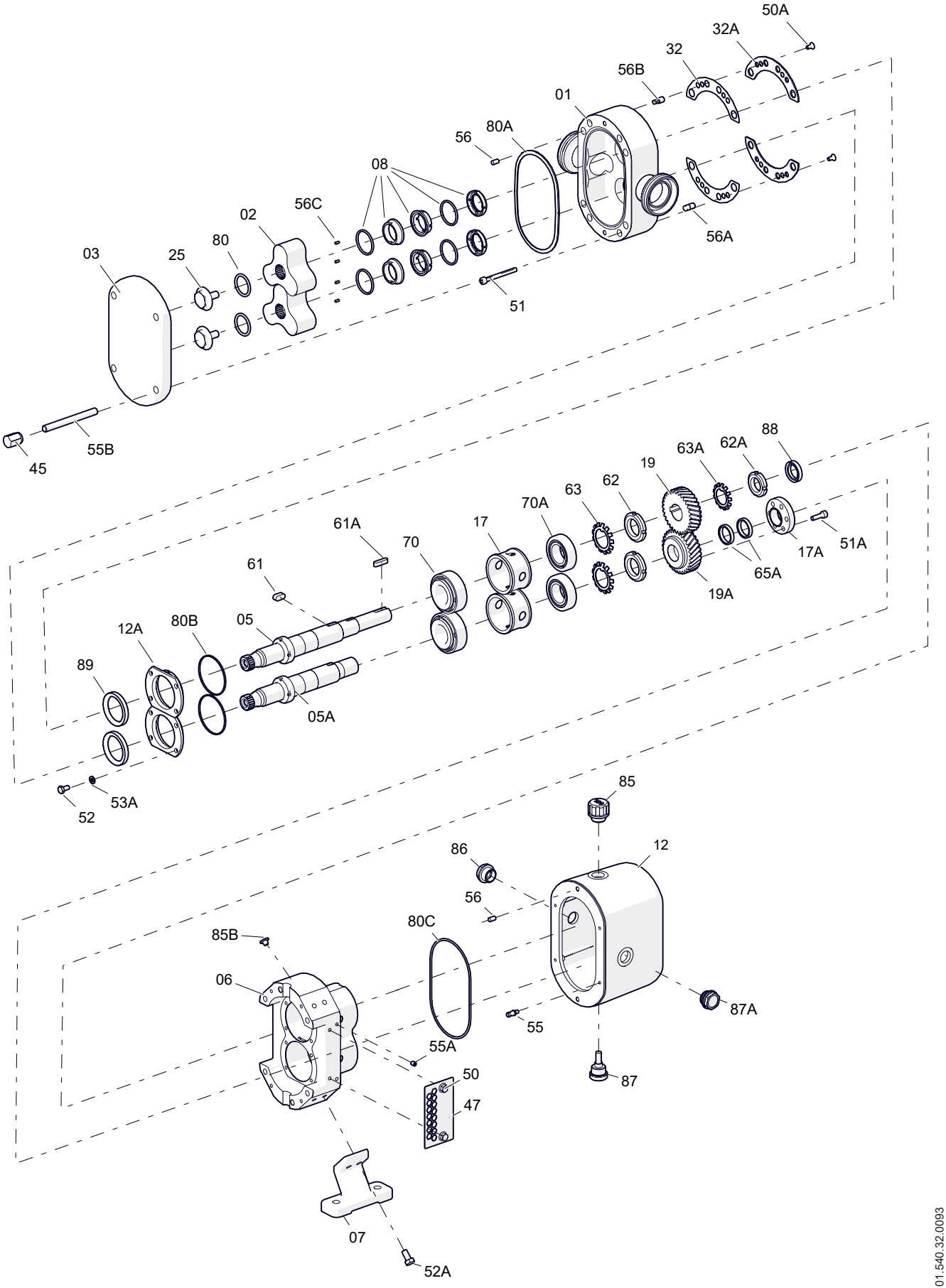
Size	Weight [kg]
UL-12	15
UL-13	16
UL-22	26
UL-23	28
UL-32	41
UL-33	45
UL-42	73
UL-43	80

9.2. DIMENSIONS



Size	Dimensions [mm]				
	A	B	C	DN	x
UL-12	278	235	126	25	22
UL-13	295	235	126	40	22
UL-22	325	270	166	40	22
UL-23	340	270	166	50	23
UL-32	365	300	196	50	23
UL-33	390	300	196	65	25
UL-42	450	375	230	65	25
UL-43	475	375	230	80	25

9.3. UL-1, UL-2 and UL-3 PUMP EXPLODED VIEW AND SPARE PARTS LIST



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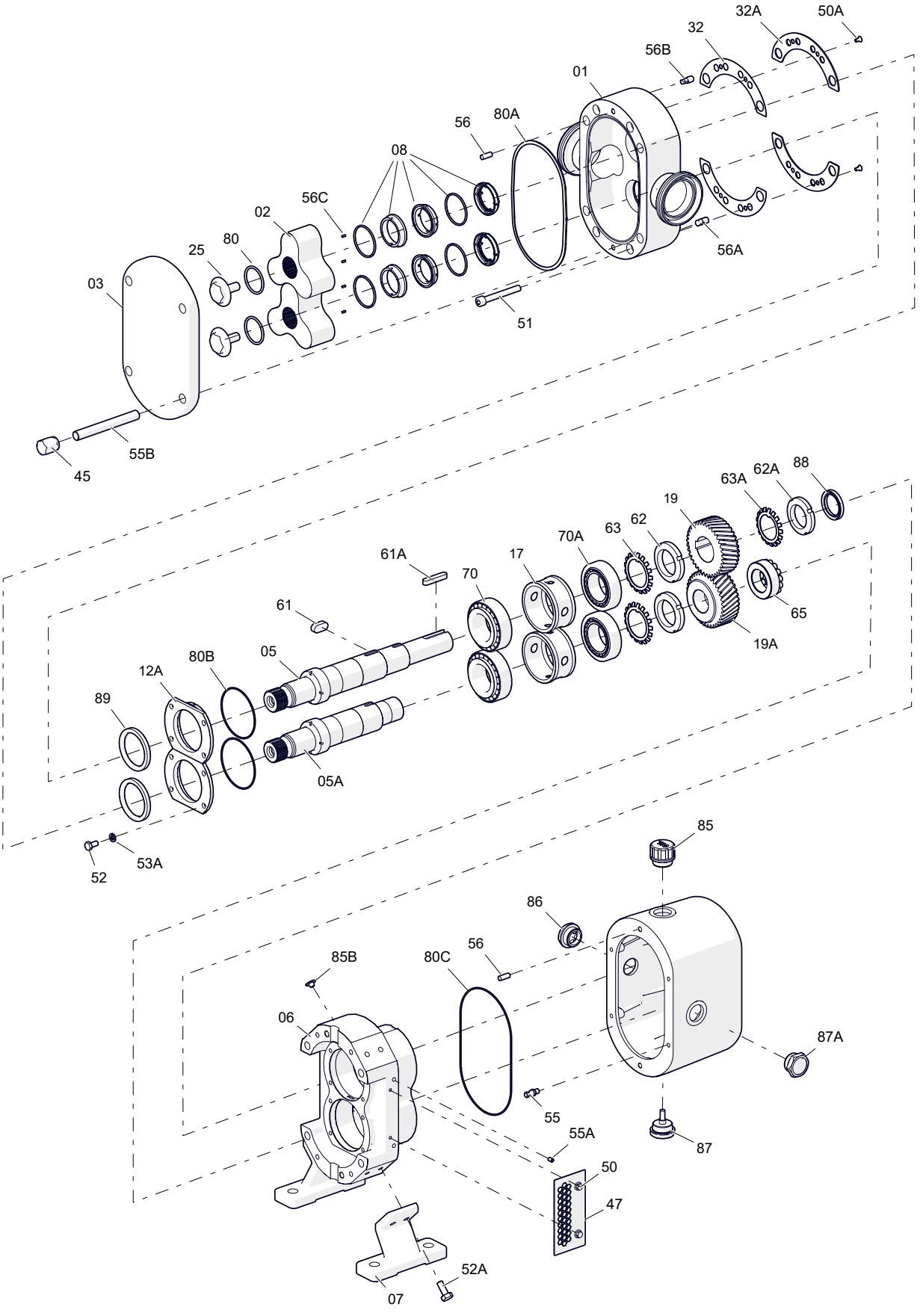
Position	Description	Quantity		Material
		UL-1	UL-2/UL-3	
01	body	1	1	1.4404 (AISI 316L)
02	tri-lobe rotor	2	2	1.4404 (AISI 316L)
03	pump cover	1	1	1.4404 (AISI 316L)
05	drive shaft	1	1	17-4PH (AISI 630)
05A	driven shaft	1	1	17-4PH (AISI 630)
06	bracket	1	1	1.4301 (AISI 304)
07	motor foot	2	2	1.4301 (AISI 304)
08	mechanical seal[1]	1	1	-
12	gear cover	1	1	1.4301 (AISI 304)
12A	bearing cover	2	2	1.4301 (AISI 304)
17	bearing spacer	2	2	1.4301 (AISI 304)
17A	drive bushing	1	1	1.0503 (AISI 1045)
19	drive shaft gear	1	1	F-154
19A	driven shaft gear	1	1	F-154
25	rotor screw	2	2	1.4404 (AISI 316L)
32	adjustment gauge	2	2	1.4307 (AISI 304L)
32A	adjustment gauge clamp	2	2	1.4307 (AISI 304L)
45	domed cap nut	1	1	1.4301 (AISI 304)
47	guard	2	2	1.4307 (AISI 304L)
50	safety screw	4	4	A2
50A	screw	4	4	A2
51	Allen screw	4	4	A2
51A	screw	8	6	8.8
52	screw	8	8	A2
52A	screw	4	4	A2
53	grower washer	8	8	A2
55	tightening screw	4	4	1.4307 (AISI 304L)
55A	stud	4	4	A2
55B	stud	4	4	A2
56	pin	4	4	A2
56A	positioning pin shape A	1	1	D8
56B	positioning pin shape B	1	1	D8
56C	pin	4	4	A2
61	cotter pin	1	1	1.4401 (AISI 316)
61A	cotter pin	1	1	1.4301 (AISI 304)
62	lock nut	2	2	steel
62A	lock nut	1	1	steel
63	safety washer	2	2	steel
63A	safety washer	1	1	steel
65A	conical ring	1	2	
70	conical roller bearing	1	1	
70A	conical roller bearing	1	1	
80	O-ring[1]	2	2	EPDM
80A	O-ring[1]	1	1	EPDM
80B	O-ring[1]	2	2	NBR

1) Recommended spare parts

Position	Description	Quantity		Material
		UL-1	UL-2/UL-3	
80C	O-ring[1]	1	1	NBR
85	oil plug	1	1	Plastic
85B	bracket protection plug	4	4	Plastic
86	sight glass	1	1	Plastic
87	magnetic drainage plug	1	1	Plastic
87A	drainage plug	1	1	Plastic
88	seal ring	1	1	NBR
89	seal ring	2	2	NBR

1) Recommended spare parts

9.4. UL-4 PUMP EXPLODED VIEW AND SPARE PARTS LIST



Position	Description	Quantity	Material
01	body	1	1.4404 (AISI 316L)
02	tri-lobe rotor	2	1.4404 (AISI 316L)
03	pump cover	1	1.4404 (AISI 316L)
05	drive shaft	1	17-4PH (AISI 630)
05A	driven shaft	1	17-4PH (AISI 630)
06	bracket	1	1.4301 (AISI 304)
07	motor foot	2	1.4301 (AISI 304)
08	mechanical seal[1]	1	-
12	gear cover	1	1.4301 (AISI 304)
12A	bearing cover	2	1.4301 (AISI 304)
17	bearing spacer	2	1.4301 (AISI 304)
19	drive shaft gear	1	F-154
19A	driven shaft gear	1	F-154
25	rotor screw	2	1.4404 (AISI 316L)
32	adjustment gauge	2	1.4307 (AISI 304L)
32A	adjustment gauge clamp	2	1.4307 (AISI 304L)
45	domed cap nut	4	1.4301 (AISI 304)
47	guard	2	1.4307 (AISI 304L)
50	safety screw	4	A2
50A	screw	4	A2
51	Allen screw	4	A2
52	screw	8	A2
52A	screw	4	A2
53	grower washer	8	A2
55	tightening screw	4	1.4307 (AISI 304L)
55A	stud	4	A2
55B	stud	4	A2
56	pin	4	A2
56A	positioning pin shape A	1	D8
56B	positioning pin shape B	1	D8
56C	pin	4	A2
61	cotter pin	1	1.4401 (AISI 316)
61A	cotter pin	1	1.4301 (AISI 304)
62	lock nut	2	steel
62A	lock nut	1	steel
63	safety washer	2	steel
63A	safety washer	1	steel
65	conical tightening ring	1	steel
70	conical roller bearing	1	steel
70A	conical roller bearing	1	steel
80	O-ring[1]	2	EPDM
80A	O-ring[1]	1	EPDM
80B	O-ring[1]	2	NBR
80C	O-ring[1]	1	NBR
85	oil plug	1	Plastic

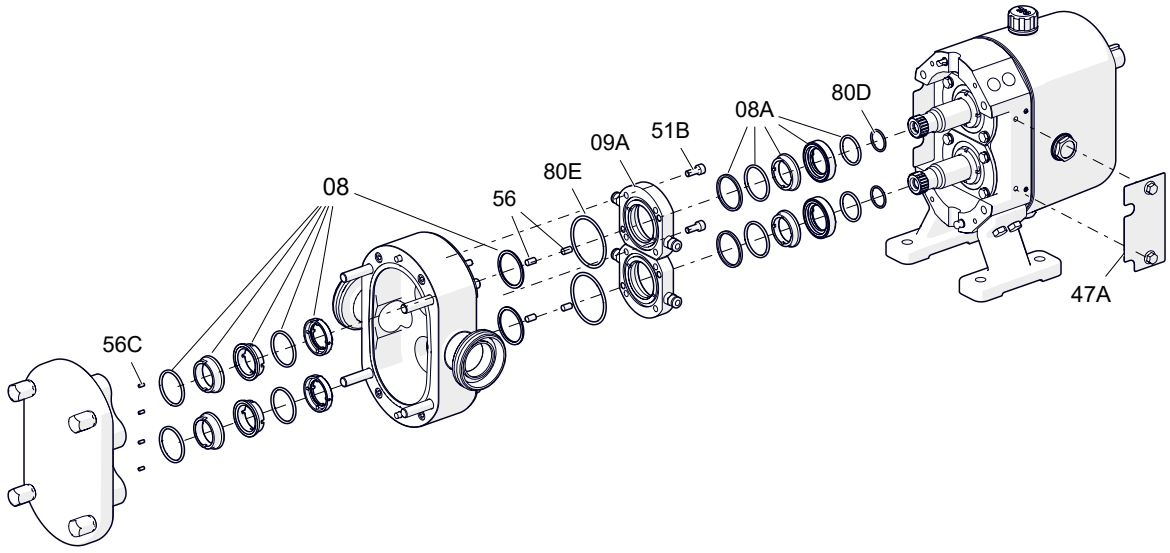
1) Recommended spare parts

Position	Description	Quantity	Material
85B	bracket protection plug	4	Plastic
86	sight glass	1	Plastic
87	magnetic drainage plug	1	Plastic
87A	drainage plug	1	Plastic
88	seal ring	1	NBR
89	seal ring	2	NBR

1) Recommended spare parts

9.5. DOUBLE MECHANICAL SEAL

9.5.1. UL-1 and UL-2 double mechanical seal



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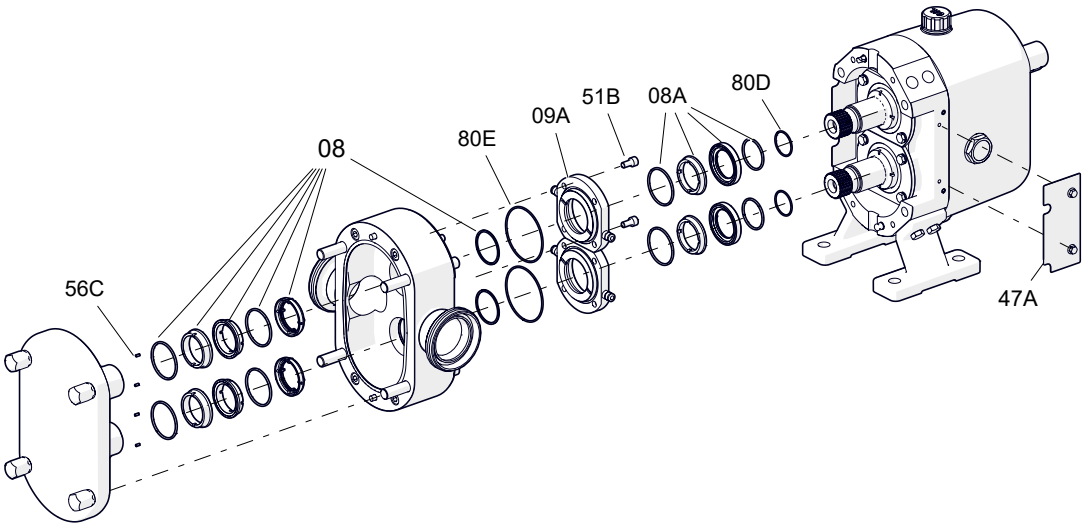
Position	Description	Quantity	Material
08	mechanical seal	2	-
08A	secondary mechanical seal	2	-
09A	double mechanical seal cover	2	1.4404 (AISI 316L)
47A	guard	2	1.4307 (AISI 304L)
51B	screw	8	A2
56	stud	4	A2
56C	pin	4	A2
80E	O-ring[1]	2	EPDM
80D	O-ring[1]	2	EPDM

1) Recommended spare parts

9.5.2. UL-3 and UL-4 double mechanical seal



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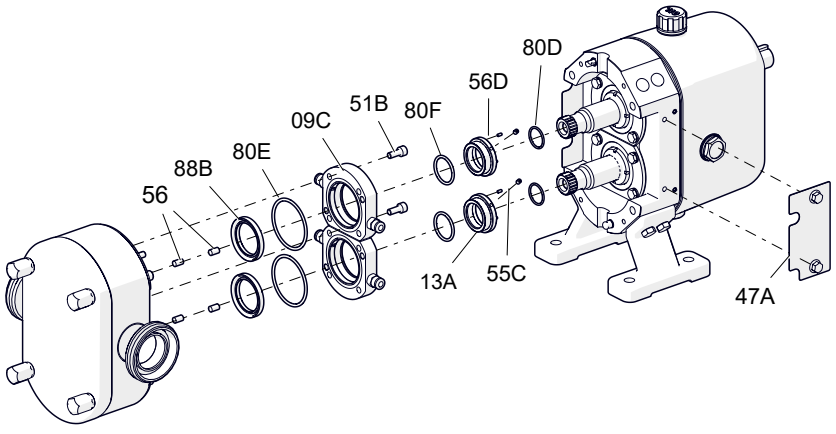
Position	Description	Quantity	Material
08	mechanical seal	2	-
08A	secondary mechanical seal	2	-
09A	double mechanical seal cover	2	1.4404 (AISI 316L)
47A	guard	2	1.4307 (AISI 304L)
51B	screw	8	A2
56C	stud	4	A4
80E	O-ring[1]	2	EPDM
80D	O-ring[1]	2	EPDM

1) Recommended spare parts

9.6. COOLED MECHANICAL SEAL (Quench)

9.6.1. UL-1 and UL-2 pump cooled mechanical seal (Quench)



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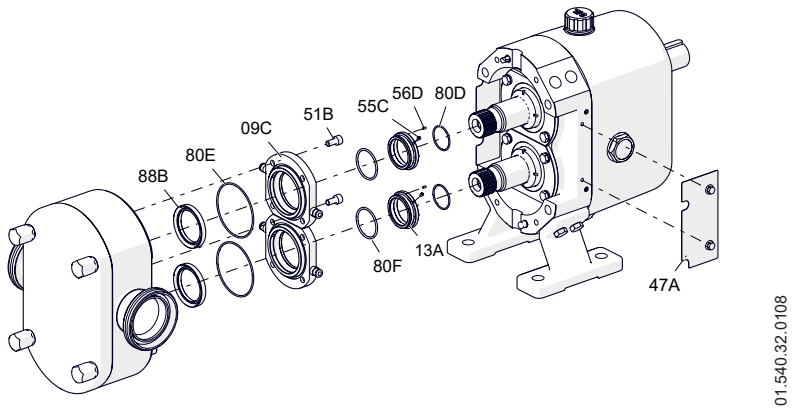
Position	Description	Quantity	Material
09C	cooled mechanical seal cover	2	1.4404 (AISI 316L)
13A	cooled mechanical seal jacket	2	1.4404 (AISI 316L)
47A	guard	2	1.4307 (AISI 304L)
51B	screw	8	A2
55C	stud	4	A2
56	stud	4	A2
56D	pin	4	A2
80D	O-ring[1]	2	EPDM
80E	O-ring[1]	2	EPDM
80F	O-ring[1]	2	EPDM
88B	seal ring[1]	2	NBR

1) Recommended spare parts

9.6.2. UL-3 and UL-4 pump cooled mechanical seal (Quench)



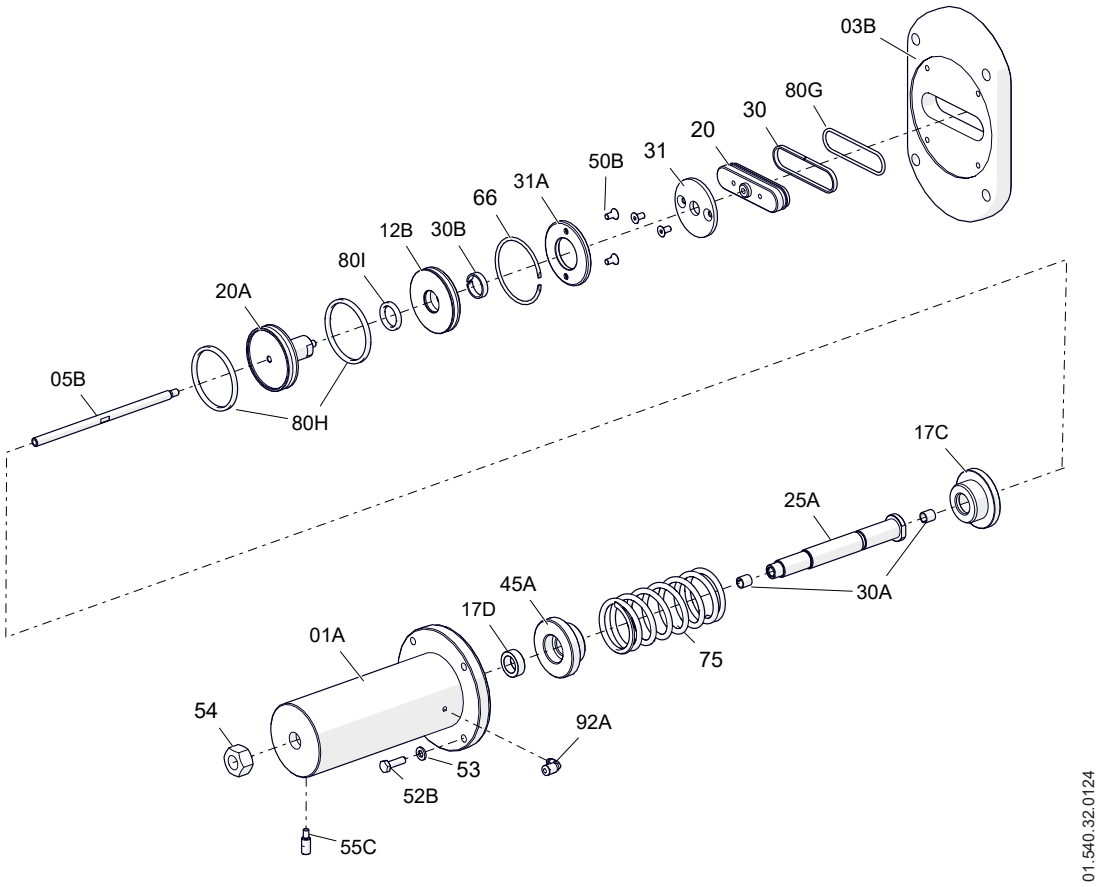
Position	Description	Quantity	Material
09C	cooled mechanical seal cover	2	1.4404 (AISI 316L)
13A	cooled mechanical seal jacket	2	1.4404 (AISI 316L)
47A	guard	1	1.4307 (AISI 304L)
51B	screw	8	A2
55C	stud	4	A2
56D	pin	8	A2
80D	O-ring[1]	2	EPDM
80E	O-ring[1]	2	EPDM
80F	O-ring[1]	2	EPDM
88B	seal ring[1]	2	NBR

1) Recommended spare parts

Position	Description	Quantity	Material
09B	cover	2	1.4404 (AISI 316L)
13	jacket	2	1.4404 (AISI 316L)
51B	screw	8	A2
55C	stud	4	A2
56D	stud	8	A2
80D	O-ring	2	EPDM
80E	O-ring[1]	2	EPDM
80F	O-ring[1]	2	EPDM
88A	PS-Seal seal ring[1]	2	NBR

1) Recommended spare parts

9.7. PRESSURE BYPASS

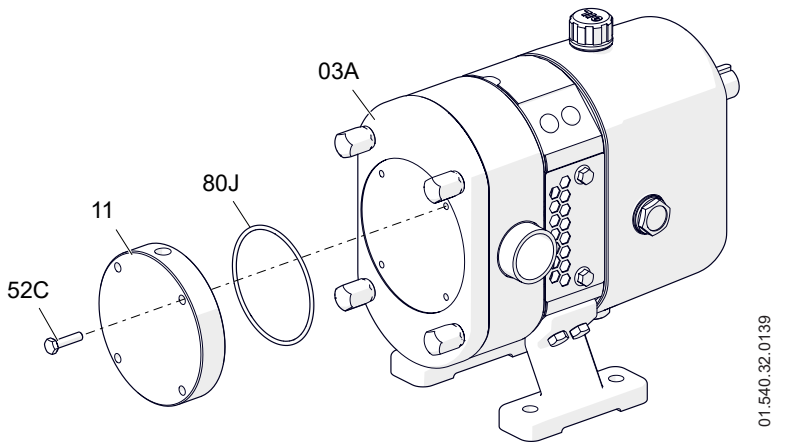


Position	Description	Quantity	Material
01A	bypass body	1	1.4301 (AISI 304)
03B	bypass pump cover	1	1.4404 (AISI 316L)
05B	indicator shaft	1	1.4301 (AISI 304)
12B	inner piston base	1	1.4301 (AISI 304)
17C	spring bushing	1	1.4301 (AISI 304)
17D	spacer	1	1.4301 (AISI 304)
20	piston	1	1.4404 (AISI 316L)
20A	inner piston	1	1.4301 (AISI 304)
25A	shaft bolt	1	1.4301 (AISI 304)
30	belt guide	1	PTFE
30A	piston ring	2	PTFE

Position	Description	Quantity	Material
30B	piston ring	1	PTFE
31	piston ring	1	1.4301 (AISI 304)
31A	inner piston base ring	1	1.4301 (AISI 304)
45A	adjusting nut	1	1.4301 (AISI 304)
50B	screw	4	A2
52B	screw	4	A2
53	washer	4	A2
54	nut	1	A2
55C	indicator screw	1	1.4301 (AISI 304)
66	retaining ring	1	1.4310 (AISI 302)
75	spring	1	1.4310 (AISI 302)
80G	O-ring[1]	1	EPDM
80H	O-ring[1]	2	NBR
80I	O-ring[1]	1	NBR
92A	connector	1	-

1) Recommended spare parts

9.8. FRONT HEATING CHAMBER



Position	Description	Quantity	Material
03A	cover	1	1.4404 (AISI 316L)
11	back cover	1	1.4404 (AISI 316L)
52C	screw	4	A2
80J	O-ring[1]	2	EPDM

1) Recommended spare parts

NOTES

NOTES

How to get in touch with INOXPA S.A.U.:
The contact details for each country in our website are constantly updated.
Details available from www.inoxpa.com.

INOXPA S.A.U.
Telers, 60 - 17820 - Banyoles - Spain

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