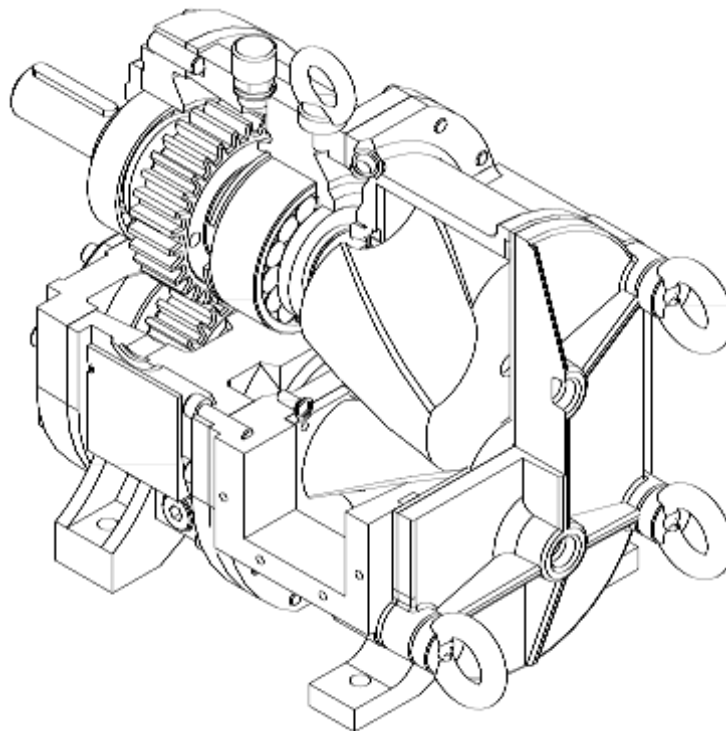


Operating and Maintenance Manual



Rotary Lobe Pump PL300 Series

Operating and Maintenance Manual Table of Contents

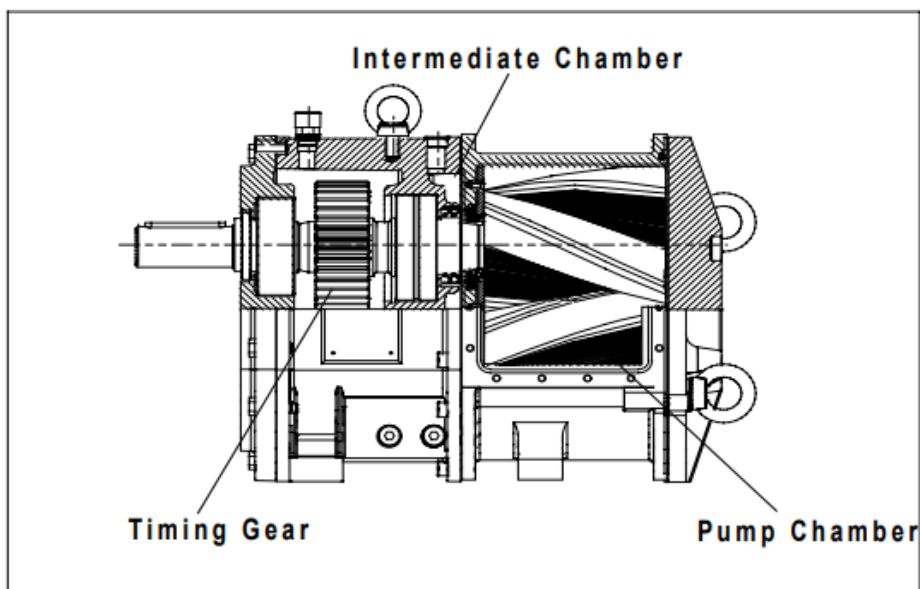
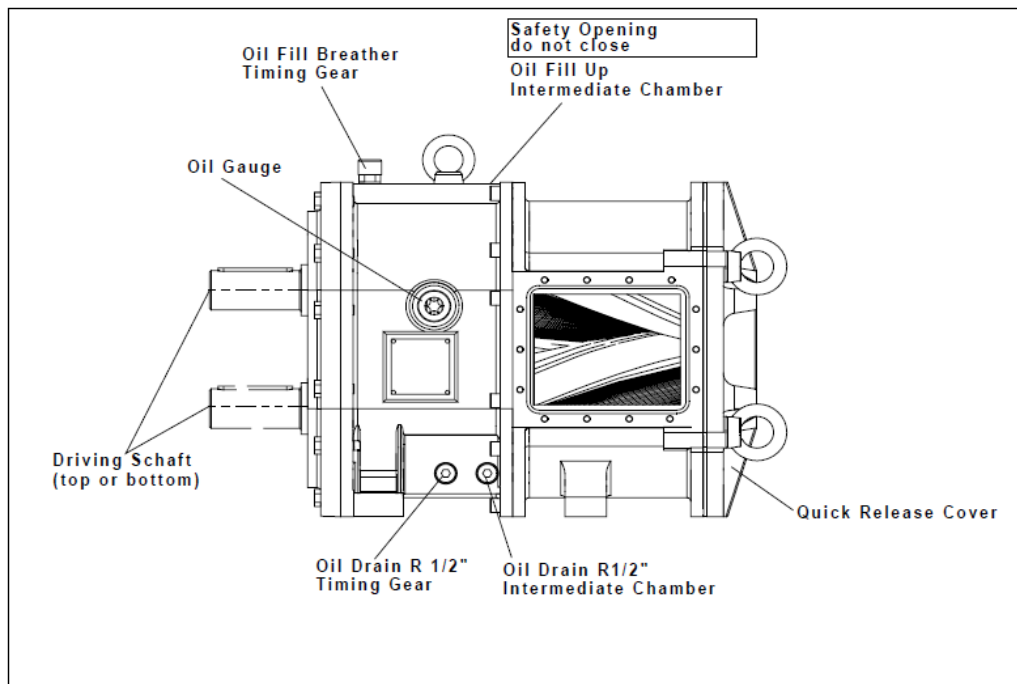
Rotary Lobe Pumps Model PL 300

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1. Rotary Lobe Pump (Bare Shaft Pump)

1.1 Construction of the Rotary Lobe Pump

Rotary Lobe Pumps of the PL Series are designed on a modular basis. Gear unit, axial wear plates, cover and mechanical seals remain the same throughout the series. The material of the fluid wetted parts of the pump unit should be adapted to the chemical and physical conditions of the fluid. The Code Number represents the parts used in the pump unit.



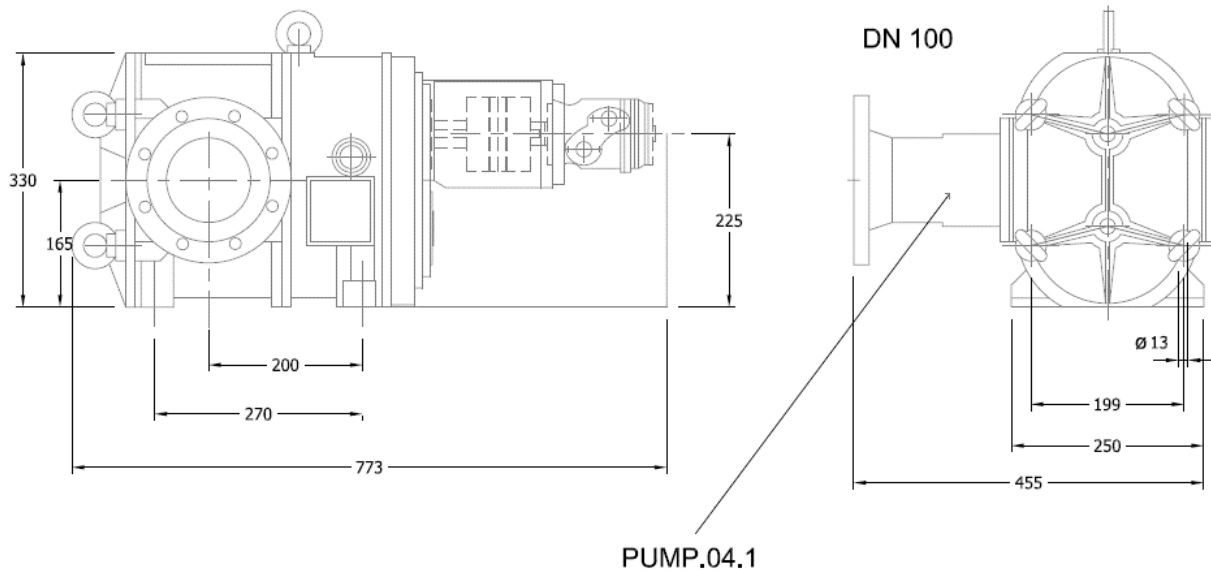
1.2 Drive Specification

The Rotary Lobe Pump is a direct hydraulic drive with 125 cc/rev hydraulic motor.

2. Complete - Aggregate

2.1 Standard Design

Rotary Lobe Pump and hydraulic drive is directly coupled incl. elastic coupling and coupling guard.



2.2 Lubricant Level and Change

Before start-up of the pump unit check oil level of timing gear at the oil gauge. The oil level must be at the middle of the oil gauge. The oil of the timing gear and the fluid of the intermediate chamber has to be exchanged every two years or after 10.000 hours of operation.

The fluid level in the intermediate chamber must be at the level of the top shaft. The top opening of the intermediate chamber must remain open to the environment and must be protected against dirt with our plastic stopper. Submersible units must be equipped with a sensor for monitoring the mechanical seal.

The functions of the intermediate chamber are:

1. Lubrication and cooling of the mechanical seals and rotor/shaft connection
2. Detection of seal failures
3. Buffer zone to the sealed timing gear

Check fluid of intermediate chamber with every rotor change. When changing mechanical seals the intermediate chamber has to be flushed and cleaned with water before fill up of new fluid. Change the hydraulic oil at least every two years or after 10,000 operation hours.

Consider that atmospheric conditions (temperature, humidity, aggressiveness etc.) can change the interval of oil-changes.

Attention: Please check if the factory site filled lubricant types and/or listed oil types of the pump unit are allowable with the environmental regulations at the application site. If need please consult factory.

Oil quantity depending on model!

Rotary Lobe Pump		
Timing Gear	Intermediate Chamber	
Model	Oil quantity	Lubricant quantity
PL 300	App. 1,5 liter	App. 0,8 liter

Factory site used oil types:

Timing Gear: Mobilgear 630
Intermediate Chamber: MOBIL AMBREX 68

Attached is a list of factory approved lubricant types for Rotary Lobe Pumps:

Oil Types Timing Gear

Type of lubricant	Ambient-Temperature	Viscosity	ARAL	BP	CASTROL	DEA	ESSO	KLüber	MOBIL	SHELL	TRIPOL
Minera Oil	-5...40 (normal)	ISO VG 220	Degol BG 220	Energol GR-XP220	Alpha SP 220 Alpha MW 220	Deagear DX SAE 85 W 90 Falcon CLP 150	Spartan EP 220	Klüberoil GEM 1-220	Mobilgear 630	Shell Omala Oel 220	Tribol 1100/220
Minera Oil	-15 25	ISO VG 100	Degol BG 100	Energol GR-XP 100	Alpha SP 100 Alpha MW 100	Deagear DX SAE 80W Falcon CLP 150	Spartan EP 100	Klüberoil GEM 1-100	Mobilgear 629	Shell Omala Oel 100	Tribol 1100/100
Minera Oil	-50...-15	ISO VG 15	Vitamol 1010	Bartran HV15	Hyspin AWS 15 Hyspin SP 15	Airkraft Hy-draulic Oil 15	Univis J13	Isoflex MT 30 rot	Mobil DTE 11M	Shell Tellus Oel T15	Tripol 770

Lubricant Type Intermediate Chamber

Type of lubricant	Ambient-Temperature	Viscosity	ARAL	BP	CASTROL	DEA	ESSO	KLüber	MOBIL	SHELL	TRIPOL
Mineral Oil	-15...+40	ISO VG 68	Motanol HE 68	Energol CS 68	Magna 68	Renolin DTA 68	NURAY 68	Klüberoil GIM 1-68	AMBREX 68	SHELL Vitrea 68	Tripol 943 AW-68

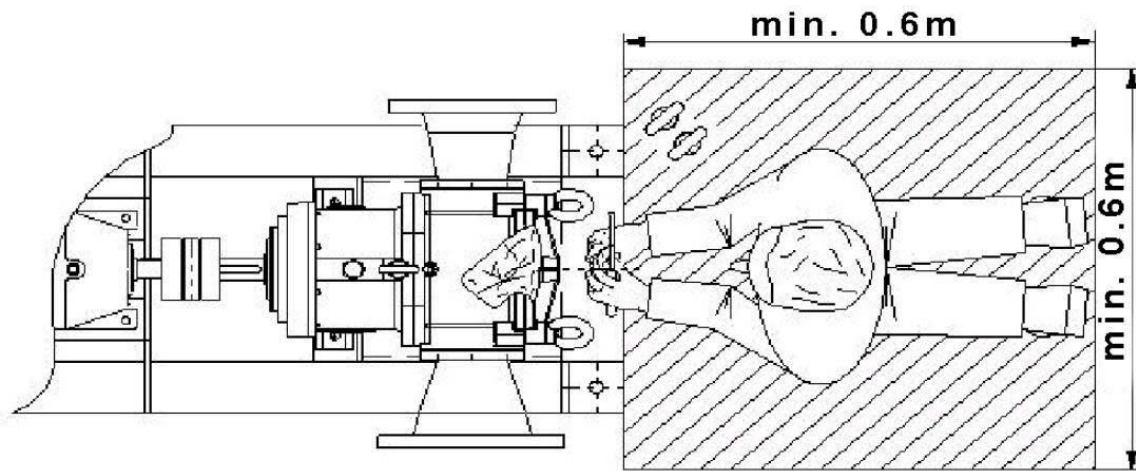
Attention: Oil level must be at the middle of the oil gauge

3. Installation in the Process System

The Rotary Lobe Pumps are self-priming under certain conditions. To prevent cavitation install the pump with flooded suction or only with a small suction lift. With larger suction lifts and/or long suction pipes, control that the NPSH available of the system is higher in comparison to the required NPSH of the pump. The required NPSH value must be at least a 0.5m under the NPSH available to prevent cavitation.

Install compensators (follow the mounting instruction of the compensator manufacturer) between pump flanges and system especially with thin-walled pipes. Also consider loads caused by changing physical conditions (i.e. temperature).

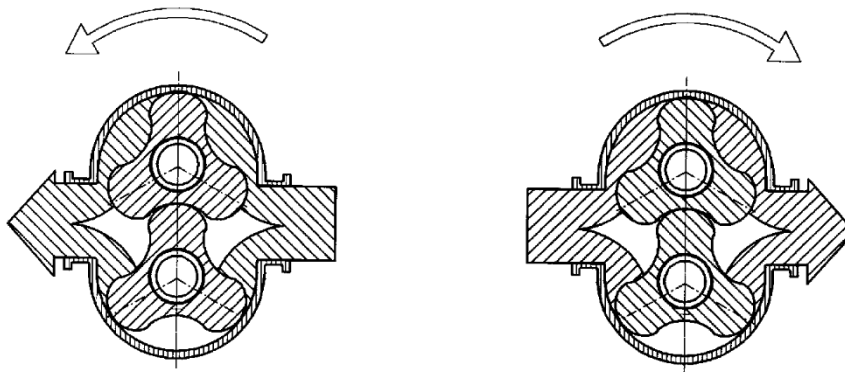
Connection flanges or valves are not allowed to apply load to the pump unit.



Recommended Maintenance Space

4. Start Up

- Check the lubricant Levels (see 2.2)
- Check that the flange and pipe connections are sealed and not leaking.
- **Prevent longer dry running in the start up phase.
Fluid is needed for cooling of the pump.**
- The Rotary Lobe Pump can operate in either direction. Check if rotation direction fits your needs.



5. Maintenance and Control

Before every start up check lubricant levels.

5.1 Disassembly of Quick Release Cover and Flanges

Following are precautions before disassembly of quick release cover and flanges:

- Make sure pump cannot start rotating. Disconnect from hydraulic drive system.
- Close suction and discharge valves.
- Loosen ring nuts of the quick release cover equally app. 5 mm and move the cover slowly off the pump casing. Pressure may still exist inside the pump.

Caution:	Remaining pressure in the pump can splash fluid out of the gap between pump casing and cover. Cover gap with suitable rag.
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5.2 Cleaning of the Rotary Lobe Pump

Remove quick release cover of the pump (see 5.1). Clean pump and flanges with suitable cleaning agent. Let the pump casing dry and use metal surface protection (i.e. grease) suitable for the rubber material of the rotors NBR.

5.3 Danger of Frost

The pump and pipe system must be secured against frost.



Attention: Frozen fluid pieces from the pipe system can cause wear inside the pump, especially at the rubber - coating of the rotors.

6. Troubleshooting

6.1 Problem / Help

Pump does not start after shut down

Possible problem	Help
<ul style="list-style-type: none"> Solids have settled inside the pump after shut down. 	<ul style="list-style-type: none"> Cleaning of pump (see 5.2)
<ul style="list-style-type: none"> Rotors are swollen and are tight to the pump casing. 	<ul style="list-style-type: none"> Check temperature and chemical compounds of fluid. Change rotor to a suitable material.
<ul style="list-style-type: none"> Long fibers, foil or plastics are blocking the pump. 	<ul style="list-style-type: none"> Cleaning of pump and suction flange (see 5.1), plan the installation of a Multi-Chopper
<ul style="list-style-type: none"> Axial rotor tolerance misaligned 	<ul style="list-style-type: none"> Adjust axial rotor tolerance (see 6.6)
<ul style="list-style-type: none"> Power and/or torque too weak, drive too small 	<ul style="list-style-type: none"> Change to bigger drive

Pump does not self prime

Possible problem	Help
<ul style="list-style-type: none"> Wrong direction of rotation 	<ul style="list-style-type: none"> Change rotation direction of the drive
<ul style="list-style-type: none"> Suction pipe blocked 	<ul style="list-style-type: none"> Clean of suction pipe
<ul style="list-style-type: none"> Suction connection leaky 	<ul style="list-style-type: none"> Check gaskets and tightness of connections
<ul style="list-style-type: none"> Air bubble inside the pump or pipe system 	<ul style="list-style-type: none"> Fill up pump with fluid or release air out of the system
<ul style="list-style-type: none"> Rubber coating of rotors destroyed 	<ul style="list-style-type: none"> Replace rotors; check temperature and chemical compounds of fluid. Change rotor to a suitable material.

Pump cavitates

Possible Problem

Pump cavitates

Possible Problem	Help
<ul style="list-style-type: none"> • Rotation speed too high: The cavities inside the pump are not filled (cavitation). • Solid is blocking suction side 	<ul style="list-style-type: none"> • Decrease rotation speed and/or increase suction - pressure • Remove solid

Oil leakage at the top of the intermediate chamber

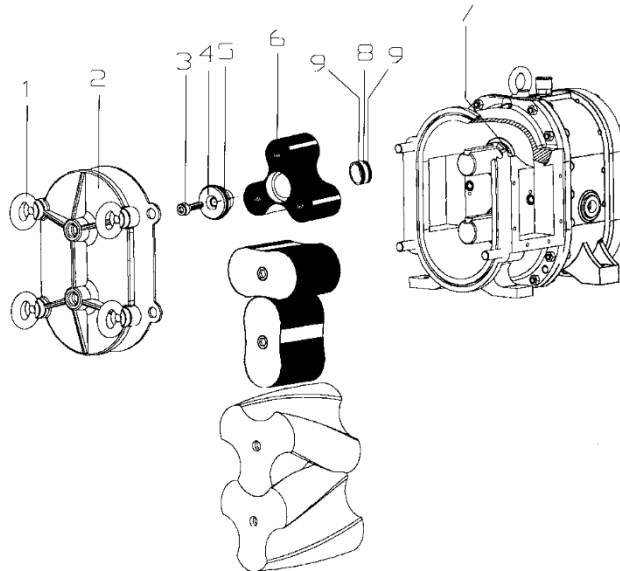
Possible Problem	Help
<ul style="list-style-type: none"> • O-rings of the mechanical seal are damaged • Mechanical seal defect 	<ul style="list-style-type: none"> • Replace the o-rings of the mechanical seal (see 6.4; 6.6) • Change of mechanical seal (see 6.4; 6.6)

Technical information mechanical seal

The single acting mechanical seals used in Rotary Lobe Pumps consist of each two seal faces positioned against each other. The mechanical seals are quenched with the fluid (standard: hydraulic oil) in the intermediate chamber. With capillary and centrifugal force created by the rotation the oil is forced between the seal faces and lubricates the seal gap and removes developing heat from the mechanical seal. Pumped fluid is not needed to lubricate and/or cool the mechanical seal.

If the mechanical seals had to be opened during maintenance it is recommended to exchange the mechanical seal, even if the wear limit has not been reached.

6.2 Changing the piston type PL



- a) Switch off the pump and lock the drive unit. Seal off the suction and pressure pipes using the shut-off valves. (see 5.1)
- b) Uniformly unscrew the four ring nuts (1) by 5 mm and slide the lid (2) back a little to allow any pressure to get rid of.



Remaining pressure in the pump can splash fluid out of the gap between pump casing and cover. Cover gap with suitable rag.

- c) Unscrew the hexagon socket screws (3) of the two pistons using a 14 mm hexagon socket key. (Shafts can be retained by clamping with a part which has no sharp edges).
- d) Pull off the seal washer (4).
- e) Special lobe puller required.
- f) Check (if necessary, replace) and oil the O-rings (5) and (7).

- g) Oil the shafts and slide on the new pistons.

Note: Check the quality symbol on the front sides of the old and new pistons.

- h) Screw in the cylinder screw (3) and tighten with a torque wrench:

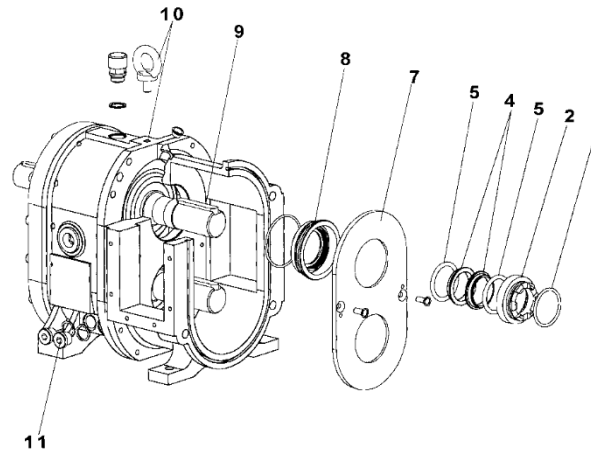
- Torque: 180 Nm for standard screws, 8.8
- Torque: 180 Nm for stainless steel screws, A4

- i) Turn the piston by hand and check for easy running.

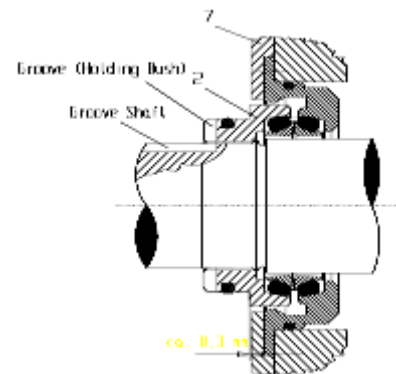
- j) Replace the lid (2) and tighten the ring nuts (1).

- ii) Before restarting the pump, test it by carefully tipping the motor switch to ensure the function of the pump.

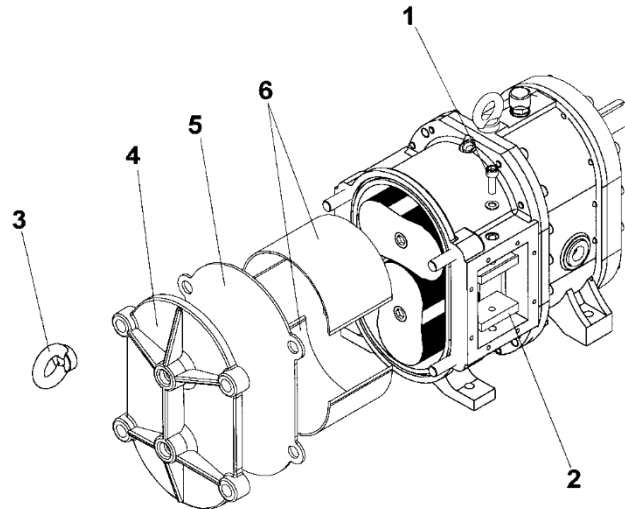
6.3 Exchange of Mechanical Seal



- a) Drain the lubricant from the intermediate chamber through the lubricant drain (11).
- b) Remove the rotors as described under 6.2.
- c) Remove the feather key (9) from the groove. Unscrew the holding bush with thread (2) by using the special tool (spare part list Pos. 95).
- d) Remove the mechanical seal rings (4) with O-rings (5) from the holding bush with thread (2) and from the stationary holding bush (8). Clean and oil the O-ring seats of the holding bushes. Flush the intermediate chamber for cleaning purpose.
- e) Push the O-rings (5) onto the new mechanical seal rings (4). Press one seal ring (4) into the stationary bush (8) and the other into the holding bush with thread (2).
- f) Screw the holding bush with thread (2) onto the shaft until aligned with the wear plate (7), then turn it backwards app. 1/6 revolution. The holding bush projects app. 0,3 mm to the wear plate. Ensure that one groove of the bush (2) is aligned with the groove on the shaft for the feather key (see 7.2).
- g) Place the feather key (9) into the aligned grooves of the holding bush with thread (2) and of the shaft.
- h) Check (replace if necessary) and oil the O-ring (1). Clean and oil the counter surfaces for the rotors.
- i) Refit the rotors (see 6.2)
- j) Fill fluid into the intermediate chamber through the oil inlet opening (10) (minimum to the level of the top shaft). Close intermediate chamber with plastic stopper for dirt protection.



6.4 Exchange of MIP Radial Liners (Optional Feature)



1. Disassembly of MIP Radial Liners

- a) Shut down pump unit and close valves surrounding the pump (see 5.1).
- b) Loosen ring nuts (3) of the quick release cover equally app. 1/5" and move the cover (4) slowly of the pump casing. Pressure may still exist inside the pump. Clean or flush the pump casing.

Caution: Remaining pressure in the pump can splash fluid out of the gap between pump casing and cover. Cover gap with suitable rag.

- c) Remove the axial wear plate (5).
- d) Now open the clamps (2) holding the MIP Radial Liners (6) in position by loosening the screws (1).

Attention: Check the CU-Rings and replace them if necessary.

- e) The MIP Radial Liners (6) can now be removed.

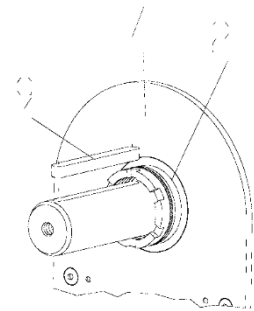
2. Assembly of MIP Radial Liners

- a) Clean the pump casing from any particles.
- b) Push the MIP Radial Liners (6) into the pump casing symmetrically.
- c) Now fasten the MIP Radial Liners (6) by equally alternate tightening of the clamps (2). Observe an equal tolerance at both sides of the flange openings.
- d) Check easy motion of the rotors, if necessary, correct the alignment of the MIP Radial Liners.
- e) Control the cover O-ring and tighten the quick release cover with the wear plate to the pump casing with the ring nuts.
- f) Before restarting the pump, test it by carefully tipping the motor switch to ensure the function of the pump.

6.5 Adjustment of the axial Tolerance of the Rotors

1. Remove the lobes as described under 6.2.
2. Take the feather key (9) out of the shaft groove.
3. a) The rotors are too tight to the **quick release cover**:

Turn the holding bush with thread (2) **clockwise** 1/6 revolution until the next groove is aligned with the shaft groove by using the special tool.



- b) The rotors are too tight to the **rear wear plate (7)**:

Turn the holding bush with thread (2) **counter clockwise** 1/6 revolution until the next groove is aligned with the shaft groove by using the special BÖRGER tool.



Do not unscrew the threaded bush (2) more than 1/6 turn! Danger of fluid leakage from the intermediate chamber!

4. Place the feather key (9) into the aligned grooves of the holding bush with thread (2) and of the shaft.
5. Refit the rotors (see 6.2).

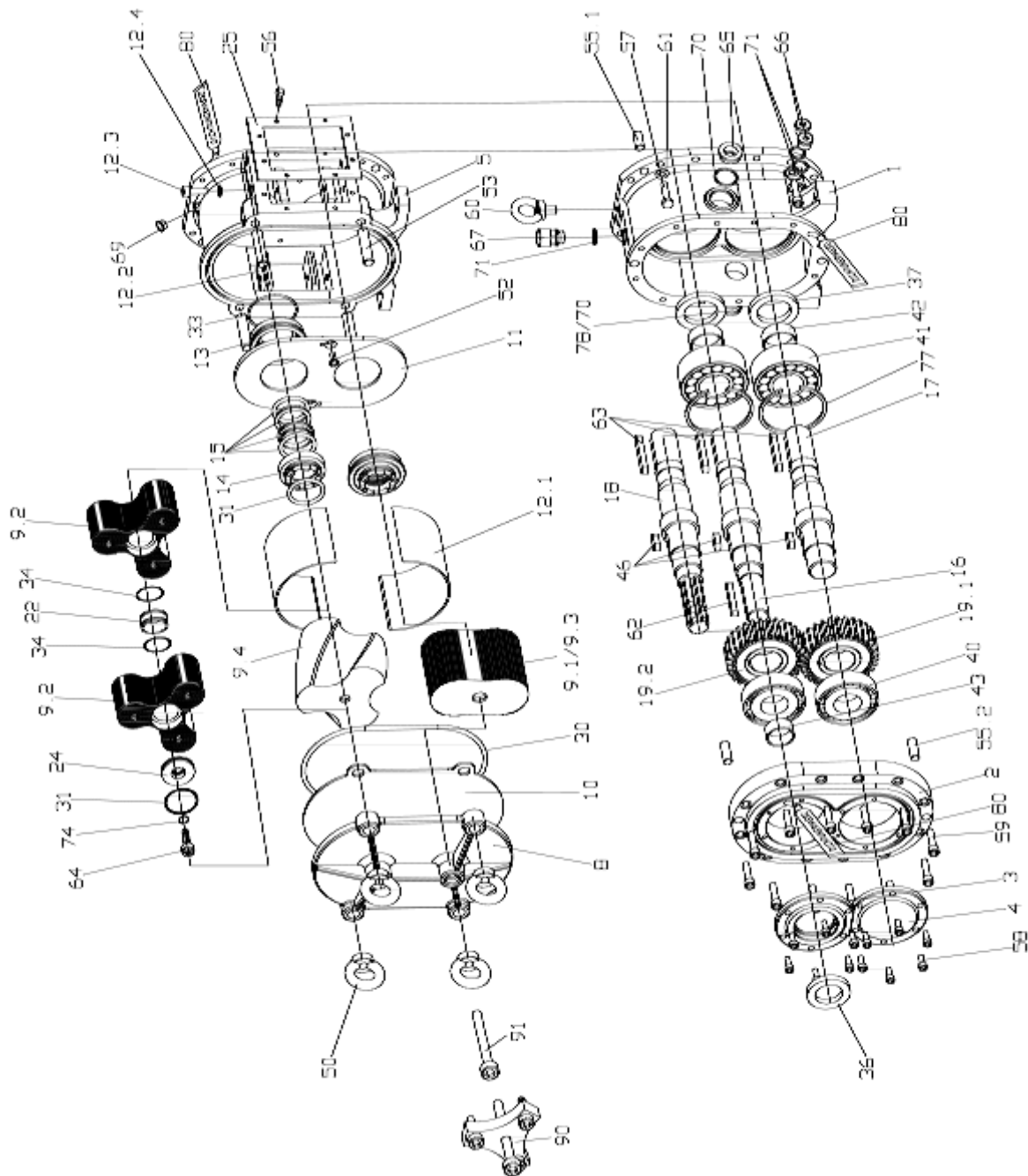
6.6 Gland Packing

Please refer to separate operation and maintenance instructions.

6.7 Special Pump Constructions

Please refer to separate operation and maintenance instructions.

7. Spare Parts



7.1 Spare Parts List

The Spare Parts List contains position numbers referring to the explosion drawing, the name of the part, material, article number (important for spare part orders) and quantity per pump. The Rotary lobe pump is furnished with fluid wetted parts according to the code number (see 7.1).

Exchange of Rotary Lobes

2/4/6/8x	rotor	Pos. No.:	9
2/4x	O-ring; 54 x 4	Pos. No.:	31
0/4/8/12 x	O-ring; 55 x 3	Pos. No.:	34

Exchange of Mechanical Seal

2x	mechanical seal	Pos. No.:	15
2x	O-ring 54 x 4	Pos. No.:	31
2x	O-ring 80 x 3	Pos. No.:	33
0/4/8/12 x	O-ring; 55 x 3	Pos. No.:	34

Exchange of wear plates

1x	front wear plate	Pos. No.:	10
1x	rear wear plate	Pos. No.:	11
2x	radial casing liners	Pos. No.:	12.1
1x	O-ring 792 x 7	Pos. No.:	30
2/4x	O-ring 54 x 4	Pos. No.:	31
0/4/8/12x	O-ring 55 x 3	Pos. No.:	34
2x	countersunk screw; M8 x 20	Pos. No.:	52

Exchange of fluid wetted parts

1x	pump casing	Pos. No.:	5
1x	front wear plate	Pos. No.:	10
1x	rear wear plate	Pos. No.:	11
2x	radial casing liners	Pos. No.:	12.1
4x	clamping part	Pos. No.:	12.2
2/4x	socket head cap screw; M10 x 25	Pos. No.:	12.3
4x	Sealing washer; A 10 x 16	Pos. No.:	12.4
2x	stationary holding bush	Pos. No.:	13
2x	holding bush with thread	Pos. No.:	14
2x	mechanical seal	Pos. No.:	15
2/4/6x	distance bushing	Pos. No.:	22
0/2x	cover disc	Pos. No.:	24
2x	gasket	Pos. No.:	25
1x	O-ring 792 x 7	Pos. No.:	30
2/4x	O-ring 54 x 4	Pos. No.:	31
2x	O-ring 80 x 3	Pos. No.:	33
0/4/8/12x	O-ring 55 x 3	Pos. No.:	34
2x	countersunk screw; M8 x 20	Pos. No.:	52
2x	hexagon head screw; M16 x 40	Pos. No.:	64
2x	sealing washer; A 21 x 26	Pos. No.:	74

As special tools use the withdrawal tool (Pos. No. 90/91), the special tool for the holding bush (Pos. No. 95).

Please order required spare parts at (please mention the article numbers):



Transairvac International Ltd Unit 28 Croft Road Industrial Estate Newcastle
under Lyme Staffordshire UK ST5 0TW

Tel: +44 (0)1782 710282 Fax: +44 (0)1782 710126 Email: enquiries@transairvac.com

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EU DECLARATION OF INCORPORATION



We, **Transairvac International Ltd**, located at **Unit 28 Croft Road Industrial Estate, Croft Road, Newcastle, Staffordshire, ST5 0TW, United Kingdom** declare:

- In exclusive responsibility that the **PL300** meets the essential health and safety requirements of the directive(s) detailed below.
- This partly completed machinery must not be put into service until the final machinery into which it is to be incorporated has been declared in conformity with the provisions of this directive, where appropriate.
- The relevant technical documentation is compiled in accordance with Annex VII part B and, where appropriate, a sentence declaring the conformity of the partly completed machinery with other relevant Directives.
- We undertake to transmit, in response to a reasoned request by the national authorities, relevant information on the partly completed machinery.

Directive	Requirements and / or Standards applied
Machinery Directive 2006/42/EC	EN 60204-1 : 2018

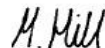
Product type	Rotary lobe pump (for liquids)
Part number	PL300
Manufacturer's representative	Transairvac International Limited
Flow	10 to 100 m ³ /hr
Pressure	Up to 6 bar
Temperature	Incoming liquid max 60°C
Drive method	Hydraulic motor
Specification	Various due to customer requirements
Application	Pumping on and off waste product (slurry) or molasses type products (pot ale etc)
Marketplace	Bulk road tanker mounted pumps

TCF reference no: TCF2023/Pumps

Name: Mitchell Hill, BEng

Date: 30th September 2024

Title: Technical Director

Signature: 

UK DECLARATION OF INCORPORATION



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Directive	Requirements and / or Standards applied
Supply of Machinery (Safety) Regulations 2008	BS EN 60204-1 : 2018

Product type	Rotary lobe pump (for liquids)
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