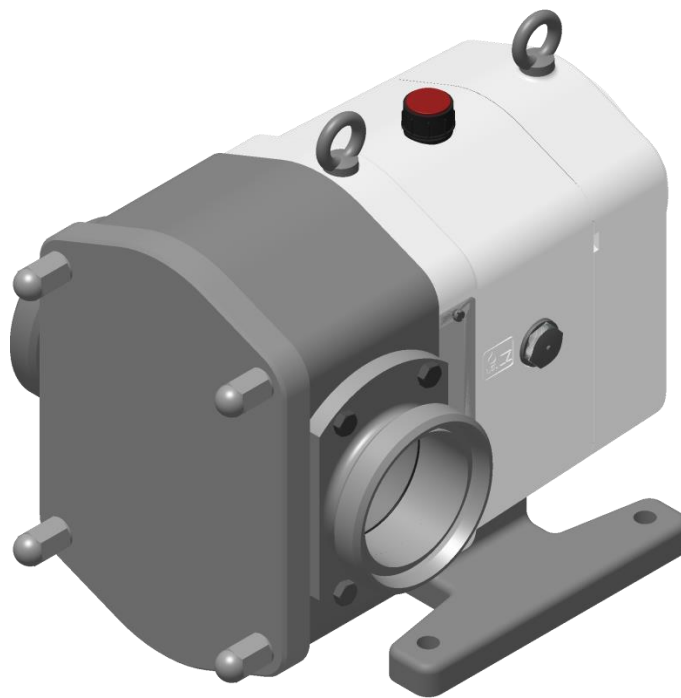




## INSTALLATION, SERVICE AND MAINTENANCE INSTRUCTIONS

# SLR-T



01.506.32.0001

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ISO 9001

BUREAU VERITAS  
Certification



Original Manual

01.506.30.0001EN  
(A) 2021/11

# EC Declaration of Conformity



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

hereby declare under our sole responsibility that the

Machine: **ROTARY LOBE PUMP**

Model: **SLRT**

Type: **SLRT 3-90**

Serial number: **IXXXXXXXXXX to IXXXXXXXXXX**  
**XXXXXXXXXXIINXXX to XXXXXXXXXXXXIINXXX**

fulfills all the relevant provisions of the following directive:

**Machinery Directive 2006/42/EC**  
**Regulation (EC) n° 1935/2004**  
**Regulation (EC) n° 2023/2006**

and with the following harmonized standards and/or regulations:

**EN ISO 12100:2010**  
**EN 809:1998+A1:2009/AC:2010**  
**EN 60204-1:2018**

The technical file has been prepared by the signer of this document.

A handwritten signature in black ink, appearing to read "Dr. Reyero Brunet".

David Reyero Brunet  
Technical Office Manager  
15th November 2021



Document: 01.506.30.02EN  
Revision: (0) 2021/11

# Declaration of Conformity



**INOXPA S.A.U.**

Telers, 60  
17820 - Banyoles (Spain)

hereby declare under our sole responsibility that the

Machine:	<b>ROTARY LOBE PUMP</b>
Model:	<b>SLRT</b>
Type:	<b>SLRT 3-90</b>
Serial number:	<b>IXXXXXXXXXX to IXXXXXXXXXX XXXXXXXXXXIINXXX to XXXXXXXXXXXXIINXXX</b>

fulfils all the relevant provisions of these regulations:

**Supply of Machinery (Safety) Regulations 2008**

and with the following designated standards:

**EN ISO 12100:2010**  
**EN 809:1998+A1:2009/AC:2010**  
**EN 60204-1:2018**

The technical file has been prepared by the signer of this document.

A handwritten signature in black ink, appearing to read 'Dr. Reyero Brunet', enclosed in a light grey rectangular box.

David Reyero Brunet  
Technical Office Manager  
15th November 2021



Document: 01.506.30.03EN  
Revision: (0) 2021/11

# 1. Safety

## 1.1. INSTRUCTION MANUAL

This manual contains information regarding the reception, installation, operation, assembly, disassembly and maintenance of the SLR-T pump.

The information published in this instruction manual is based on updated data.

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

## 1.2. INSTRUCTIONS FOR START-UP

This instruction manual contains essential and useful information for properly starting the pump and maintaining it in good operating condition.

Prior to starting the pump, personnel and operators must carefully read the safety instructions detailed in this section and must familiarise themselves with the operating characteristics of the pump; also, personnel and operators must strictly follow the instructions provided. It is of vital importance that these instructions be kept at a safe location near the installation area.

## 1.3. SAFETY

### 1.3.1. Warning symbols



**Danger for people in general**



**Risk of injury caused by rotating machine parts**



**Electrical hazard**



**Danger! Caustic or corrosive agents**



**Danger! Suspended loads**



**Danger to the correct operation of the machine**



**A safe working environment must be ensured at all times**



**The use of safety goggles is mandatory**

## 1.4. GENERAL SAFETY INSTRUCTIONS



**Read this instruction manual carefully before installing and starting the pump. Contact INOXPA if you have any doubts or queries.**

### 1.4.1. During the installation



The *Technical Specifications* in Chapter 8 must always be observed.

**Do not operate the pump before connecting it to the pipework.**

**Do not operate the pump unless the pump body has been fitted and adjusted and the pump rotors have been secured.**

**Check for correct specifications of the motor, especially if its working conditions create an explosion hazard.**



**During the installation, all electrical work must be carried out by authorised personnel.**

### 1.4.2. During operation



The *Technical Specifications* in Chapter 8 must always be observed. Under no circumstances can the specified limits be exceeded.

**NEVER touch the pump or the pipework during operation if the pump is being used for transferring hot liquids or during cleaning.**



The pump contains moving parts. **NEVER** place your fingers inside the pump during operation.



**NEVER** operate the pump with the suction and discharge valves closed.

**NEVER** spray water directly on the electric motor. The standard motor protection is IP-55: protection against dust and water spray.

#### 1.4.3. During maintenance



The *Technical Specifications* in Chapter 8 should always be observed.

**NEVER** disassemble or remove the pump until the pipes have been emptied. Remember that liquid will always remain inside the pump's body (if it does not have a purge). Bear in mind that the liquid 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.



**ALWAYS** disconnect the electrical power to the pump prior to carrying out any maintenance work. Remove the fuses and disconnect the cables from the motor terminals.

**All electrical work must be carried out by authorised personnel.**

#### 1.4.4. Compliance with the instructions

Any failure to comply with the instructions may impose a risk to the operators, the environmental conditions in the room and the machine, and may ultimately result in the loss of any right to claim damages.

This non-compliance may result in the following risks:

- Major malfunction of the machine/plant.
- Non-compliance with specific maintenance and repair procedures.
- Possible electrical, mechanical and chemical hazards.
- The environmental conditions in the room may impose a hazard due to the substances being released.

#### 1.4.5. Warranty

We wish to emphasise that any warranty will be void immediately and lawfully; INOXPA shall be compensated for any civil liability claims submitted by third parties in the following cases:

- The operation and maintenance work has not been carried out in accordance with the corresponding service instructions; the repairs have not been carried out by INOXPA personnel or they have been carried out without our written authorisation;
- Modifications have been carried out on our material or equipment without written authorisation;
- The parts or lubricants used are not INOXPA genuine parts/lubricants;
- The material or equipment has been improperly used due to errors or negligence, or has not been used according to the instructions and its intended purpose.
- The pump parts have been damaged by high pressure due to the absence of a safety or relief valve.

The supplied General Conditions of Delivery also apply.



**The machine may not undergo any modification without prior approval from the manufacturer. For your safety, use only original spare parts and accessories. The usage of other parts will relieve the manufacturer of any liability.**

**Any change in the operating conditions is only possible with the prior written consent of INOXPA.**

**Do not hesitate to contact us if you have any questions or if you require further explanations regarding specific aspects relating to this machine (adjustments, assembly, disassembly, etc.).**

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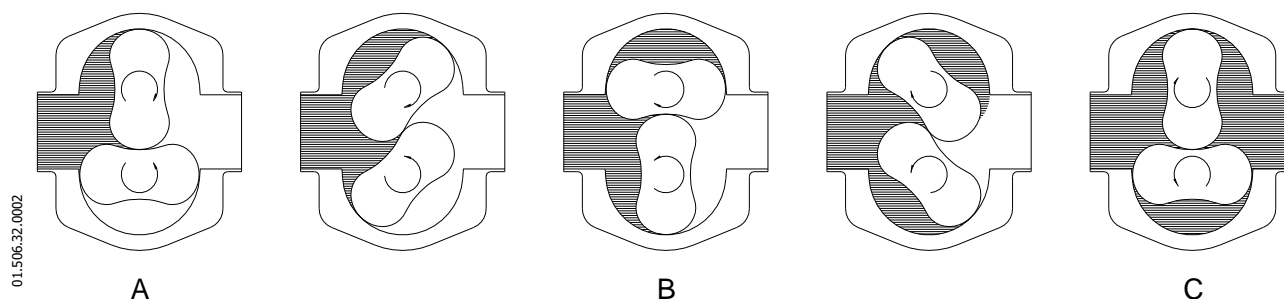
## 3. General information

### 3.1. DESCRIPTION

INOXPA's SLR-T lobe rotor pumps are part of our extensive range of positive displacement rotary pumps for viscous liquids. Thanks to the wider lobes of the SLR-T pump, it delivers a higher flow rate, appropriate for pressures of up to 7 bar. The SLR-T model has been especially developed to respond to all hygiene requirements of the food processing industry. With regard to hygiene, reliability and robustness, the entire range of lobe rotor pumps satisfies all the requirements of the aforementioned industry. Thanks to its modular design, there is an optimal interchangeability of parts between the different pumps. This unit is approved for use in food processing applications.

### 3.2. PRINCIPLE OF OPERATION

The lobe rotor pump is a positive displacement rotary pump. The upper lobe is driven by the drive shaft. The lower lobe is located on the driven shaft and is driven through a helical gear. Both lobes rotate synchronously inside the pump casing without touching each other. During operation of the pump, a fixed amount of liquid is displaced and conveyed to the discharge nozzle. The following figure shows how a lobe rotor pump operates.



**A:** As the lobes rotate, the space on the suction side increases when one lobe separates from the other, generating a partial vacuum which pushes the liquid into the pumping chamber.

**B:** Driven by the rotating shafts, each lobe is successively filled with liquid, which is conveyed towards the discharge side. The gaps between the lobes and between the lobes and the pump walls are small enough to maintain the spaces sealed.

**C:** The pump body is completely filled and liquid escapes through the meshing of the lobes, pushing against the walls of the spaces, thus completing the pumping action.

### NOISE

Lobe rotor pumps are rotary displacement pumps. Owing to the contact between internal parts, variations in pressure, etc., these pumps are louder than centrifugal pumps. This noise originating from the operation and installation must be considered.



**Appropriate personal protective equipment must be used if the sound pressure level in the work area exceeds 80 dB(A).**

### 3.3. APPLICATION

The SLR-T lobe rotor pump is capable of pumping a wide variety of fluids, with viscosities ranging from 1 mPa.s to 100,000 mPa.s.

It can pump delicate liquids and liquids containing soft solids with minimum degradation.

It also has a built-in flange to facilitate connection to a hydraulic motor, which enables it to be mounted on a lorry.



**Each type of pump is designed for a specific field of application. Your pump was selected to meet specific pumping conditions at the time it was ordered. INOXPA shall not be liable for any damage that may occur if the information provided by the buyer is incomplete (specifications of the fluid to be pumped, RPM, etc.).**

# 4. Installation

## 4.1. RECEPTION OF THE PUMP

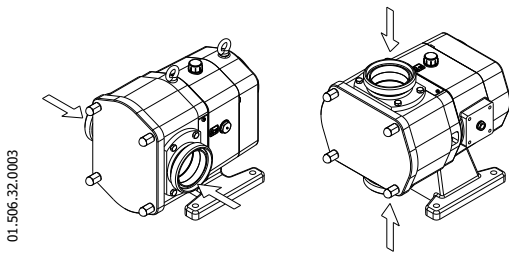


**INOXPA is not liable for any deterioration of the material caused by its transport or unpacking. Visually check that the packaging has not been damaged.**

The following documentation is included with the pump:

- Shipping documents
  - Instructions and Servicing manual for the pump
  - Instructions and Servicing manual for the motor (\*)
- (\*) If INOXPA has supplied the pump with a motor.

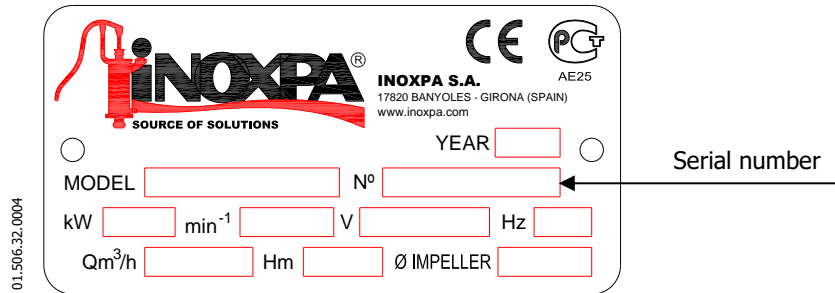
Unpack the pump and check the following:



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- The pump's suction and discharge connections.
- Remove any packaging material and check that the pump and motor have not suffered any damage.
- If found not to be in good material condition and/or if not all the parts are included, the shipping carrier should submit a report as soon as possible.

### 4.1.1. Identification of the pump



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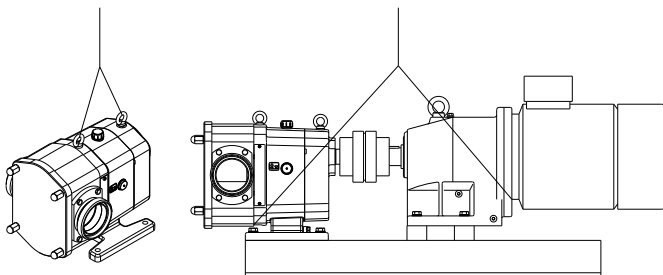
Name plate of the pump

## 4.2. HANDLING AND STORAGE



**The SLR-T pumps are usually too heavy to be stored manually. Use an adequate means of transport. Use the points indicated in the diagram for lifting the pump. The pump should only be transported by authorised personnel. Do not work or walk underneath heavy loads.**

Lift the pump as indicated below:



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- Always use two supporting points placed as far away from each other as possible.
- Secure the points in a manner that prevents them from sliding or moving.



### 4.3. LOCATION

- Place the pump as close as possible to the suction tank and, if possible, below the liquid level.
- Place the pump in a position that allows enough space around it to provide access to the pump as well as to the motor.
- Place the pump on a flat and level surface.
- The base must be rigid, horizontal and protected against vibrations.



**Install the pump in a manner that it can be properly ventilated. If the pump is installed outside, it must be sheltered under a roof. Its location must allow for easy access during any required inspection or maintenance task.**

#### 4.3.1. Foundation

The foundation for the pump should be built in such a way that the drive and the pump are level and well supported. The pump unit must thus be installed on a baseplate - in accordance with DIN 24259 - or on a frame, both placed on the foundation. The foundation must be strong, level and flat, without any vibrations, in order to prevent distortion (to maintain the alignment of the pump - correct operation is guaranteed during start-up).

To install the pump unit on the foundation proceed in the following way:

- Drill holes in the foundation to adjust the foundation bolts. This is not necessary if wedge anchors are used instead of foundation bolts.
- Place the baseplate or frame horizontally on the foundation (use spacers if required).
- Grout.
- Once the grout has hardened completely, the pump unit can be installed on the baseplate or frame. Carefully tighten the nuts on the foundation bolts.

For other types of foundations, consult INOXPA.

### 4.4. COUPLING

For selecting and installing couplings, please consult the supplier manual. On occasions, the starting torque of a positive displacement pump can be quite high. Therefore, a coupling with a torque capacity 1.5 to 2 times larger than the recommended torque should be selected.

#### 4.4.1. Alignment

The pump and motor shaft of the pump unit has been accurately pre-aligned in our factory.

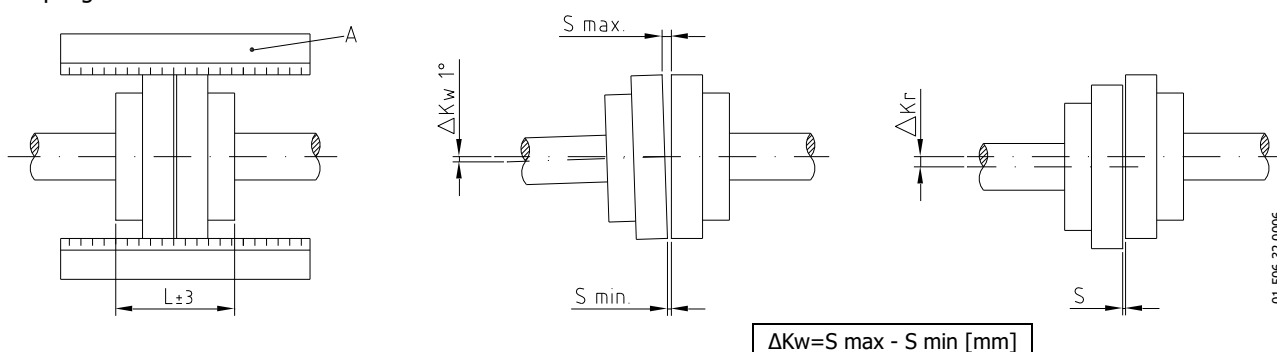


**After installing the pump unit, the pump and motor shaft must be re-aligned.**

- Once the installation of the pump unit has been completed, check the alignment of the pump and motor shaft again. If necessary, re-align.
- In the case of high-temperature applications, the pump can be started and operated at its working temperature for a short period of time. Afterwards, re-check the pump-pipe alignment.

Place a straight-edge ruler (A) on the coupling: the ruler should make contact with both halves of the coupling along its entire length. Refer to the illustration below.

Repeat the procedure, but this time on both sides of the coupling close to the shaft. For increased accuracy, this check can also be carried out using an external gauge on two diametrically opposed points on the exterior surfaces of the two halves of the coupling.



Maximum alignment deviation:

Outer diameter of the coupling [mm]	S max [mm]	ΔKw [mm]	ΔKr [mm]	L [mm]
129	5	2.2	0.30	125
140	5	2.4	0.35	135
182	5	3	0.40	175

#### 4.5. PIPEWORK

- In general, suction and discharge pipes must be installed in straight sections, with the minimum number of elbows and fittings, in order to reduce wherever possible any pressure losses that may be caused by friction.
- Make sure that the pump's ports are properly aligned with the pipework and have a diameter similar to that of the pipe connections.
- Place the pump as close as possible to the suction tank, if possible below the liquid level, or even below the tank, in order to achieve the largest possible static head for suction.
- Place the pipe support brackets as close as possible to the pump's suction and discharge ports.

##### 4.5.1. Shut-off valves

It is possible to isolate the pump to carry out maintenance work. To accomplish this, shut-off valves must be installed and connected to the pump's suction and discharge connections.



**These valves must ALWAYS be open when the pump is operating.**

##### 4.5.2. Self-priming process

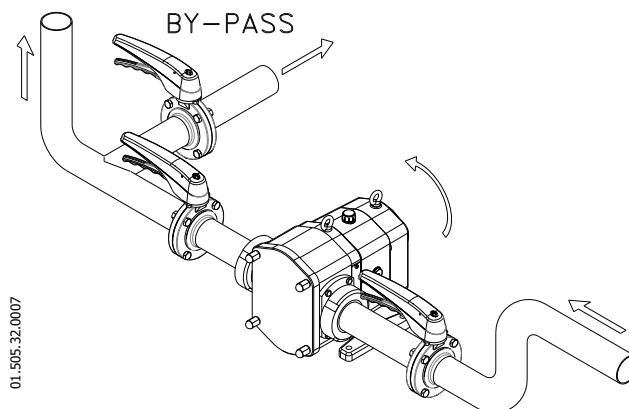
In general terms, if the self-priming process is followed, the pump must contain sufficient liquid to fill all internal recesses and voids, allowing the pump to generate a difference in pressure.

However, if low viscosity fluids are being pumped, a foot valve of the same or greater diameter than that of the suction pipe must be installed; as an alternative, a "U" shaped pipe may be installed.



**The use of a foot valve is not recommended for pumping viscous liquids.**

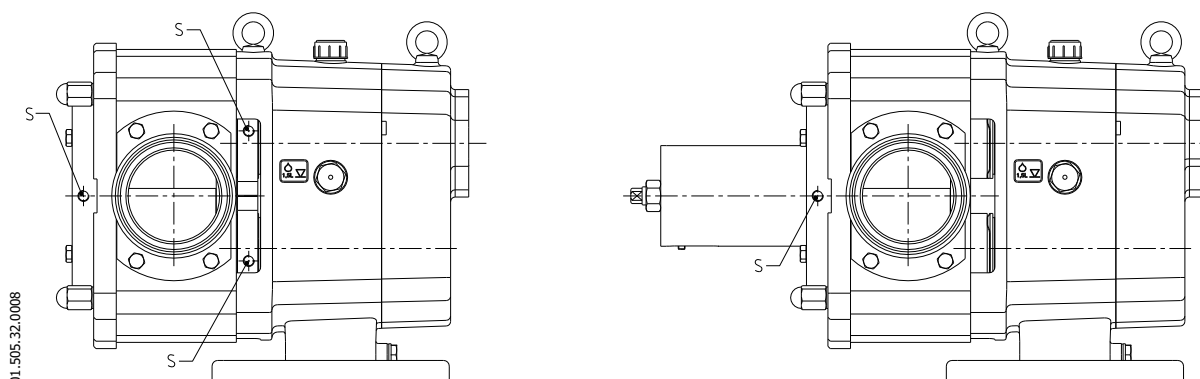
- To eliminate air and gases from the suction line, the backpressure inside the discharge line must be reduced. When using the self-priming process, the pump must be started by opening and closing the discharge line, which allows the air and gases to escape with a reduced backpressure.
- Another option involves the use of long pipes or the installation of a check valve in the discharge line; it is also possible to install a bypass with a shut-off valve on the discharge side of the pump. This valve must be opened for priming, which allows air and gases to escape with a minimum backpressure.
- The bypass must not return to the suction port, it should go to the supply tank instead.



## 4.6. AUXILIARY LINE

### 4.6.1. Heating/cooling jackets

The heating/cooling jacket (S) is located at the front of the pump cover. There is also an option to fit a jacket in the area of the mechanical seal. Heating or cooling media can be connected as shown in the figure below.



## 4.7. RELIEF VALVE (PRESSURE BYPASS)



**Positive displacement lobe rotor pumps must be protected from excessive pressure when they are in operation. Therefore, all SLR pumps can be fitted with a stainless steel pressure relief valve or with a pressure bypass on the pump body cover.**

### 4.7.1. Protection

This valve protects the pump and prevents excessive pressure from building up in the circuit. It reduces the differential pressure ( $\Delta p$ ) between the suction and discharge lines, but not the maximum pressure in the system.



**Do not use the relief valve to protect the system against excess pressure. This valve is designed to protect only the pump; it is not a safety valve.**

### 4.7.2. Principle of operation

The pressure relief valve or bypass prevents the build-up of excessive pressure inside the pump. For example, when the discharge port on the pump is blocked and liquid cannot be pumped, excessive pressure can cause serious damage to some parts of the pump. The bypass opens a passage from the discharge side to the suction side of the pump: an escape route which directs the flow back to the suction side when the pressure in the system exceeds a specific threshold level.



**If the relief valve is not working properly, the system will not operate correctly. The pump must be disconnected immediately. Identify the problem and resolve it before starting the pump again.**



**Remember that the relief valve cannot be used to regulate the pump flow.**

The relief valve can be adjusted to any specific pressure, depending on the type of pump being used.

#### 4.8. ELECTRICAL INSTALLATION



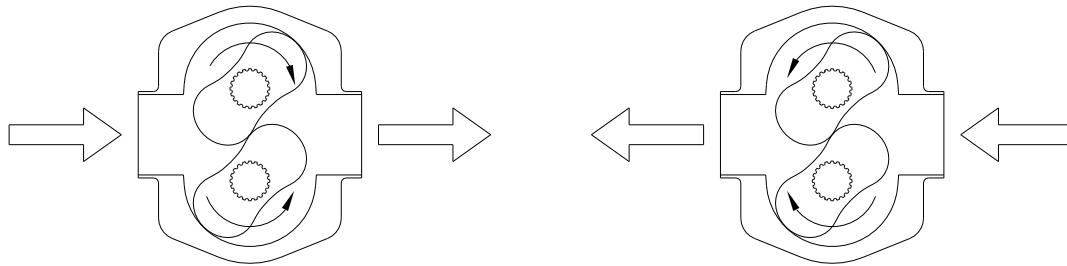
**Only allow qualified personnel to connect the electric motors. Take the necessary precautions to prevent damage to cables and connections.**



**The electrical equipment as well as the terminals and control system components can remain electrically charged even when they are disconnected. Touching them may be dangerous for operators or cause irreversible damage to equipment.**

**Prior to handling the valve, ensure the motor is stopped.**

- Connect the motor in accordance with the instructions supplied by the motor manufacturer.
- Verify the direction of rotation (refer to the label on the pump).
- Run the pump motor for a short period of time. Ensure that the pumping direction is correct. Running the pump in the wrong direction may cause serious damage.



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**ALWAYS verify the direction of the pump with liquid inside the pump.**

## 5. Starting the pump



Prior to starting the pump, carefully read and follow the installation instructions given in Chapter 4 *Installation*.

### 5.1. STARTING THE PUMP



Carefully read Chapter 8 *Technical specifications*. INOXPA is not liable for inappropriate use of the equipment.



Do not touch the pump or the pipework while hot products are being pumped.

#### 5.1.1. Inspections that must be carried out prior to starting the pump

- Fully open the shut-off valves on the suction and discharge pipes.
- Check the oil level in the pump. Add oil to the pump until the oil level reaches the half mark on the sight glass and stays there (in case of starting the pump for the first time: the pumps are shipped with oil in the bearing support. However, this check must always be performed).
- If liquid does not flow into the pump, fill it with the liquid to be pumped.



The pump shall **NEVER** operate without any liquid inside.

- Check that the electrical power supply matches the rating indicated on the motor plate.
- Check for proper direction of rotation of the motor.
- If the pump has a heating jacket, install the corresponding ancillary connection with the specifications indicated in Chapter 8, *Technical specification*.

#### 5.1.2. Inspections that must be carried out when starting the pump

- Check that the pump is not making any strange noises.
- Check that the absolute inlet pressure is sufficient to prevent cavitation inside the pump. Refer to the curve for the minimum pressure required above the vapour pressure (NPIPr).
- Control the discharge pressure.
- Check that there are no leaks through the sealed areas.



The shutoff valve must not be used to regulate the flow in the suction line. It must be completely open during operation.



Control the power consumption of the motor to prevent an electrical overload.

If required, decrease the flow and the power consumed by the motor by decreasing the motor speed.

## 5.2. PRESSURE BYPASS

The pressure at which the valve opens depends on the fluid to be pumped, the viscosity, the rpm, etc., which means that prior to starting the pump, the user must set the opening pressure of the safety valve.

When the pump incorporates a safety valve, the valve is set to the pump's maximum working pressure. The user must verify this by checking the position of the pin (55D). At the maximum set pressure, the pin has moved out all the way toward the pump cover.

In order to set the correct opening pressure, proceed as follows:

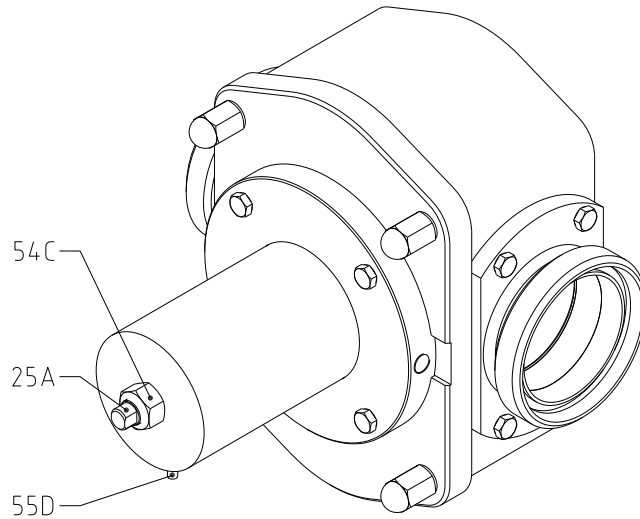
- Loosen the nut (54C).
- Use a spanner to turn the adjustment screw (25A) to the right to reduce the spring tension and get the desired opening pressure. While carrying out this operation, we can see how the pin (55D) moves away from the pump cover.
- When the desired opening pressure has been set, tighten the nut (54C).
- In the SLR-T pump, the spring can be adjusted to set the bypass valve pressure between 2 and 7 bar.



**When checking the safety valve, make sure that the pump pressure NEVER exceeds the set pressure +2 bar.**



**If the safety valve is not working properly, the pump must be put out of service immediately. The valve must be checked by INOXPA's technical service personnel.**



## 6. Operating problems

The following table provides solutions to problems that may appear during normal pumping operations. It is assumed that the pump has been installed properly and that it has been correctly selected for the relevant application. Please contact INOXPA if you require technical assistance.

Operating problems	Probable causes
Motor overload	8, 9, 12, 16, 20, 21, 22, 23, 24, 26.
The pump flow or pressure is too low	2, 4, 5, 7, 8, 9, 10, 11, 13, 14.
There is no pressure on the discharge side	1, 2, 3, 6, 7.
Irregular discharge flow rate / pressure	2, 4, 5, 6, 9, 12.
Noise and vibrations	2, 4, 5, 6, 7, 8, 9, 11, 12, 13, 16, 19, 20, 21, 22, 23, 24, 25, 26.
The pump gets clogged	8, 9, 11, 16, 19, 20, 21, 22, 24, 25, 26.
Pump overheated	7, 8, 9, 11, 12, 16, 20, 21, 22, 23, 24, 26.
Abnormal wear	4, 5, 11, 15, 16, 19, 24, 25.
The mechanical seal leaks	17, 18.

Probable causes	Solutions
1 Wrong direction of rotation	Reverse the direction of rotation
2 Insufficient NPIP	Increase the NPIP: <ul style="list-style-type: none"> <li>• Raise the suction tank</li> <li>• Lower the pump</li> <li>• Reduce the speed</li> <li>• Increase the diameter of the suction pipe</li> <li>• Shorten and simplify the suction line</li> </ul>
3 The pump is not purged	Purge or fill with product
4 Cavitation	Increase the suction pressure (refer to section 2)
5 The pump sucks in air	Inspect the suction line and all of its connections
6 Suction pipe obstructed	Check the suction line and the filter/s, if applicable
7 Incorrect bypass valve setting	Verify the setting of the relief valve or bypass
8 Discharge pressure is too high	If required, reduce the pressure loss by increasing the diameter of the discharge pipe
9 The viscosity of the liquid is too high	<ul style="list-style-type: none"> <li>• Reduce the pump speed</li> <li>• Reduce the viscosity; for example, by heating the liquid</li> </ul>
10 The viscosity of the liquid is too low	<ul style="list-style-type: none"> <li>• Increase the pump speed</li> <li>• Increase the viscosity; for example, by cooling the liquid</li> </ul>
11 The temperature of the liquid is too high	Reduce the temperature by cooling the liquid
12 The pump speed is too high	Reduce the pump speed
13 The lobes are worn	Replace the lobes
14 The pump speed is too low	Increase the pump speed
15 The product is highly abrasive	Install hardened lobes
16 The bearings are worn	Replace the bearings, check the pump
17 The mechanical seal is worn or damaged	Replace the seal
18 The gaskets are not suitable for the liquid	Install the correct gaskets; consult with the supplier
19 The gears are worn	Replace and re-adjust the gears
20 The lubricating oil level is too low	Fill with oil
21 Improper lubricating oil	Use a suitable type of oil
22 Friction in the lobes	<ul style="list-style-type: none"> <li>• Reduce the pump speed</li> <li>• Reduce the discharge pressure</li> <li>• Adjust the play</li> </ul>
23 Misaligned coupling	Align the coupling
24 Tension in the pipework	Connect the pipes to the pump without tension
25 Foreign matter in the liquid	Install a filter in the suction line
26 The pump and/or the electric motor is not secured to the baseplate / foundation	Tighten, check that the pipes are connected to the pump without tension and align the coupling



**If the problem persists, stop the pump immediately. Contact the pump manufacturers or representatives.**

# 7. Maintenance

## 7.1. GENERAL CONSIDERATIONS

Just like any other machine, this pump requires maintenance. The instructions in this manual cover the identification and replacement of spare parts. These instructions have been prepared by the maintenance personnel and are aimed at those responsible for the supply of spare parts.



Carefully read [Chapter 8 Technical specifications](#).

**All parts or materials that are replaced must be properly disposed of / recycled in accordance with the directives in force in each area.**



**ALWAYS disconnect the pump before beginning any maintenance work.**

### 7.1.1. Check the seal gaskets

Periodically check that there are no leaks around the shaft. If the seal gaskets leak, replace the gaskets in accordance with the instructions provided in Section 7.6 [Disassembly / assembly of the mechanical seal](#).

### 7.1.2. Tightening torque

Material	Tightening torque [Nm]								
	M5	M6	M8	M10	M12	M14	M16	M18	M20
<b>8.8</b>	6	10	25	49	86	135	210	290	410
<b>A2</b>	5	9	21	42	74	112	160	210	300

### 7.1.3. Lubrication

The bearings are lubricated by immersion in an oil bath.

The pumps are supplied with oil.

- Periodically check the oil level; for example, weekly or every 150 hours of operation.
  - The first oil change must be carried out after 150 hours of operation.
  - Afterwards, it may be changed every 2,500 hours of operation or at least once a year under normal operating conditions.
- When changing the oil: the sump must be filled to the half mark on the sight glass.



**Do not fill the bearing support with oil above that level.**

Stop the pump for a moment and then re-check the oil level; if required, add a little oil.

- The oil capacity of the SLR-T pump is 1.5 litres.
- Oils for temperatures between 5 and 50 °C: SAE 90 or ISO VG 220.

## 7.2. STORAGE

Before storing the pump it should be completely drained. Where possible, avoid exposing the parts to excessively humid environments.



### 7.3. CLEANING

#### 7.3.1. Manual cleaning



The use of aggressive cleaning products such as caustic soda and nitric acid can burn the skin.

Use rubber gloves during the cleaning process.



Always wear protective goggles.

#### 7.3.2. Automatic CIP (Cleaning In Place)

If the pump is installed in a system with CIP, dismantling of the pump is not required.

The minimum recommended liquid speed for an effective cleaning process is 1.8 m/s (minimum Reynolds number > 100 000 at 1.0~2.5 bar).

If an automatic cleaning system is not available, disassemble the pump in accordance with the instructions supplied in the section "Disassembly and assembly of the pump".

Cleaning solutions for CIP processes.

Only use clear water (chlorine free) for mixing with the following cleaning agents:

**a) Alkaline solution:** 1% by weight of caustic soda (NaOH) at 70°C (150°F)

1 kg NaOH + 100 litres of water = cleaning solution

or

2.2 litres 33% NaOH + 100 litres of water = cleaning solution

**b) Acid solution:** 0.5% by weight of nitric acid (HNO<sub>3</sub>) at 70°C (150°F)

0.7 litres of 53% HNO<sub>3</sub> + 100 litres of water = cleaning solution



**Check the concentration of the cleaning solutions; incorrect concentrations may lead to deterioration of the pump seals.**

To remove any traces of cleaning products, ALWAYS perform a final rinse with clean water at the end of the cleaning process.

#### 7.3.3. Automatic SIP (Sterilisation In Place)

Steam sterilisation is applied to all equipment including the pump.



**Do not start the pump during the steam sterilisation process.**

**The parts/materials will not suffer any damage if the instructions in this manual are followed.**

**Make sure that no cold liquid enters the system until the temperature of the pump has cooled down to at least 60°C (140°F).**

**The pump generates an important pressure loss through the sterilisation process. We recommend the use of a bypass circuit with a discharge valve to ensure that steam / superheated water sterilises the entire circuit.**

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

- a) **Maximum temperature:** 140°C / 284°F
- b) **Maximum time:** 30 min
- c) **Cooling:** Sterile air or inert gas
- d) **Materials:** EPDM / PTFE (recommended)  
FPM / NBR / (not recommended)

#### 7.4. DISASSEMBLY OF THE PUMP

Assembly and disassembly of the pump should only be performed by qualified personnel. Make sure that the personnel carefully reads this instruction manual and, in particular, the instructions concerning the work to be carried out.



**Incorrect assembly or disassembly may cause the pump to malfunction and lead to high repair costs and a long down-time period.  
INOXPA will not be liable for accidents or damage caused by failure to observe the instructions contained in this manual.**

##### Preparations

Provide for a clean working environment since some parts, including the mechanical seal, may need to be handled carefully and others have small tolerances.

Check that the parts being used have not been damaged during transport. When doing this, you need to inspect the fitting edge, the matching faces, seals, check for burrs, etc.

After every disassembly, clean the parts thoroughly and check for any damage. Replace all damaged parts.

##### Tools

Use the adequate tools for carrying out the assembly and disassembly operations. Use the tools properly.

##### Cleaning

Prior to disassembling the pump, clean the exterior and interior of the pump.

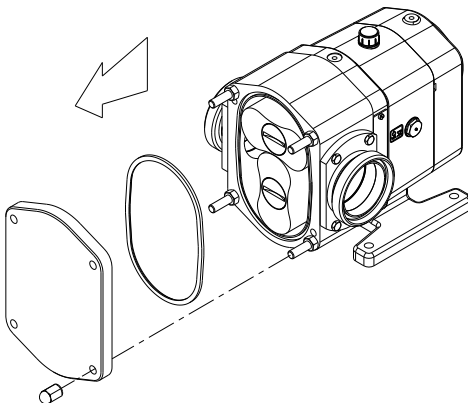


**NEVER clean the pump by hand while it is operating**

##### 7.4.1. Removal of the pump cover

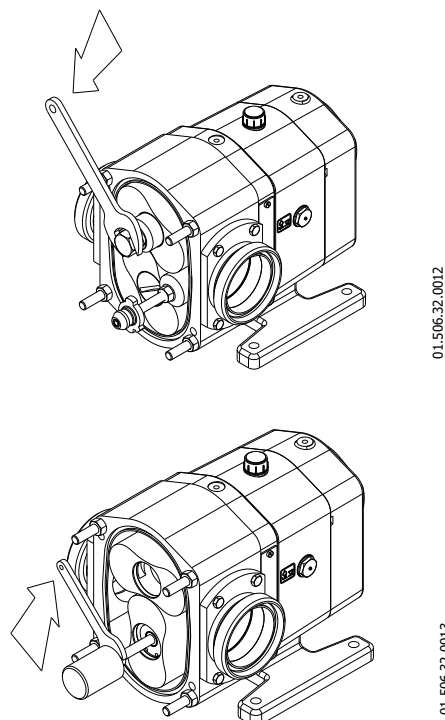


**CAUTION! Liquid from inside the pump may spill out when the pump cover is removed**



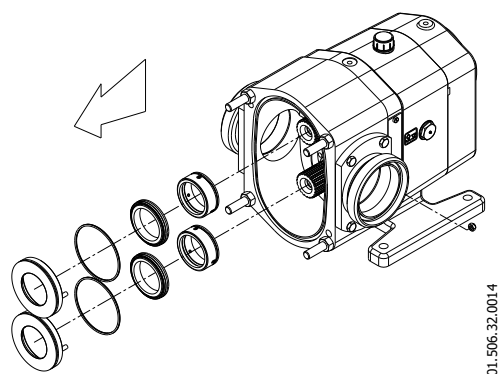
- Close the suction and discharge valves.
- Remove the cap nuts (45).
- Remove the pump cover (03).
- Check that the gasket (80A) is in good condition.

### 7.4.2. Disassembly of the lobes



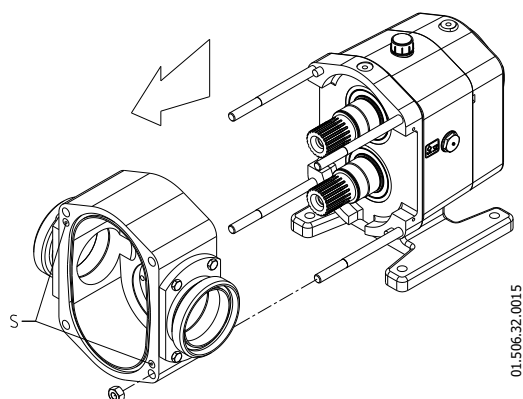
- Loosen the lobe screws (25) with a key (this key can be ordered from INOXPA).
- These screws have a right-hand thread. To prevent the lobes from turning simultaneously, the extraction tool handle can be used (this tool can be ordered from INOXPA).
- Check that the O-rings (80) are in good condition.
- Remove the impeller washers (35).
- Remove both lobes (02) using the extraction tool by placing it on the grooves machined in the lobes for this purpose and tighten the nut, if necessary, with a 19 mm spanner.
- Remove the spacer washers (32) fitted on each shaft. If more than one washer is installed on each shaft, keep them separated to prevent them from getting mixed up.

### 7.4.3. Removal of the mechanical seal cover



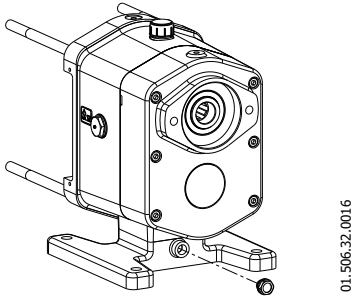
- Loosen the nuts (57) securing each seal cover (09). Make sure that these nuts are not completely removed from the stud.
- Press nuts (57) so that the seal covers (09) are loosened. If necessary, use a tool to achieve this.
- The seal covers (09) can be withdrawn once the nuts (57) have been removed. The stationary part (08A) of the mechanical seal remains housed in the seal cover. To remove the rotating part (08) which remains mounted on the shaft, unscrew the studs from the rotating part and remove it. Refer to Chapter 7.6. *Disassembly / assembly of the mechanical seal*

### 7.4.4. Disassembly of the body



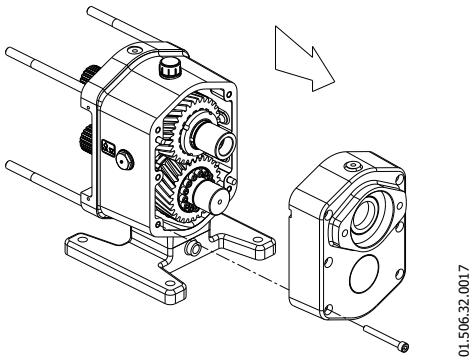
- Loosen and remove the nuts (54) that fasten the pump body (01) to the bearing support (06).
- The body has two M10 through holes to facilitate the extraction (S).

### 7.4.5. Draining the lubricating oil



- Place a container under the pump feet (07) to collect the lubricating oil so that it can be recycled.
- Remove the drain plug (87) located on the rear side of the pump feet (07).

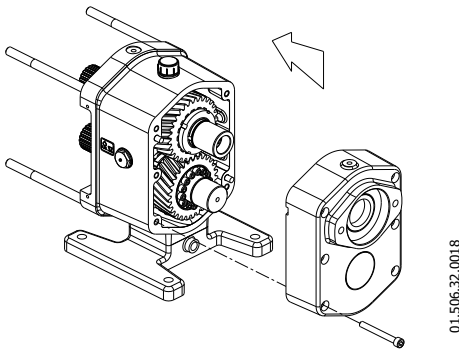
### 7.4.6. Disassembly of the shaft assembly



- Loosen and remove the screws (51A).
- Removal of the bearing cover (12) is a little complicated because the cover was mounted with a seal tool. For this reason, it has two notches to facilitate its removal.
- Check the condition of the bearing cover seal (18). If any defect is found, look for a replacement part before assembling the pump.

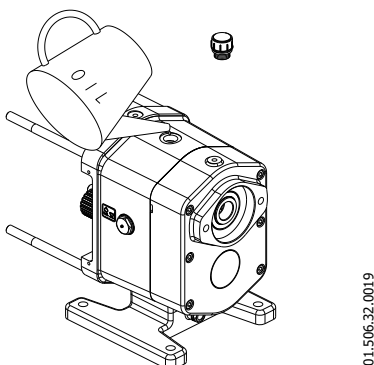
## 7.5. ASSEMBLY OF THE PUMP

### 7.5.1. Assembly of the shaft assembly



- Check that the bearing cover seal (18) is not damaged and fit it in the correct position on the bearing cover (12) using a seal tool.
- Install the bearing cover (12) and fasten it with screws (51A).

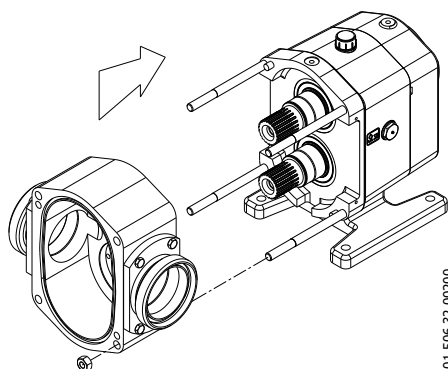
### 7.5.2. Filling with lubricating oil



- Remove the oil cap (85) located on top side of the bearing support (06).
- Fill the bearing support (06) with lubricating oil to the half mark on the sight glass (86).

Refer to 7.1.3 *Lubrication* for the type and quantity of oil to be used.

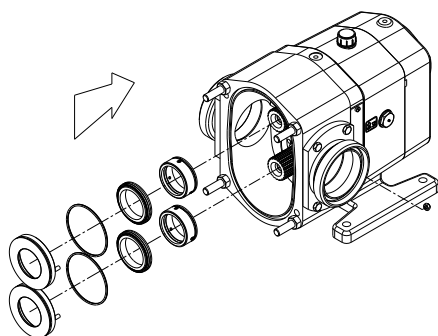
### 7.5.3. Assembly of the body



- Install the body (01) on the support (06). Due to the arrangement of the pins, it may be necessary to hit the body (01) with a nylon mallet.
- Install and tighten the nuts (54) that secure the pump body (01) to the bearing support (06).

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### 7.5.4. Assembly of the mechanical seal



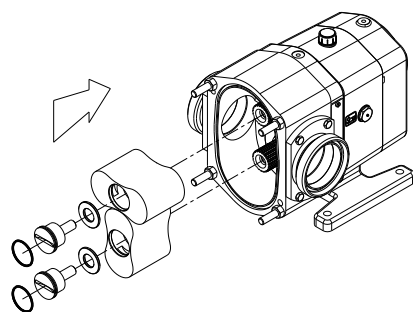
- Install and push the rotating part of the mechanical seal (08) until it reaches the end of the shaft, and tighten the studs on the rotating part of the mechanical seal (08).
- Install the stationary part of the mechanical seal (08A) on the seal cover (09) and place the O-ring (80B).
- Place the cover seal (09) in the body (01) and fasten it with the nuts (57) on the rear part of the body. Refer to Chapter 7.6. *Disassembly / assembly of the mechanical seal*

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### 7.5.5. Installation of the lobes



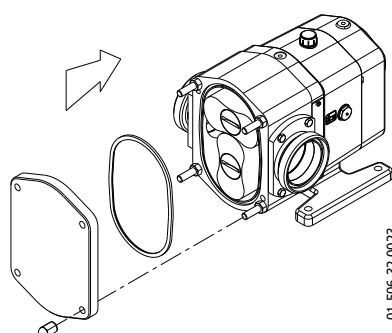
**ALWAYS** check the clearance between the lobes and between the lobes and the body before completing the assembly. See 7.7.1 *Play and tolerances*



- Install new O-rings (80 and 80D) on the lobe (25) screws and on the shafts (05 and 05A).
- Lubricate the O-rings with soapy water or food grade oil compatible with the O-ring material.
- Adjust the spacer washers (32) on the shafts (05 and 05A).
- Refer to chapter 7.7.3 *Pump body/lobe adjustment using spacer washers.*
- Install the lobes (02) on the shafts (05 and 05A) at an angle of 90 degrees relative to one another, making sure that the markings of the lobes and the shafts (0 and 1) match.
- Fit the impeller washers (35) on each impeller (02).
- Tighten the lobe screws (25) with a key (this key can be ordered from INOXPA).
- To prevent the lobes from turning simultaneously, the extraction tool handle can be used (this tool can be ordered from INOXPA).

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### 7.5.6. Mounting the cover



- Check that the seal (80A) is in good condition or replace it with a new one, if necessary.
- Place it on the pump body (01).
- Place the pump cover (03) on the body (01) and tighten the cap nuts (45) in a crosswise pattern.
- Refer to chapter 5.1.1 *Inspections that must be carried out prior to starting the pump.*

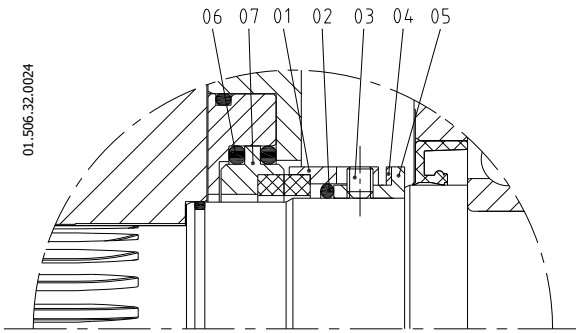
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## 7.6. DISASSEMBLY / ASSEMBLY OF THE MECHANICAL SEAL



**Mechanical seals are fragile parts. Handle them with care. Do not use screwdrivers or similar tools to extract the parts.**

- Clean all components of the mechanical seal before installing them.
- Check that the working surfaces are not damaged. INOXPA recommends replacing the entire mechanical seal if one of the working surfaces is found to have a defect.
- Replace the O-rings during assembly.



Item	Description
	Simple mechanical seal
01	Rotating part
02	O-ring
03	Retaining stud
04	Wave spring
05	Drive bushing
06	O-ring
07	Stationary part

### Disassembly



**If present, remove the spacer washers (32) installed on each shaft. If more than one washer is installed on each shaft, keep them separated to prevent them from getting mixed up.**

- Remove the cover seal as indicated in section 7.4.3. to provide access to the stationary part (07) of the mechanical seal.
- Remove the rotating part (01) from the shaft (05 and 05A) by unscrewing the studs (03) and check the condition of the O-rings (02).

### Assembly

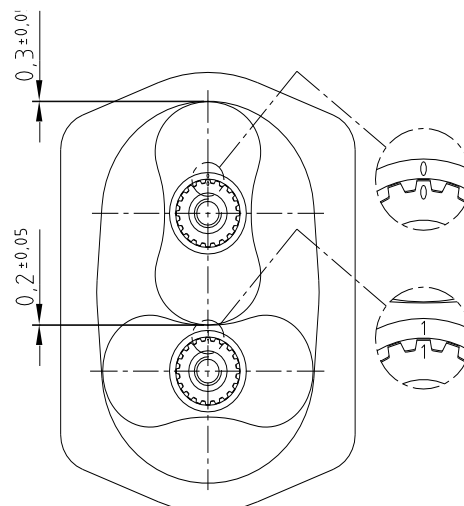
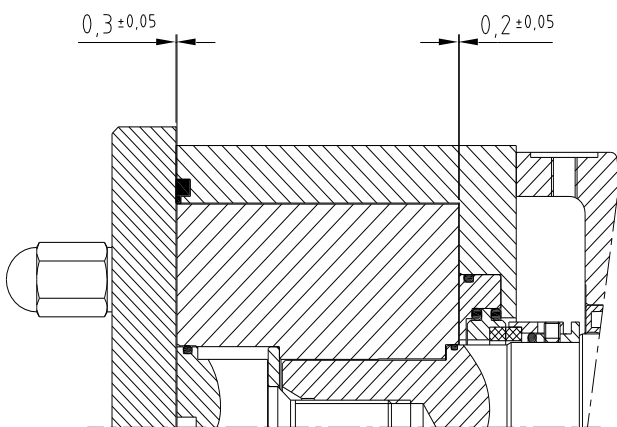


**Remember that if spacer washers (32) are present, they must be adjusted on the originating shafts.**

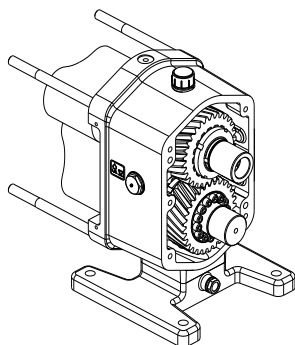
- When assembling the mechanical seal, use soapy water on the different parts and gaskets to allow them to slide better; apply to both the stationary part and the rotating part of the seal.
- Install the rotating part (01) on the shafts (05 and 05A) by tightening the studs (03).
- Install the stationary part (07) and place the seal cover (09) on the body (01).

## 7.7. ADJUSTING AND SYNCHRONISING THE LOBES

### 7.7.1. Play and tolerances

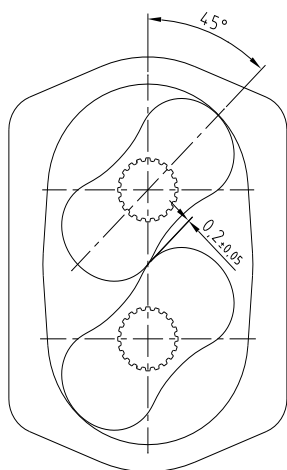


### 7.7.2. Synchronising the lobes

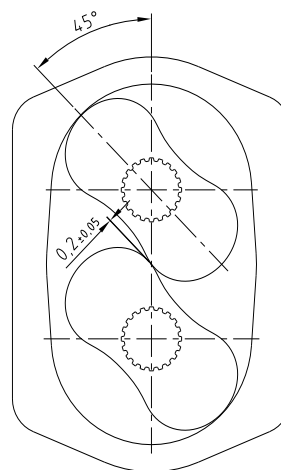


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- To be able to synchronise the lobes, it is first necessary to remove the pump body, the lobes, the seal cover and the seals as indicated in the corresponding sections.
- Drain the oil from the bearing support, by removing the oil cap (85) and the drain plug (87).
- Remove the bearing cover (12) from the support (06).
- Loosen the screws on the conical tightening ring (65) of the driven shaft gear (19A). In principle, the tensioning unit is of a self-release type. It is now possible to turn the drive shaft (05) while firmly holding the driven shaft (05A).
- Fit the lobes (02) on the shafts (05 and 05A) as indicated in 7.5.5 *Installation of the lobes*.



Posición 1

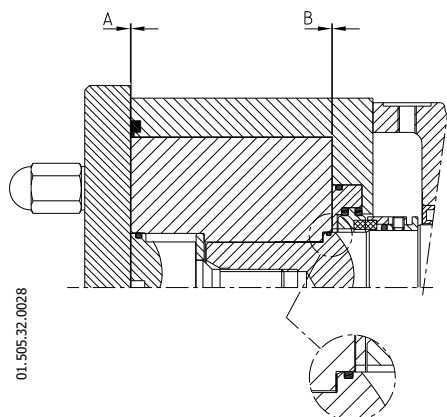


Posición 2

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- Turn the lobes to position 1 as shown in the drawing and adjust the distance until the separation is as indicated.
- Manually tighten the torque screws on the adjustable locking mechanism.
- Then turn the upper lobe approximately 90° in counterclockwise direction (position 2). Check that the separation distance in this position is equal to that of position 1. If this is not the case, the separation distances must be adjusted by slowly turning one lobe while the other one is held firmly.
- Tighten the torque screws of the adjustable locking mechanism diagonally with 2 or 3 turns using the set torque.
- When tightening the screws on the adjustable locking mechanism, ensure that the gears (19 and 19A) are not turning at the same time. This can be prevented by placing a wooden wedge between the gears (19 and 19A).
- Re-check the separation distance between the lobes (02) and turn the drive shaft (05) a few times to verify that the lobes (02) are not rubbing against each other at any point.
- Remove the lobes (02) from the shafts (05 and 05A).
- Apply a small amount of lubricant to the drive shaft (05) in the area of the retainer ring (88) once you have completed the assembly process.

### 7.7.3. Adjustment of the lobes/pump body using spacer washers



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- This is the last adjustment to be carried out. The pump needs to be synchronised and the pump body must be mounted on the support.
- The adjustment will be carried out using spacer washers (32) placed between the sleeve (13) and the lobe (02).
- There are 3 washer thicknesses: 0.1, 0.15 and 0.2 mm.
- Install the lobes (02) and adjust the screws (25) in the way described in 7.5.5 *Installation of the lobes*.
- Check the tolerances between the lobes and the body (A and B). See 7.7.1 *Play and tolerances*. If they are out of scale, replace the spacer washers until the correct play is obtained.

# 8. Technical Specifications

## 8.1. TECHNICAL SPECIFICATIONS

Volume displaced at 100 rpm .....	110 litres
Maximum flow rate .....	63 m <sup>3</sup> /h (277 GPM)
Maximum differential pressure .....	7 bar (102 PSI)
Maximum working pressure .....	16 bar (232 PSI)
Maximum temperature .....	120 °C (248 °F)
Maximum (recommended) viscosity <sup>(1)</sup> .....	100,000 mPa.s
Maximum speed.....	950 rpm
Maximum connection size .....	80 mm (3")
Suction/discharge connections .....	DIN 11851 (standard)
Internal diameter of the connection .....	81 mm
Max. recommended theoretical sphere size .....	13 mm
Lobe width .....	88 mm
Lobe diameter .....	131.5 mm
Maximum torque of the pump support .....	400 Nm
Pump weight .....	70 kg

<sup>(1)</sup> The maximum permitted viscosity will depend on the type of liquid and the sliding speed of the seal sides.  
For higher viscosities, please consult with INOXPA.

### Materials

Parts in contact with the product .....	AISI 316L /329
Other stainless steel parts .....	AISI 304
Seals in contact with the product.....	EPDM
Materials for the other seals.....	Ask your supplier
Surface finish .....	Ra < 0.8 mm

### Mechanical seal

Type of seal .....	Simple external seal
Material of the stationary part .....	Carbon
Material of the rotating part .....	Silicon carbide
Elastomer material .....	EPDM

### Double lip seal

Material.....	PTFE
Maximum pressure.....	7 bar (102 PSI)

### Heating jacket

Maximum temperature .....	180 °C (356 °F)
Maximum pressure.....	4 bar (58 psi)



## 8.2. NOISE LEVEL

The measurements were taken in accordance with EN 12639 / ISO 3746 - Grade 3.

Tolerance  $\pm 3$ dB.

LpA in dB refers to the sound pressure level measured at a distance of 1 m from the surface of the machine and at a height of 1.6 m from the ground.

LwA in dB refers to the sound power level.

The levels of sound pressure and sound power have been established for the following operating points:

A: maximum differential pressure and maximum rotation speed.

B: maximum differential pressure and 50% of the maximum rotation speed.

C: 50% of the maximum differential pressure and maximum rotation speed.

D: 50% of the maximum differential pressure and 50% of the maximum rotation speed.

The data shown in the table refer to clean water at 20 °C.

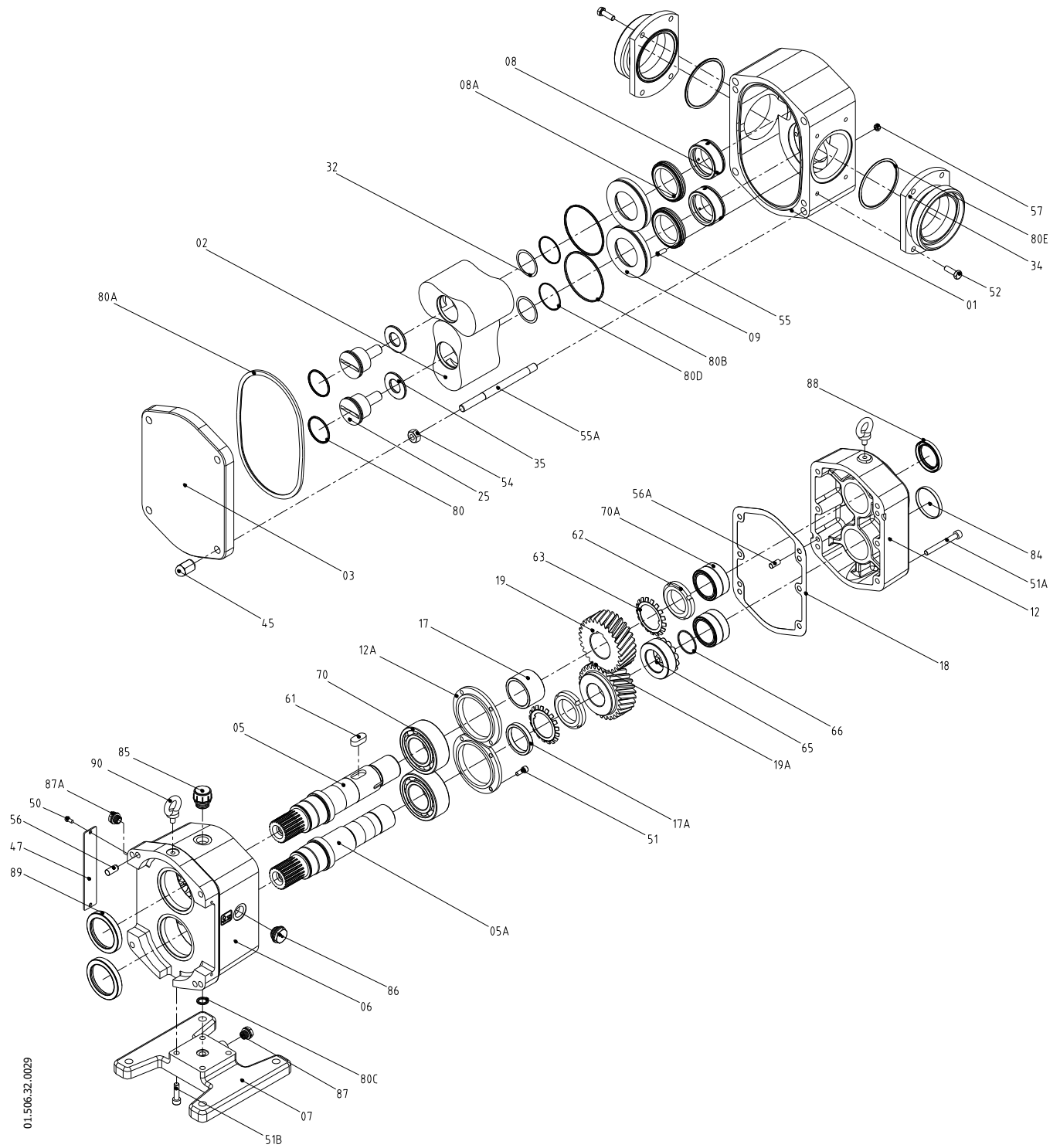
Pump	LpA (dB)				LwA (dB)			
	A	B	C	D	A	B	C	D
<b>SLR-T 3-90</b>	79	70	68	65	89	80	78	75

The noise level can greatly increase if elbows or smaller diameter pipes are mounted at the pump inlet or outlet.



**Appropriate personal protective equipment must be used if the sound pressure level in the work area exceeds 80 dB(A).**

### 8.3. SLR-T PARTS BREAKDOWN

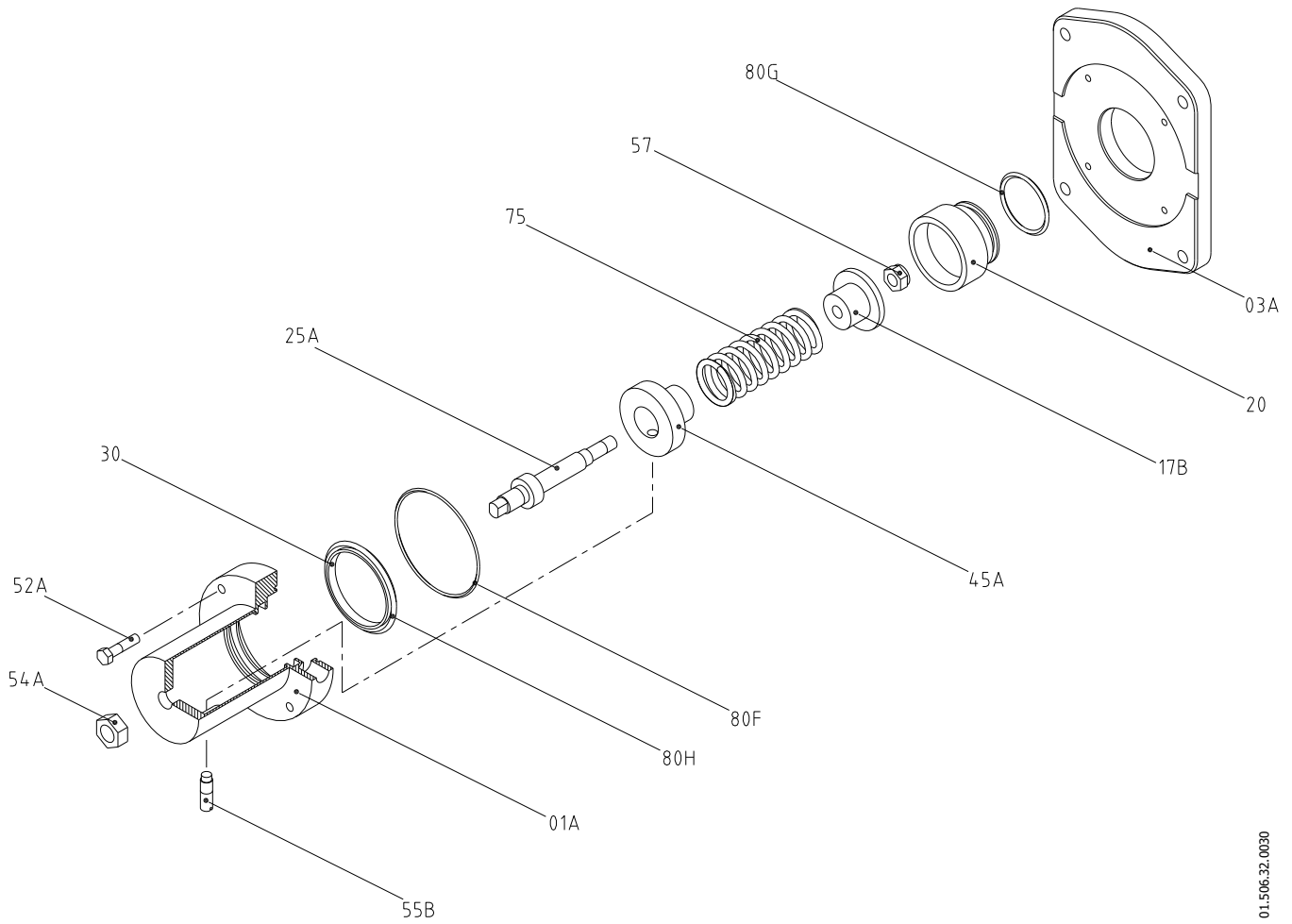


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#### 8.4. SLR-T PARTS LIST

Item	Description	Quantity	Material
01	Body	1	CF 3M
02	Twin lobe impeller	2	AISI 316L
03	Cover	1	AISI 316L
05	Drive shaft	1	AISI 329
05A	Driven shaft	1	AISI 329
06	Support	1	GG 25
07	Foot	1	GG 25
08	Rotating part of the seal	2	Sil./EPDM
08A	Stationary part of the seal	2	Graph./EPDM
09	Seal cover	2	AISI 316L
12	Bearing cover	1	GG-25
12A	Bearing back cover	1	GG-25
17	Drive shaft bushing	1	F-114
17A	Driven shaft bushing	1	ST-52
18	Bearing cover seal	1	Seal paper
19	Drive shaft gear	1	F-154
19A	Driven shaft gear	1	F-114
25	Lobe screw	2	AISI 316L
32	Adjustment spacer	2	Stainless steel
34	DN-80 connections	2	AISI 316L
35	Impeller washer	2	AISI 316L
45	Cap nut	4	AISI 304
47	Support protection	2	PETP
50	Screw	4	8.8 steel
51	Screw	8	8.8 steel
51A	Screw	6	A2
51B	Screw	4	A2
52	Screw	8	A2
54	Nut	4	A2
55	Stud	4	AISI 304
55A	Stud	4	AISI 304
56	Pin	2	F522
56A	Pin	2	A2
57	Nut	4	A2
61	Cotter pin	1	Steel
62	Lock nut	2	Steel
63	Lock washer	2	Steel
65	Conical tightening ring	1	Steel
66	Elastic ring	1	Steel
70	Ball bearing	2	Steel
70A	Needle roller bearing	2	Steel
80	O-ring	2	EPDM
80A	Body seal	2	EPDM
80B	O-ring	1	NBR
80C	O-ring	2	NBR
80D	O-ring	2	NBR
80E	O-ring	1	EPDM
84	Sealing plug	1	PTFE
85	Oil cap	1	Plastic
86	Sight glass	1	Plastic
87	Drain plug	1	Plastic
87A	Cap	1	Plastic
88	Retainer	1	NBR
89	Retainer	2	NBR
90	Eyebolt	2	Stainless steel

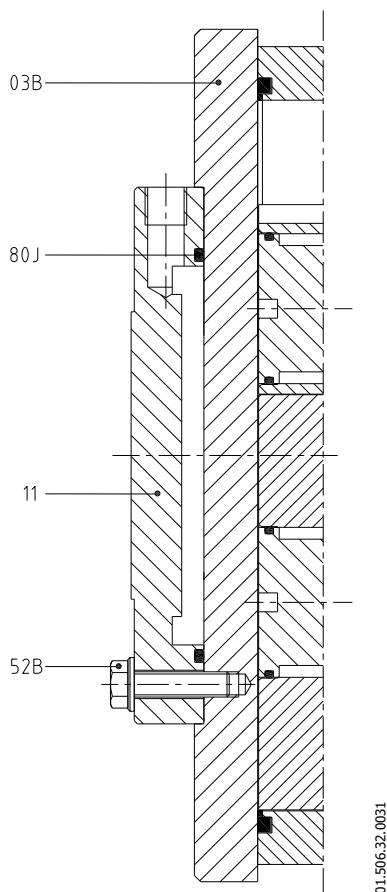
## 8.5. PUMP SAFETY VALVE



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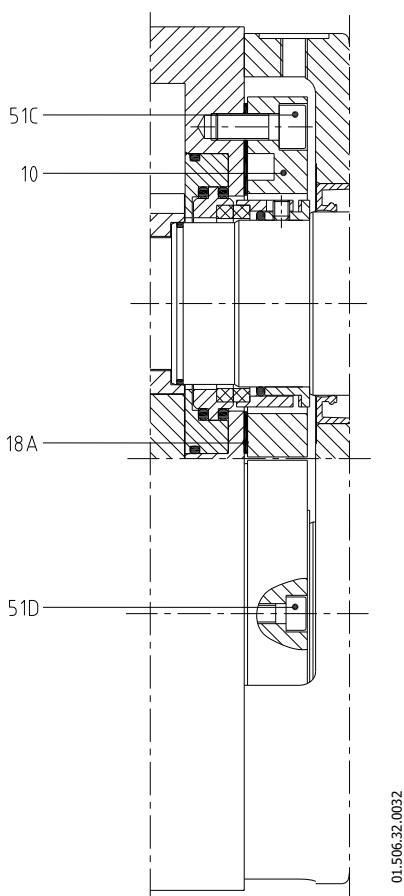
Item	Quantity	Description	Material
01A	1	Safety valve body	AISI 304
03A	1	Pump cover for safety valve	AISI 316L
17B	1	Spring bushing	AISI 304
20	1	Piston	AISI 316L
25A	1	Shaft - bolt	AISI 304
30	1	Guide ring	PTFE
45A	1	Adjustment nut	AISI 304
52A	4	Hex screw	A2
54A	1	Hex nut	A2
55B	1	Pivot	AISI 304
57	1	Self-locking nut	A2
75	1	Spring	AISI 301
80F	1	O-ring	EPDM
80G	1	O-ring	EPDM
80H	1	O-ring	EPDM

### 8.6. FRONT HEATING JACKET



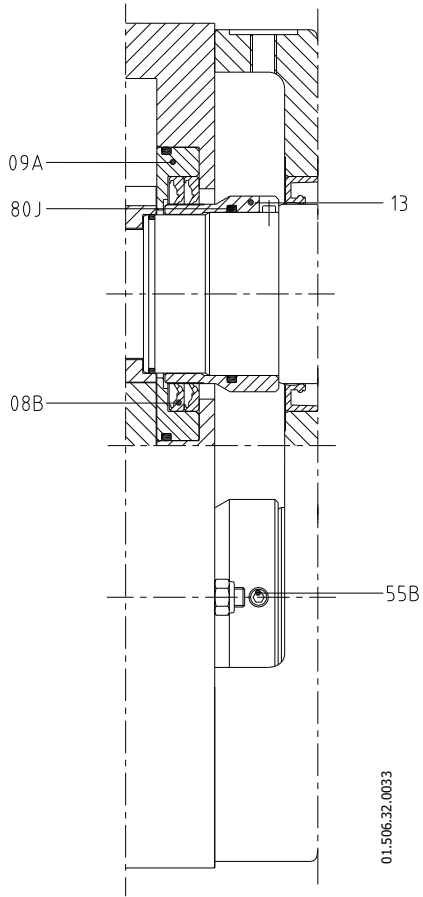
Item	Quantity	Description	Material
03B	1	Pump cover heating jacket	AISI 316L
11	1	Front heating jacket	AISI 304
52B	4	Hex screw	A2
80J	1	O-ring	EPDM

### 8.7. REAR HEATING JACKET



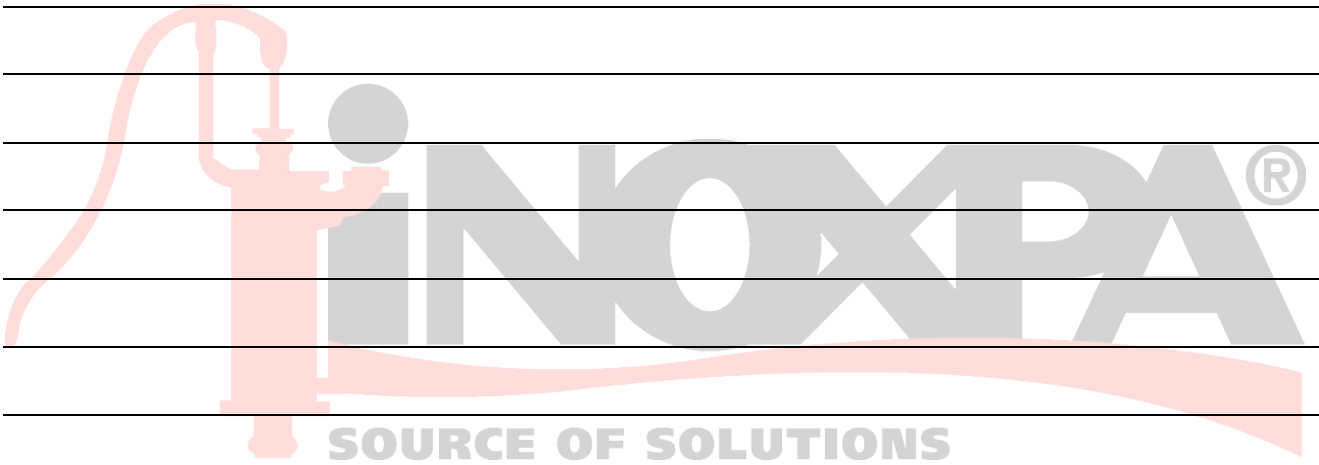
Item	Quantity	Description	Material
10	1	Rear heating jacket	AISI 316
18A	1	Heating jacket seal	AISI 304
51C	4	Allen screw	A2
51D	1	Allen screw	A2

### 8.8. DOUBLE LIP SEAL



Item	Quantity	Description	Material
08B	4	Lip seals	PTFE
09A	2	Seal cover	AISI 316L
13	2	Lip seal sleeve	AISI 316L
55B	4	Stud	A2
80J	2	O-ring	EPDM

NOTES



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