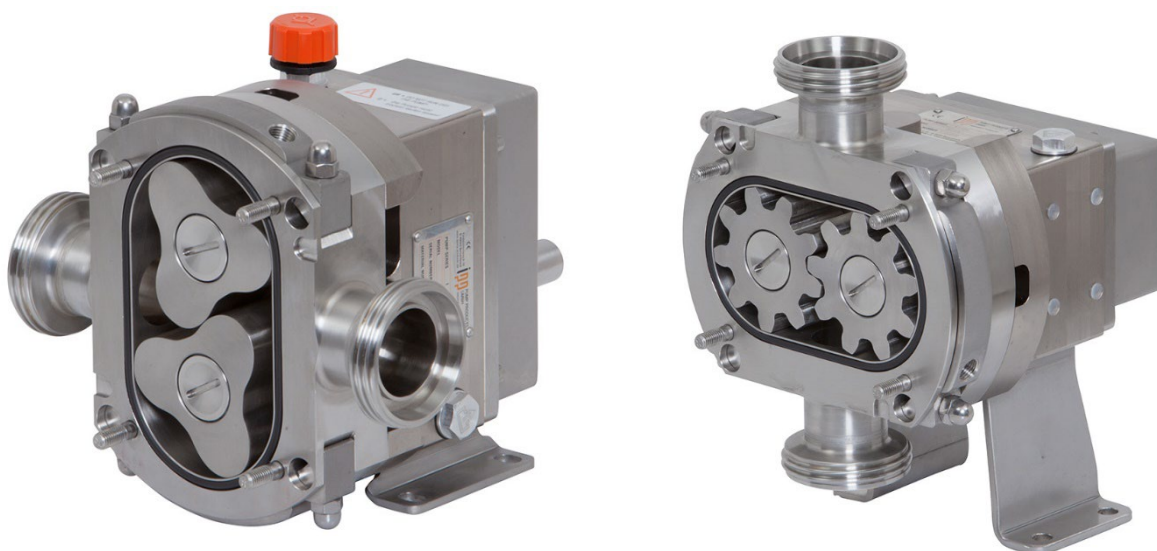




Operating Instructions

iLobe

Rotary lobe pump

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1 How to consult and keep this documentation

These operating instructions have been established by IPP Pump Products GmbH and refer to the installation, safe utilisation and maintenance of the iLobe rotary lobe pump. In this sense this documentation and the use and maintenance manuals supplied by the manufacturers of the single components is an integral part of the iLobe rotary lobe pump.

The purpose of all the documentation mentioned above is to enable the users of the iLobe rotary lobe pump to operate the pump safely and thus the documentation contains clear rules of use; this documentation must be read carefully and understood by the users.

Please note that the specifications mentioned in any operating and maintenance manuals referring to this pump, have been developed in order to assure the safety and healthiness of the users. For this reason you as well as the operating and maintenance staff have to carefully read and understand these instructions and have to be able to apply the indications / procedures.

The compliance with these indications renders possible the safe utilisation of the pump as well as the execution of appropriate interventions. As indicated above the declaration of conformity as well as all operating and technical maintenance instructions of the iLobe rotary lobe pump have to accompany the pump in case of a resale of the pump. This documentation has to be kept carefully until the final demolition of the pump and must be made available to the personnel appointed to operate the pump.

It is good practice not to damage the manual and keep it properly, Do not tear pages, dirty them or get them greasy, never expose them to sources of heat and always maintain the proper layout. This documentation and annexes must be made available to the personnel authorized to operate the pump in such way that it can be consulted easily; to clear any doubts about its safe operation and / or the execution of use and maintenance procedures.

The content of the technical manual reflects the state of the art at the time of construction of the machine in question. The technical manuals cannot be considered inadequate, as a result of technological improvements of the iLobe rotary lobe pump.

The technical documentation and relative annexes are completely confidential: IPP Pump Products GmbH reserves all rights related to this use and maintenance manual and with the object presented therein. The receiving party recognises these rights to IPP Pump Products GmbH in the person of its legal representative, Mr. Fredrik Jönsson, and undertakes, in the absence of an explicit written consent, no to make it accessible to others, either in whole or in part and, not to use it outside the purpose for which it was created. Any violators will be prosecuted according to law.



WARNING

For an appropriate safety management during the operation and maintenance of the iLobe rotary lobe pump the complete technical documentation must accompany the pump, even in case of re-sale.



DANGER

The technical documentation contains information / procedures referring to the utilization and execution of a safe maintenance of the iLobe rotary lobe pump. It must be kept near to the pump's location, at a place which is easily accessible for the operating staff. The person responsible for the operation and maintenance has to be able to find the documentation and consult it at any time.

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DANGER

All technical documentations regarding the iLobe rotary lobe pump have to be kept at an easily accessible place so that they can be consulted quickly. Furthermore the personnel responsible for the operation and maintenance have to be informed about the place where the documentation is kept.

2 Used symbols

Important information about the technical reliability and safe utilization are presented as follows in these operating instructions (these symbols can always be found at the beginning of the text to which they refer).



DANGER

The DANGER symbol draws the attention to a procedure, practice or similar measure which – if not performed correctly – can result in injury. Do not proceed beyond a DANGER symbol until you have fully understood and satisfied the conditions specified.



WARNING

The WARNING symbol draws the attention to an operating procedure, practice or other similar measure which is potentially dangerous and which bears the risk of serious injury if the instructions are not followed exactly.



ATTENTION

The ATTENTION symbol draws the attention to an operation procedure, practice or similar measure which might damage or even completely destroy the product if it is not executed or followed correctly. Do not proceed beyond an ATTENTION symbol, unless you have read and complied with the conditions specified.



NOTE

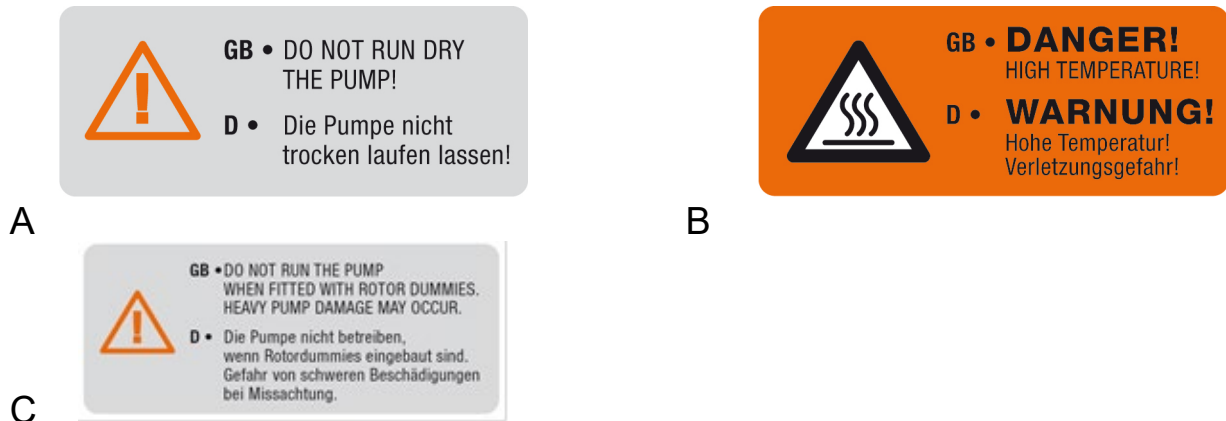
Refers to technical aspects for which the user of the equipment must pay particular attention.

3 Used tags

On the iLobe rotary lobe pump, there is an identification plate, which shows the model and the serial number of the iLobe rotary lobe pump.

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On the surface of the different components of the iLobe rotary lobe pump there are warning tags which prohibit the dry running of the pump (tag A). If the iLobe rotary lobe pump has been designed for liquids over 50°C there is a tag on the pump warning of hot surfaces (tag B). Figure C shows the tag that warns against operation with rotor dummies.



NOTE

Please note that the markings / tags at the iLobe rotary pump may not be changed or removed.



WARNING

It is not allowed to use any IPP Pump Products GmbH item without its identification plate. Should an item be without its identification plate the customer has to contact IPP Pump Products GmbH technical office so that the item can be identified and a new identification plate can be issued.

4 Terms and definitions

Dangerous areas: any area inside and / or in proximity of a machine in which the presence of an exposed person constitutes a risk for the safety and health of this person.

Exposed person: any person who finds himself either entirely or in part in a dangerous area.

Machine: Assembly of parts: according to definition in article 2 of the Directive 2006/42/EC of the European Parliament and the council of 17th May 2006.

Manufacturer: IPP Pump Products GmbH

Customer: Physical or legal person on whose behalf the machine is built, upon prior written acceptance of an order confirmation.

Copyright: 2012 IPP Pump Products GmbH
Date of release: 15.03.2022
Doc. number: 0179 – Date 03/2022



WARNING!

- All work on and with the pump must always be in accordance with all the prevailing standards regarding occupational health and safety as well as machine safety.
- Never let the pump run without pump cover or without being connected to the piping!
- The pump may never be put into operation if the coupling is not provided with a proper coupling protection.
- When performing maintenance work to the pump, ensure that the drive of the pump is shut down and cannot be switched on unintentionally!
- Always wear protective gloves and safety goggles when performing maintenance work to the pump, if the pump conveys liquids which are a health hazard.
- Ensure that the pump is depressurized when it must be disassembled for maintenance purposes! Close any steam or heating water feeding pipes!
- If the pump is provided with a heating jacket and / or conveys hot liquids, let the pump cool down before starting maintenance work.
- When lifting a pump or a pump unit it is not allowed to stand under the hoisted load.
- Never insert your fingers into the pump case or into the connection ports. Even manually rotating of the shaft can cause injuries!
- Ensure that the drive motor cannot be started during works at the pump unit. Also ensure that the rotating parts are completely covered.
- If the pump has already been installed. Ensure that the pump is shut down and make sure that the pump cannot be switched on unintentionally!
- Any works at the electric drive motor may only be carried out by qualified staff!
- A pressure relief valve may ONLY be disassembled if the pump stands still, has cooled down and has been depressurized completely!
- The pump cover may ONLY be disassembled if the pump stands still, has cooled down and has been depressurized completely!

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ATTENTION!

- The piping system must ALWAYS BE CLEANED respectively be FREE OF SOLID MATTERS! After each new installation of the system, after each work at the system and each opening of the system an appropriate cleaning must be carried out!
- If there is the risk of exceeding the maximum operating pressure an appropriate safety device must be fitted to the pump, the motor or to the system!
- Always check the alignment of the coupling between pump and drive motor after hoisting the pump unit to its base plate.
- A pump which is NOT equipped with a QUENCHED or FLUSHED shaft seal may NEVER be installed in a position where it possibly could run DRY!
- The pump may never run if the gearbox is not filled with oil appropriately!
- The pump may never run with a closed pressure valve or blocked pressure pipe.
- When the pressure relief valve is activated the pump may only continue running for a short period in order to avoid the risk of overheating. A pressure relief valve is a safety device, not a flow control!
- Avoid extreme temperature fluctuations of the pumped liquid. This could cause damages to the pump if the pump components expand / shrink.
- The indicated maximum values for operating pressure, the speed and the temperature may never be exceeded!
- When emptying the pump make sure that it does not run dry! Dry running is only permitted if the pump is equipped with a flushed shaft seal.

5 Intended use

The iLobe rotary lobe pump manufactured by IPP Pump Products GmbH has been designed and manufactured for the installation in industrial plants of third parties. Its purpose is to pump liquids which comply with the materials used in the construction of the pump.

For an appropriate installation all technical indications of these operating and maintenance instructions must be complied with.

The utilization of the iLobe rotary lobe pump is only permitted within the admissible ranges of pressure and temperature under consideration of chemical and corrosive influences.

Any utilization exceeding the indicated operating ranges and specifications is being considered as improper use. Any damages resulting from this will void responsibility of the manufacturer and the user bears the full risk.

Please contact IPP Pump Products GmbH if the pump shall be used for any other application or at any other conditions than those which are part of the agreed specifications according to which the pump had been selected.



DANGER

Any improper use of the iLobe rotary lobe pump is forbidden without the written permission of IPP Pump Products GmbH.

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6 Introduction

6.1 General information

These operating instructions contain important information about the correct installation, utilization and maintenance of the pump.

Furthermore, this manual provides the necessary information for the installation staff / operating staff in order to avoid injuries and problems during the installation and operation of the pump and in order to guarantee the correct handling of the machine and ensure a perfect functioning of the pump.

This manual represents the most recent information regarding the pump types mentioned in this manual at the time printing. IPP Pump Products GmbH reserves the right to modify the construction of the mentioned pump types as well as the contents of this manual without prior or afterward notification.



ATTENTION

Read this manual thoroughly before installing, operating respectively repairing this pump. Ensure that operators and technical maintenance staff are familiar with the symbols used and have understood the content. The instructions of this manual must be followed step by step.

6.2 Warranty

Warranty is strictly limited to the conditions specified by IPP Pump Products GmbH and will only be granted according to these conditions.

Warranty will only come into force provided that:

- The pump has been installed and put into operation strictly in accordance with the instructions given in this manual;
- Any maintenance and repair works have been executed according to the instructions given in this manual;
- Only original IPP Pump Products GmbH parts or parts provided by IPP Pump Products GmbH have been used for replacement;
- The pump has been used according to the agreed conditions only;
- The construction principle of the pump has not been changed by the buyer;
- The damages in question are not result of work carried out by persons not qualified or appointed.
- The damage has not been caused through force majeure.

6.3 Transport and receiving of the goods

Please make sure that the pump has not been damaged during transport. If any damage has occurred, the transport company and IPP Pump Products GmbH must be notified of this immediately.

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ATTENTION

In order to facilitate the transport on your premises and in order to protect the pump as good as possible, please leave the pump on the pallet or in the crate as long as possible until it has reached its final position.

6.4 How to identify the pump

The serial number and the model type of the pump can be seen on the identification plate. Please always indicate the relevant serial number and model on any correspondence and order for spare parts.

Manufacturer

Die iLobe – Rotary lobe pumps are manufactured by

IPP Pump Products GmbH
Feldmühlenweg 6 - 10
D- 49593 Bersenbrück
Phone +49 (0) 5439-80921-0
Fax. +49 (0) 5439-80921-20
info@pump-products.de
www.pump-products.de

7 Safety

7.1 General information

This manual provides the necessary information to prevent the installer / operator from injury or discomfort during installation and operation of this pump and to ensure the correct use and reliable performance of the pump.

- Read this manually thoroughly before installing, operating or servicing this pump.
- Make sure that operating and maintenance staffs are familiar with the contents of this manual and with the relevant instructions.
- Make sure that the operating and technical maintenance staffs are familiar with the symbols used.
- Follow the instructions of this manual step by step.
- This manual has to be stored at a place which is known and accessible to any user.

7.2 Staff

All personnel in charge of the installation, operation or maintenance of the pump must have received the necessary training and qualification.

7.3 Precautions

- When performing maintenance work to the pump ensure that the drive motor is shut down and cannot be switched on unintentionally!
- All work on and with the pump must always be in accordance with all the prevailing standards regarding occupational health and safety as well as machine safety!
- Always wear protective gloves and safety goggles if the pump conveys harmful liquids that may cause injuries!
- Make sure that the pump is depressurized if it has to be disassembled for overhaul!
- Let the pump cool down first if it is fitted with heating jacket and / or if it is conveying hot liquids.

8 Risk assessment relating to the use of ipp Pump Products GmbH Premiumlobe Rotary Lobe Pumps and pump units in potentially explosive atmospheres



NOTE

For a feature to be suitable for an application, the feature must be fit for its designated purpose and also suitable for the environment where it is to be installed.

Source of Hazards	Potential Hazards	Frequency of Hazards	Recommended Measures
Unvented cavities	Build up of explosive gas	Very Rare	Ensure that pump is totally filled. Dry running must be avoided. Consider mounting ports vertically.
Rotorcase / Rotors / Front Cover	Unintended mechanical contact, overpressure, temperature, foreign particles	Rare	Ensure that operating pressures are not exceeded. Use of external pressure relief valves or those integrated in the pump. Ensure that sufficient NPSH to prevent cavitation. System Design and installation Service plan. Ensure that the system and the pump are free foreign particles.
Pressure relief valve	Overheating	Rare	Integrate temperature sensors, Setting of correct response pressure
Pump external surfaces	Excess temperature. Electrostatic charging	Rare	User must ensure temperature limits.

			Setting of pressure relief valve, Monitor oil-filling level in gearbox. Monitor temperature of gearbox housing, Provide a ground contact for pump.
Cover "O" ring	Pump liquid leakage. Build up of explosive gas.	Very Rare	Check selection of elastomers are suitable for application. Ensure cover retaining nuts are tight enough.
Pump casing / cover	Pump liquid leakage. Build up of explosive gas.	Very Rare	Stainless steel, Corrosion resistant.
Shaft seals	Excess temperature. Unintended mechanical contact. Leakage. Build up of explosive gas.	Rare	Selection of seal system must be suitable for application.
Auxiliary system for shaft sealing	Pump liquid leakage. Build up of explosive gas.	Rare	Selection of auxiliary seal system must be suitable for application. Filling-level monitoring required.
Rotation direction test	Excess temperature due to dry running	Very Rare	The pump must generally be filled. If flushed seals are installed ensure that flush is applied to seal assemblys. Only allow pump to run for minimum period – just a few seconds. If necessary, also disconnect the pump from the motor.
Closed valve condition	Excess Temperature. Excess Pressure. Mechanical contact.	Rare	Use pressure relief valves with temperature monitoring
Shaft	Random induced current	Very Rare	Provide a ground contact for pump
Mechanical shaft coupling (Torque Protection)	Temperature from friction. Sparks from break up of shear pins. Electrostatic charging	Rare	Coupling selection must suit application.
Mechanical shaft coupling (standard)	Break up of spider. Unintended mechanical contact. Electrostatic charging	Rare	Coupling selection must suit application. Note the service plan.
Mobile unit	When moving the cart, sparks can be caused by hitting objects or tipping over;	Rare	Only move at a slow pace on level ground and drive around objects far away. Use

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	electrostatic charge; Damage to flexible lines from being driven over		conductive wheels. Lay lines outside of the danger area, coil up power lines. Check all lines for damage before each connection. Have damaged lines replaced by qualified personnel. Earth.

8.1 To be observed in the Atex area

- Since the pump must always be filled when running, there is no ATEX zone inside! Risk analysis only applies to outer zone.
- Overpressure protection is mandatory.
- Any dry running is to be avoided. Pump and mechanical seals must be secured against dry running.
- An earth connection must be provided.

8.2 Atex Information Plate

The nameplate of a pump or a pump unit certified for “Explosion protection” contains the following data:

 SERIAL NUMBER I		
		PUMP PRODUCTS GMBH SOLUTIONS & TECHNOLOGY
PUMP-SERIES I MODEL I SERIAL NUMBER I		
Feldmühlenweg 6-10 · D-49593 Bersenbrück Fon +49 (0) 5439-80921-0 · www.pump-products.de		

Pump type code:

example:

PREMIUMLOBE (see the User manual of the pump for the explanation)

Serial number: manufacturers' serial number of the pump

Ex marking: Ex-symbol followed by ATEX type designation (see examples on next page).

8.3 ATEX type designation examples

Example 1:

II 2G Ex h IIC T4 Gb

II 2G marking according to Group II, Category 2,
Gas (G) protection,
Ex h non-electrical equipment
IIC explosion group IIC
T4 temperature class T4
Gb Equipment protection level (EPL)

Example 2:

II2D Ex h IIIC T120 C Db

II 2D marking according to Group II, Category 2,
Dust (D) protection,
Ex h non-electrical equipment
IIIC explosion group IIIC
T120°C temperature class 120°C
Db Equipment protection level (EPL)

The environment temperature must be between -20°C and +40°C, if not, the corresponding environment temperature will be indicated on the nameplate.

8.3.1 Equipment Groups & Categories

Equipment-groups (annex I of the EU guideline 2014-34)	
Group I	Group II
(Mines, mine gas and dust)	(other explosive atmospheres gas/dust)

Category M		Category 1		Category 2		Category 3	
1	2	G (gas) (Zone 0)	D (dust) (Zone 20)	G (gas) (Zone 1)	D (dust) (Zone 21)	G (gas) (Zone 2)	D (dust) (Zone 22)

For equipment providing a very high level of protection when endangered by an explosive atmosphere	For equipment providing a high level of protection when likely to be endangered by an explosive atmosphere	For equipment providing a very high level of protection when used in areas where an explosive atmosphere is very likely to occur	For equipment providing a high level of protection when used in areas where an explosive atmosphere is likely to occur	For equipment providing a normal level of protection when used in areas where an explosive atmosphere is less likely to occur
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8.4 Remark on EX type plate concerning CE-marking

A single pump without drive, according to the EC-Machine Directive, is not considered to be a machine and does not have to be CE-marked: a II-B Manufacturers Declaration will suffice. However the CE-marking is prescribed by the ATEX regulations, and therefore is compulsory.

8.5 Temperature classes and allowable temperatures

During normal operation the highest temperature on the surface of the pump will either correspond to the temperature of the pumped liquid, increased with a safety margin for a possible local temperature rise on the mechanical seal, or to the temperature of the gearbox oil or to the heating medium, in case the pump is heated by jackets. The maximum permissible temperature depends on the temperature class (T4) or on T_{max} to be complied with. The complete pump surface must be freely exposed to the atmosphere to allow proper cooling. The ATEX type designation is related to ambient temperatures of maximum 40°C. If the ambient temperature is over 40°C, corrections must be made according to the difference. Refer to your local Ipp Pump Products GmbH supplier.

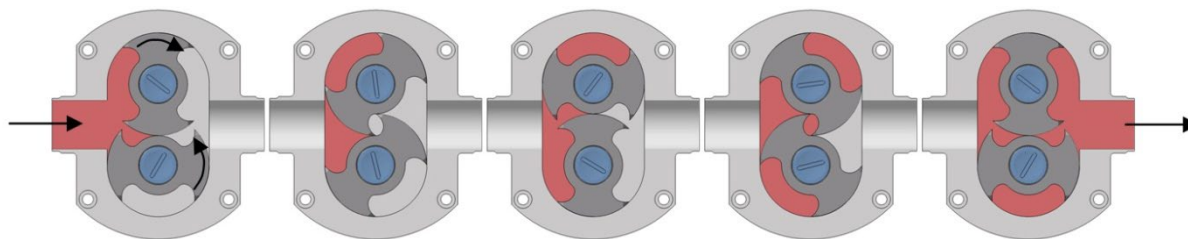
8.6 Responsibility

It is the responsibility of the operator to ensure specified product temperatures are not exceeded and to ensure regular inspections and maintenance for proper functioning of the shaft seal, the bearings and the internal pump parts. If this cannot be ensured by the operator, suitable monitoring facilities must be provided.

9 General information

9.1 Pumping principle

A lobe pump is a rotary positive displacement pump. The operating principle is based on the counter-rotation of 2 rotors in a rotor case. Both rotors are fixed on shafts. The shafts are supported by a bearing house, which is directly mounted on the rotor case. One shaft is driving the other one is driven synchronously by timing gears. The rotors do run without contact in the rotor case. The chamber between rotors and rotor case rotate from inlet to outlet. When passing the inlet, the atmospheric pressure pushes liquid in the chamber which is then transported to the outlet and finally displaced. The pumped product seals the clearances between the rotors and the clearances between the rotors and the rotor case. Depending on the pumped liquid properties and the operation conditions, a rotary lobe pump runs with slip.



9.2 Range of products

9.2.1 Connections

The range of products comprises pump types with connections DN15, DN20, DN25, DN32, DN40, DN50, DN65, DN80 and DN100. The pump can be assembled optionally with the connections in horizontal or vertical position.

9.2.2 Shaft seals

The following shaft seals are available:

- Single mechanical seal
- Double mechanical seal with flushing or quench (with or without pressure)
- Lip seal

9.2.3 Model types

Type	Displacement [L/rev.]	max. differential pressure [bar]	max. speed [min ⁻¹]	Nominal port size	Weight [kg]
iL42i	0,03	12	1800	DN25	12
iL55sxx	0,01	15	1400	DN15	16,5
iL55sx	0,03	15	1400	DN15	16
iL55s	0,04	15	1400	DN20	16,5
iL55i	0,056	15	1400	DN25	17
iL55li	0,075	15	1400	DN32	17,5
iL55l	0,094	8	1400	DN40	18
iL63s	0,07	15	1400	DN40	20
iL63i	0,12	15	1400	DN40	20
iL63l	0,174	15	1400	DN40	21
iL85s	0,21	15	1100	DN40	42
iL85i	0,28	15	1100	DN50	45
iL85l	0,35	15	1100	DN65	47
iL115s	0,55	15	900	DN50	108
iL115si	0,7	15	900	DN65	111
iL115i	0,95	15	900	DN80	114
iL115l	1,23	15	900	DN100	123
iL130sx	1,23	15	850	DN65	185
iL130s	1,6	15	850	DN80	196
iL130i	1,97	15	850	DN100	207
iL130l	2,34	9	850	DN100	217

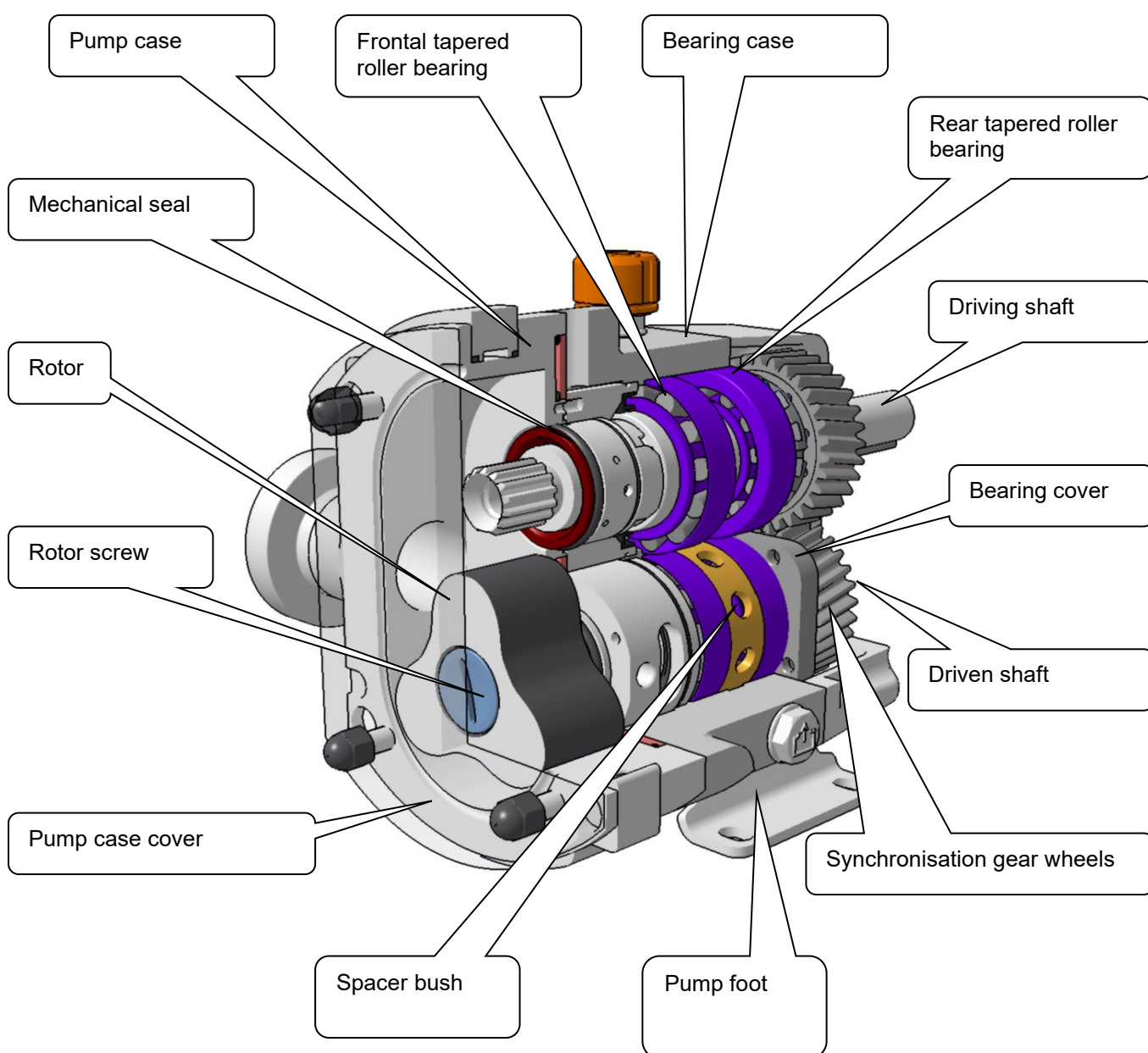


NOTE

The given data are maximum limits. Depending on the individual duty conditions these limits can vary.

10 Main components

The pump with its main components:



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11 Installation

11.1 General information

- The foundation must be solid, flat and even.
- The area in which the pump unit is placed, must be well vented. Too high temperature, air humidity or a dusty atmosphere may have negative effects to the performance of an electric motor.
- The area around the pump-unit must be sufficient for the pump to be operated, cleaned or repaired.
- In order to ensure an unobstructed air supply to an electric motor there must be a free space behind the fan cover, equal to $\frac{1}{4}$ of its diameter. For details, please refer to the manual of the electric motor.



DANGER

Any works at or with the pump must always be carried out in accordance with the prevailing standards regarding occupational health and safety as well as machine safety.

11.2 Transport



ATTENTION

In order to facilitate the transport of the pump on your premises, and in order to protect it as good as possible, please leave the pump on the pallet or in the crate as long as possible until it has reached its final position.

11.3 Storage Conditions

If the pump is not installed immediately following storage instructions have to be obeyed for a future troublefree operation.

Store the pump at a temperature of ca. 20°C. Protect it against wetness, dust as well as against mechanical influences and UV radiation.

If you plan to store the pump for more than one year, you should oil the coupling and fill the gearbox completely with oil. Please note that before the pump is put into operation the oil filling level of the gearbox has to be reduced to the operation level (see chapter 11.17). To avoid potential damage caused by foreign objects in the pump, close the connections of the pump with the included sealing caps.

In case the pump has already been in operation, clean it thoroughly both internally and externally. If the pump is equipped with a flush tank, the flush tank and its connecting pipelines have to be completely emptied and also cleaned thoroughly.

When the pump is stored with an engine, make sure the engine is protected against cold, dust and especially wetness, even by air humidity. Furthermore, the instructions for storage and transport of the manufacturer of the engine have to be obeyed.

To avoid potential damage on the gearbox and the mechanical seals, the shafts have to be checked for ease of movement before putting into operation.

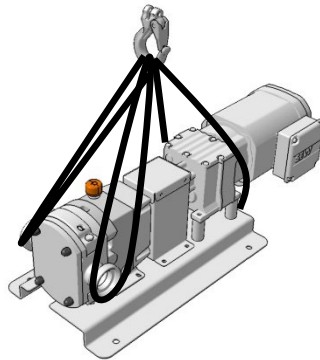
11.4 Lifting

If an appropriate lifting device is available, this shall be used for lifting the pump / pump unit.

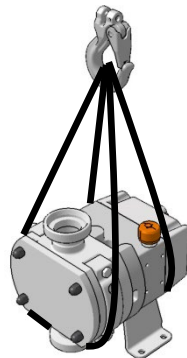


It is not allowed to stand under suspended loads!

If the pump is assembled with a motor on a base plate the hoisting slings for lifting the pump unit are fixed as follows:



If a pump with bare shaft must be lifted, the hoisting slings are fixed as follows:



Never insert your fingers into the pump case or into the connections. Even rotating the shafts by hand might cause injuries!



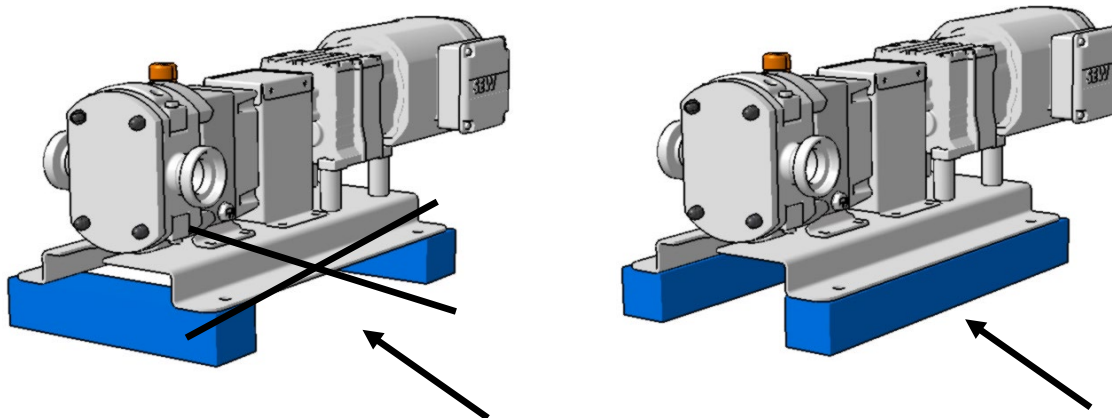
If there is the risk of exceeding the maximum operating pressure an appropriate safety device must be fitted to the pump, the motor or to the system!

11.5 Foundation

The foundation must be solid, flat and level.

When planning the foundation take into consideration the drainage and required space for the pump drainage as well as maintenance, assembly and service.

The base plate of the pump unit must be supported over the whole length and must be even on the foundation. The base plate must not bend!



11.6 Mobile unit

A mobile cart is available as an option. Installation should be on level ground. The parking brake on braked castors should be activated before installation. If the castors are not braked, the mobile trolley should be secured against rolling with wedges before installation. Flexible lines should be laid in such a way that no damage can occur. Power lines should be coiled up when moving the cart to avoid damage. Before connection the lines to the power supply, it should be ensured that the lines are undamaged.



DANGER

Avoid rear-end collisions with objects or people. There is a risk of property damage and injury. Only drive at a slow walking speed. Only drive on level surfaces.

11.7 Installation dimensions

The correct installation dimensions of the pump unit are part of the unit drawing which has been supplied with the pump or which can be obtained at IPP Pump Products GmbH.

For details regarding the most important dimensions of the bare shaft pump, please refer to chapter 18 of this manual.

11.8 Pipe system

The pipe system must comply with the following requirements:

11.8.1 General

- Ensure that the piping system is sufficiently supported, especially at the inlet and outlet ports. The piping must not weigh on the pump.
- It must be possible to connect the ports on site in exact line to the inlet and outlet ports of the pump.
- The pipes must be fitted and connected stress-free.
- Piping which is fitted obliquely insufficiently supported or which exerts force to the pump may cause serious damages to the pump!
- Please also consider thermo tensions which can cause improper forces to the pump.
- Ensure that there is no leakage at the piping and connections.

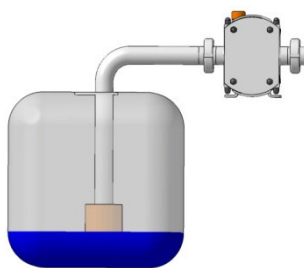
11.8.2 Inlet piping

It is recommended to place the pump below the supply liquid level. A flooded suction reduces the presence of air in the system.

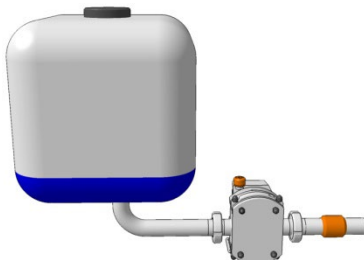


11.9 Non-return valve

In case the pump is installed above the liquid level, a non-return valve must be fitted to the foot of the suction line in order to keep it filled with liquid. This applies especially when low-viscous liquids are conveyed.



For systems that convey liquid under vacuum, a non-return valve in the delivery line is recommended. This prevents backflow of air or liquid.



11.10 Pump with pressure relief valve

If the pump is fitted with a pressure relief valve at the pump cover it is compulsory to install a pressure gauge at the pressure side and a shut-off valve directly after the pressure gauge. These are needed for the adjustment of the reaction pressure. The pressure gauge must have a measuring range of at least 0-25 bar.

11.11 Assembly of the pump unit

If the pump has been supplied with bare shaft it must be assembled to a drive motor and assembled on a base plate.

This is done as follows:

Place the pump onto the base plate and fix it with appropriate retaining bolts.

Fix one part of the coupling onto the pump shaft.

Fix the other part onto the shaft of the drive.

Now place the drive onto the base plate. Leave a distance of app. 3 mm between the two coupling parts.

Align the drive to the pump. Therefore place the copper plates under the pump feet. Then the drive is fixed.

The coupling must be aligned according to the following instructions.

11.11.1 Alignment of the coupling

After the assembly and the set-up of the pump unit the alignment of the coupling must be checked.

It is necessary to check the alignment of the coupling always when the pump unit is detached from the base plate!



NOTE

Misalignment can cause excessive wear and increased motor temperatures and noise level.

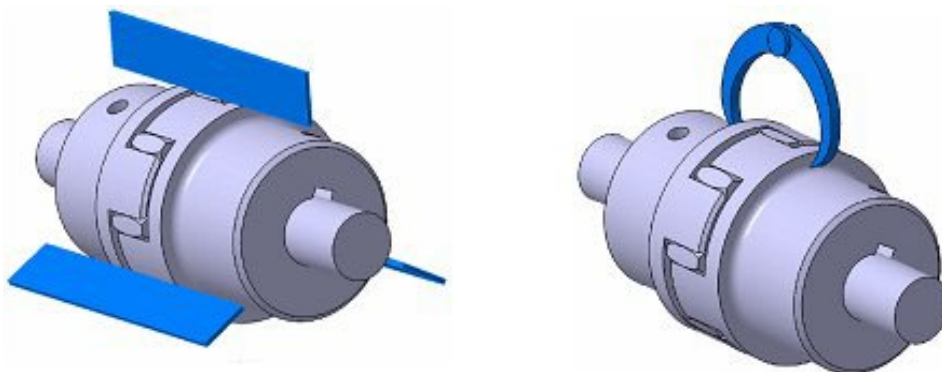
Check the alignment by means of special equipment or do the following:

Place a ruler on the coupling. It must touch the coupling parts over the complete width, see figure.

Repeat this check at three different positions around the coupling;

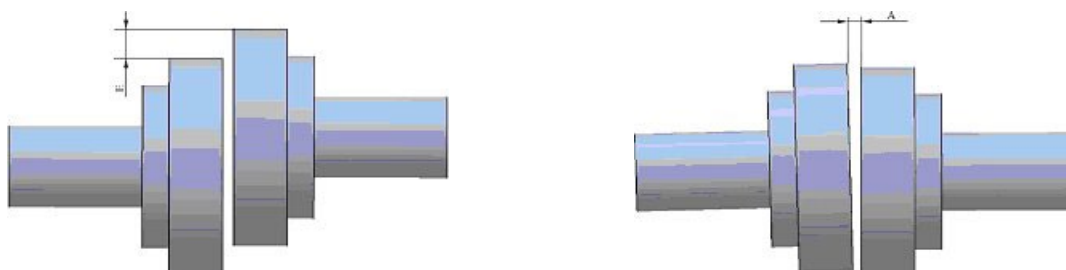
Check the alignment by means of a pair of outside callipers at 2 diametric opposite positions at the lateral faces of the coupling, see figure.

If the measured values are outside the tolerance limits, slightly loosen the retaining bolts of the drive and move the drive until the values are within their tolerance limits. Re-fix the retaining bolts. If the alignment is correct, the coupling protection is fitted.



11.11.2 Alignment tolerances

The following table with its corresponding figure shows the tolerance limits for aligning the coupling:



Outside diameter coupling [mm]	A must be between [mm]	Max. balance between $A_{\max}$ and $A_{\min}$ [mm]	E must be between [mm]
81-95	2 – 4	0,15	0 - 0,15
96-110	2 – 4	0,18	0 - 0,18
111-130	2 – 4	0,21	0 - 0,21
131-140	2 – 4	0,24	0 - 0,24
141-160	2 – 6	0,27	0 - 0,27
161-180	2 – 6	0,30	0 - 0,30
181-200	2 – 6	0,34	0 - 0,34
201-225	2 – 6	0,38	0 - 0,38

11.12 Connection of the pipes



DANGER

Ensure that the motor CANNOT be started during any works carried out at the pump unit and with the rotating parts not completely covered!



ATTENTION

The pipe system must ALWAYS be CLEANED respectively free of solid matters! After the new installation of the system as well as after each work at the system and after each opening of the system an appropriate cleaning must be carried out! Debris and solid matters can cause serious damages!



ATTENTION

A pump which is NOT equipped with a QUENCHED shaft seal may never be installed in a position where it possibly could run DRY!

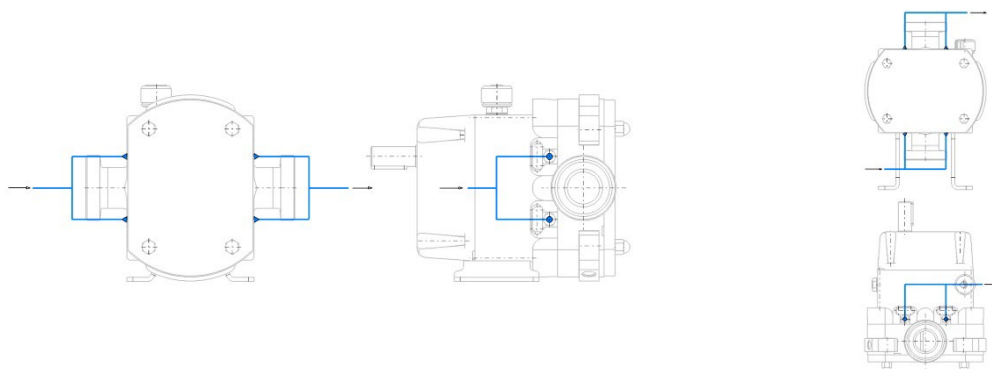
11.13 Flushing of the shaft seals

The connection of the flushing pipes is done by means of the openings in the pump case. The connections are threaded G1/8" as standard.

The flow rate in the flushing system is individually determined in the project planning phase. The flow rate can be between 0.5 l/min to 2 l/min.

If a low-pressure flushing or– Quench is used, the pressure in the system is **max. 0.2 bar**. If the ports are fitted in vertical position: connect the supply of the flushing pipes at the bottom side!

If a pressure flushing (Flush) is used the pressure of the flushing system must be app. 2 bar higher than the pressure of the system. If the connection ports are fitted in vertical position: connect the supply line at the bottom side.



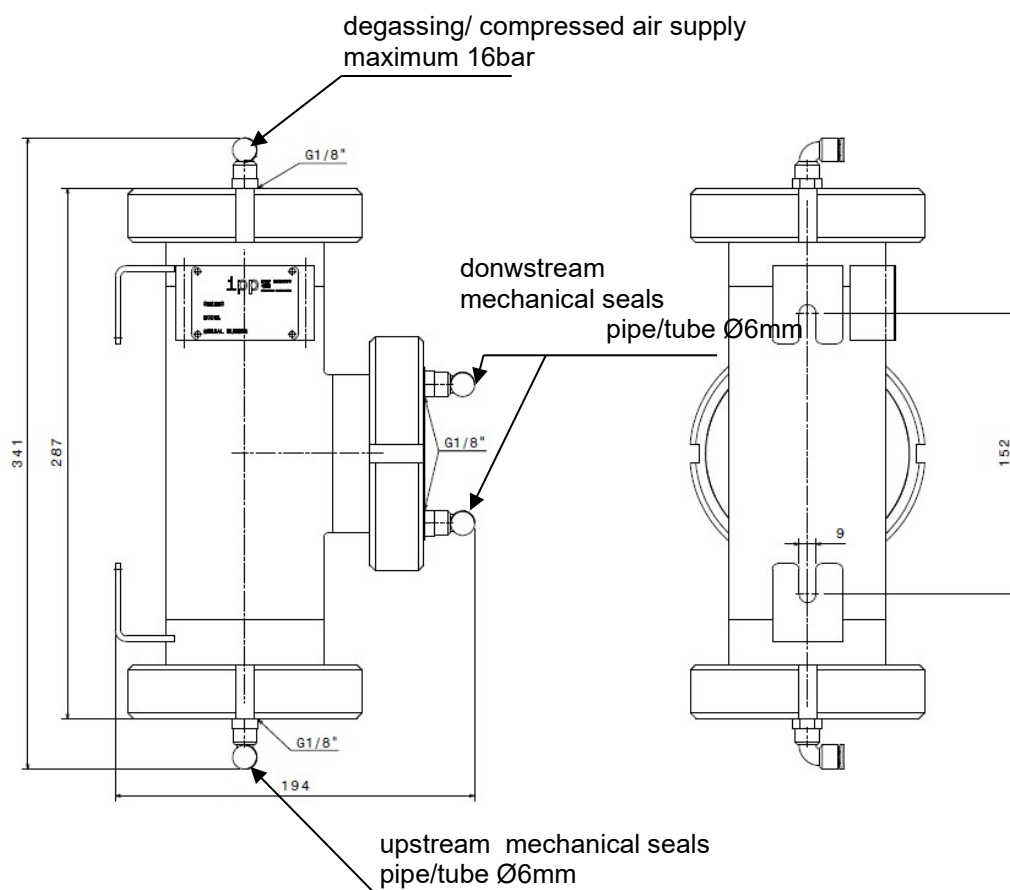
11.14 Barrier pressure tank / Barrier fluid tank

The barrier pressure tank is delivered from the factory without barrier fluid. To avoid damages to the mechanical seals the barrier pressure tank must be filled with a suitable liquid before start-up of the pump.

The barrier pressure tank can be operated depressurized or under pressure. When operating under pressure the sealing pressure must be app. 2 bar higher than the operating pressure of the pump to be sealed. The sealing pressure must not exceed the admissible pressure of 16 bar.

If the barrier pressure tank is operated depressurized, it serves as quench tank and consequently the liquid is a flush fluid.

11.14.1 Overview barrier pressure tank

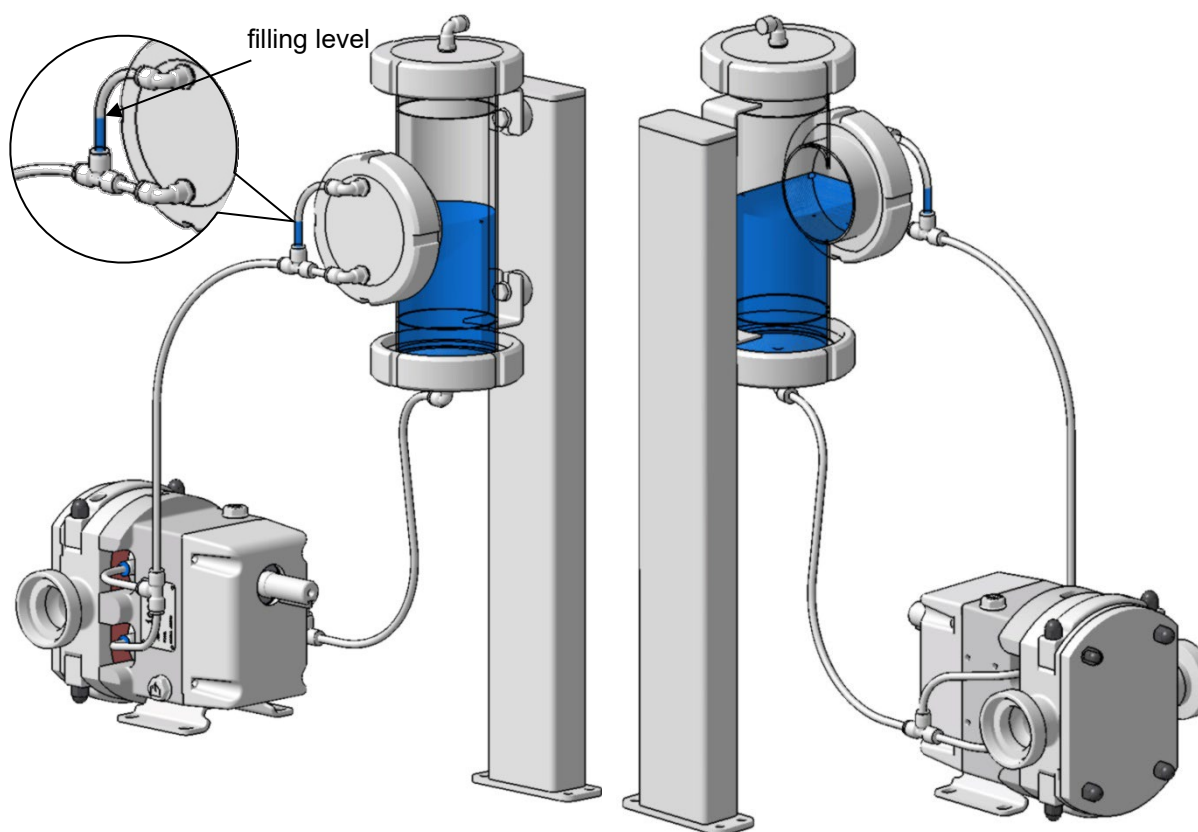


11.14.2 Assembly and connection of the tank

In general the barrier pressure tank is delivered connected to the pump with hoses and fixed onto the base plate. In special cases it might be possible that the barrier pressure tank is not delivered assembled and must be installed by the customer on site. In case of a later assembly the following points must be observed:

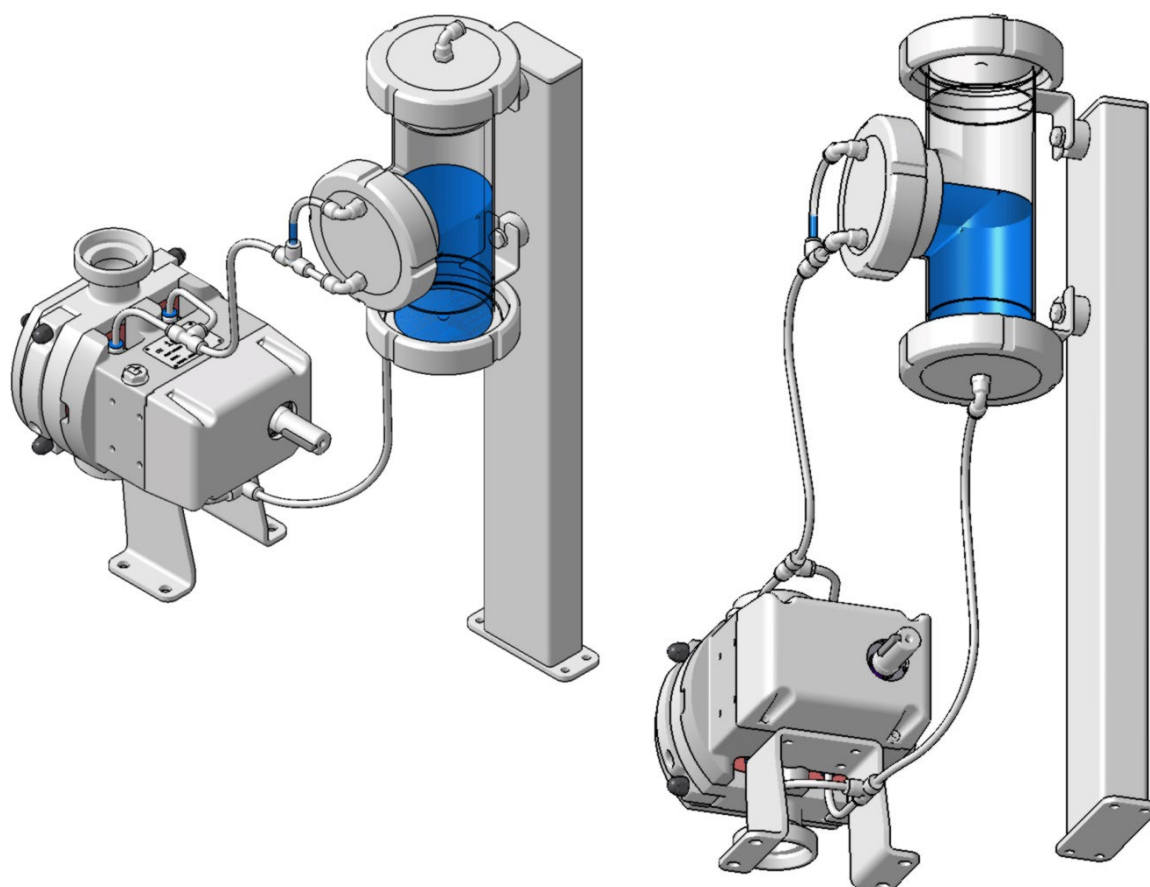
As this barrier pressure unit is a buffer system with thermosiphon circuit the barrier pressure tank must be arranged in a way that the pipes leading to the mechanical seal are continuously declining and the pipes from the mechanical seals to the barrier pressure tank are continuously rising.

In case of a horizontal position of the connection ports the pipes can either be connected serially or in parallel. If the mechanical seals should be flushed in parallel it must be observed that the T-piece of the flow pipe is not positioned above the bottom flush connection. The T-piece of the return pipe should be installed at least on the same height as the top flush connection. When laying the pipes respectively hoses it must always be made sure to prevent a later formation of lumps in order to guarantee the perfect circulation of the barrier liquid.



Parallel flushing mechanical seals

If the pump position is vertical the flush pipes can only be connected in parallel. The feed must be at the bottom part and the return at the top part of the pump.



Flushing of mechanical seal vertical

The ports can be connected with hoses or pipes. The selection of the material depends on the application field and on the barrier liquid and must be done by the customer himself.

11.14.3 Selection of barrier fluid

The barrier fluid must be compatible to the pumped fluid to be sealed, it must have suitable lubricating characteristics and sufficient heating capacity. In case of ATEX-execution it must further be observed that the barrier fluid is electrically conductive.

The barrier fluid should be soluble in the pumped fluid in order to guarantee a mixing of both fluids and a complete and thorough flushing of the mechanical seals.

When selecting the O-rings and seals which get in contact with the flushing fluid these must be checked for compatibility with the selected barrier fluid.

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11.14.4 Filling and emptying the tank



DANGER

Never open a barrier pressure tank under pressure. Before opening the barrier pressure system must always be completely depressurized. To avoid scalding by escaping barrier fluid let the barrier pressure system cool down before opening.

For filling the barrier pressure tank must be opened by screwing off the upper locknut with a suitable tool (e.g. hook wrench for locknut DN80). The system is being filled until the filling level has reached the middle of the hose between T-piece and upper entry of the barrier fluid tank (see 11.14.2). At special executions with sight glass the filling level should be app. in the middle of the sight glass. If a filling level monitoring system is installed the operating manual of the system must be observed.



ATTENTION

On any variation of barrier pressure tanks the circulation system must always be closed.

Then the barrier fluid tank is closed with the locknut and can be put into operation.

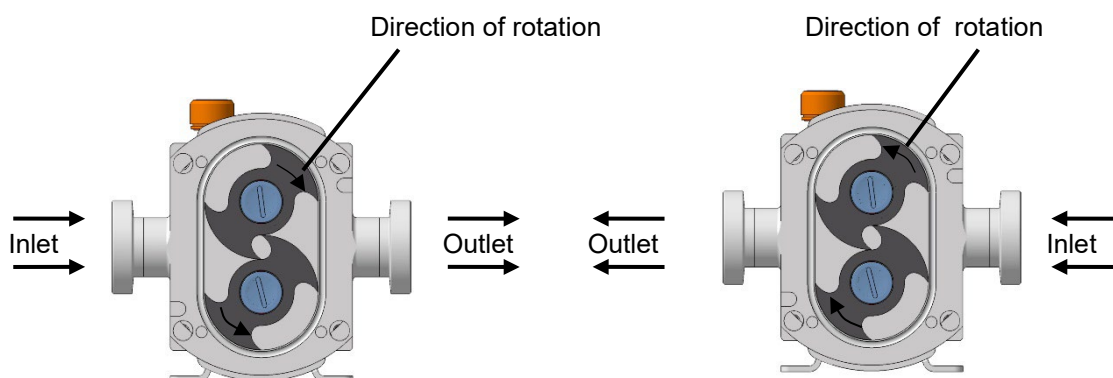
The change of the barrier fluid should be done in suitable intervals. For this purpose the feed pipe is loosened at the lowest point and the barrier fluid tank and the drain pipe are emptied. To remove residual liquid in the mechanical seals the detached feed pipe is closed and an air pressure pipe is connected to the upper connection port of the tank. Then the open circuit is pressurized. Afterwards the system can be cleaned and the barrier pressure tank can be refilled.

11.15 Direction of rotation



ATTENTION

Never operate the pump without pump cover or without being connected to the pipes!
Before connecting the drive to the power supply, the correct direction of rotation of the drive shaft must be established. The pump operates in both directions. At the same time the drive shaft can have different positions. See the following figure to establish the correct direction of rotation of the drive shaft.



11.16 Connection of the drive



DANGER

The pump may never be put into operation unless the coupling is not provided with a proper protection device!

When driven by an electric drive motor the following must be considered:



DANGER

An electric drive may only be connected to the electric power supply by a qualified electrician!
Before connecting an electric drive motor, please acquaint yourself with the actual regulations of the local electric works.

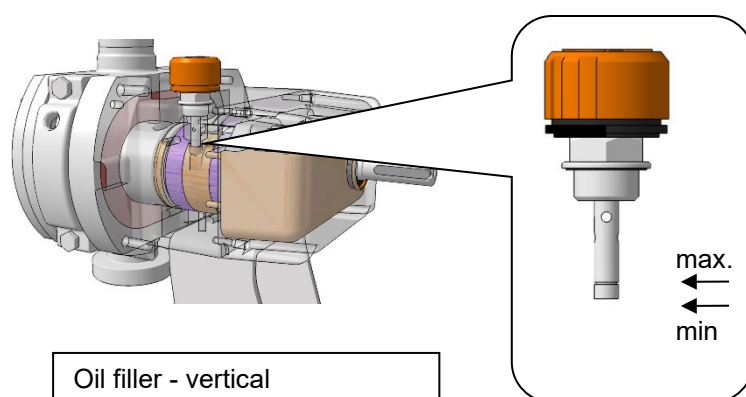
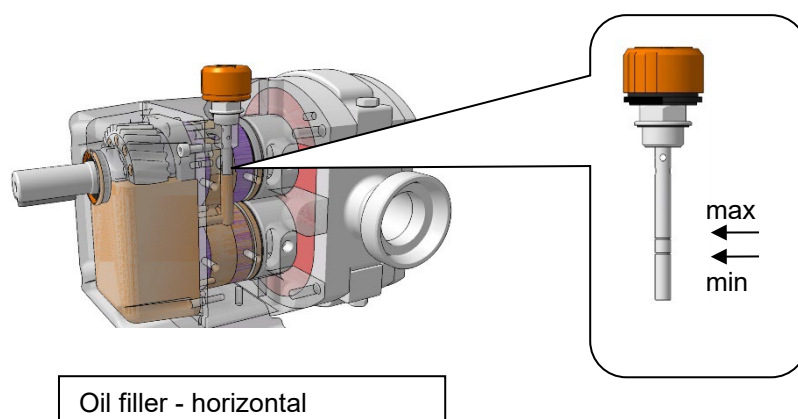
- Protect the drive against overload.
- If possible, fit an operation switch at the pump.
- If possible, mount an earth switch.

11.17 Filling with oil

The gearbox of a new pump has been filled with oil by the manufacturer!

Unscrew the venting plug together with the oil dipstick.

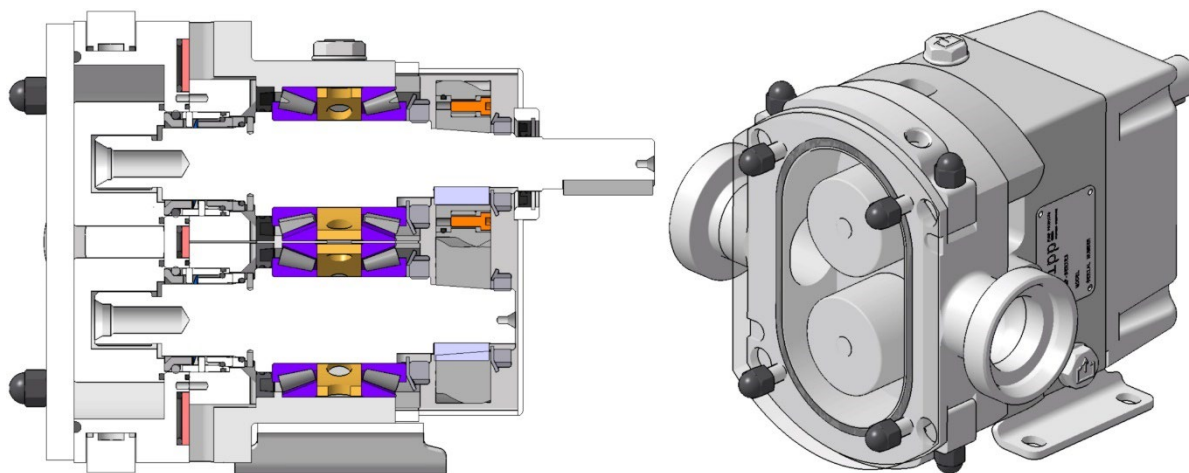
Fill the oil through the filling opening into the gearbox. The relevant quantities can be found in chapter 15. Check the oil level by means of the oil dipstick. For this purpose screw in and out by hand the dipstick. The oil level must be between the top and bottom limit. When the correct oil level is reached, tighten the oil dipstick by hand.



12 Commissioning

12.1 Cleaning of the system

Rotary lobe pumps are particularly sensitive to conveying solid particles. Newly installed systems or overhauled systems often contain hard particles from welding, grinding or other mechanical work. When flushing the system those hard particles can get stuck between the pump elements of the rotary lobe pump and cause severe damage when starting the pump. For initial cleaning of the system rotor dummies can be used which allow those particles to pass the pump without causing damages.



For a correct fitting and disassembly of the rotors, please refer to the instructions in chapter 14.6 and 14.7.

Rotor dummies are available at IPP Pump Products GmbH.

12.2 Control

Please check if there's enough oil in the gearbox. The oil level must be between the top and bottom limit marked at the oil dipstick. (see chapter 10.14).



ATTENTION

Never start the pump when the gearbox is not filled with oil correctly!

If connected, check the pressure of the flushing system.

If a double mechanical seal is fitted, the non-pressurized flushing (quench) must have a capacity of **2,5 l/min**. If the ports are fitted in vertical position: connect the supply lines of the flushing system at the bottom side!

If a double mechanical seal is fitted the pressurized flushing (Flush) must be app. 2 bar higher than the system pressure. Capacity of 2,5 l / min. If the connection ports are fitted in vertical position: connect the supply line at the bottom side.

If connected, check if the heating system has the required temperature.

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12.3 Start-up

- Open – if existing – the non-return valves of the flushing pipes.
- Open – if existing – the non-return valve at the outlet.
- Open – if existing – the non-return valve at the inlet.
- Start the pump unit.

12.4 During operation



ATTENTION

If it is not fitted with a pressure relief valve, the pump may never run with closed non-return valve or if the outlet is blocked. If the pressure relief valve is activated, the pump should not run too long in order to avoid overheating! A pressure relief valve is a protective device, not a control valve.



NOTE

Avoid strong temperature changes of the pumped liquid. This could cause damages to the pump if the pump components expand or shrink. The indicated limits for pressure, speed or temperature must not be exceeded!

12.5 To stop the pump for a short period

When interrupting or stopping the pumping procedure it must be ensured that the pump does not run dry! This is only admissible if the pump is fitted with a flushed shaft seal.

Stop the pump by switching off the drive motor.

If the system stays pressurized, leave the non-return valves of the flushing pipes (if existing) OPEN.

If the pump is fitted with heating jackets, leave the non-return valves (if existing) at the heating system OPEN, if the pump conveys liquids which can get solid at lower temperatures.

13 Maintenance

13.1 General

The following points have to be checked regularly:

- Perfect functioning of the pump. Excessive noise can be caused by worn bearings, problems at the gear wheels, galling rotors or cavitations.
- Check for leakage at the shaft seals.
- If applicable: pressure and capacity of the flushing system.
- If applicable: temperature of the heating system
- The oil level: If the oil level is reduced, check the pump for oil leakage. If the oil level is increased, check the oil for entry of water or product to be pumped.
- Pressure at the inlet and outlet ports.
- Visual control: check for corrosion.

13.2 Oil change

The gearbox oil should be changed every 3000 operating hours or at least 1 x per year. Please see chapter 15.1 and 15.2 for oil specifications.

14 Disassembly / Assembly

14.1 Order of spare parts

When ordering spare parts please indicate the following:

- The serial number. **This can be found on the identification plate of the pump.**
- The model type: **This can be found on the identification plate of the pump.**
- The position number, quantities and – if known – part no. of the requested spare parts.

Chapter 16 shows a cross-sectional drawing of the pump with a spare parts list and the correct position numbers. Rotors and gear wheels are always supplied as a pair!

14.2 Precautions



DANGER

Never let the pump run without pump cover or without having the pipes connected appropriately!



DANGER

It must be ensured that the drive of the pump is switched off during maintenance works and cannot be re-started unintentionally!



DANGER

If the pump possibly conveys liquids which are harmful to health, please wear protective gloves and goggles when working at the pump!



DANGER

Ensure that the pump is depressurized when it must be disassembled for maintenance purposes!

14.3 Special tools

14.3.1 Rotor key

Type	Part No.
iL42	110.1003.01F000
iL55	110.1003.01F000
iL63	210.1003.00F000
iL85	220.1003.00F000
iL115	230.1003.00F000
iL130	230.1003.00F000

14.3.2 Auxiliary tool for assembly

Type	Part No.
iL42	260.1006.01C000
iL55	250.1006.01C000
iL63	210.1006.01C000
iL85	220.1006.01C000
iL115	230.1006.01C000
iL130	270.1006.00C000

14.4 Pump drainage

- Close the non-return valves at the inlet and outlet ports of the pump. If there are no non-return valves, it must be ensured that the liquid level of the pipe system is under the pump level.
- Place a collection tank at the front under the pump case.
- Loosen **partly** the cap nuts at the pump case cover.

- Insert a screwdriver into the recesses provided for this and lift the pump case cover from the pump case.
- Collect the leaking liquid in the collection tank underneath the pump case.
- If there is no more liquid leaking re-tighten the cap nuts by hand.

14.5 Oil drainage

- Place a collection tank under the drainage opening of the gearbox cover.
- Unscrew the oil vent plug on top of the pump.
- Remove the oil drain screw at the bottom of the gearbox cover and drain the oil into the collection tank.
- After complete drainage screw the oil vent plug and the oil drain plug into their positions.



NOTE

It must be ensured that no oil leakage is contaminating the environment.

14.6 Dismantling of the pump

- Remove the coupling protection
- Loosen the coupling part on the pump shaft and push the coupling part backwards.
- Loosen – if existing – the flushing tubes from the shaft seal.
- Loosen – if existing – connections at the pressure relief valves and other safety valves.
- Loosen – if existing – the steam and heating pipes from the heating jacket.



DANGER

Ensure that the feeding of steam or heating liquid is closed and that the heating jacket has cooled down!

Loosen the connections from the pressure and suction connection. **Make sure that the piping is well-supported!**

Unscrew the bolts and remove the pump from the base plate. If necessary, use an appropriate hoisting device. For detailed hoisting instructions, please refer to chapter 10.3 of this manual.

14.7 Disassembly of the pump

An explanation of the position numbers can be found in the cross-sectional drawing with part list in chapter 16.

Place the pump onto a bench which is suitable to carry the pump weight.



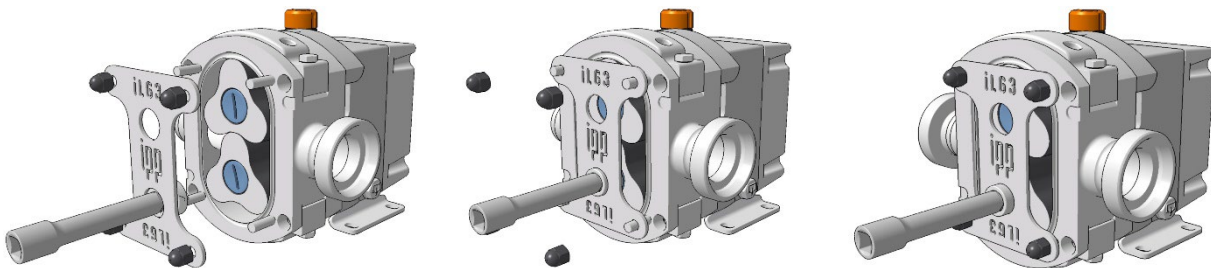
NOTE

In order to catch residual oil and product liquid it is recommended to put the pump in a large basin

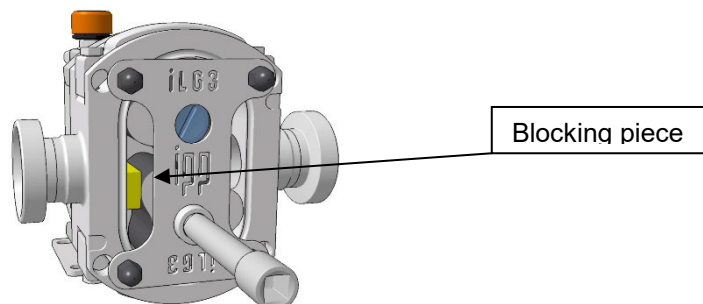
14.7.1 Disassembly of the rotors

Remove the cap nuts and pull off the pump case cover and the o-ring respectively profile shape gasket.

Unscrew the rotor screw by means of the supplied rotor key and remove the rotor screw with the o-rings. Use the auxiliary tool in order to prevent the rotor key from gliding off and thus damaging the rotor screw. When tightening the auxiliary tool, make sure that the rotor screw still can rotate. When loosening and tightening the rotor screw follow the instructions regarding the auxiliary tool in the same way.



Put a soft plastic block between the rotor and the rotor case in order to prevent them from rotating.



Remove the rotors from the shafts.

14.7.2 Disassembly of the shaft seals

The rotating sliding ring or shaft protection bush is located in the recesses in the already disassembled rotors. Remove these sliding rings or shaft protection bush by lifting them up carefully by means of a screwdriver or another suitable tool.

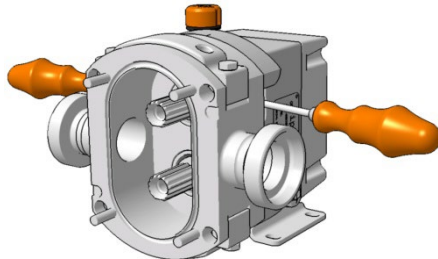


ATTENTION

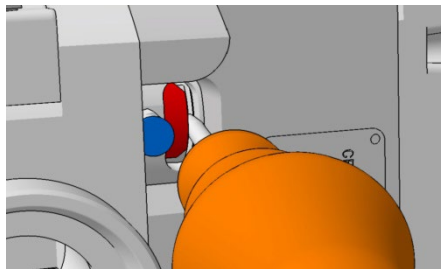
Exercise extreme care! In no case you should use a striking tool and you should not exercise bumping movements with the screw driver.

The other parts of the shaft seals are disassembled as follows:

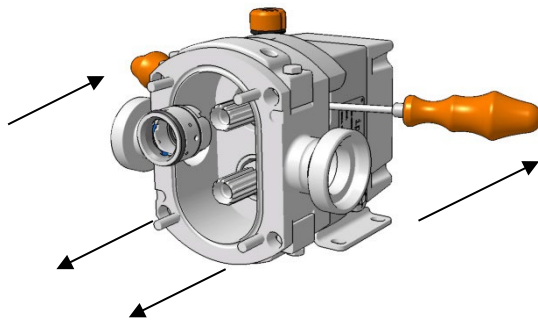
Insert a screw driver on both sides of the shaft into the assembling openings on both sides of the pump case.



Place the screw driver or another suitable tool behind the visible edges of the seal case.



Now lift up carefully (by using both screw drivers at the same time) the seal case with the shaft seal to the front out of the pump case.



Remove the seal case with the shaft seal from the front from the shaft.

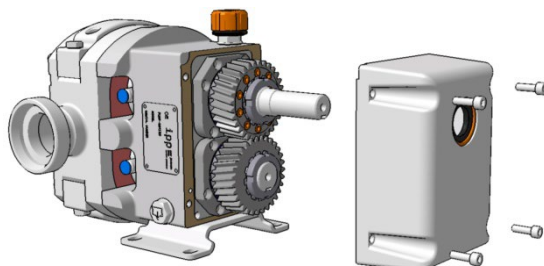
Remove the other shaft seal in the same way. Take care not to exchange the two sliding rings of the mechanical seal when assembling the mechanical seal again. The sliding rings have been adjusted to each other and must not be exchanged!

14.7.3 Disassembly of the gearbox

Continue the disassembly as follows: Ensure that there is no more oil left in the gearbox!

Remove the feather key out of the driving shaft.

Loosen the locking screws of the gearbox cover. Insert a screw driver or another suitable tool into the recesses of the gearbox cover and lift the cover up from the bearing case.



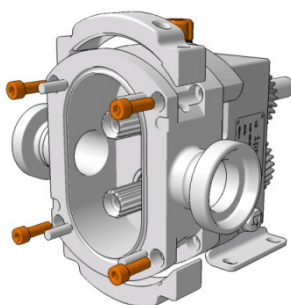
Remove the flat gasket or the o-ring of the gearbox.

Screw off the heating covers at the pump case and remove these.

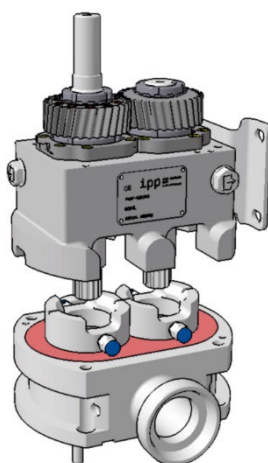


DANGER

ATTENTION: Hot surfaces, do not touch!



Place the pump on the stay bolts of the pump case and pull up the bearing case together with the shafts. Use a suitable hoisting device.

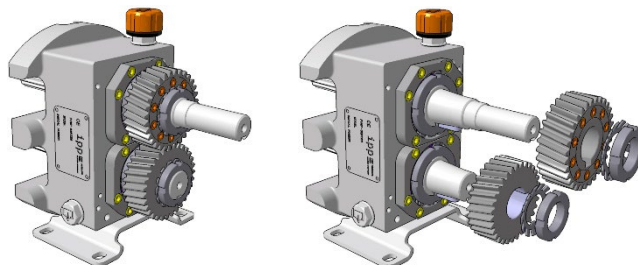




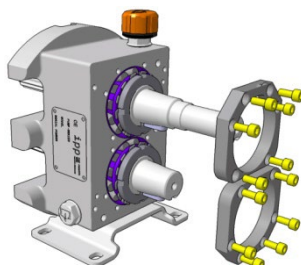
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Est: D. Lünemann /
W. Stein

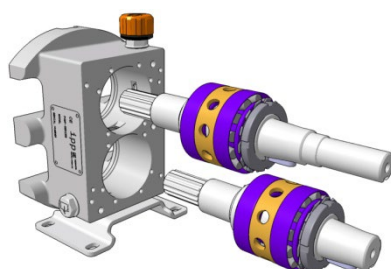
Unlock the groove nuts of the gear wheels and loosen the groove nuts.



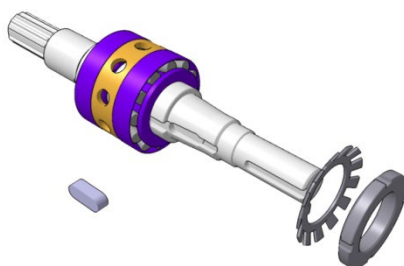
Pull of the gear wheels from the shafts. A puller or a lever may be a helpful tool.
Remove the feather keys. Remove the bearing covers.



Press the shaft units off the bearing housing by applying a press.



Remove the feather keys, unlock the groove nuts and loosen these.

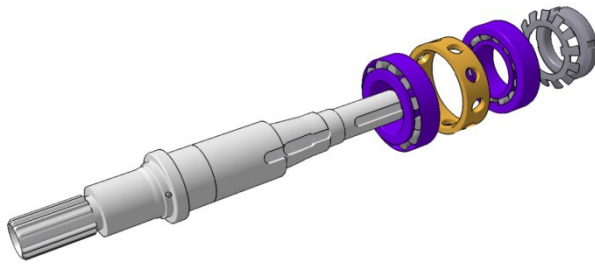


Use a press to pull off the bearings from the shaft.

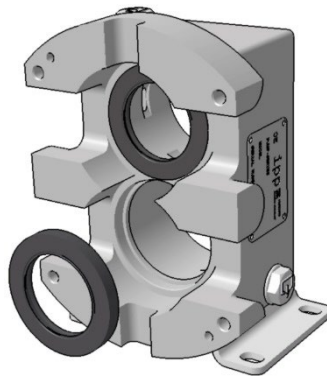


NOTE

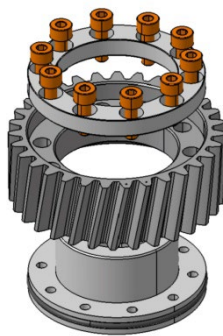
Attention: Do not damage or scratch the seal faces of the shaft seals.



Pull out the radial shaft seals out of the bearing housing. Don't damage the seal seat!



Loosen the support ring from the gear of the drive shaft and separate the sprocket wheel from the centre sleeve.



14.7.4 Control of the parts

Only use original - IPP Pump Products GmbH –parts for replacement of defective parts.

Check all radial shaft seals for leakages and damages.

Check all non-defective for scratches, burrs, debris or excessive wear.

If the gearbox cover has already been disassembled: Ensure that the sealing surface between pump case and gearbox cover are clean and free of sealing residues. Clean all parts with a lint-free cloth.

14.8 Assembly of the pump

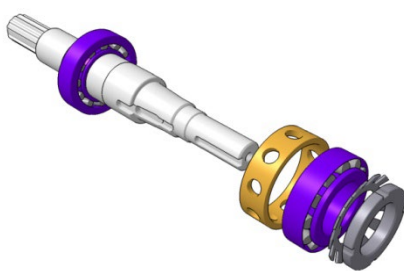
In chapter 16 you find a cross-sectional drawing with part lists and an explanation of the position numbers.

If the pump is fitted with Trilobe rotors the synchronised running must always be adjusted after installation of new bearings or disassembly of the bearing units.

Ensure that all parts are clean; a clean working environment is helpful for successful assembly!

Insert the radial shaft seals in the bearing housing.

Install the front bearing onto the shaft.



DANGER

We recommend heating the bearing to app. 100 to 150°C. **(Attention: Heat can cause severe injury)**

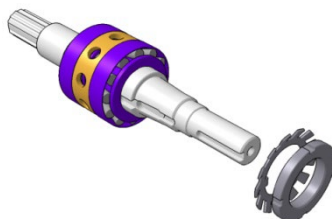


DANGER

Install the spacer bushing and the rear bearing. This should also be heated to app. 100 – 120°C. **(Attention: Danger of injury by hot parts)**

Work rapidly in order to prevent bearings from cooling down too early.

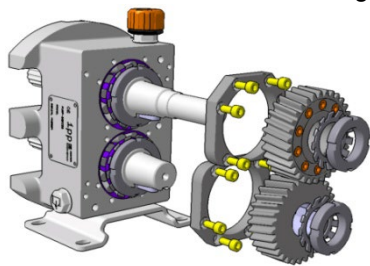
Pretension the bearing by mounting the lock washer and tighten the shaft nut.



The pretension must be adjusted to the following friction torques of the bearing when installed and cold: We recommend using a torque gauge. If required, please contact IPP Pump Products GmbH. Please adjust the following friction torques:

Type	Torque
iL42	1,4 – 1,6 Nm
iL 55	1,5 – 1,8 Nm
iL63	1,8 – 2,0 Nm
iL85	2,0 – 2,5 Nm
iL115	3,5 – 4,0 Nm
iL130	5,5 – 6,0 Nm

Insert the feather keys and press the shafts into the bearing case (use a press).

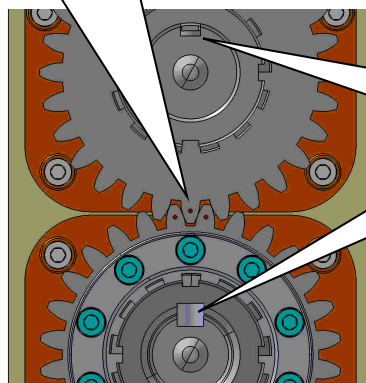


Now place the bearing covers onto the shaft ends.

Now install the gear wheels and tighten them and lock the screwing.

It is important that the feather keys are in a 12 o'clock position and that the markings of the tooth flanks gear into each other. In this position, install the fixing ring and the screws. Just pull hand-tight in order to be able to adjust the final timing later.

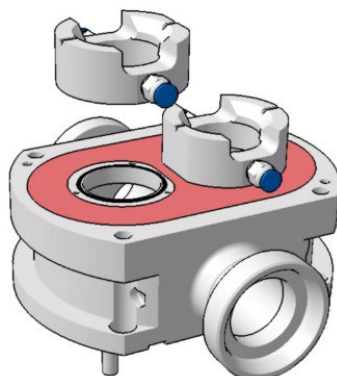
Markings gear into each other

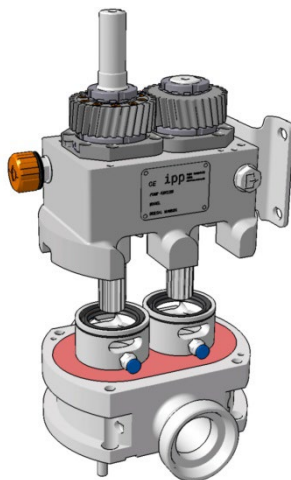


Feather keys in 12 o'clock position

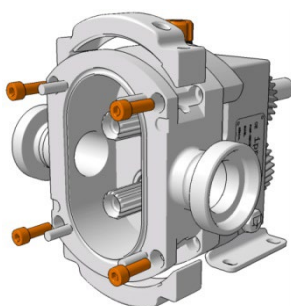
Prepare the pump case by inserting the o-rings into pump case.

If the pump is fitted with a heating system the o-rings and the heating plate are inserted into the position provided for these (see chapter „heating“). Place the spacer bushings into their position.





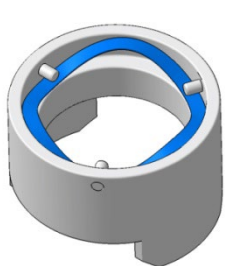
Place the bearing case with the shafts onto the pump case. Pay attention when passing the shafts: the toothing of the shafts can easily be damaged.
 Place the pump onto the pump feet and tighten the bearing case.



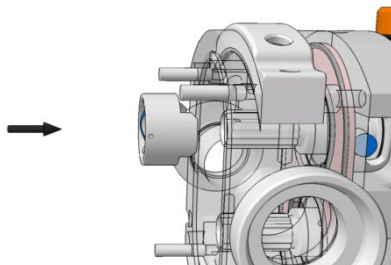
14.8.1 Mechanical seals

14.8.1.1 Single mechanical seals

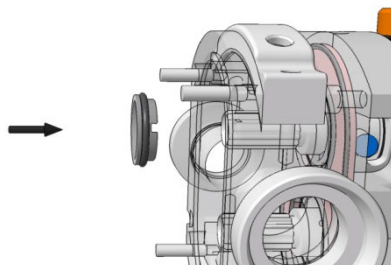
Insert the shaft spring into the mechanical seal housing.



Push the seal housing into the pump case so that the pins fit into the slots provided for these. The slots are in one line with the leakage holes.



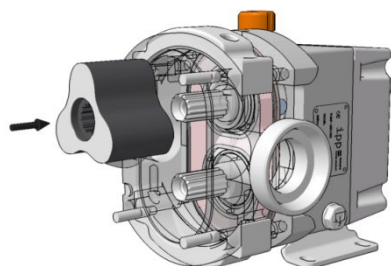
Now insert the fixed sliding rings together with the o-ring. We recommend placing the o-ring onto the sliding ring first. Take care that the cylindrical pins of the seal housings fit into the driving slots of the sliding rings. Attention: Grease the o-rings with an appropriate lubricant.



Now insert the rotating sliding rings with the installed o-ring into the rotors. Ensure that the pins of the sliding ring fit into the slots of the rotor. Attention: Grease the o-rings with an appropriate lubricant.



Clean the sliding surfaces and insert the rotors.

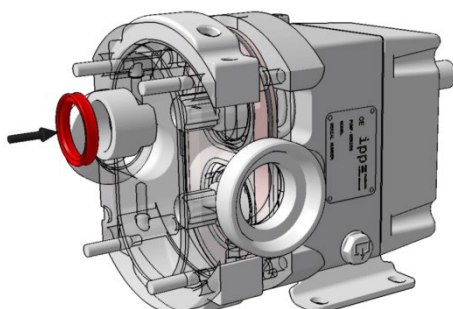




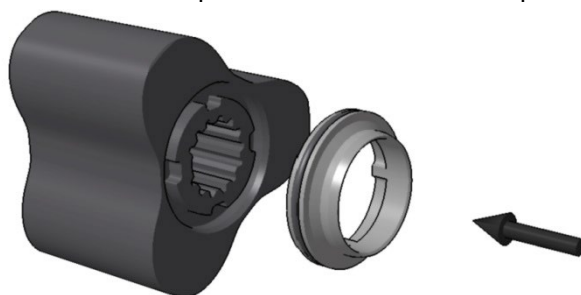
ATTENTION

No excessive force is needed to install the mechanical seal provided that all parts are engaged to each other appropriately. Check the spring functioning before installing the rotors.

14.8.1.2 Lip seals

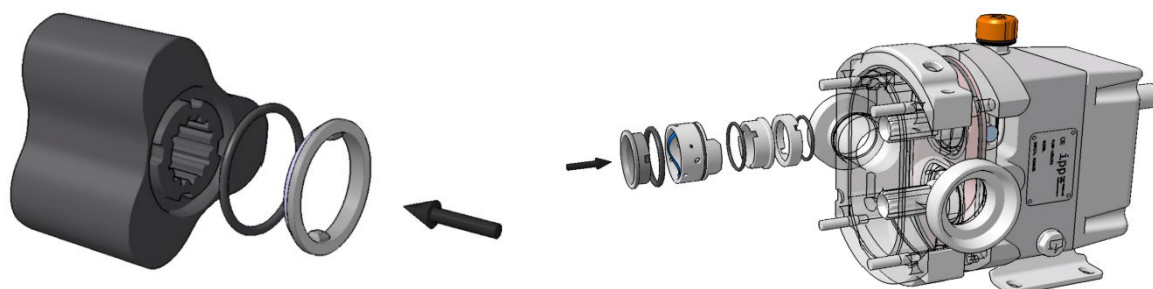


Insert the insection sleeve and the lip seal one after another onto the shaft. Ensure that the pins of the insection sleeve are engaged into their slots. The slots are in one line with the leakage slots. Grease the lip seals with a suitable lubricant. The lip should be directed to the product (see chapter 18.3.1.3).

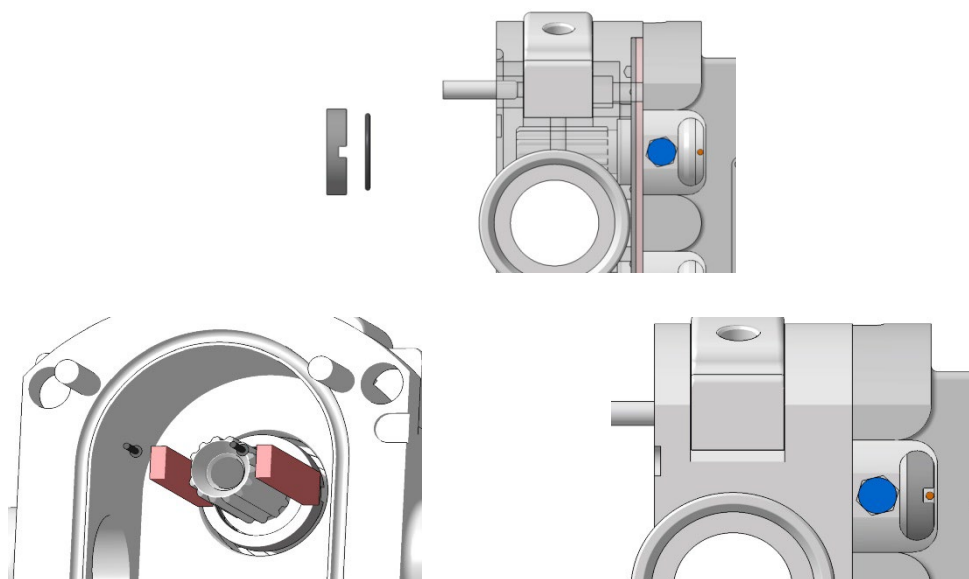


Insert the shaft protection bush with the pre-assembled o-rings into the rotors. Ensure that the pins of the shaft protection bush are engaged to the notch of the rotor. Attention: The o-rings should be greased with a suitable lubricant.

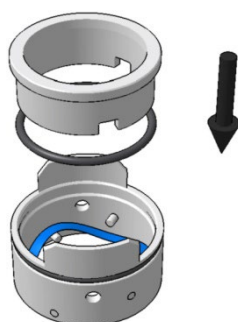
14.8.1.3 Double mechanical seals



First place the rotating sliding ring of the atmosphere side onto the shaft. We recommend inserting the o-ring into the sliding ring first. Grease the o-ring with an appropriate lubricant. Turn the shafts to 3 o'clock position so that the cylindrical pins for the rotating-lock can be seen in the leakage slots. Insert the sliding ring so that the cylindrical pins fit into the driving grooves. Two of the supplied locking blocks can be of assistance, see picture.



Now install the mechanical seal housing. Insert the wave spring as well as the o-ring for the fixed sliding ring of the atmosphere side. Ensure that the wave spring lies between the two rows of cylindrical pins for the rotating locking. Grease the o-ring by means of an appropriate lubricant. When inserting the sliding ring the cylindrical pins of the atmosphere side must fit into the driving grooves of the sliding ring.



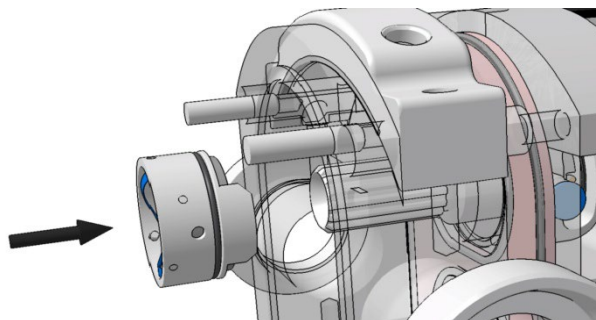
Install the static o-ring at the outside diameter of the mechanical seal housing. Don't overstretch the o-ring. Grease the o-ring by means of an appropriate lubricant.

Insert the mechanical seal housing into the pump case.

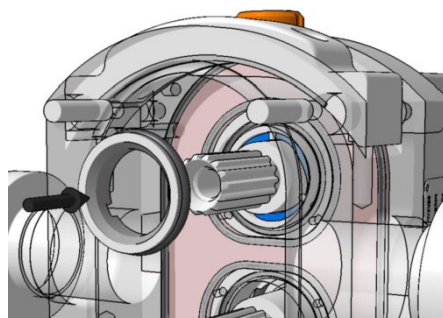


NOTE

First the sliding surfaces of both atmosphere side sliding rings must be cleaned and free of grease. The pins of the rotating locking must fit into the grooves provided for that. These are in one line to the leakage slots.



Now insert the fixed sliding rings together with the o-ring. We recommend inserting the o-ring to the sliding ring first. Ensure that the cylindrical pins of the mechanical seal housing fit into the driving grooves of the sliding rings. Attention: Grease the o-rings by means of an appropriate lubricant.



Now insert the rotating sliding rings with the installed o-rings into the rotors. Ensure that the pins fit into the grooves of the rotor.

Attention: Grease the o-rings by means of an appropriate lubricant.



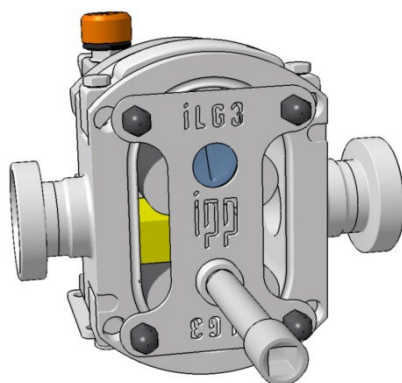
Clean the sliding surfaces so that they are free of grease and insert them into the rotors.



ATTENTION

No excessive force is needed to install the mechanical seal provided that all parts are engaged to each other appropriately. Check the spring functioning before installing the rotors.

Now install the rotors. Some rotors are stamped and should be kept with their respective shafts. Check the wave spring functioning of the mechanical seal again by pushing the rotors against the seat. The wave spring must push back the rotors. Now install the slightly greased o-rings and the rotor screw. We recommend using the auxiliary tool in order to avoid damaging the rotor screw even with high tightening torques.



14.9 Tightening Torques:

Type	Torque
iL42	25 Nm
iL55	36 Nm
iL63	50 Nm
iL85	70 Nm
iL115	150 Nm
iL130	300 Nm

The rotor to be tightened must be blocked before. As the gear wheels are not tightened yet, they don't transmit a turning moment.

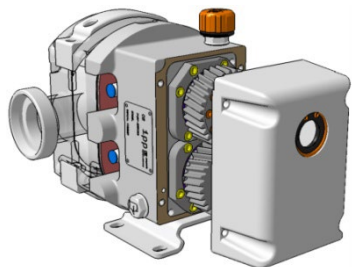
Now tighten the rotors by means of a torque wrench.

Now adjust the timing between the rotors. For this purpose fix the gear wheel in the position where the rotors don't touch each other when turning left or right.

A feeler gauge for Trilobe-rotors and a slide gauge for Biwing-rotors are required.

Type	Trilobe-Rotors Mesh clearance	Biwing-Rotors Mesh clearance
iL42	0,08 – 0,15 mm	4,2 – 6,0 mm
iL55	0,09 – 0,18 mm	7,4 – 8,0 mm
iL63	0,12 – 0,20 mm	11,5 – 12,5 mm
iL85	0,12 – 0,18 mm	14,4 – 15,5 mm
iL115	0,15 – 0,25 mm	22,0 – 23,4 mm
iL130	0,22 – 0,35 mm	27,7 – 29,3 mm

Insert the flat gasket or o-ring for gearbox and ensure clean and even surfaces without residues. Install the gear box cover on the bearing housing. Be careful when passing through the shaft in order not to damage the radial shaft seals. Slight greasing could be helpful.



Before tightening, ensure that the radial shaft seal is concentric to the shaft. Now fill in oil as described in chapter 10.14.

Before installing the pump cover, check the pump clearances in order to ensure the contactless running of the rotors. A feeler gauge and a depth gauge are required!

The standard clearances are as follows:

		iL42	iL55	iL63	iL85	iL115	iL130
Radial max	[mm]	0,12	0,14	0,18	0,165	0,225	0,30
Radial min	[mm]	0,10	0,11	0,12	0,135	0,195	0,27
Axial front max	[mm]	0,11	0,12	0,18	0,16	0,186	0,27
Axial front min	[mm]	0,09	0,10	0,12	0,135	0,165	0,24
Axial rear max	[mm]	0,11	0,12	0,18	0,185	0,215	0,27
Axial rear min	[mm]	0,09	0,10	0,12	0,16	0,194	0,24
Mesh clearance max	[mm]	0,15	0,18	0,2	0,18	0,25	0,35
Mesh clearance min	[mm]	0,08	0,09	0,12	0,12	0,15	0,22
Mesh distance max	[mm]	6,0	8,0	12,5	15,5	23,4	29,3
Mesh distance min	[mm]	4,2	7,4	11,5	14,5	22,0	27,7

The values can vary in case of electro polished or specially adjusted pumps.

Install the pump case cover.



ATTENTION

Don't stretch or overstretch the o-ring resp. the profile gasket, otherwise the gasket must be replaced before installing the pump case cover.

15 Decommissioning

15.1 Disassembly

See chapter 13.5 for disassembling the pump.

15.2 Storage

See paragraph 11.3 Storage Conditions.

15.3 Disposal

If the pump should be scrapped the following points must be observed:

Clean the pump case inside if there could be residues of the pumped liquid.
Drain the oil completely of the gear box.
Offer the old pump to a company specialized in metal scraping.

16 Technical data

16.1 Oil types

The following types of oil are recommended for the gear box:

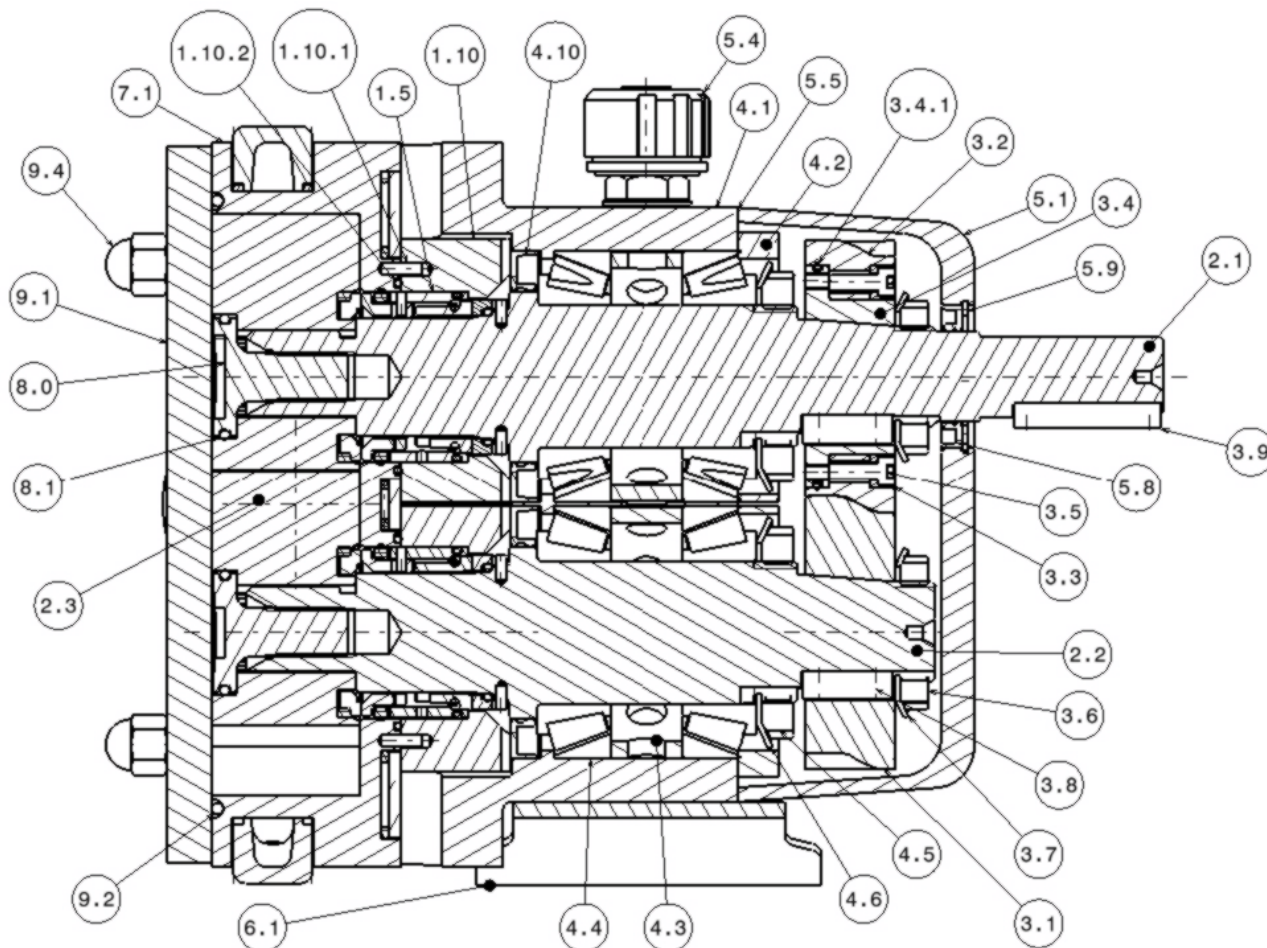
Example of recommended oils	
Brand	Type
Shell	Cassida Fluid HF 68, NSF H1
PETRO-CANADA	Purity FG AW Hydraulic 68, NSF H1
Klüber	4UH1-68N, NSF H1 (synthetisch)

Recommended characteristics	
Environment temperature	Viscosity
-18 °C to 0 °C	VG 68
0 °C to 30 °C	VG 68
30 °C to 150 °C	VG 220

16.2 Oil quantities

	Horizontal	Vertical
iL42	0,2 Liter	0,25 Liter
iL55	0,25 Liter	0,26 Liter
iL63	0,27 Liter	0,29 Liter
iL85	0,9 Liter	0,8 Liter
iL115	2,25 Liter	2,0 Liter
iL130	3,2 Liter	3,0 Liter

17 Cross-sectional drawing

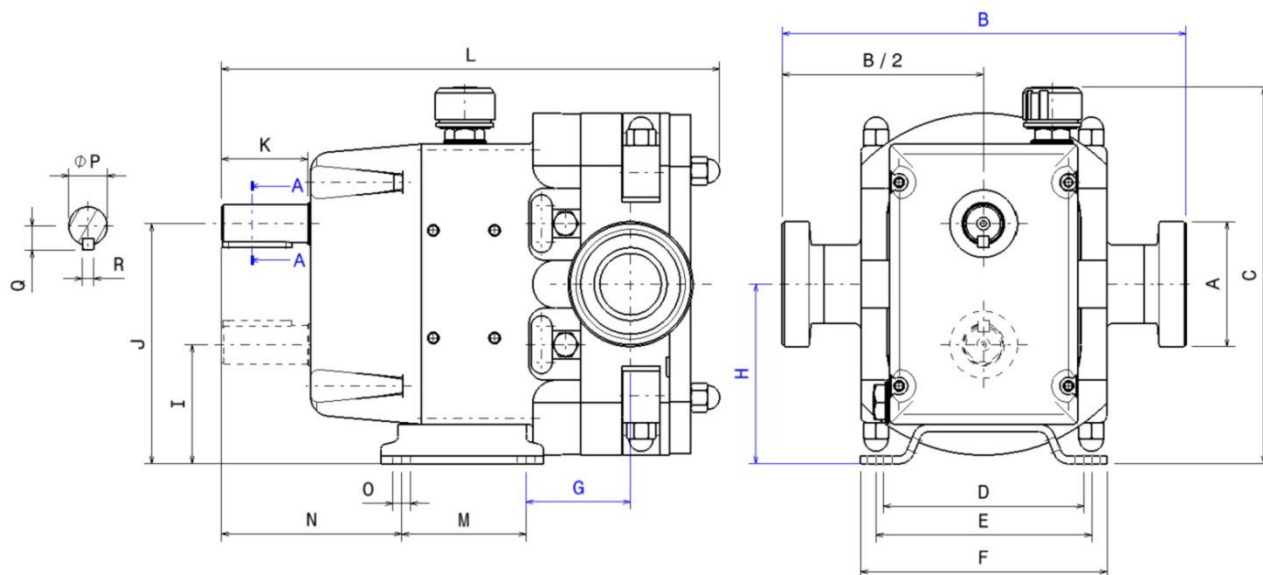


18 Parts list

Pos.	Description	Quantity	Pos.	Description	Quantity
1.5	Mechanical seal housing	2	4.5	Shaft nut	2
1.10	Spacer bushing I	2	4.6	Tab washer	2
1.10.1	Driving pins spacer bushing	6	4.8	Allen screw bearing flange	12
1.10.2	O-Ring spacer bushing front side	2	4.9	Allen screw bearing case	4
		2	4.10	Frontal radial shaft seal	2
2.1	Driving shaft	1	5.1	Gear box cover	1
2.2	Driven shaft	1	5.2	Locking plug	1
2.3	Rotor	2	5.4	Oil dipstick	1
3.1	Gear wheel driven shaft helical gearing	1	5.5	Flat gasket gear box cover	1
3.2	Gear ring driving shaft, helical gearing	1	5.6	Allen screw	4
3.3	Clamping ring gearing ring	1	5.8	Rear radial shaft seal	1
3.4	Centre bush	1	5.9	Retaining ring	1
3.4.1	O-Ring centre bush	1	6.1	Pump foot	2
3.5	Allen screw	10	6.2	Hexagonal screw	4
3.6	Shaft nut	2	7.1	Pump case	1
3.7	Tab washer	2	8.0	Rotor screw	2
3.8	Feather key	2	8.1	O-Ring rotor screw	2
3.9	Feather key, drive pin	1	9.1	Pump case cover	1
4.1	Bearing case	1	9.2	O-ring pump case cover	1
4.2	Bearing flange	2	9.3	Stud screw	4
4.3	Spacer bush	2	9.4	Cap nut	4
4.4	Taper roller bearing	4			

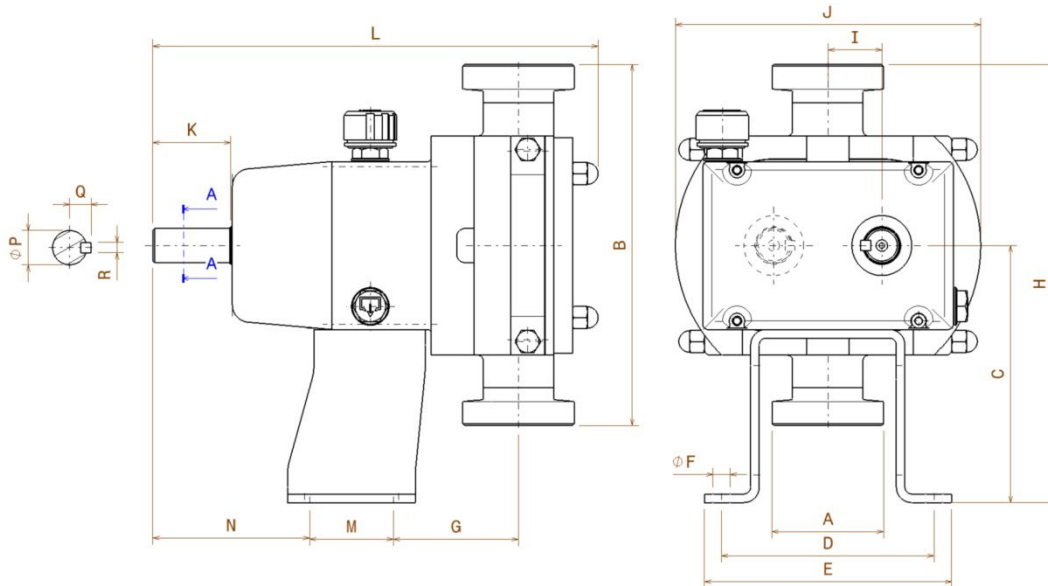
19 Dimensions

19.1 Horizontal execution



Typ Pos	iL42	iL55					iL63			iL85			iL115				iL130			
	i	sx/sxx	s	i	li	l	s	i	l	s	i	l	s	si	i	l	sx	s	i	l
A	DN25	DN15	DN20	DN25	DN32	DN40	DN40	DN40	DN40	DN40	DN50	DN65	DN50	DN65	DN80	DN100	DN65	DN80	DN100	DN100
B	157	177	177	177	176	174	210	210	210	234	232	236	308	312	312	322	362	358	364	364
C	134	182	182	182	182	182	196	196	196	237	237	237	319	319	319	319	363	363	363	363
D	105	106	106	106	106	106	104	104	104	155	155	155	195	195	195	195	288	288	288	288
E	105	110	110	110	110	110	112	112	112	160	160	160	201	201	201	201	288	288	288	288
F	125	130	130	130	130	130	128	128	128	180	180	180	220	220	220	220	320	320	320	320
G	49,5	31	34,5	38,5	42,5	48,5	55	55	67	67,2	73,7	76,2	75,5	79,75	90,3	102,3	102,8	114,3	126,3	137,3
H	58,5	90,5	90,5	90,5	90,5	90,5	93,5	93,5	93,5	123	123	123	164	164	164	164	182,5	182,5	182,5	182,5
I	37	63	63	63	63	63	62	62	62	80,5	80,5	80,5	106,5	106,5	106,5	106,5	117,5	117,5	117,5	117,5
J	80	118	118	118	118	118	125	125	125	165,5	165,5	165,5	221,5	221,5	221,5	221,5	247,5	247,5	247,5	247,5
K	29	29	29	29	29	29	45	45	45	46	46	46	70	70	70	70	75	75	75	75
L	210	213	218	225	233,5	244	260	260	277	335	346	357	455	466	484	506	517	539	561	583
M	65	55	55	55	55	55	65	65	65	86	86	86	96	96	96	96	114	114	114	114
N	59,5	90,5	90,5	90,5	90,5	90,5	94	94	94	126	126	126	211	211	211	211	205	205	205	205
O	9	9	9	9	9	9	9	9	9	11	11	11	11	11	11	11	18	18	18	18
P	14	15	15	15	15	15	20	20	20	25	25	25	40	40	40	40	45	45	45	45
Q	9	9,5	9,5	9,5	9,5	9,5	12,5	12,5	12,5	15,5	15,5	15,5	23	23	23	23	27,5	27,5	27,5	27,5
R	5	5	5	5	5	5	6	6	6	8	8	8	12	12	12	12	14	14	14	14

19.2 Vertical execution



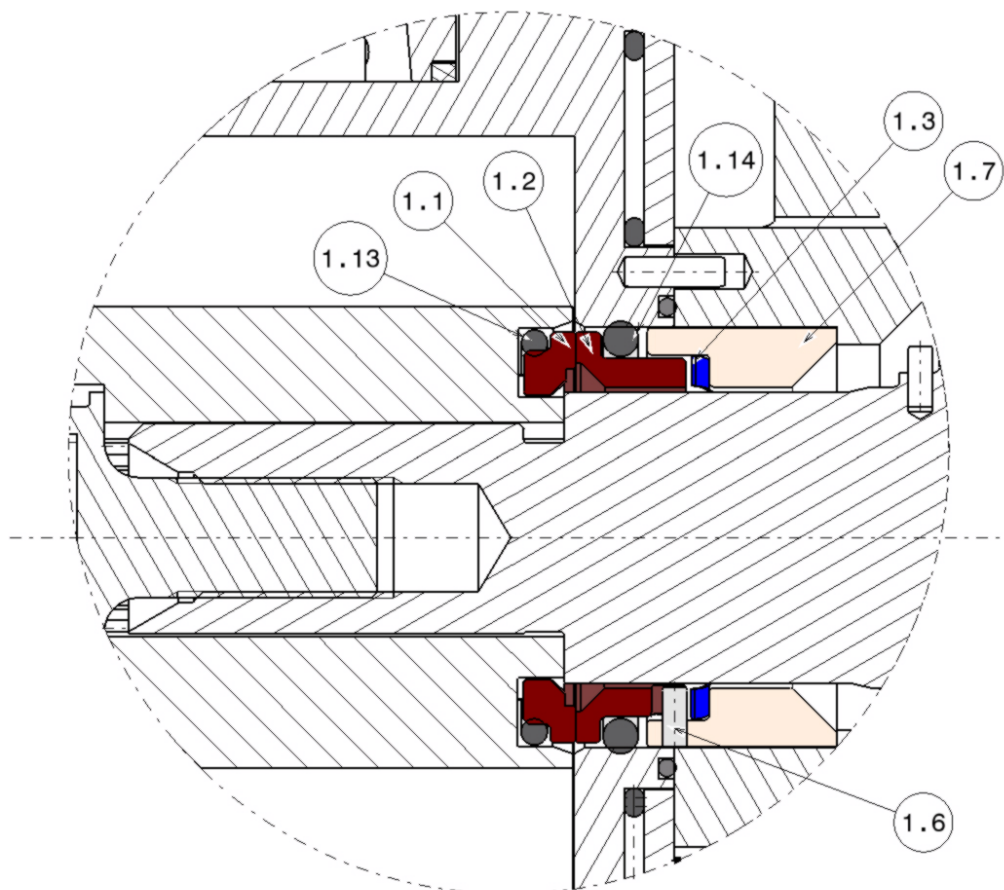
Typ Pos	iL42	iL55						iL63			iL85			iL115				iL130			
	i	sx/sxx	s	i	li	l	s	i	l	s	i	l	s	si	i	l	sx	s	i	l	
A	DN25	DN 15	DN 20	DN 25	DN 32	DN 40	DN 40	DN 40	DN 40	DN 40	DN 50	DN 65	DN 50	DN 65	DN 80	DN 100	DN65	DN80	DN100	DN100	
B	157	177	177	177	176	174	210	210	210	234	232	236	308	312	312	322	362	358	364	364	
C	52	118	118	118	118	118	150	150	150	165,5	165,5	165,5	145	145	145	145	185	185	185	185	
D	125	124	124	124	124	124	124	124	124	156	156	156	196	196	196	196	318	318	318	318	
E	145	144	144	144	144	144	144	144	144	180	180	180	220	220	220	220	350	350	350	350	
F	9	10	10	10	10	10	10	10	10	11	11	11	11	11	11	11	18	18	18	18	
G	52	48,5	52,5	56	60	66	73	73	87	84,7	91,2	93,7	68,7	73	83,5	95,5	59,8	71,3	83,3	94,3	
H	130,5	206,5	206,5	206,5	206	205	255	255	255	282,5	281,5	283,5	299	301	301	306	366	364	367	367	
I	21,5	27,5	27,5	27,5	27,5	27,5	31,5	31,5	31,5	42,5	42,5	42,5	57,5	57,5	57,5	57,5	65	65	65	65	
J	117	162	162	162	162	162	178	178	178	218	218	218	298	298	298	298	360	360	360	360	
K	29	31	31	31	31	31	45	45	45	46	46	46	70	70	70	70	75	75	75	75	
L	210	213	213	213	213	213	260	260	277	335	346	357	455	466	484	506	517	539	561	583	
M	65	45	45	45	45	45	49	49	49	51	51	51	96	96	96	96	114	114	114	114	
N	57	83	83	83	83	83	91,5	91,5	89,5	143,5	143,5	143,5	216	216	216	216	205	205	205	205	
P	14	15	15	15	15	15	20	20	20	25	25	25	40	40	40	40	45	45	45	45	
Q	9	9,5	9,5	9,5	9,5	9,5	12,5	12,5	12,5	15,5	15,5	15,5	23	23	23	23	27,5	27,5	27,5	27,5	
R	5	5	5	5	5	5	6	6	6	8	8	8	12	12	12	12	14	14	14	14	

19.3 Material specifications

Pos. No.	Description	Materials:	Material no.
9.1	Pump case cover	Stainless steel	1.4404
8.0	Rotor screw	Stainless steel	1.4404
4.1	Bearing housing	ST52	
3.2	Gear ring	34CrNiMo6	1.6582
3.1	Gear wheel	42CrMo4	1.7225
2.1	Driving shaft	X-2 CrNiMoN 22-5-3	1.4462
2.2	Driven shaft		
7.1	Pump case	Stainless steel	1.4404
2.3	Rotor	Stainless steel	1.4404

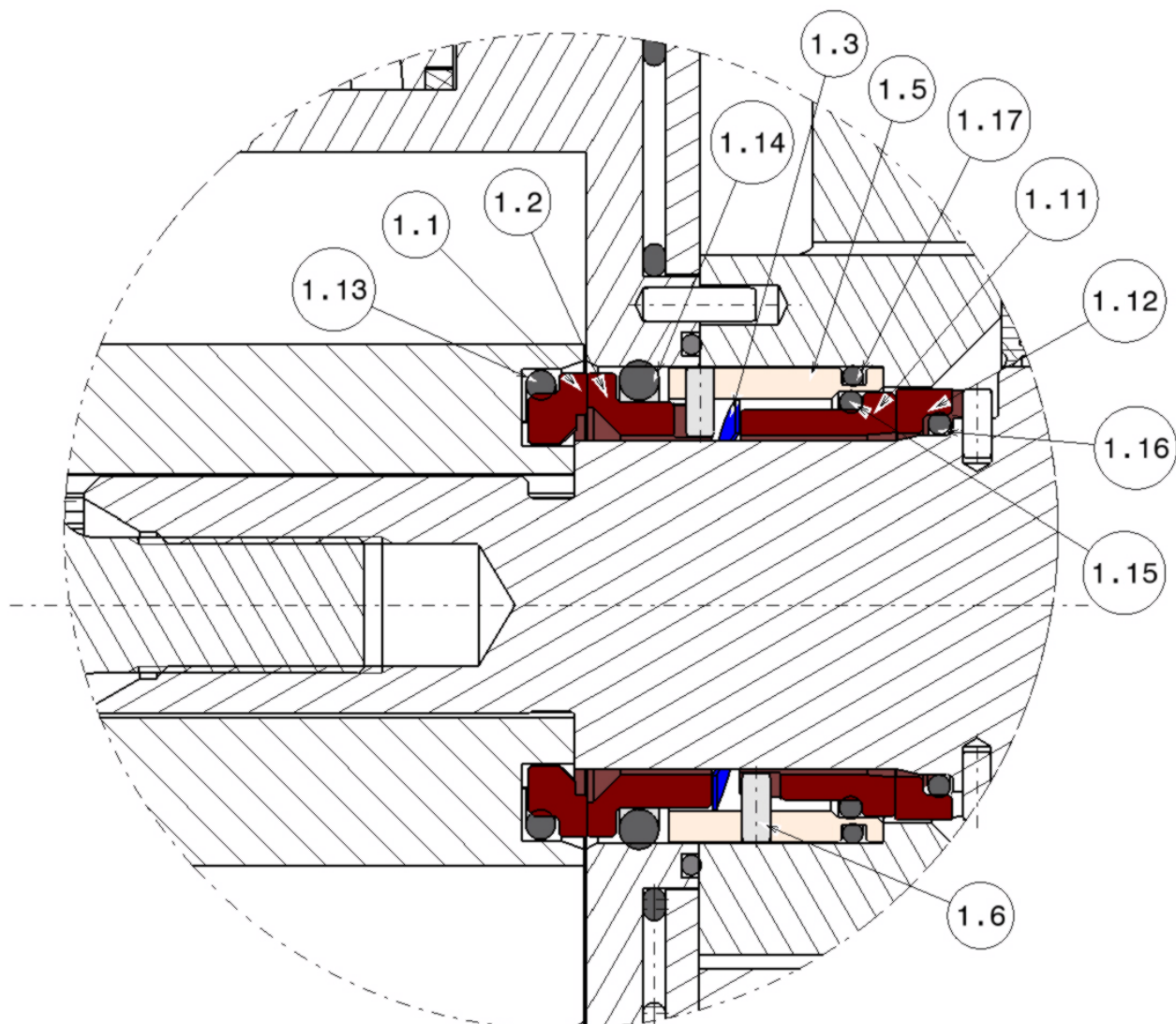
19.3.1 Shaft seals

19.3.1.1 Single mechanical seals



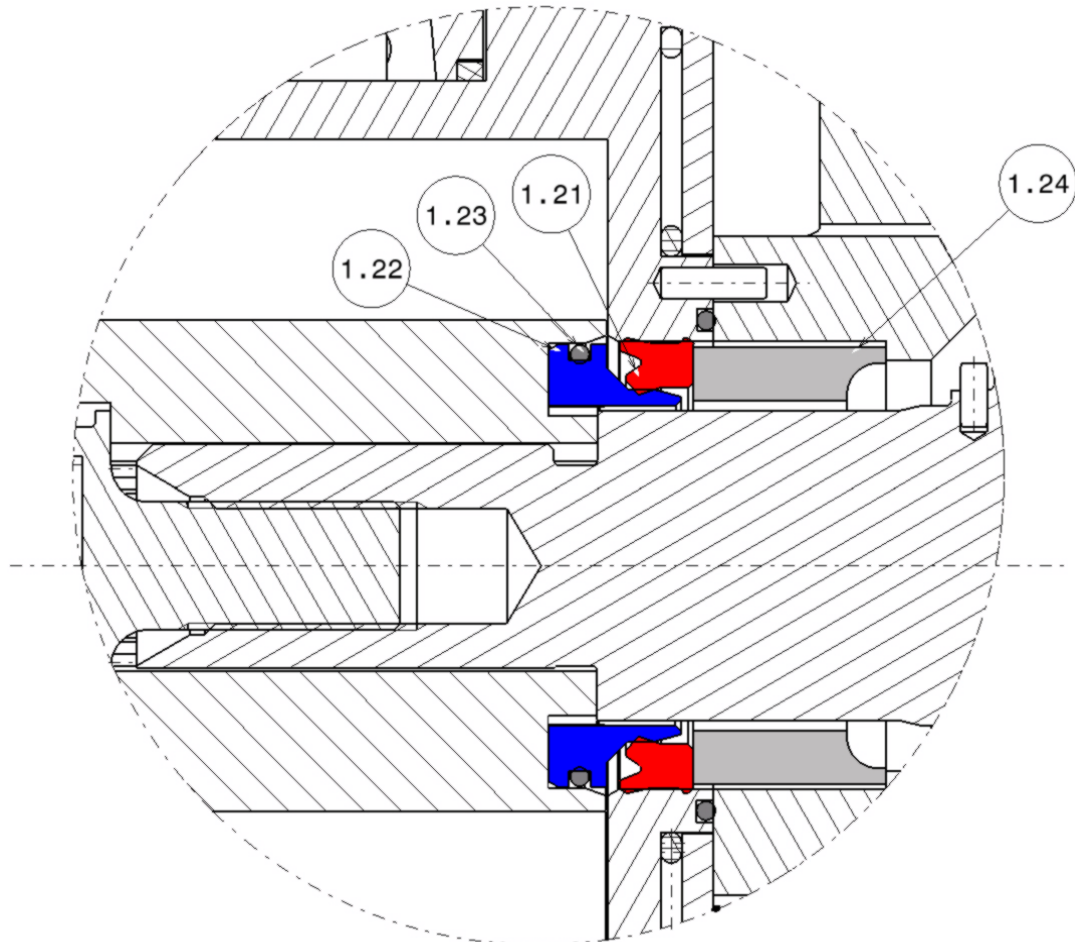
Pos.	Description	Quantity
1.1	Rotary Seal Face, Product Seal	2
1.2	Stationary Seal Face, Product Seal	2
1.3	Wave Spring	2
1.6	Anti-Rotation Pins Seal Housing, Single Mech. Seal	4
1.7	Seal Housing Single Mecanical Seal	2
1.13	O-Ring Rotary Seal Face, Product Seal	2
1.14	O-Ring Stationary Seal Face, Product Seal	2

19.3.1.2 Double mechanical seal



Pos.	Description	Quantity
1.1	Rotary Seal Face, Product Seal	2
1.2	Stationary Seal Face, Product Seal	2
1.3	Wave Spring	2
1.5	Seal Housing Double Mechanical Seal	2
1.6	Anti-Rotation Pins, Seal Housing, Double Mech. Seal	8
1.11	Stationary Seal Face, Atmosphere Seal	2
1.12	Rotary Seal Face, Atmosphere Seal	2
1.13	O-Ring Rotary Seal Face, Product Seal	2
1.14	O-Ring Stationary Seal Face, Product Seal	2
1.15	O-Ring Stationary Seal Face, Atmosphere Seal	2
1.16	O-Ring Rotary Seal Face, Atmosphere Seal	2
1.17	O-Ring, Seal Housing	2

19.3.1.3 Lip seal



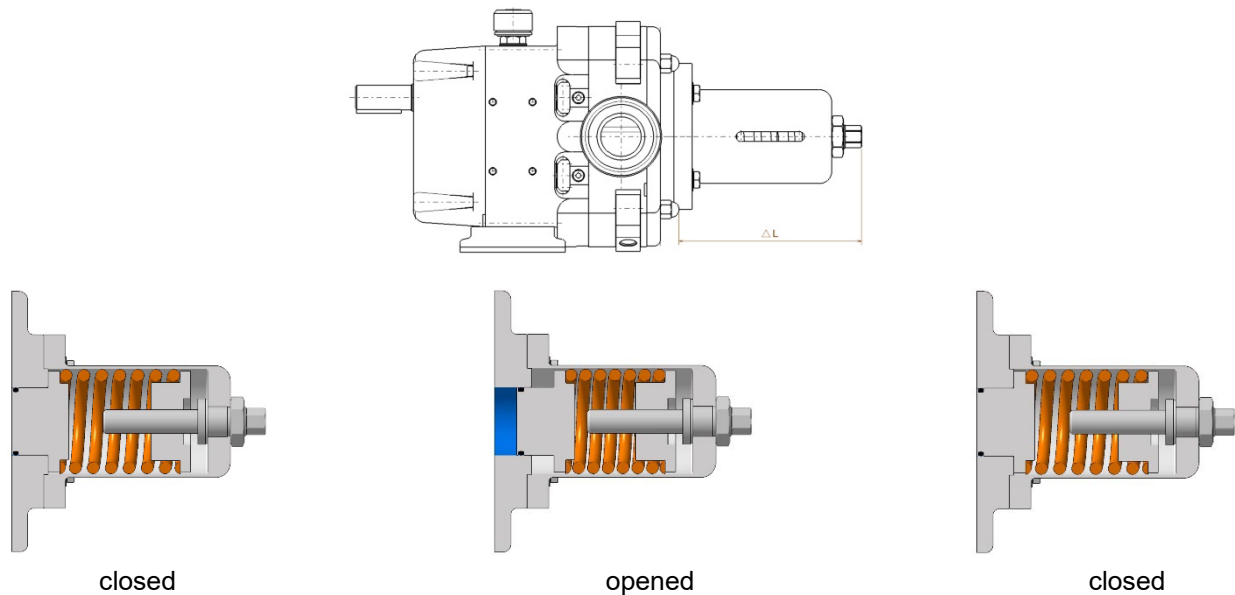
Pos.	Description	Quantity
1.21	Radial shaft seal	2
1.22	Shaft protection bush	2
1.23	O-ring	2
1.24	Ejection bush	2

20 Pressure relief valves

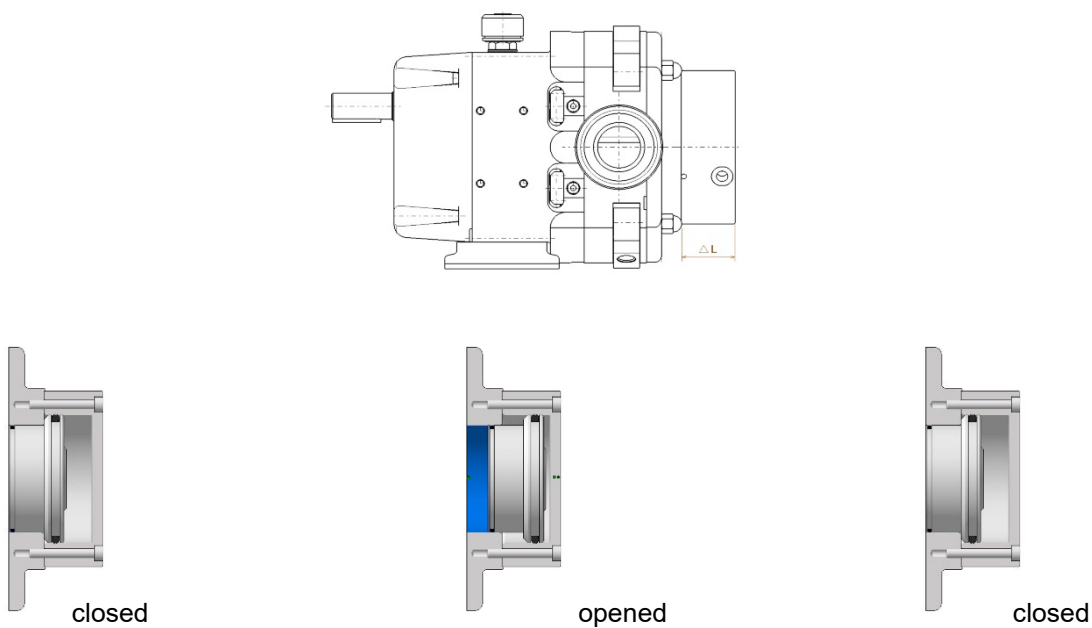
20.1 Effect, purpose and hygienic suitability

In order to protect the pump and the factory there are pressure relief valves available for the integration into the pump cover. The pressure relief valves are available in two versions, spring loaded or pressure loaded. At a certain pressure in the pump these pressure relief valves react and cause a short-circuit between the inlet and outlet port of the pump. Thus the rotary lobe pump as displacement pump is protected against overpressure. The pressure relief valves are also suitable for hygienic operation as the discharge room which means the short-circuit between inlet and outlet, is being re-closed completely.

20.1.1 Pressure relief valve integrated into the pump cover, spring loaded



20.1.2 Pressure relief valve integrated into the pump cover, pressure loaded and controlled by compressed air



20.2 Adjustment

The hydraulically loaded surface of the pressure relief valve corresponds to app. $\frac{1}{2}$ of the valve piston surface when the pump is running. With the pump stationary the complete surface is loaded. The reaction pressure of the valve cannot be pre-adjusted. The adjustment pressure depends on the individual product characteristics and the respective operating conditions.

The adjustment is done as follows:

Install a pressure gauge if possible directly at the outlet port of the pump. As far as possible let the pump run discharged respectively without nameable resistances in the factory installation. Simulate a resistance for example by slowly closing one blocking valve and observe the pressure gauge. Adjust the desired reaction pressure by charging the pressure relief valve step by step and closing the blocking valve. The reaction pressure is reached when the pressure gauge stops rising when the blocking valve is completely closed.

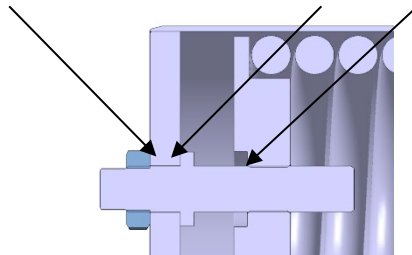
The spring loaded pressure relief valve is pre-loaded by turning the valve rod anti-clockwise.

The pressure loaded pressure relief valve is being pre-loaded for example by means of a pressure reducer.

When supplied to the customer the pressure relief valves are always relaxed.

20.3 Maintenance and lubrication

The lubrication points at the spring loaded pressure relief valve are at the valve rod at the contact surfaced to the valve housing and in the thread.



At a pressure loaded pressure relief valve the o-rings must be provide with an appropriate lubricant.

20.4 Pressure relief valve with built-in temperature sensor

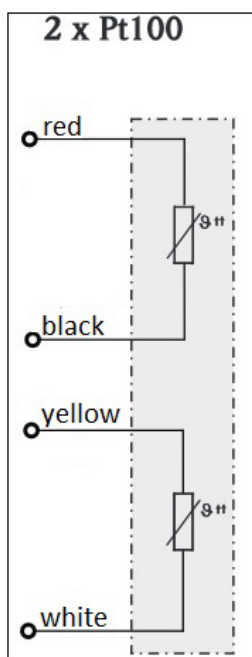
Generally, positive displacement pumps must be protected against excessive overpressure.

Excessively high overpressure might be caused by an obstruction in the discharge line, by solidifying or cooling of the pumped fluid, by modification of the pumped fluid or by wrong pre-setting of the speed.

A protection against overpressure must be provided either on site by an external pressure relief valve, e.g. with tank return system or by a pressure relief valve built into the pump cover. Pressure relief valves built into the pump cover must be adjusted to the response pressure values which have to be fixed by the customer. After reaction, correctly adjusted pressure relief valves release the pump internal return flow from the discharge side to the suction side. The fluid displaced by the pump elements, circulates in the pump so that the major part of the frictional heat is not being discharged anymore thus causing an uncontrolled increase of temperature in the pump. The temperature sensor integrated to the pump cover is used for a safety-related shutdown of the pump.

The shutdown temperature must be fixed by the user of the pump. We recommend a shutdown temperature of 10 – 20 K above the maximum operating temperature.

The built-in temperature sensor is a resistance temperature detector with two PT 100 measuring resistors in a 2-wire configuration.



As the sensor is a resistance sensor, for the evaluation an electronic temperature transmitter is required which supplies power to the sensor and measures and evaluates the variable voltage drop.

By using two independent measuring resistors both mechanically and chemically caused temperature variations of a sensor element can be recognized and reported by the transmitter. For this purpose the temperature transmitter must record the independent measured values of both measuring resistances, evaluate and compare them.

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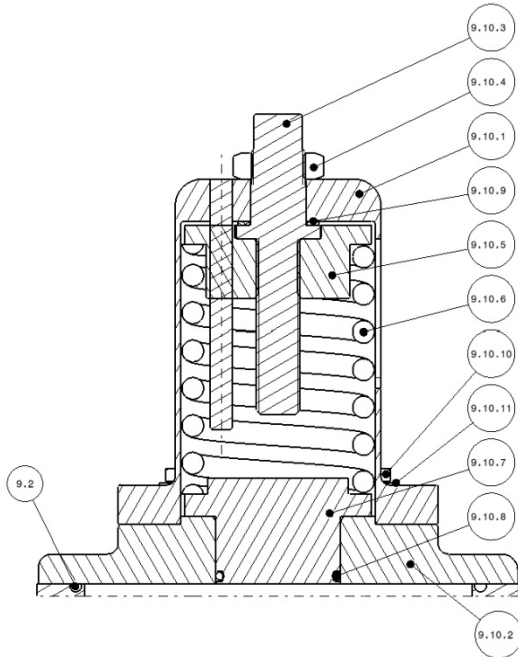
The recognition of changes of sensor measured values caused by an error is of particular importance for a later SIL consideration. The corresponding performance level respectively SIL results from the risk analysis (risk graph), which must be issued respectively stipulated by the user of the pump.

The integration and calibration of the temperature sensor is explicitly done by the customer. Also the correct setting of the pressure relief valve is done by the customer.

The maximum operating pressure values for the setting of the pressure relief valve and the maximum operating temperatures can be looked up in the commercial documents.

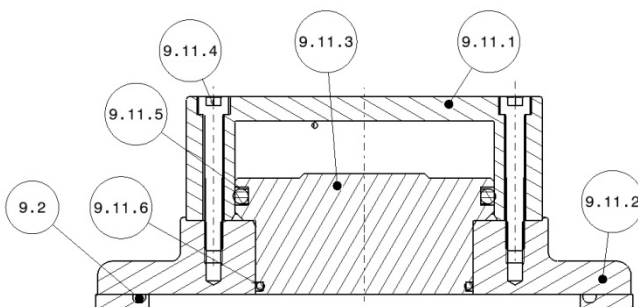
20.5 Parts list

20.5.1 Spring loaded pressure relief valves



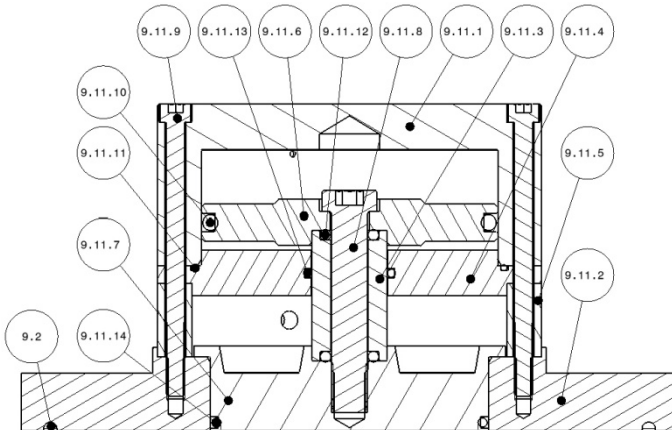
Pos.	Description	Quantity
9.2	O-Ring pump case cover	1
9.10.1	Valve housing	1
9.10.2	Pump cover for pressure relief valve	1
9.10.3	Valve rod	1
9.10.4	Counter nut	1
9.10.5	Pressure plate	1
9.10.6	Valve spring	1
9.10.7	Valve piston	1
9.10.8	O-ring pressure relief valve / spring	1
9.10.9	POM-washer	1
9.10.10	Hexagonal screw	4
9.10.11	Washer	4

20.5.2 Pressure relief valve pressure loaded and controlled by compressed air



Pos.	Description	Quantity
9.2	O-Ring pump case cover	1
9.11.1	Valve cover	1
9.11.2	Pump cover for pressure relief valve	1
9.11.3	Control piston	1
9.11.4	Allen screw	8
9.11.5	O-ring valve cover	1
9.11.6	O-ring control piston	1

20.5.3 2-Way Pressure relief valve pressure loaded and controlled by compressed air



Pos.	Description	Quantity
9.2	O-Ring seal for pump case cover	1
9.11.1	Valve cover	1
9.11.2	Pump housing cover for pressure relief valve	1
9.11.3	Guiding, valve piston	1
9.11.4	Control plate	1
9.11.5	Distance plate	1
9.11.6	Control plate	1
9.11.7	Valve piston	1
9.11.8	Allen screw	1
9.11.9	Allen screw	8
9.11.10	O-Ring seal for control plate	1
9.11.11	O-Ring seal for control housing	1
9.11.12	O-Ring seal for guiding for valve piston	2
9.11.13	O-Ring seal for guiding valve piston / control plate	1
9.11.14	O-Ring seal for valve piston	1

21 Heating / heat exchange

21.1 Principle

The series iLobe can be fitted with a heatable pump case.

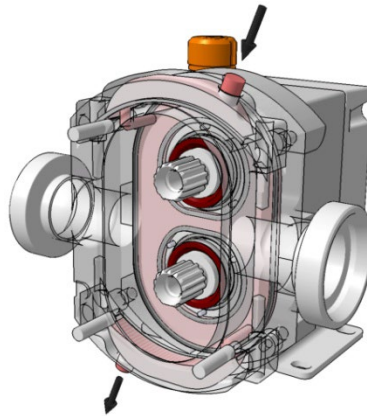
The heat exchange surfaces also permit the cooling of the pump.

Thus the surface temperatures in the pump can be adapted. The heat exchange surfaces are not dimensioned for cooling or heating the system.

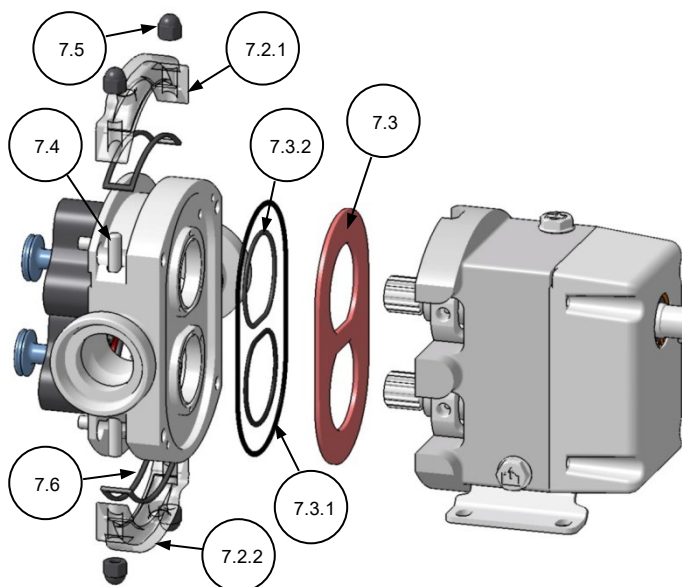
21.2 Heatable pump case with integrated heat channels IHCh RC

In order to improve the heat exchange any iLobe rotary lobe pump can be fitted optionally with integrated heat channels in the pump case. This option can only be implemented later if the pump has been prepared for heating.

The heating can be done through different heating transfer media. The maximum pressure is app. 3,5bar overpressure.



The flow direction of the heating transfer media is variable.



Pos.	Description	Quantity
7.2.1	Heating pump cover top	1
7.2.2	Heating pump cover bottom	1
7.3	Heating plate	1
7.3.1	O-Ring Heating plate large	1
7.3.2	O-Ring Heating plate small	2
7.4	Stud Screw	4
7.5	Cap nut	4
7.6	Gasket heating pump cover	2

22 Cleaning

For the iLobe rotary lobe pump, only cleaning agents that do not attack external metal parts or external elastomers should be used from the outside.

Cleaning in the area of the radial shaft seals with a high-pressure cleaner is prohibited. The liquids can get into the gearbox and impair the lubricating and corrosion properties of the gear oil.

23 Trouble shooting

A malfunction in a pump system may have various causes. The malfunction is not always necessarily in the pump itself, but can also be caused by a malfunction in the piping system or in another fitting in the system. If the real operating conditions deviate too much from the specifications according to which the pump was purchased, this might also cause malfunctioning. Therefore the following points should be checked first:

Has the pump been installed correctly?

Are the operating conditions still in accordance with the original specifications?

Are the further fittings in the pipe system functioning correctly?

In general the following malfunctions can be observed at a pump:

- Pump gives no liquid
- Pump gives irregular liquid flow
- Capacity too low
- Pump overheats
- Motor overheats
- Excessive rotor wear
- Excessive wear of the shaft seals
- Pump vibrates excessively or makes too much noise
- Pump stops
- Pump stops during start-up

The table on the next page shows possible cases and solutions for the malfunctions mentioned above:

Fault										Cause	Action
1	2	3	4	5	6	7	8	9	10		
*										Wrong direction of rotation	Change direction of rotation of motor
*										Pump is not filled with liquid	Vent suction line and rotor case and prime rotor case with liquid
*	*	*					*			Insufficient NPSHA	Enlarge diameter of suction line or simplify suction line and make it shorter, or reduce speed and product temperature
		*	*					*		Creation of steam in the suction line	
	*	*					*			Air entering into the suction line	Check the connections
*	*	*					*			Gas in the suction line	Vent suction line / pump casing
	*	*					*			Insufficient static head	Increase liquid level to enlarge static head
			*	*			*		*	Product viscosity is too high	Reduce the speed / increase the product temperature
		*								Product viscosity is too low	Increase speed / lower the product temperature
		*	*		*		*		*	Product temperature too high	Cool the product / pump casing
				*					*	Product temperature too low	Heat the product / rotor case
					*	*	*	*		Foreign particles in the product	Clean the system / place a filter at suction side
		*	*	*	*		*	*	*	Pressure at pump discharge is too high	Check the piping for obstructions / simplify the discharge line
			*	*	*		*	*		Pump case distorted by piping	Check alignment / support the piping
				*			*			Speed too high	Reduce the speed
		*								Speed too low	Increase the speed
			*	*	*	*	*	*		Insufficient flushing	Increase flushing pressure / capacity
			*	*	*	*	*	*	*	Worn bearings / timing gears	Replace worn parts
*										Pressure relief valves reacts	Check the discharge for any obstructions, closed valves or further reasons for resistance

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