

IOM manual

tapflo®

Sanitary Positive Displacement Pump Tapflo LPX series

2023 | 1



Read this instruction manual carefully,
before you install and operate the pump



Pump models:

25-1
25-2
40-1
40-2
50-1
50-2
80-1
100-1



» All about your flow®

www.tapflo.com

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EC-DECLARATION OF CONFORMITY

Machinery Directive 2006/42/EC, Annex IIA

We hereby declare that **LPX Rotary lobe pumps**

Manufactured by Tapflo Sp. z o.o. Poland for

Tapflo AB

Filaregatan 4

442 34 Kungälv, Sweden

types:	LPX 25-1	LPX 50-1
	LPX 25-2	LPX 50-2
	LPX 40-1	LPX 80-1
	LPX 40-2	LPX 100-1

whether delivered without drive or delivered as an assembly with drive, are in conformity with the relevant provisions of the Machinery Directive 2006/42/EC, Annex I.

Manufacturer Declaration

Machinery Directive 2006/42/EC, Annex IIB

The product must not be put into service until the machinery into which it has to be incorporated has been declared to conform with the provisions of the Directive.

Mr Marcel Lemański is authorized to compile the technical file.

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Signed for and on behalf of Tapflo AB



Per Antonsson
Chief Executive Officer
Kungälv, 2.01.2023

1. SAFETY

1. SAFETY

READ AND UNDERSTAND THIS MANUAL PRIOR TO INSTALLING, OPERATING OR SERVICING THIS EQUIPMENT

We recommend users of our equipment and designs follow the latest Industrial Safety Standards. At a minimum, these should include the industrial safety requirements established by:

1. Occupational Safety and Health Administration (OSHA), Title 29 of the CFR. Section 1910.212- General Requirements for all Machines
2. National Fire Protection Association, ANSI/NFPA 79. ANSI/NFPA 79- Electrical Standards for Industrial Machinery
3. National Electrical Code, ANSI/NFPA 70 ANSI/NFPA 70- National Electrical Code ANSI/NFPA 70E- Electrical Safety Requirement for Employee Workplaces
4. American National Standards Institute, Section B11

ATTENTION! Servicing energized industrial equipment can be hazardous. Severe injury or death can result from electrical shock, burn, or unintended actuation of controlled equipment. Recommended practice is to disconnect and lockout industrial equipment from power sources, and release stored energy, if present. Refer to the National Fire Protection Association Standard No. NFPA70E, Part II and (as applicable) OSHA rules for Control of Hazardous Energy Sources (Lockout-Tagout) and OSHA Electrical Safety Related Work Practices, including procedural requirements for:

- **Lockout-tagout**
- **Personnel qualifications and training requirements**
- **When it is not feasible to de-energize and lockout-tagout electrical circuits and equipment before working on or near exposed circuit parts**

Locking and Interlocking Devices: These devices should be checked for proper working condition and capability of performing their intended functions. Make replacements only with the original manufacturer's renewal parts or kits. Adjust or repair in accordance with the manufacturer's instructions.

Periodic Inspection: Industrial equipment should be inspected periodically. Inspection intervals should be based on environmental and operating conditions and adjusted as indicated by experience. At a minimum, an initial inspection within 3 to 4 months after installation is recommended. Inspection of the electrical control systems should meet the recommendations as specified in the National Electrical Manufacturers Association (NEMA) Standard No. ICS 1.3, Preventative Maintenance of Industrial Control and Systems Equipment, for the general guidelines for setting-up a periodic maintenance program.

Replacement Equipment: Use only replacement parts and devices recommended by the manufacturer to maintain the integrity of the equipment. Make sure the parts are properly matched to the equipment series, model, serial number, and revision level of the equipment.

1. SAFETY

Warnings and cautions are provided in this manual to help avoid serious injury and/or possible damage to equipment:



ATTENTION! marked with a stop sign.

Immediate hazards which **WILL** result in severe personal injury or death.



WARNING! marked with a warning triangle.

Hazards or unsafe practices which **COULD** result in severe personal injury or death.



CAUTION! marked with a warning triangle.

Hazards or unsafe practices which **COULD** result in minor personal injury or product or property damage.

2. REPLACEMENT LABELS

2. REPLACEMENT LABELS



WARNING! The following labels are installed on your equipment. If these labels are removed or become unreadable, refer to “Parts Lists” in chapter 9: “Parts Lists” for replacement part numbers.

2.1. Application Instructions

Apply to a clean, dry surface. Remove the backing from the label, place it in proper position, protect it with a cover sheet and burnish it. (A soft rubber roller also may be used to press the label into place). Apply all labels to be readable from the front of the pump.

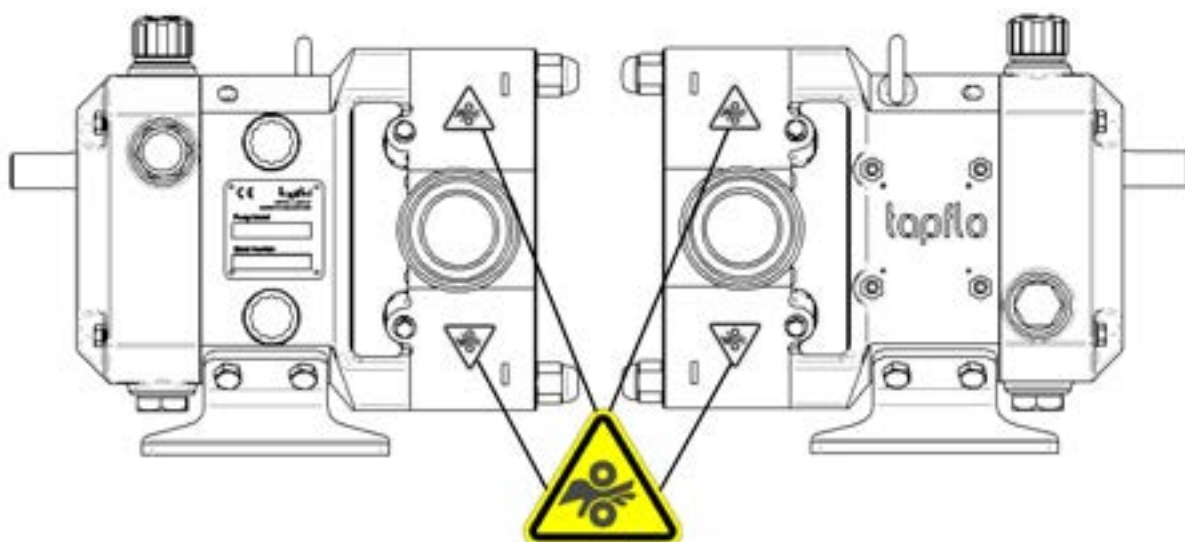


Fig. 1: Label locations

Label	Definition
	Entanglement hazard
	Replace plug with breather plug

3. CARE OF STAINLESS STEEL

3. CARE OF STAINLESS STEEL

NOTE! Tapflo recommends the use of an FDA-approved anti-seize compound on all threaded connections.

3.1. Care of stainless steel

Corrosion resistance is greatest when a layer of oxide film is formed on the surface of stainless steel. If film is disturbed or destroyed, stainless steel becomes much less resistant to corrosion and may rust, pit or crack.

Corrosion pitting, rusting and stress cracks may occur due to chemical attack. Use only cleaning chemicals specified by a reputable chemical manufacturer for use with 300 series stainless steel. Do not use excessive concentrations, temperatures or exposure times. Avoid contact with highly corrosive acids such as hydrofluoric, hydrochloric or sulfuric. Also avoid prolonged contact with chloride-containing chemicals, especially in presence of acid. If chlorine-based sanitizers are used, such as sodium hypochlorite (bleach), do not exceed concentrations of 150 ppm available chlorine, do not exceed contact time of 20 minutes, and do not exceed temperatures of 104°F (40°C).

Corrosion discoloration, deposits or pitting may occur under product deposits or under gaskets. Keep surfaces clean, including those under gaskets or in grooves or tight corners. Clean immediately after use. Do not allow equipment to set idle, exposed to air with accumulated foreign material on the surface. Corrosion pitting may occur when stray electrical currents come in contact with moist stainless steel. Ensure all electrical devices connected to the equipment are correctly grounded.

3.2. Elastomer seal replacement following passivation

Passivation chemicals can damage product contact areas of equipment. Elastomers (rubber components) are most likely to be affected. Always inspect all elastomer seals after passivation is completed. Replace any seals showing signs of chemical attack. Indications may include swelling, cracks, loss of elasticity or any other noticeable changes when compared with new components.

4. INTRODUCTION

4. INTRODUCTION



DANGER! The pump contains internal moving parts. **DO NOT** put hands or fingers into the pump body ports or drive area at any time during operation. To avoid serious injury, **DO NOT** install, clean, service, or repair the pump unless all power is off and locked out.

4.1. Pump model designation

LPX **40-1** - **1SSE2D4Z** - **30/129** **T** - **N** - **TRF**
1 2 3 4 5 6 7

1. Tapflo Lobe Pump LPX

LPX = Tapflo Lobe Pump

2. Pump size (pump inlet dimension DN):

	Connection size		Displacement
	Inlet	Outlet	litres/rev
25-1	25	25	0,04
25-2	25	25	0,1
40-1	40	40	0,14
40-2	40	40	0,23
50-1	50	50	0,3
50-2	50	50	0,67
80-1	80	80	0,94
100-1	100	100	2,29

3. Special pump solutions:

1. Mechanical seal

no sign. = SiC / SiC / FKM (VITON) / AISI316L (FDA standard)

SSE = SiC / SiC / EPDM / AISI316L (FDA standard)

2. Type of mechanical seal

no sign. = single mechanical seal (standard)

D = double mechanical seal (SiC / SiC; elastomers as on liquid side)

3. Connection options

no sign. = thread DIN11851

C = SMS 3017 clamp

T = DIN 32676 clamp

4. Optional executions

Z = buffer liquid reservoir

FQ = system with QFT1000 tank

J = front cover heating

5. Connections position

no sign. = horizontal

V = vertical

4. INTRODUCTION

4. Motor Data:

Example: **30** / **129**
 | |
 Motor Power Gear Motor Speed

02	=	0.25 kW
03	=	0.37 kW
05	=	0.55 kW
07	=	0.75 kW
11	=	1.1 kW
15	=	1.5 kW
22	=	2.2 kW
30	=	3.0 kW
40	=	4.0 kW
55	=	5.5 kW
75	=	7.5kW
110	=	11 kW
150	=	15 kW

5. Motor options:

M	= pump with hygienic motor shroud
C	= external cooling for electric motor
T	= motor with PTC
F60	= 60 Hz motor
IP....	= IP class for motor
UL	= UL/CSA certified motor
H	= motor for high humidity
V...	= optional motor voltage

6. Gearmotor Manufacturer:

N	= NORD
B	= Bonfiglioli
S	= SEW
X	= Special

7. Assembly options:

no sign.	= Pump Unit on Baseplate
TR	= Pump Unit on Trolley
TRF	= Pump Unit on Trolley with IP66 frequency inverter
TRC	= Pump Unit on Trolley with Control switch

4. INTRODUCTION

4.2. Intended use



CAUTION! Improper use of the pumps leads to:

- Damage
- Leakage
- Destruction
- Possible failures in the production process

The Tapflo LPX Lobe Rotary Pump is exclusively intended for pumping liquids, especially in beverage and food installations as well as in comparable applications of the chemical, pharmaceutical and health care industries.

Its use is permissible only within the admissible pressure and temperature margins and under consideration of chemical and corrosive influences.

Any use exceeding the margins and specifications set forth is considered to be not intended. Any damage resulting therefrom is not within the responsibility of the manufacturer. The user will bear the full risk.

4.3. Pump receiving

NOTE! Each pump is shipped from the factory with the gearbox sealed. Prior to operation, check the oil level and replace the uppermost oil drain plug with the supplied oil fill breather. See chapter 7.2: “*Lubrication*” for oil type and quantity.

All ports are covered at the factory to keep out foreign objects during transit. If covers are missing or damaged, remove the pump cover for a thorough inspection of the fluid head. Be sure that the pumping head is clean and free of foreign material before rotating the shaft.

4.4. Pump characteristics

These positive displacement, low-slip, stainless steel pumps are designed with larger diameter shafts for greater strength and stiffness and are mounted on a heavy-duty cast iron bearing frame with double tapered roller bearings.

- Designed for continuous operation.
- Rotor connections are sealed from the product zone.
- Rotors are secured to the shafts using rotor nuts.
- Single mechanical seals are standard.
- CIP capability.

4.5. Equipment serial number

All pumps are identified by a serial number on the gear case nameplate. The serial number is also stamped on the pump body.

NOTE! The gear case and body must be kept together to maintain proper rotor clearance. Failure to do so will damage the pump.

4. INTRODUCTION

4.6. Pump shaft location

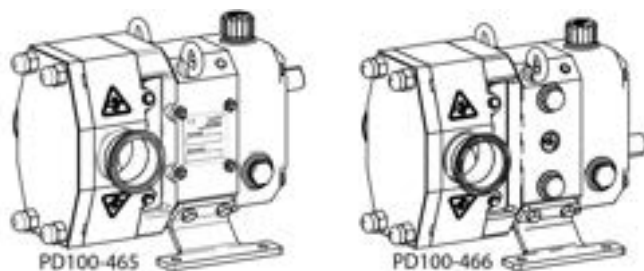


Fig. 2: Upper and Lower Shaft Mount

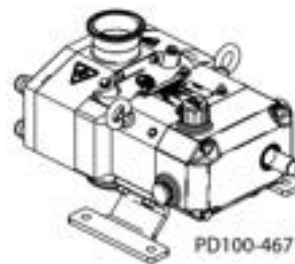


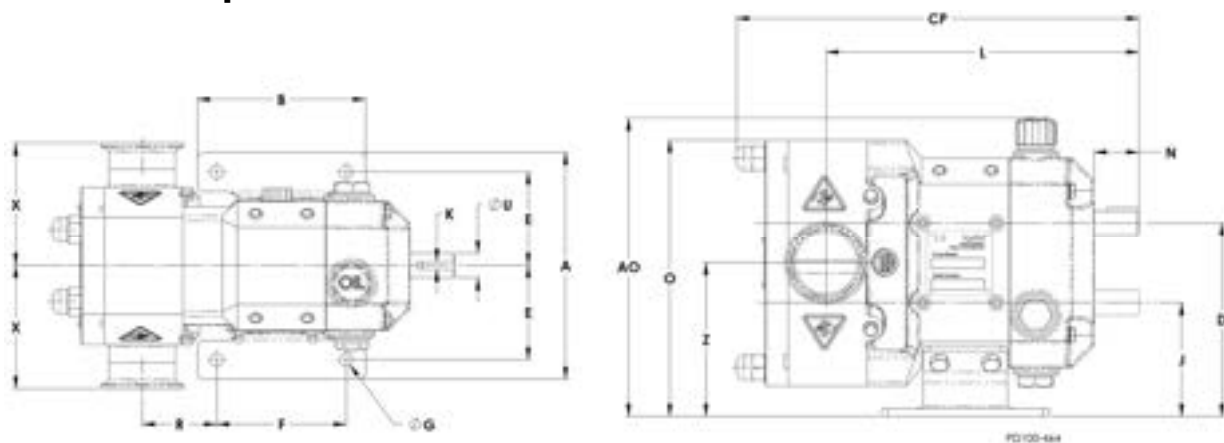
Fig. 3: Side mount Left Hand (as viewed from pump cover)

There are two pump drive shaft locations, as shown in Figure 2 and Figure 3. When side-mounted, left-hand as viewed from the pump cover (Figure 3), rotation may be reversed for up or down vertical flows. See also Figure 24 and Figure 25.

The mounting position may be easily reconfigured by changing the location of the mounting feet. The breather plug must be moved to the uppermost port and the level indicator should be in the lowest, side port in the gear cover.

4. INTRODUCTION

4.7. Pump dimensions



4.7.1. Mounting dimensions

																ISO 2852 DIN 11851 SMS 1145	DIN 2633	
Model	A	AO	B	CP	D	E	F	G	J	K	L	N	O	R	U	X		Z
25-1	175.5	230.5	130.0	281.4	149.6	72.8	100.0	10	87.6	6x6	227.6	34.7	231.6	43.5	19	98.0	130.0	118.6
25-2	175.5	230.5	130.0	286.8	149.6	72.8	100.0	10	87.6	6x6	229.0	34.7	231.6	44.9	19	98.0	130.0	118.6
40-1	175.5	230.5	130.0	298.7	149.6	72.8	100.0	10	87.6	6x6	235.8	34.7	231.6	51.7	19	98.0	130.0	118.6
40-2	175.5	230.5	130.0	299.1	149.6	72.8	100.0	10	87.6	6x6	235.9	34.7	231.6	51.8	19	98.0	130.0	118.6
50-1	175.5	230.5	130.0	311.1	149.6	72.8	100.0	10	87.6	6x6	241.8	34.7	231.6	57.7	19	98.0	130.0	118.6
50-2	239.1	310.6	160.0	396.4	205.9	99.5	120.0	13	112.9	10x8	321.0	57.6	292.9	75.5	38	124.0	156.0	159.4
80-1	239.1	310.6	160.0	423.9	205.9	99.5	120.0	13	112.9	10x8	332.6	57.6	292.9	87.1	38	134.0	166.0	159.4
100-1	301.1	384.6	250.0	553.6	263.7	130.5	210.0	13	138.7	16x10	437.0	85.6	368.2	81.5	55	159.0	189.0	201.2

4.7.2. Technical data

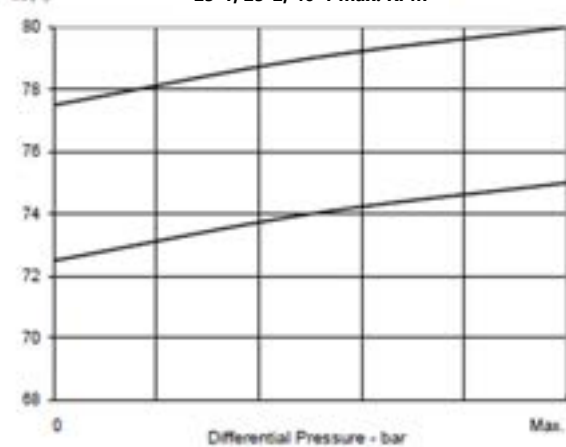
Model	Displacement liter/rev	Nominal Connection Size	Differential Pressure Rating bar	Max. Pump Speed RPM	Input Shaft Diameter	Max. Torque N-m	Max. Temp. °C	Horizontal Mount Pump Weight	Vertical Mount Pump Weight
25-1	0.04	25 (1")	10	1200	19	108	100	22	22
25-2	0.10	25 (1")	10	900	19	108	100	22	22
40-1	0.14	40 (1.5")	10	900	19	108	100	24	24
40-2	0.23	40 (1.5")	10	900	19	108	100	24	24
50-1	0.30	50 (2")	10	900	19	108	100	25	25
50-2	0.67	50 (2")	10	700	38	400	100	65	65
80-1	0.94	75 (3")	10	700	38	400	100	70	70
100-1	2.29	100 (4")	10	600	55	1200	100	148	148

NOTE! All weights in daN, mass in Kg.

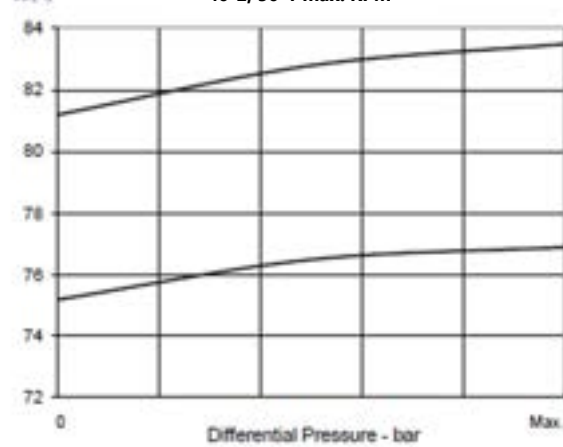
4. INTRODUCTION

4.7.3. Sound level

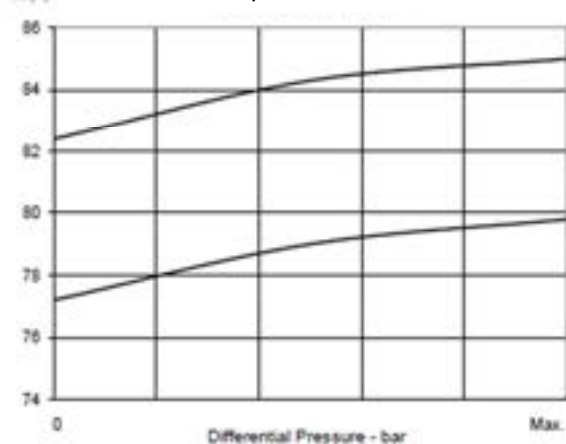
25-1, 25-2, 40-1 max. RPM



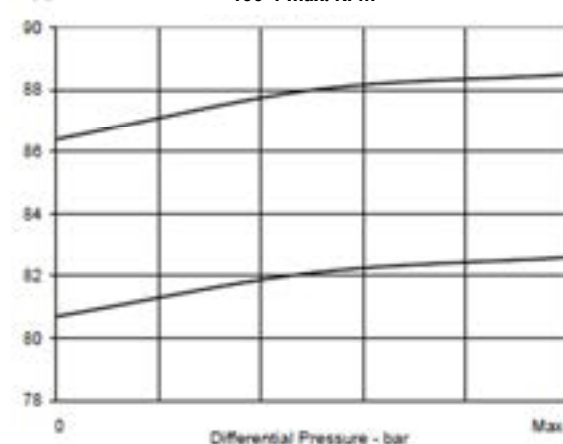
40-2, 50-1 max. RPM



50-2, 80-1 max. RPM



100-1 max. RPM



4.7.4. Maximum particle size

Model	Port Connection Inside Diameter (mm)	Max. Theoretical Particle Size (mm)	Recommended Max. Particle Size (mm)
25-1	20	7.6	3
25-2	26	15.6	5
40-1	40	15.6	5
40-2	40	25.6	9
50-1	50	25.6	9
50-2	50	38.5	13
80-1	81	38.5	13
100-1	100	45.6	15

5. INSTALLATION

5. INSTALLATION

The installation of the pump and piping system should be in accordance with local codes and restrictions. Practices described in this manual are recommended for optimum performance. All system equipment, such as motors, sheaves, drive couplings, speed reducers, etc., must be properly sized to ensure satisfactory operation of your pump within its limits.



CAUTION! These pumps are positive displacement, low slip design and will be severely damaged if operated with closed valves in discharge or inlet lines. The pump warranty is not valid for damages caused by a hydraulic overload from operation or start-up with a closed valve in the system.

5.1. Install pump and drive unit



WARNING! Full guards must be installed to isolate operators and maintenance personnel from rotating components.

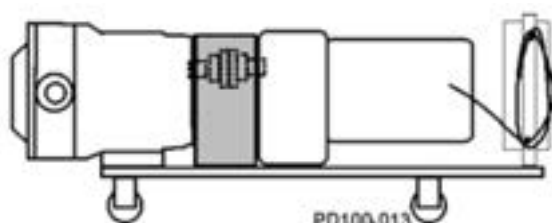


Fig. 4: Portable Base

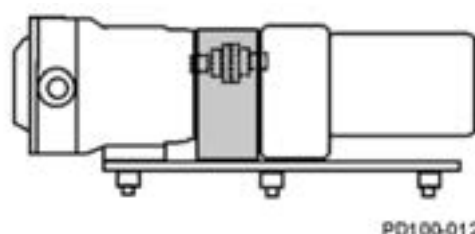


Fig. 5: Adjustable Leg Base

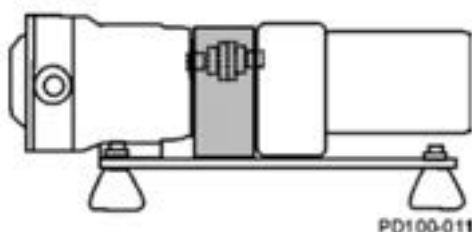


Fig. 6: Leveling and/or Vibration Isolation Pads

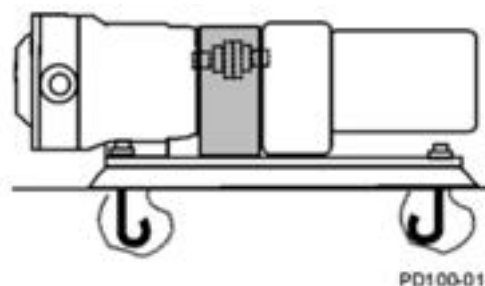


Fig. 7: Permanent Installation on Foundation

In a typical installation configuration, the pump and drive unit are mounted on a common base plate. The unit can be installed in any of the arrangements shown in Figure 4 through Figure 7 (the shaded area indicates the guard location).

NOTE! When installing unit as shown in Figure 7, level the unit before installing the bolts.

5. INSTALLATION

5.2. Install connections and piping

5.2.1. Piping support

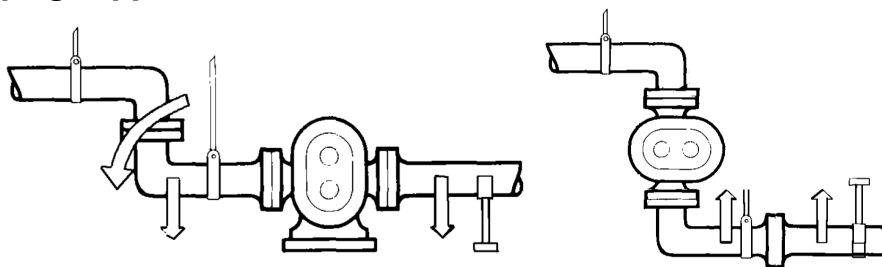


Fig. 8: Piping Support

To minimize forces exerted on the pump, support all piping to the pump independently with hangers or pedestals. Such forces can cause misalignment of the pump parts and lead to excessive wear of rotors, bearings, and shafts.

Figure 8 shows typical supporting methods used to independently support each pipe, reducing the weight effect of piping and fluid on the pump.

5.2.2. Expansion joints

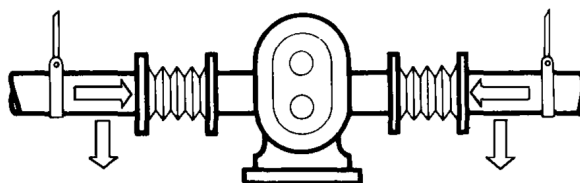


Fig. 9: Flexible Connections and Supports

Thermal expansion of piping can cause tremendous forces. Use thermal expansion joints to minimize these forces on the pump.

Flexible joints can be used to limit transmission of mechanical vibration. Ensure that the free ends of any flexible connections in the system are anchored.

5.2.3. Inlet piping

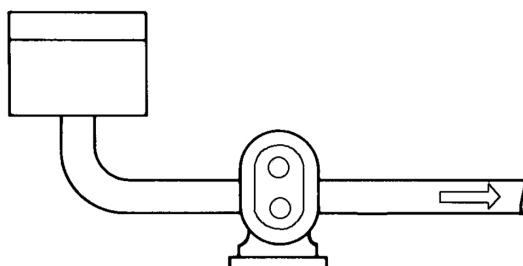


Fig. 10: Pump Below Supply

Install the pump below the supply liquid level to reduce the air in the system by flooded suction (Figure 10).

5. INSTALLATION

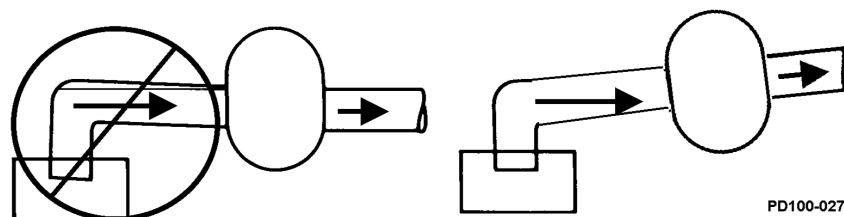


Fig. 11: Correct Piping to Prevent Inlet Air Pockets

If the pump is installed above the supply liquid level, the piping on inlet side must slope up toward the pump, preventing air pockets in the pipes (Figure 11).

5.3. Install check valves

5.3.1. Inlet side on lift applications

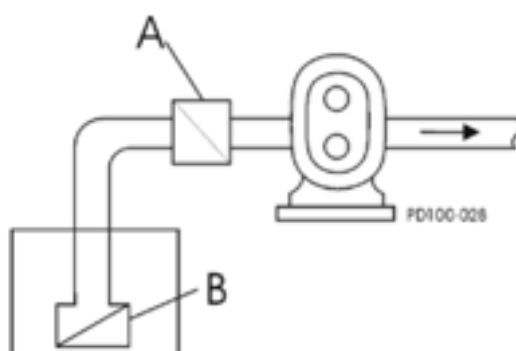


Fig. 12: Inlet Check Valve

Use check valves to keep the inlet line full, particularly with low-viscosity fluids (Figure 12).

- A. Inlet Check Valve
- B. Foot Check Valve

5.3.2. Discharge side

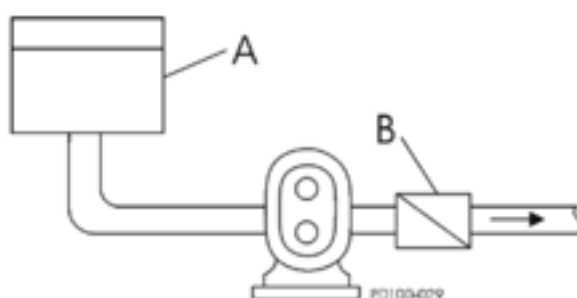


Fig. 13: Discharge Check Valve

For systems with liquid under a vacuum, we recommend installing a check valve on the discharge side of the pump. The check valve prevents backflow (air or fluid) to aid in the initial start-up by minimizing the required differential pressure supplied by the pump to start the flow (Figure 13).

- A. Closed Tank - produces a vacuum on liquid (Low Absolute Pressure)
- B. Check Valve (outlet)

5. INSTALLATION

5.4. Install isolation valves



Fig. 14: Isolation Valves

Isolation valves permit pump maintenance and safe pump removal without draining the system (Figure 14, item A).

5.5. Install relief valves

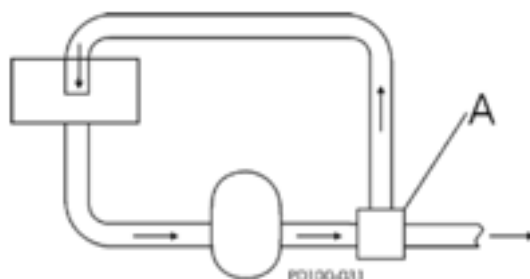


Fig. 15: Relief Valves

Install relief valves to protect the pump and piping system against excessive pressure. We recommend installing an external relief valve designed to bypass fluid from the pump outlet to the inlet side of the system (Figure 15, item A).

5.6. Install side strainers and traps

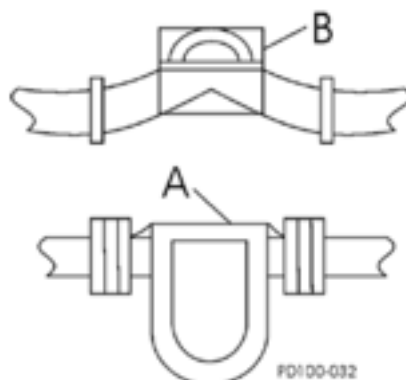


Fig. 16: Inline Strainers and Traps

Inlet side strainers and traps (Figure 16, items A and B) can be used to prevent foreign matter from damaging the pump. Make the selection carefully to prevent cavitation caused by the restriction of the inlet. If the inlet strainers are used, they must be serviced regularly to prevent clogging and flow stoppage.

A. Strainer

B. Magnetic Tap

5. INSTALLATION

5.7. Install pressure gauges

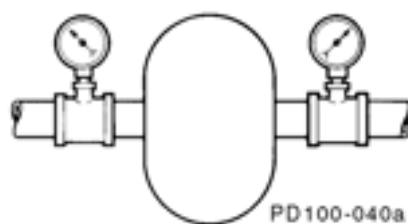


Fig. 17: Pressure and Vacuum Gauges

Pressure and vacuum gauges provide valuable information about pump operation (Figure 17).

Wherever possible, install the gauges to help provide information on the following:

- Normal or abnormal pressures
- Indication of flow
- Changes in pump condition
- Changes in system conditions
- Changes in fluid viscosity

5.8. Seal flush connections

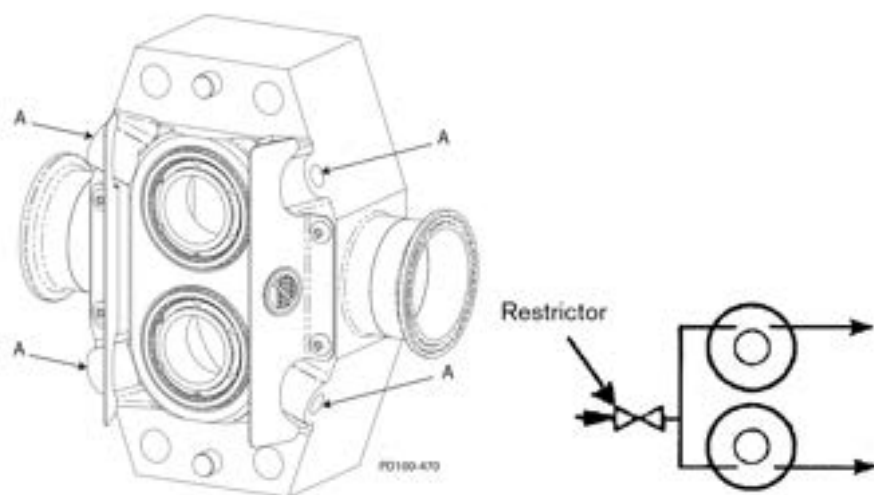


Fig. 18: Flush Piping Setup

Pumps with double seals require flushing. The flush media (typically water) must be connected and flowing whenever pump is operated.



WARNING! Operating the pump without flush will damage the seal and pump parts due to excess heat from dry running.

Pump bodies have four G 1/8 BSPT flush connections located near the bottom and top of the body (Figure 18, item A).

1. Flushing media may be piped into either side for both shaft seals and discharged to drain on opposite side.
2. Both inlets may be manifolded to simplify piping. Be sure flush water is flowing out both discharge lines.

5. INSTALLATION

3. Use cool, filtered flush media to obtain maximum service life of seal components. If the pumped product is sticky or solidifies at room temperature, use warm or hot media.
4. Install a pressure reducing valve and flow control valve (needle valve) on the flush supply line. Set the supply pressure at a maximum of 2 bar (30 psi) and adjust the flow rate to approximately 0.9 lpm (1/4 gpm) (more for high temperature applications).
5. 5A solenoid valve also should be installed in the flush supply and wired in series with the motor starter to provide automatic start/stop of the flush media flow before the motor turns on and after motor turns off.

5.9. CIP (Clean-In-Place) guidelines

These optional CIP (Clean-In-Place) guidelines are designed to provide complete access of CIP solutions to all product contact surfaces:

- Ensure that the velocity rate of CIP solutions is adequate to clean the entire circuit. For most applications, a velocity of 1.5 m/sec (5 ft./sec) is sufficient. For the CIP solution to achieve the proper velocity, the pump drive must have enough speed range and horsepower. The required inlet pressure also must be satisfied. If the pump does not supply enough CIP solution velocity, a separate CIP supply pump with an installed bypass may be used. To determine the appropriate bypass arrangement, contact Application Engineering.
- Ensure that a differential pressure is created across the pump. Differential pressure will push CIP solutions through close-clearance areas of the pump, resulting in better cleaning action. The high-pressure side may be either the inlet or outlet side. 2 bar (30 psi) differential pressure is adequate for most applications.
- The pump must be operated during CIP to increase turbulence and cleaning action within the pump. If complete draining is required, the pump must be in the side mount position.

5.10. Check coupling alignment

Pump and drive coupling alignment **must** be rechecked after the complete unit has been installed and piping completed. Periodic rechecking is advisable during the pump service life.

- We recommend using a flexible coupling to connect the drive to the pump. Several different types are available, including couplings with slip or overload provision. Flexible couplings can be used to compensate for end play and small differences in alignment.
- Align the pump and drive shaft as closely as possible.

5. INSTALLATION

5.11. Check angular alignment

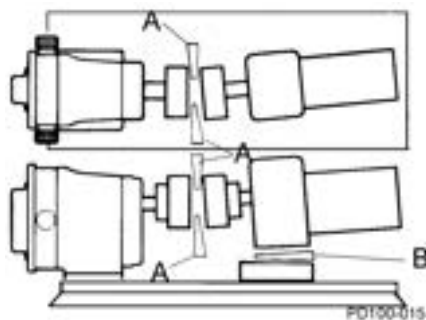


Fig. 19: Check Angular Alignment

1. Using feeler gauges or taper gauges (Figure 19, items A and B), check the alignment at four points every 90 degrees around the coupling; adjust to equal dimension at all points.
2. Set the space between the coupling halves to the manufacturer's recommended distance.
3. Install shims to bring the system into alignment.

5.12. Check parallel alignment

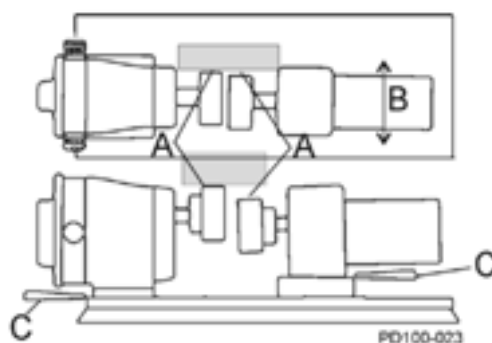


Fig. 20: Check Parallel Alignment

1. Check both the horizontal and vertical alignment of the pump and drive using a straight edge.
2. Using a feeler gauge at location "A" in Figure 20, determine the direction and amount of movement needed (Figure 20, item B).
3. If necessary, shim at location "C" and/or move drive as needed.

5.13. Check belt and chain alignment

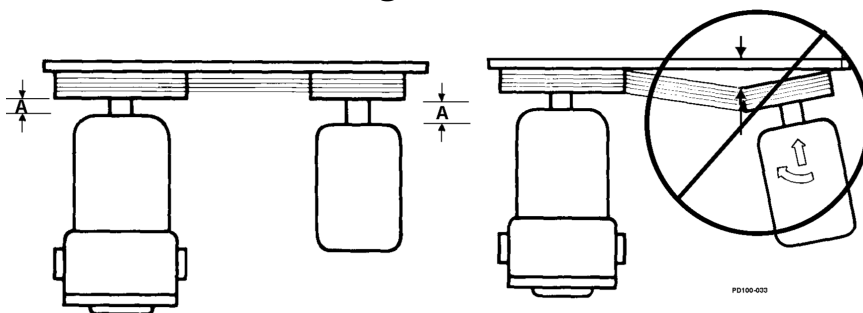


Fig. 21: Alignment Belt and Chain Drives

Use a straight edge to visually check the belt or chain alignment. Keep the shaft distance to a minimum (Figure 21, item A). After the piping is complete and before the belts are installed, manually turn the pump shaft to ensure that it turns freely.

5. INSTALLATION

5.14. Check pump rotation

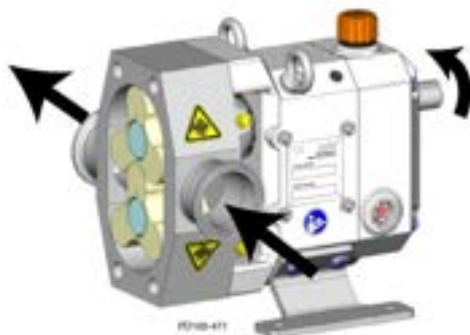


Fig. 22: Upper Shaft Drive Flow

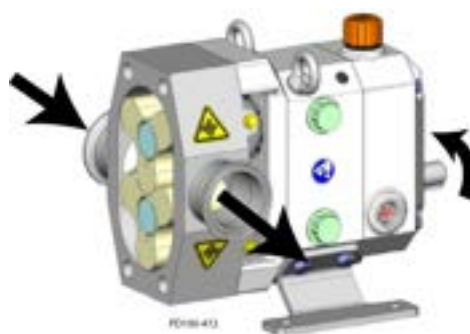


Fig. 23: Lower Shaft Drive Flow

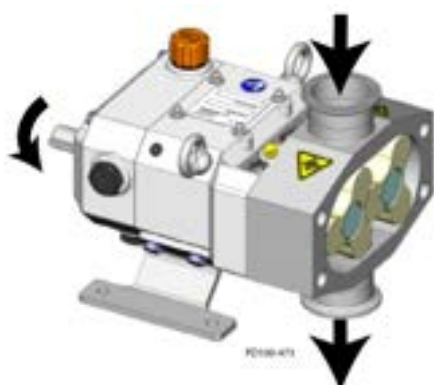


Fig. 24: Vertical Porting Flow

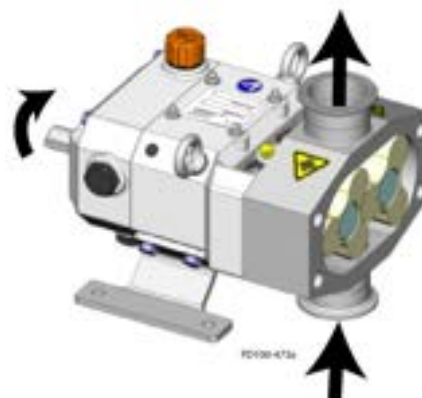


Fig. 25: Pump Rotation

Check the rotation direction of the drive to determine the rotation direction of pump (Figure 22 through Figure 25). After verifying the correct drive rotation, connect the coupling and assemble the pump and coupling guards.

NOTE! The pump covers in the following figures have been removed to view the rotor rotation. Never operate the pump with the covers removed.

6. OPERATION

6. OPERATION



DANGER! The pump contains internal moving parts. **DO NOT** put hands or fingers into the pump body ports or drive area at any time during operation. To avoid serious injury, **DO NOT** install, clean, service, or repair the pump unless all power is off and locked out.



CAUTION! These pumps are positive displacement, low slip design and will be severely damaged if operated with closed valves in the discharge or inlet lines. The pump warranty is not valid for damages caused by a hydraulic overload from operation or start-up with a closed valve in the system.

6.1. Pre-startup checklist



CAUTION! Do not use this pump to flush a newly- installed system. Severe damage may occur to the pump and system if the pump is used to flush the system. Remove the rotors during system flushing.



WARNING! Full guards must be installed to isolate the operators and maintenance personnel from the rotating components. Guards are provided with Tapflo LPX pumps as part of a complete pump and drive package.



WARNING! Do not start a pump with seal flush unless the seal flush is installed and on.

1. Ensure that the pump is correctly installed as described in chapter 5: "*Installation*". Review chapter 5.5: "*Install Relief Valves*" and install relief valves as needed.
2. Check the coupling alignment. See chapter 5.10: "*Check Coupling Alignment*".
3. Ensure that the pump and piping are clean and free of foreign material such as welding slag, gaskets, etc.
4. Ensure that all piping connections are tight and leak-free. Where possible, check the system with non-hazardous fluid.
5. Ensure that the pump and drive are lubricated. See chapter 7.2: "*Lubrication*".
6. Ensure that all guards are in place and secure.
7. Double mechanical seals require adequate supply and flow of clean flushing fluids.
8. Ensure that all valves are open on the discharge side and a free flow path is open to the destination.
9. Ensure that all valves are open on the inlet side and fluid can fill the pump. A flooded suction installation is recommended.
10. Check the direction of pump and drive rotation to ensure that the pump will rotate in the proper direction. See chapter 5.14: "*Check Pump Rotation*".

6.2. Startup procedure

1. Start the pump drive. Where possible, start at a slow speed or jog.
2. Ensure that the liquid is reaching the pump within 60 seconds. If pumping does not begin and stabilize, check chapter 8: "*Troubleshooting*".

6. OPERATION

6.3. Shutdown procedure

1. Shut off the power to the pump drive.
2. Shut off the supply and discharge lines.

6.4. Emergency shutdown procedure

Emergency shutdown procedures should be documented by plant personnel after assessing system-wide requirements.

7. MAINTENANCE

7. MAINTENANCE

7.1. Important safety information



DANGER! The pump contains internal moving parts. **DO NOT** put hands or fingers into the pump body ports or drive area at any time during operation. To avoid serious injury, **DO NOT** install, clean, service, or repair the pump unless all power is off and locked out.

Before detaching port connections to the pump:

- Close suction and discharge valves.
- Drain pump and clean or rinse, if necessary.
- Disconnect or shut off the electrical supply and lock out all power.

7.2. Lubrication

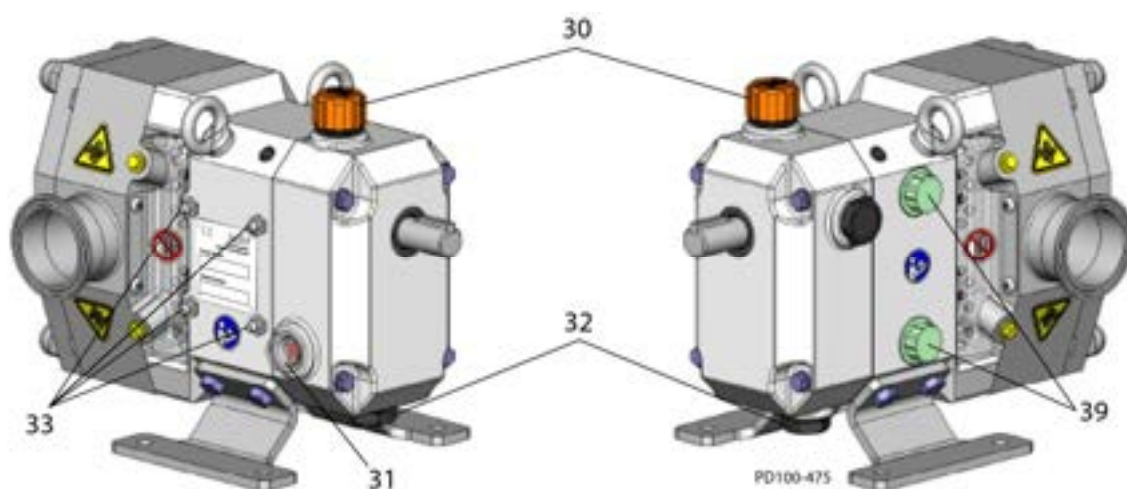


Fig. 26: Lubrication points

Tab. 1: Callout table for figure 26

30	Oil Fill Breather
31	Oil Level Check Plug, Sight Glass
32	Oil Drain Plug
33	Grease Fittings
34	Grease Cleanout Plug

7.2.1. Drive lubrication

Refer to the manufacturer's manual shipped with the drive for proper drive lubrication and frequency.

7.2.2. Gear oil



CAUTION! Each pump is shipped from the factory with the gearbox sealed. Prior to operation, check the oil level and replace the uppermost oil drain plug with the supplied oil fill breather, at the location of item 30 in Figure 26.

Refer to the table below for the required capacity per pump model as shown.

Change the oil every 1000 hours.

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Gear Oil Specification

ISO Grade 320, SAE 140 or AGMA Number 6EP

Tab. 2: Gear oil volume

Model	Gear oil volume	
	Horizontal ports	Vertical ports
25-1, 25-2, 40-1, 40-2, 50-1	100 ml	170 ml
50-2, 80-1	325 ml	490 ml
100-1	625 ml	1125 ml

7.2.3. Bearing lubrication

Bearings are factory-lubricated with grease. Table 3 provides approximate volumes for adequate re-greasing. Grease the bearings every 250 hours.

Excess grease will accumulate in the gear case. Remove it through the cleanout hole covered with a plastic plug (Figure 26, item D).

Bearing Lubricant Grease

NLGI Grade No. 2, EP, Lithium-based lubricant

Tab. 3: Grease quantity

Model	Gear oil volume	
	Front bearing	Rear bearing
25-1, 25-2, 40-1, 40-2, 50-1	5 ml	4 ml
50-2, 80-1	10 ml	9 ml
100-1	17 ml	14 ml

7.3. Maintenance inspections



DANGER! The pump contains internal moving parts. **DO NOT** put hands or fingers into the pump body ports or drive area at any time during operation. To avoid serious injury, **DO NOT** install, clean, service, or repair the pump unless all power is off and locked out.

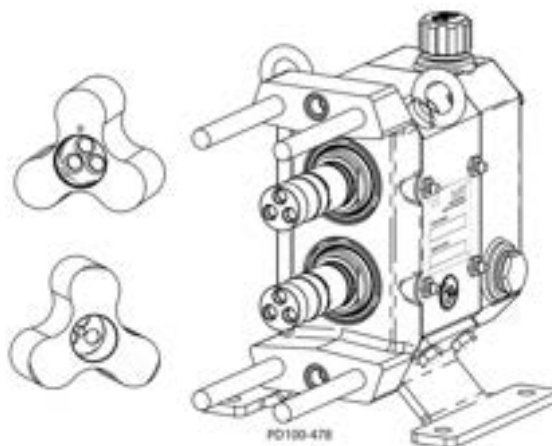


Fig. 27: Check for wear

Detecting wear in the early stages can reduce repair costs and down time. A simple “look-feel” inspection of the pump during breakdown cleaning is recommended to detect signs of trouble at an early stage.

7. MAINTENANCE

7.3.1. Inspection of shaft

Visually inspect the shaft for twists or bends; replace it as necessary.

7.3.2. Inspection of hub end

Visually inspect the rotor hub end for excessive wear; replace it as necessary. Each time the rotors are removed, replace the O-rings on the hub.

7.3.3. Inspection of shaft shoulder

Visually inspect the shaft shoulder for excessive wear and replace it as necessary. If the shaft shoulder has a sharp edge, remove the edge with a file to prevent cutting the shaft O-ring on installation.

7.3.4. Inspection of gears and bearings

NOTE! The rotor hub and shaft shoulder wear are caused by operating with a loose rotor lug screw(s) for extended periods.

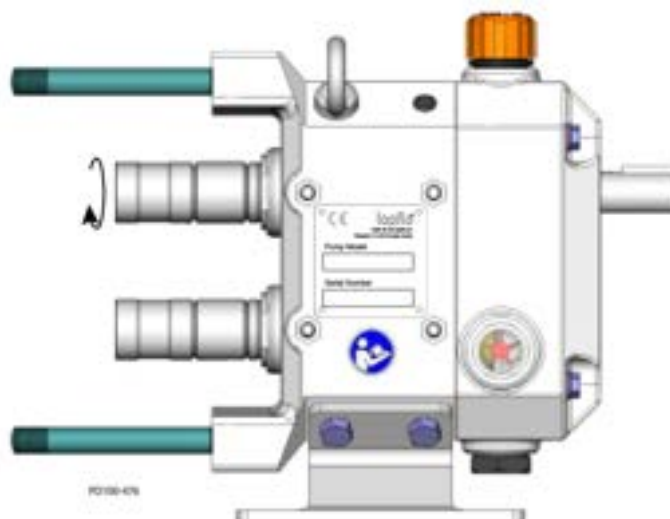


Fig. 28: Backlash check

Gear backlash

With the fluid head and seals removed, feel for gear backlash by rotating either shaft by hand. The other shaft must engage immediately. Perform this check three times at 60-degree intervals.

If play (backlash) is evident, remove the gear case cover, check the gear teeth for wear and ensure that the gear is not loose on the shaft. If the gear teeth are worn, replace the gears.

If the gear is loose on the shaft, inspect the shaft key and keyway; replace as necessary.

7. MAINTENANCE

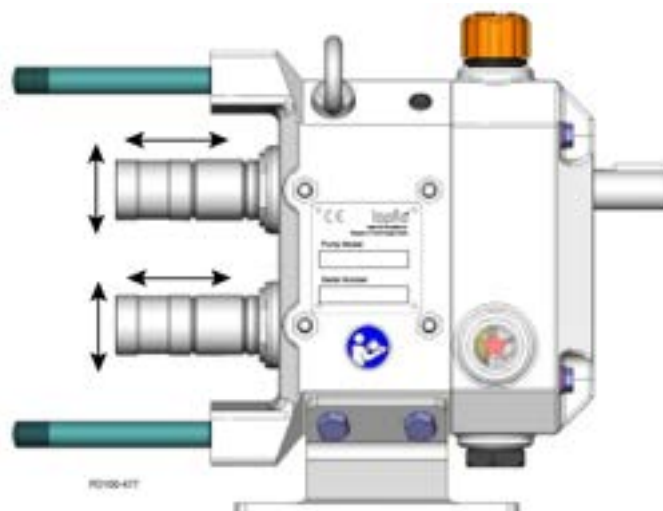


Fig. 29: Bearing deflection check

Check bearing condition

With the fluid head and seals removed, check the bearing condition by applying (by hand) an up or down force of approximately 30 lbs. (14 kg). If movement is detected, the bearing may be failing.

Check the shaft movement forward or backward. When the bearing is determined to be failing, replace the bearing and review the lubrication schedule.

7.3.5. Recommended maintenance schedule

Item	Grease Quantity per Bearing
Replace Gear Oil	Every 1000 hours. See chapter. 8.2.2.: "Gear Oil".
Grease Bearings	Every 250 hours. See chapter 7.2.3.: "Bearing Lubrication".
Replace O-Rings	Every time O-rings are removed.

NOTE! For seals and rotors, component life varies widely between different applications. Inspect for wear and replace as needed. See chapter 7.4: "Maintenance Inspection Chart".

7. MAINTENANCE

7.4. Maintenance inspection chart

PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTIONS
Rotor to rotor contact or uneven rotor to rotor clearance.	Hard object jammed into rotors and twisted shafts.	Replace shafts. Install strainers if necessary. Check and replace gears if necessary.
Worn rotor hub end or shaft shoulder.	Loose rotor lug screw(s). Rotors slammed against shoulder when installed.	Torque rotor lug screw(s). See chapter 7.8.14: " <i>Torque Reference</i> ". Replace rotors and shafts or shim shafts to maintain proper back face clearances.
Sharp edged shaft shoulder.	Loose rotor lug screw(s). Rotors slammed against shoulder when installed. Back face clearances not even.	Remove sharp edge with file to prevent cutting shaft O-ring. Verify back face clearances are even.
Gear backlash.	Lack of lubrication. Excessive hydraulic loads.	Check lubrication level and frequency. Reduce hydraulic loads. Check and replace gears if necessary.
Worn or broken gear teeth.	Lack of lubrication. Excessive hydraulic loads.	Check lubrication level and frequency. Reduce hydraulic loads. Check and replace gears if necessary.
Loose bearings, axially or radially.	Lack of lubrication. Lack of lubrication. Excessive hydraulic loads. Product or water contamination.	Check lubrication level and frequency. Reduce hydraulic loads. Ensure no excess grease build-up. Replace bearings if necessary.
Damaged front grease seals.	Seal may be old and worn. No grease on lips to lubricate.	Replace seals. Properly lubricate with grease when installing. Inspect shaft surface under seals.
Damaged rear oil seals.	Shaft worn under seals. Seal may be old and worn.	Replace seals. Properly lubricate with grease when installing. Inspect shaft surface under seals.

7.5. Cleaning

The pump cleaning schedule should be determined on-site for the materials being processed and the plant maintenance schedule. For CIP cleaning, see chapter 5.9: "*CIP (Clean-In-Place) guidelines*".

To disassemble the fluid head, see chapter 7.6.: "*Pump disassembly - hydraulic components*". Remove and clean the cover O-ring, pump seals, and the rotor lug screws. Inspect and replace them as necessary.

In applications where material can harden in the pump during shutdown, a CIP cleaning, flush, or disassembly of the fluid head and manual cleaning is strongly recommended.

NOTE! Always replace the rotor cap O-rings and rotor hub O-rings when reassembling the pump. If the area behind these seals becomes soiled, contact Application Engineering for a specific cleaning and sanitizing procedure validated to remove bacteria.

7. MAINTENANCE

7.6. Pump disassembly – hydraulic components



DANGER! The pump contains internal moving parts. **DO NOT** put hands or fingers into the pump body ports or drive area at any time during operation. To avoid serious injury, **DO NOT** install, clean, service, or repair the pump unless all power is off and locked out.



DANGER! To avoid serious injury, shut off and drain product from the pump prior to disconnecting the piping.

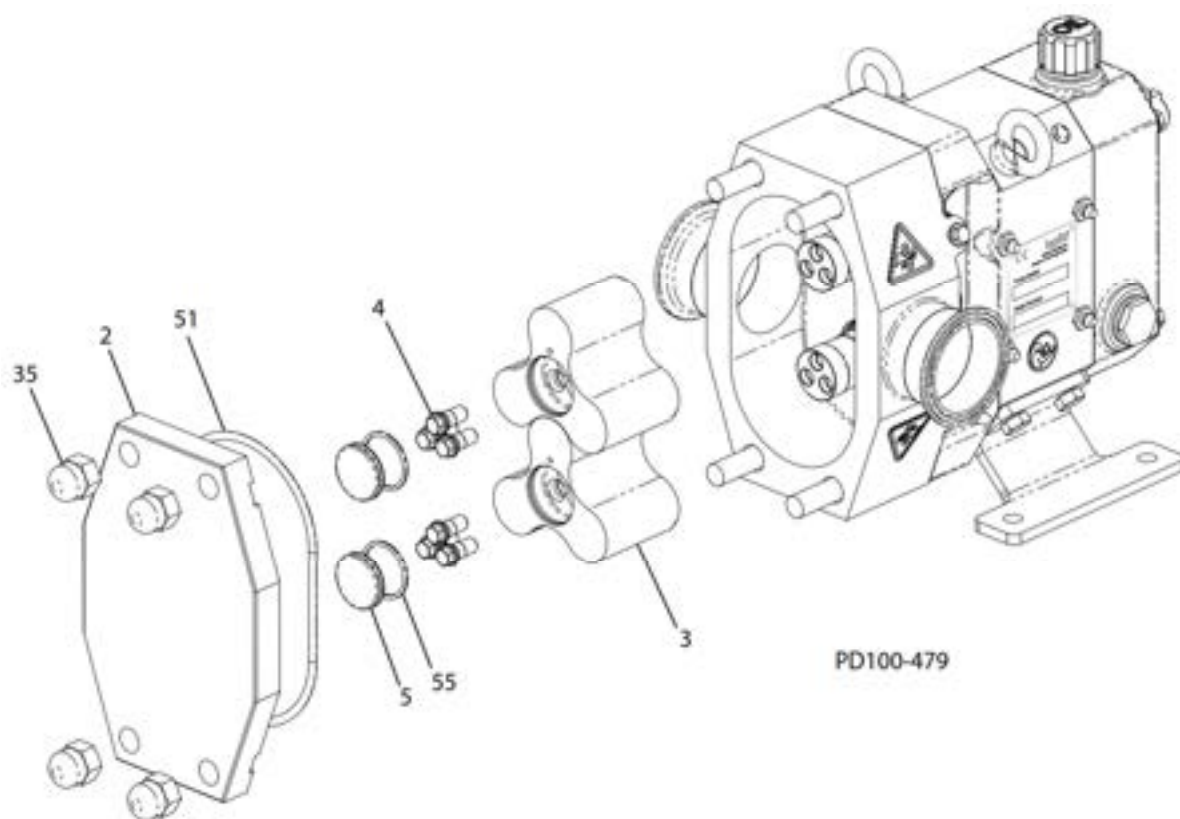


Fig. 30: Pump Cover and Rotor Removal

Tab. 4: Callout table for figure 30

2	Cover
3	Rotor
4	Rotor Nut
5	Rotor screw cap
35	Acorn nut
51	Cover O-ring
55	Rotor screw cover O-ring

7.6.1. Pump cover removal

1. Remove the cover acorn nuts (Figure 30, item 35).
2. Remove the cover (item 2). Cavities are provided on the mounting surface of the cover to permit removing the cover with the aid of a screwdriver.
3. Remove and inspect the O-ring (item 51).

7. MAINTENANCE

7.6.2. Rotor removal

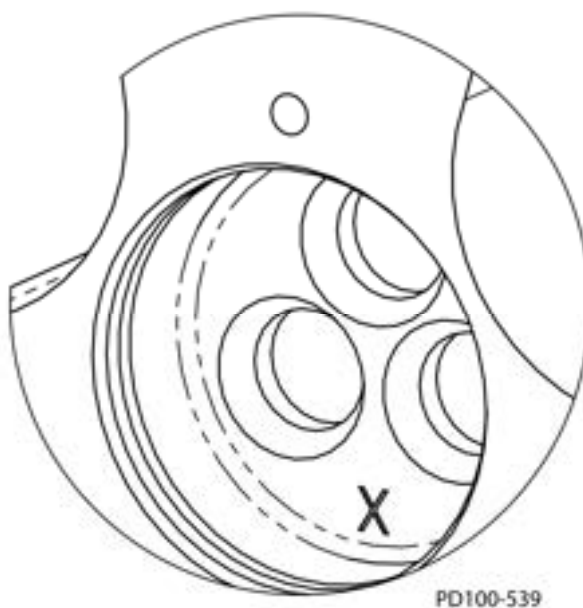


Fig. 31: Counterbore Detail

1. Remove the screw caps (Figure 30, item 5) from the rotors (item 3). Remove and inspect the O-rings (item 55).
2. Remove the rotor lug screws (item 4). To prevent the rotors from turning while loosening (or tightening) the rotor lug screws, block the rotors following the guidelines provided in the chapter 7.6.3.: *"Rotor Blocking"*.
3. Remove the rotors (Figure 30, item 3). If the rotors cannot be removed by hand, use a twisting motion to break them free. If unsuccessful, tap the body forward using a mallet to loosen the rotors.

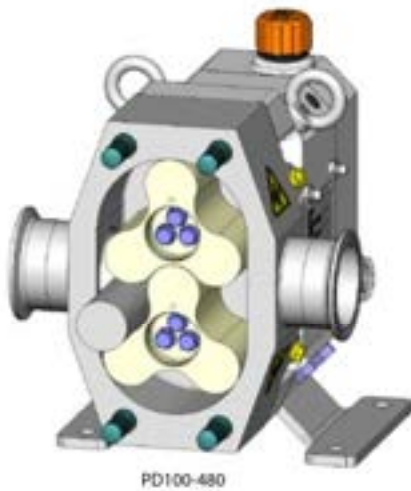
NOTE! The rotor mounted on the drive shaft is marked with an "X" in the lug screw counterbore (see Figure 31). The marked rotor must always be installed on the drive shaft to maintain proper rotor clearance and prevent pump damage.

7.6.3. Rotor blocking

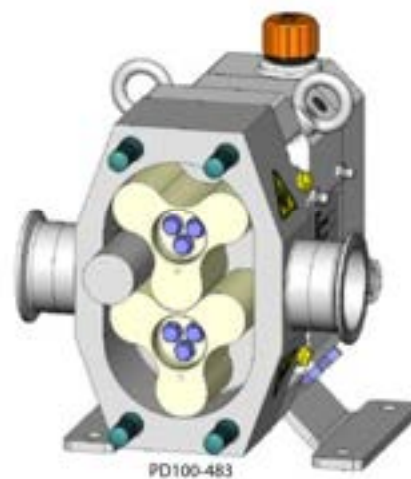
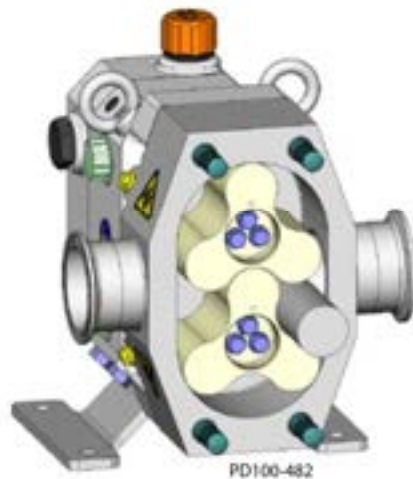
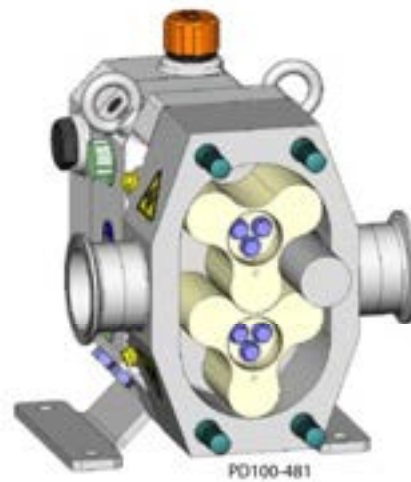
Use a rod made of a non-marring material to block the rotors and prevent them from turning. A plastic rod works well for this purpose. Table 5 lists rod diameters by model for rotor blocking. Always block the rotor against the body, not against the opposite rotor. See Figure 32.

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Loosen Bottom Rotor



Loosen Top Rotor



Tighten Bottom Rotor

Tighten Top Rotor

Fig. 32: Rod Position for Blocking

Tab. 5: Rod diameters

25-1	15 mm
25-2, 40-1	20 mm
40-2, 50-1	30 mm
50-2, 80-1	45 mm
100-1	60 mm

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7.6.4. Pump body removal

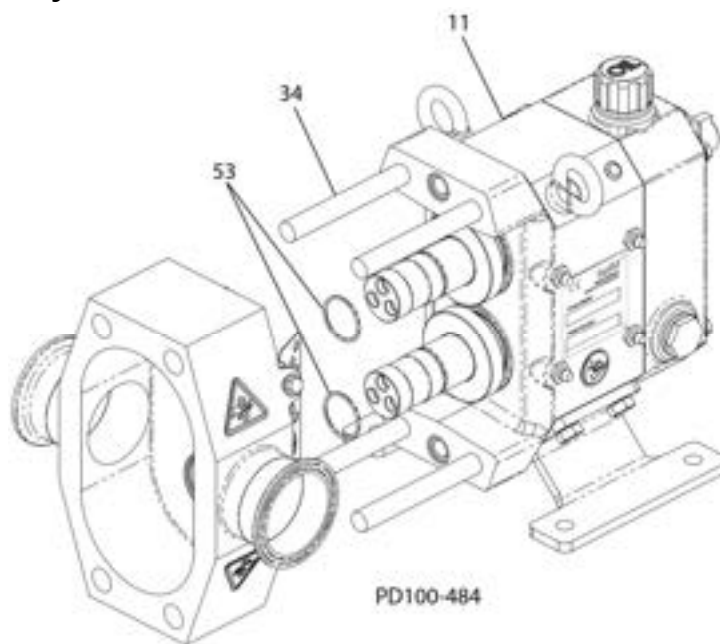


Fig. 33: Pump body removal

1. Using a mallet, tap the body forward until the dowels are free of the gear case (Figure 33, item 11).
2. Carefully slide the body off of the studs (item 34) to prevent damaging the mechanical seal components.
3. Place the body on a protected surface with the seals facing up.
4. Remove and inspect the rotor hub O-rings (item 53).

7.6.5. Mechanical seal removal

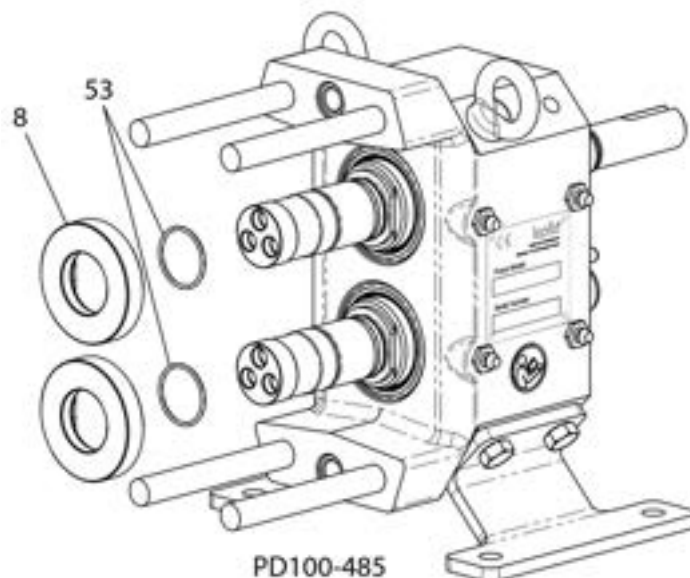


Fig. 34: Remove seal seats

1. Remove the seal seats (Figure 34, item 8) from the shafts. Take care to prevent damage to the seats or shafts.
2. Remove and inspect the O-rings (item 53).

7. MAINTENANCE

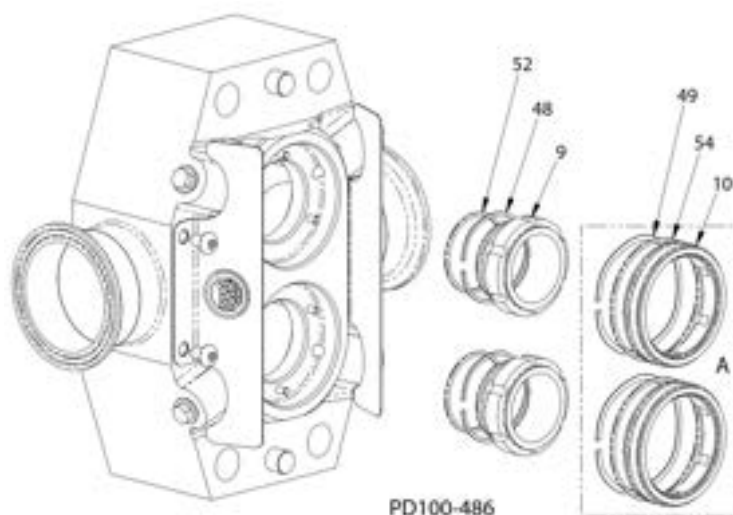


Fig. 35: Remove seals

1. Remove the inner seal (Figure 35, item 9) and wave spring (item 48). Remove the O-ring (item 52) from the inner seal and inspect it. Replace as necessary.
2. On pumps equipped with double mechanical seals (Figure 35, inset A), remove the outer seal (item 10) and wave spring (item 49). Remove the O-ring (item 54) from the outer seal and inspect it. Replace as necessary.

7.7. Gearbox disassembly



DANGER! The pump contains internal moving parts. **DO NOT** put hands or fingers into the pump body ports or drive area at any time during operation. To avoid serious injury, **DO NOT** install, clean, service, or repair the pump unless all power is off and locked out.



DANGER! To avoid serious injury, shut off and drain product from the pump prior to disconnecting the piping.

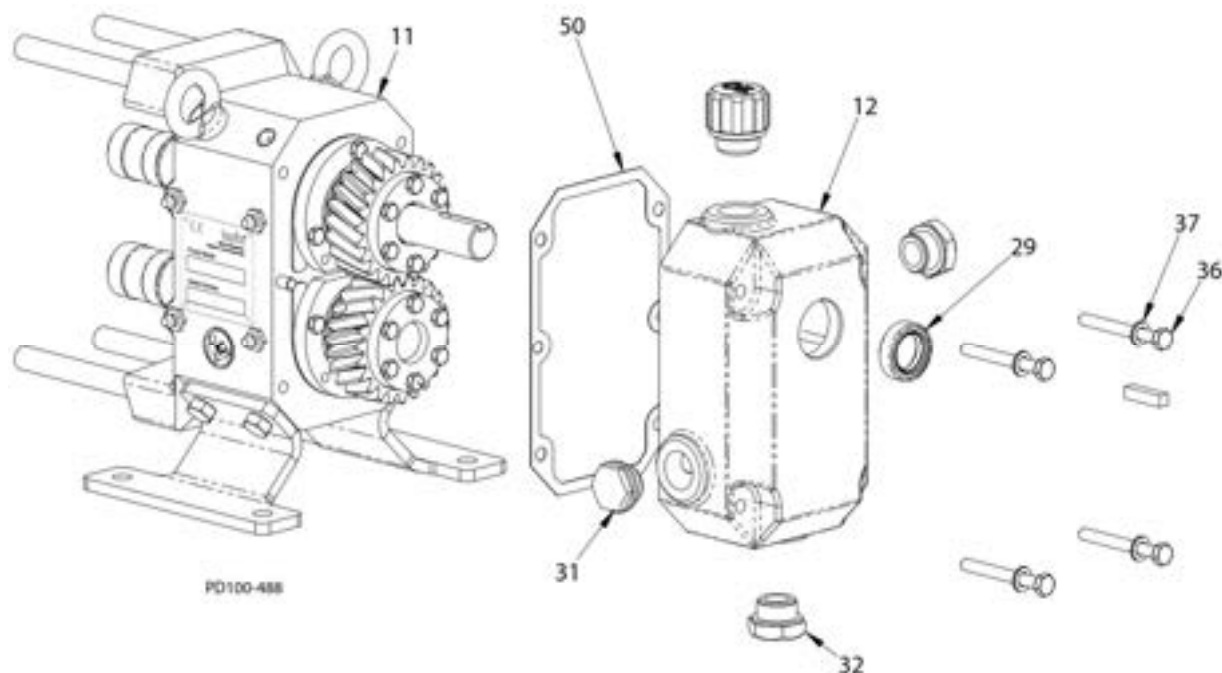


Fig. 36: Remove Gear Case Cover

7. MAINTENANCE

7.7.1. Gear cover removal

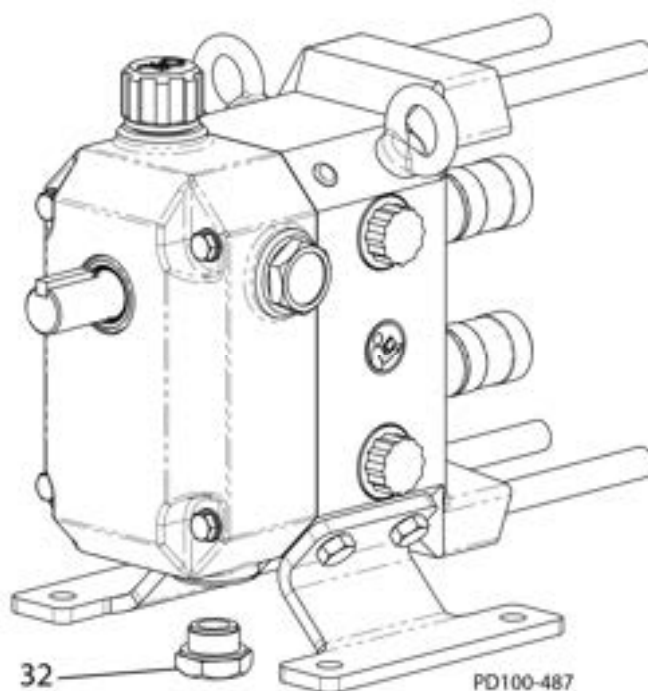


Fig. 37: Remove Oil Drain Plug

1. Remove the bottom drain plug (Figure 37, item 32) and drain the oil into an appropriate container. Dispose of the used oil in accordance with local requirements.
2. Remove the input shaft key (if present) and remove any burrs or sharp edges from the input shaft.
3. Remove the cap screws (Figure 36, item 36) and washers (item 37) and remove the cover (item 12).
4. Remove the input shaft seal (item 29) from the gear cover and discard it.
5. Inspect the level indicator plug (item 31) and replace it if it appears cloudy or stained.
6. Remove the gasket (Figure 36, item 50) and discard it. Carefully scrape any gasket residue from the mating surfaces of the gear cover (item 12) or gear case (item 11).

7.7.2. Gear cover removal

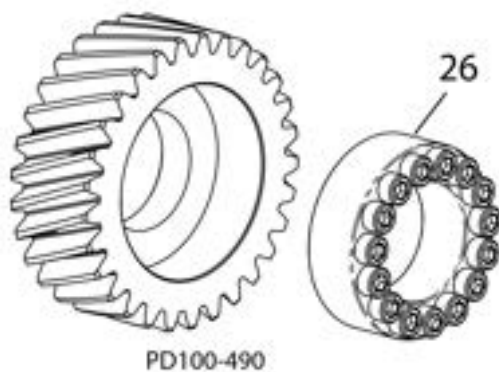


Fig. 38: Locking Assembly

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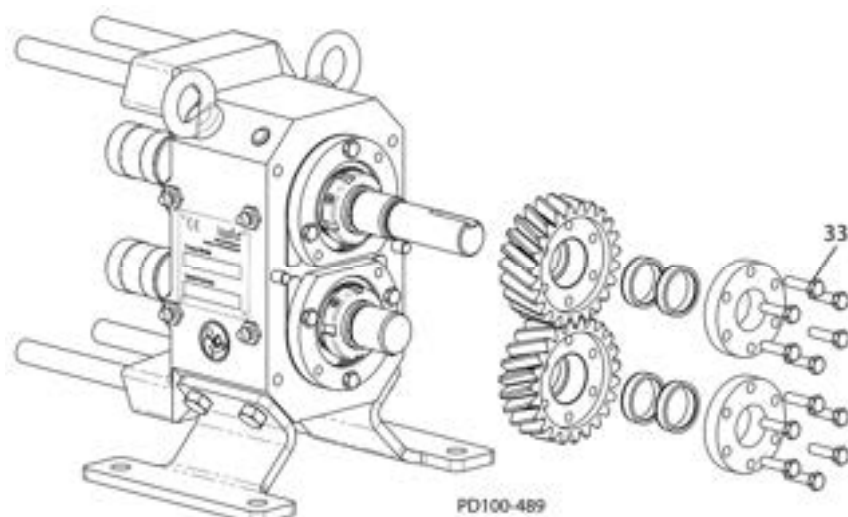


Fig. 39: Remove Gear and Locking Assembly

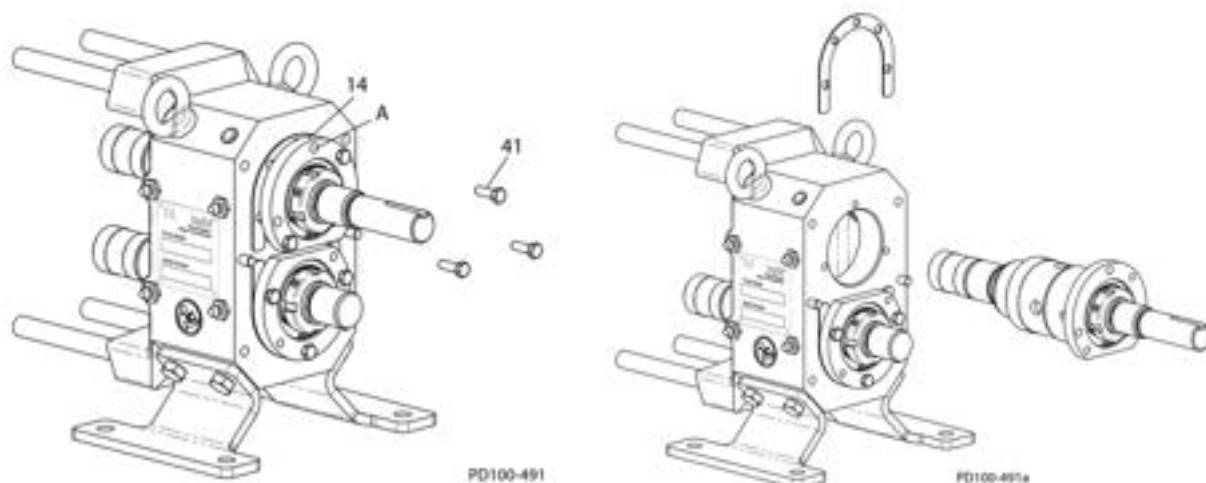


Fig. 40: Remove Screws

Fig. 41: Remove Shaft

1. Loosen the clamp ring screws (Figure 39, item 24) or locking screws in the locking assembly (Figure 38, item 26) to release the gear from the shaft.
2. Remove the gear and locking assembly from the shaft.
3. Repeat steps 1-2 for the other shaft.
4. Remove the bearing case screws (Figure 40, item 41).
5. Install 2 screws in the tapped holes (Figure 40, item A) in the bearing case (item 14). Tighten the screws to pull the bearing case from the gear case. (Figure 41).
6. Repeat steps 4-5 for the other shaft.

7. MAINTENANCE

7.7.3. Bearing removal

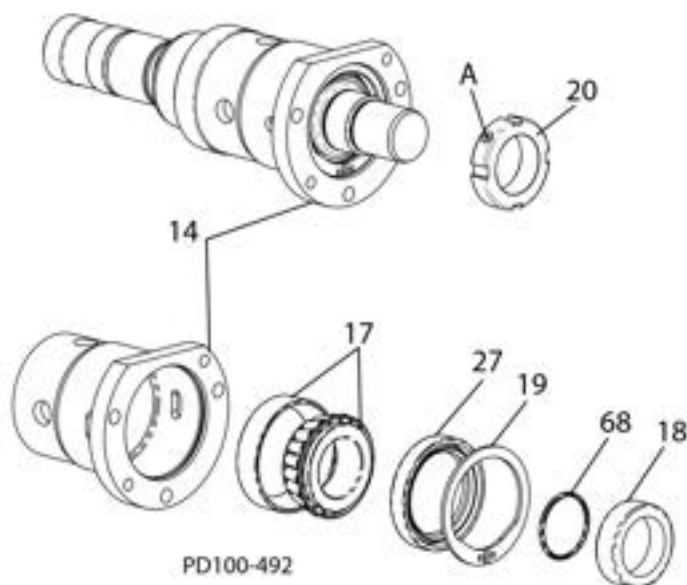


Fig. 40: Remove bearings

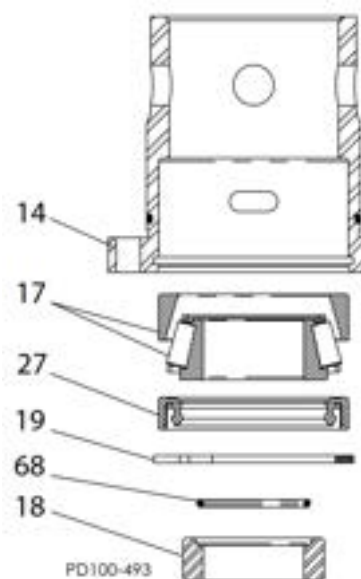


Fig. 41: Press Shaft Free of Rear Bearing

1. Loosen the locking setscrew(s) (Figure 42, item A) in the bearing adjustment nuts (item 20) and remove the bearing adjustment nuts.
2. With the bearing case supported as shown in Figure 43, press the shaft free of the rear bearing (item 17), bearing case (item 14), seal sleeve O-ring (item 68), and seal sleeve (item 18).
3. Remove the retaining ring (item 19) from the bearing case and press the rear bearing cup and rear bearing seal (item 27) out of the bearing case.
4. Press the front bearing cone off of the shaft.
5. Repeat the steps above for the other shaft.

7.8. Pump assembly

NOTE! Use care at all times to prevent damage to critical machined surfaces.

NOTE! Check the components for sharp edges or burrs. Remove them as required.

7. MAINTENANCE

7.8.1. Install front seals

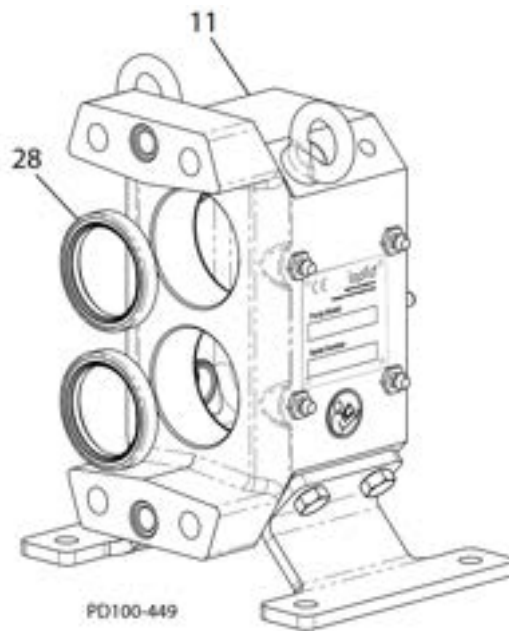


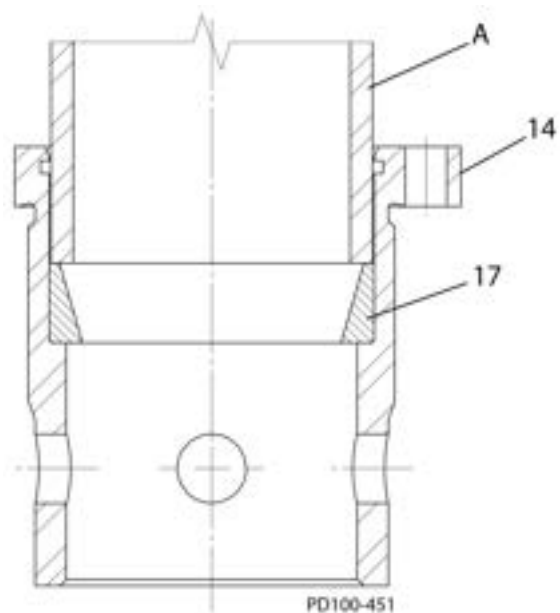
Fig. 44: Install Front Seals

Install new front bearing seals (Figure 44, item 28) into the gear case (item 11) with the primary lip facing toward the inside of the gear case. The seals should be flush with the face of gear case.

7.8.2. Bearing assembly



Fig. 45: Press Bearing Cone onto Shaft



46: Press Rear Bearing Cup

Fig.

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1. Press the rear bearing cup (Figure 46, item 17) into the bearing case (item 14) using a pusher tool (item A).
2. Heat the bearing cone to 120°C and place it on the shaft.

Alternate method: Press the front bearing cone (Figure 45, item 16) onto the shafts (items 6-7). The bearing cone must seat squarely against the shaft shoulder.

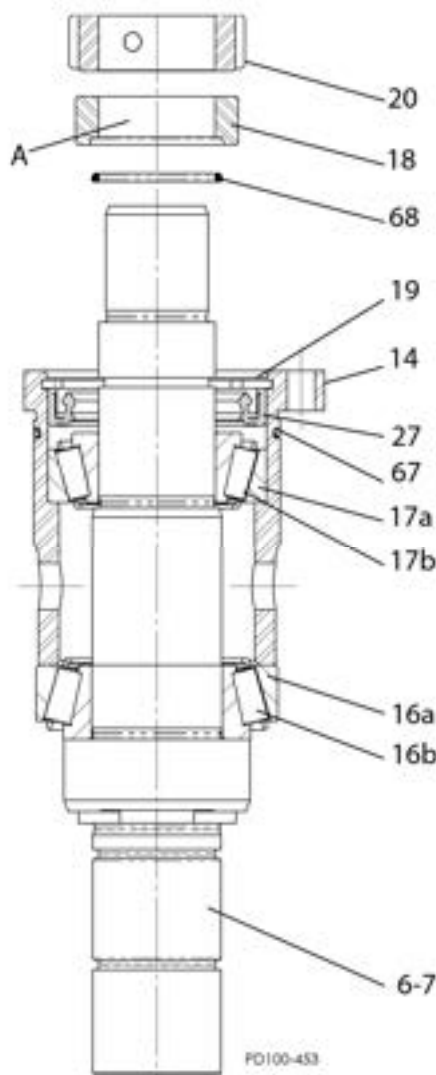


Fig. 47: Bearing Assembly

3. Install the front bearing cup (Figure 47, item 16a) onto the mounted cone (item 16b), followed by the bearing case (item 14).
4. Press the rear bearing cone (item 17b) onto the shaft and into the cone.
5. Press the rear seal (item 27) into the bearing case (item 14) with the primary lip facing away from the bearing and install the retaining ring (item 19). Orient the seal as shown and make sure it does not interfere with the bearing.
6. Install the O-ring (item 68) and seal sleeve (item 18) onto the shaft as shown in Figure 47. Orient the seal sleeve with the groove toward the bearing.
7. Install the bearing adjustment nut (item 20) and tighten "hand tight." Do not tighten the locking setscrews at this time.
8. Install the O-ring (item 67) into the groove of the bearing case (item 14).

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7.8.3. Bearing adjustment

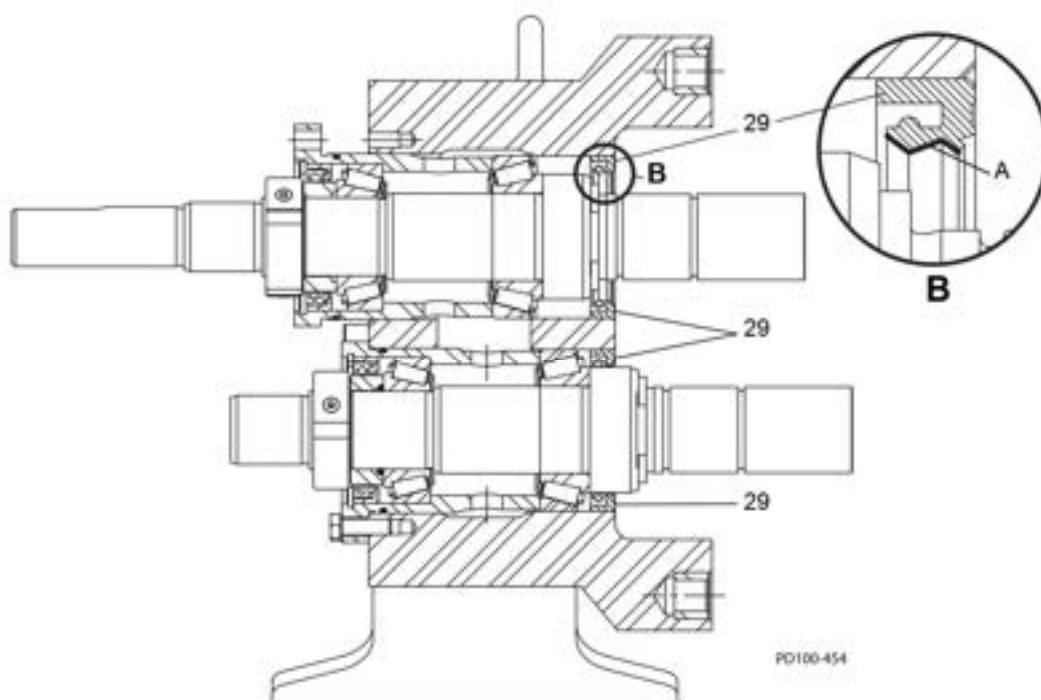


Fig. 48: Apply Bearing Grease

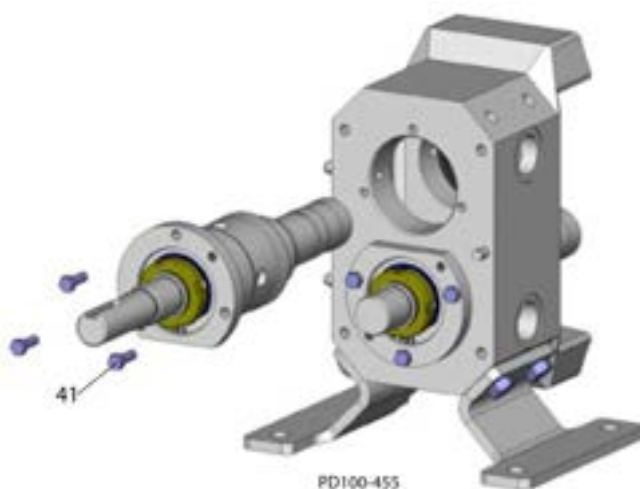


Fig. 49: Secure with Cap Screw

1. See Figure 48. Apply a coating of bearing grease to the inside diameter (item A) of the front lip seals (item 29).
2. Install the shaft assemblies into the gear case and secure them with cap screws (Figure 49, item 41). Apply a light film of bearing grease to the bores and bearing cups to ease installation. Use care to prevent damage to the lip seals (Figure 48, item 29) during assembly.
3. Install one lug screw (Figure 50, item 4) into one of the tapped holes in each of the shafts and check the rolling torque of each shaft assembly with a torque wrench.

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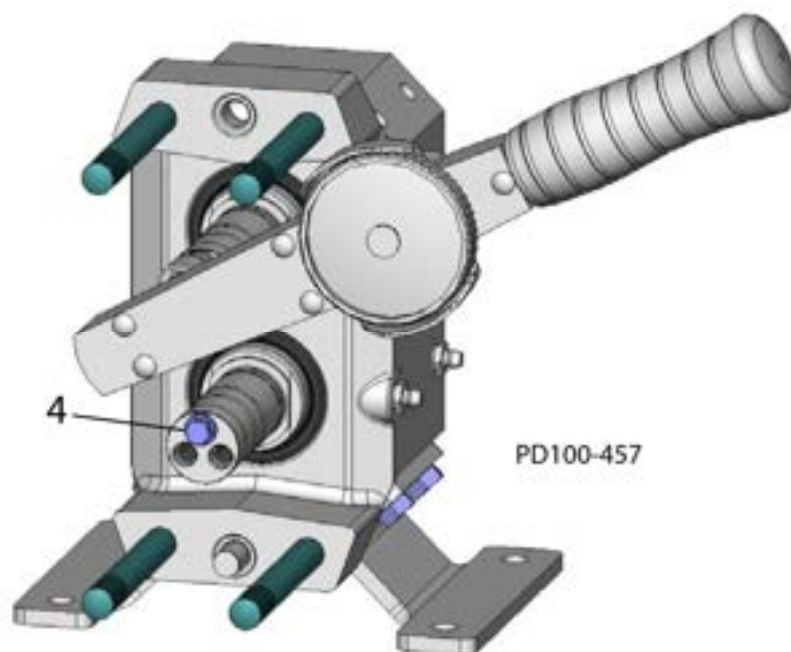


Fig. 50: Check Rolling Torque

4. Tighten or loosen the bearing lock nut (Figure 51, item 20) to achieve a torque value as shown in Table 6.

Tab. 6: Bearing rolling torque

Pump	Torque
25-1, 25-2, 40-1, 40-2, 50-1	1.6 – 1.8 Nm
50-2, 80-1	3.2 – 3.4 Nm
100-1	4.5 – 4.7 Nm

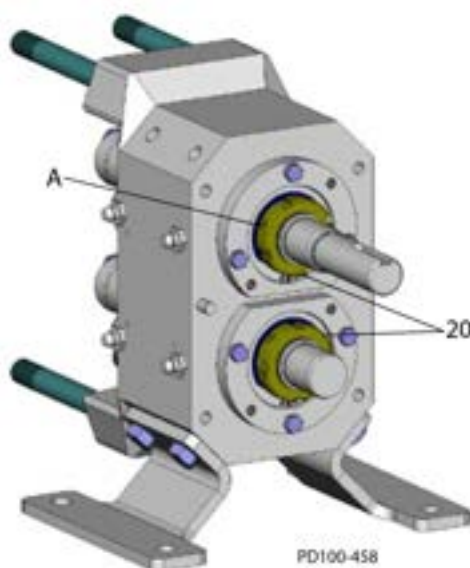


Fig. 51: Tighten Setscrews

5. Tighten the locking setscrew(s) (Figure 51, item A) in the bearing lock nuts (item 20).

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7.8.4. Shaft seal installation

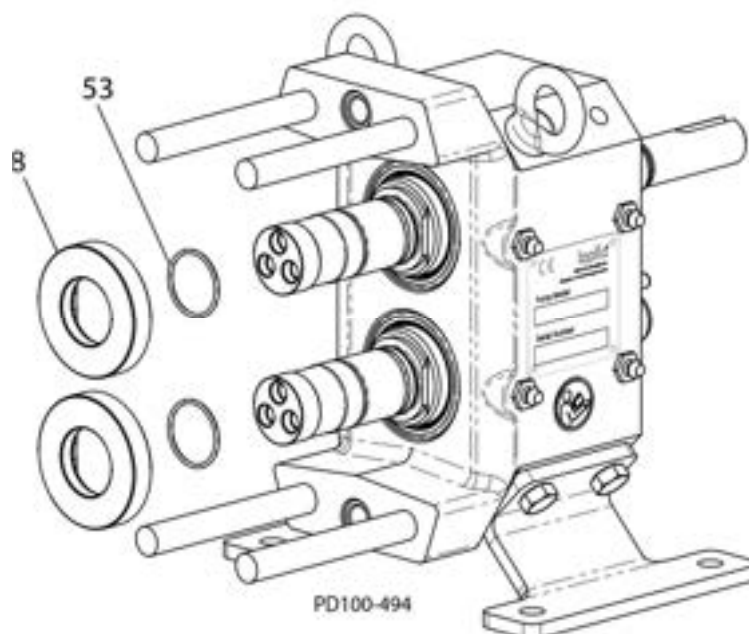


Fig. 52: Shaft Seal Installation

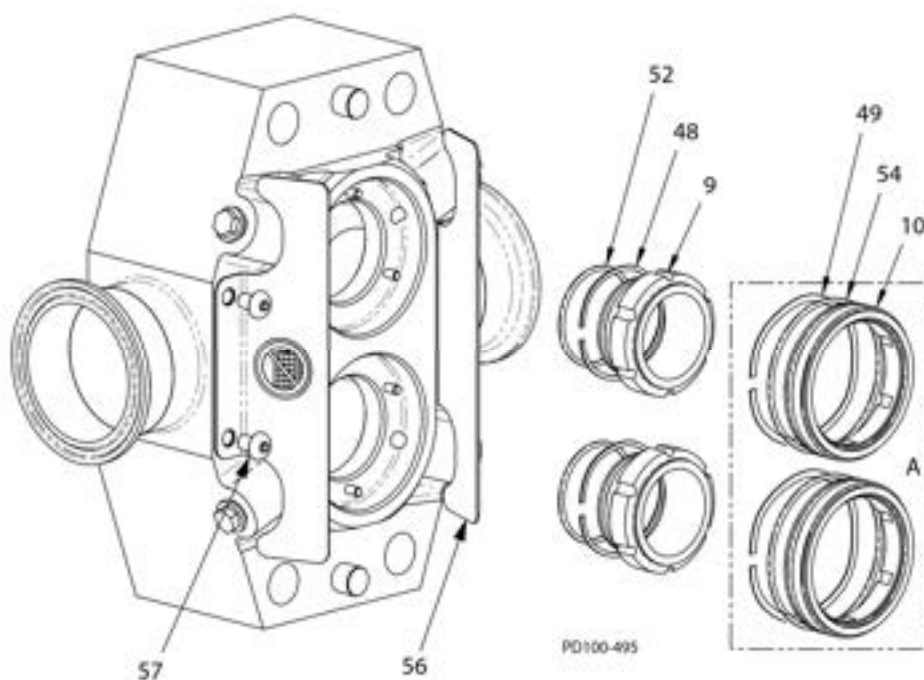


Fig. 53: Shaft Seal Installation

1. Install the seat O-rings (Figure 52, item 53) into the rear groove in the shaft.
2. Apply a compatible lubricant to the O-rings and install the seal seats (Figure 52, item 8). Align the flats in the seal seats with the flats on the shafts and seat them firmly against the shaft shoulder.
3. Install the inner seal O-ring (Figure 53, item 52) into the inner seal groove and install the wave spring (item 48) onto the body of the inner seals (item 9).

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4. Apply a compatible lubricant to the O-rings and install the seal, O-ring, and wave spring into the body. Align the slots in the seal with pins in the body. Repeat for the second seal.
5. Fasten the guards (Figure 53, item 56) to the body with button head screws (item 57).
6. For pumps equipped with double seals (Figure 53, inset A):

Install the outer seal O-ring (Figure 53, item 54) into the groove in the outer seal (item 10).

Place the wave spring (item 49) into the bore, then apply a compatible lubricant to the O-ring and install the seal into the body. Repeat for the second seal.

7.8.5. Mechanical seal guidelines/notes

1. The lapped faces of mechanical seal components are extremely flat and smooth. Use great care when handling these components to prevent damage and reduced seal performance.
2. Although it is impossible to prevent touching the seal faces during assembly, use clean hands and try to minimize contact with the lapped faces.
3. Keep the work area clean to prevent contamination of the seal faces.
4. O-ring lubrication is important to ease assembly of the components, prevent O-ring damage, and provide proper seal function. The lubricant chosen must be non-toxic and compatible with the O-ring material.
5. Clean water can be used as an assembly lubricant for the O-rings if no other lubricant is available.
6. Seal seats should sit squarely against the shaft shoulder.
7. The inner and outer seals should not bind in their respective bores. When pushed by hand, the wave springs should return the seals to their starting position.

7.8.6. Body installation

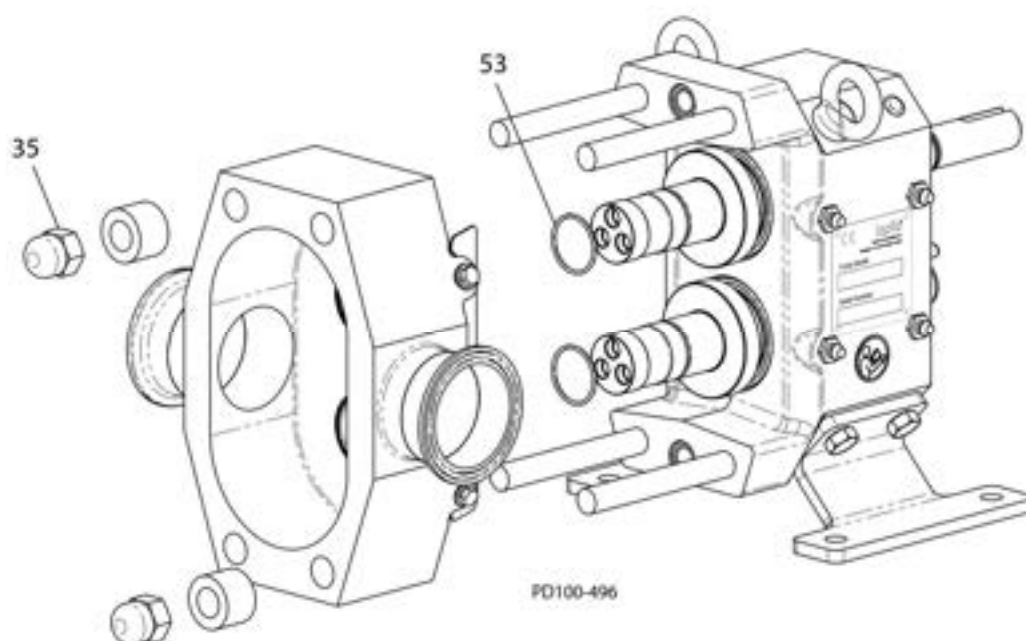


Fig. 54: Body Installation

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Tab. 7: Cover spacer dimensions

Pump	I.D. (mm)	O.D. (mm)	Length (mm)
25-1, 25-2, 40-1, 40-2, 50-1	14	25	18
50-2, 80-1	18	25	18
100-1	21	30	30

1. Install the rotor hub seal O-rings (Figure 54, item 53) into the groove of each shaft.
2. Guide the body with seals installed over the studs and seat it firmly to the gear case. Use care to prevent damage to the seals.
3. Fix the body to the gear case using two spacers and acorn nuts (item 35) at opposite corners of the body. See Table 7 for nominal dimensions required for spacers.

7.8.7. Rotor positioning

NOTE! The screw holes in the rotors are designed to match the screw holes in the shafts in only one orientation. To aid assembly, reference marks are provided on each rotor and the end of the shaft.

Rotor clearances and synchronization require that each rotor must always be installed on a specific shaft to maintain these clearances and prevent pump damage. The drive shaft rotor, therefore, is marked with an 'X' in the lug screw counterbore. The marked rotor must always be installed on the drive shaft.

7.8.8. Rotor installation

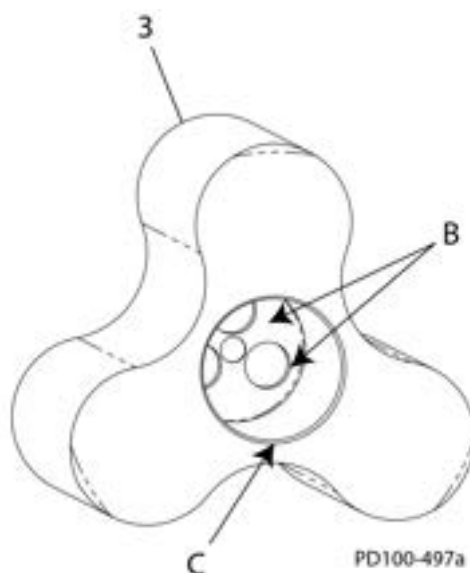


Fig. 55: Rotor detail

1. The shaft bore of the rotors (Figure 55, item 3) must be clean and free of burrs and debris (Figure 55, item B). The edge chamfer (item C) must be free of burrs to prevent damage to the O-rings.
2. The face of the shaft must be free of raised edges or burrs (see Figure 56, Detail G, item D).

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3. **Re-using rotors:** Apply a compatible lubricant to the O-rings and install the marked rotor onto the drive shaft and the unmarked rotor onto the short shaft, making note of the alignment reference mark on the shafts for rotor positioning. (See item A in Figure 56, Detail F and G.)

Installing new rotors: Apply a compatible lubricant to the O-rings and install the rotors onto the shafts, making note of the alignment reference mark on the shafts for rotor positioning. (See item A in Figure 56, Detail F and G.) Stamp an "X" approximately 3mm high in the face of the counterbore opposite the alignment reference mark. See Figure 56, Detail F; also see Figure 31 for a larger view.

4. Install one lug screw (Figure 56, item 4) into the hole nearest the reference mark in each rotor.
5. Install the remaining screws and torque all screws to the value listed in Table 8.

Tab. 8: Lug screw torque

Pump	Hex	Torque
25-1, 25-2, 40-1, 40-2, 50-1	9 mm	24 Nm
50-2, 80-1	13 mm	70 Nm
100-1	18 mm	160 Nm

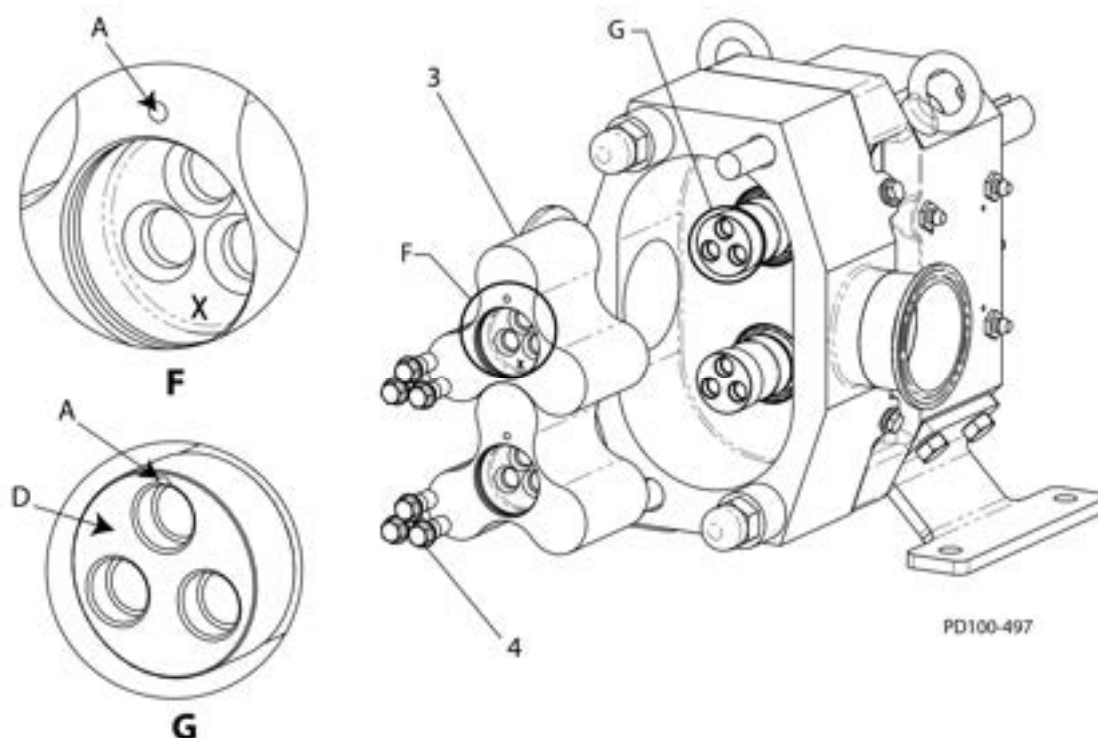


Fig. 56: Rotor installation

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7.8.9. Setting rotor clearance

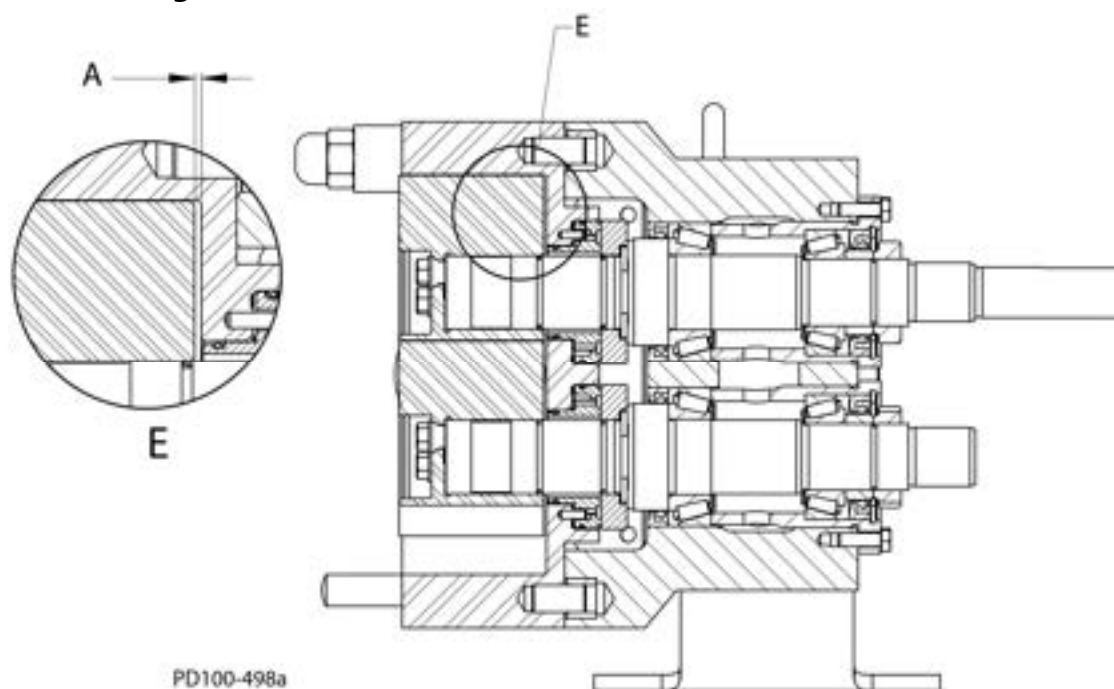


Fig. 57: Rotor to Body Clearance

1. Measure the clearance between the rotor and body as shown in Detail E, item A in Figure 57. Record this number.
2. Refer to Table 9. Subtract the "Clearance Target" for the appropriate model from the clearance measurement. The resulting value is the total shim thickness that must be installed behind the flange of the bearing case.

Tab. 9: Back face and front face clearance

Pump model	Clearance target	Acceptable range	
		Back face	Front face
25-1	0.100	0.125	0.260
25-2		0.100	0.155
40-1			
40-2	0.125	0.150	0.265
		0.125	0.160
50-1	0.125	0.150	0.315
		0.125	0.210
50-2	0.150	0.175	0.340
80-1		0.150	0.235
100-1	0.200	0.225	0.440
		0.200	0.335

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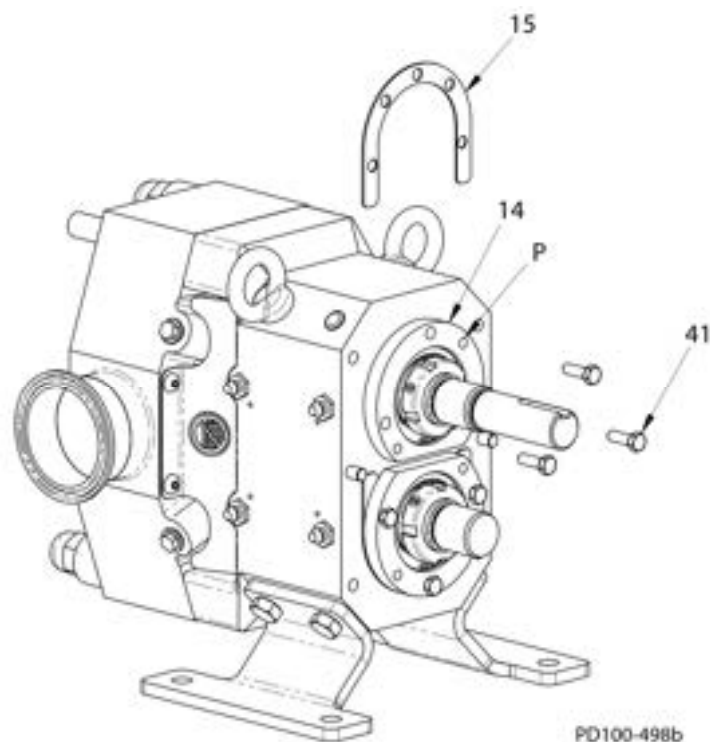


Fig. 58: Install Shims

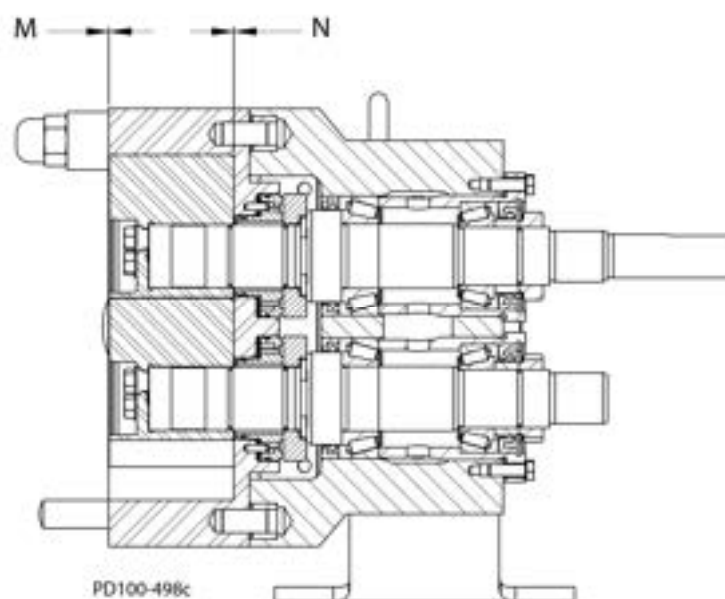


Fig. 59: Measure Clearance

3. Choose a combination of shims (Figure 58, item 15) to achieve a thickness as close as possible to the calculated amount. Do not exceed the calculated amount.
4. Remove the bearing case screws (Figure 58, item 41), install the shims selected in Step 3, and re-install the screws. To provide clearance for the shims, move the shaft toward the rear by tapping gently on the rotor with a soft-faced mallet or by installing two screws in the jacking holes (item P) in the bearing case flange (item 14).
5. Check the resulting back face and front face clearance (items M and N in Figure 59). Adjust the shims as necessary.

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7.8.10. Gear mounting and rotor synchronization

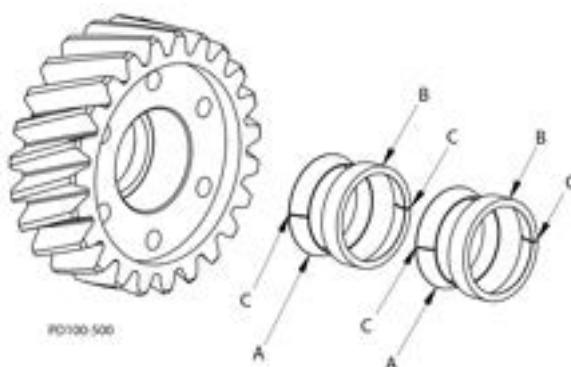


Fig. 60: Locking Element Assembly

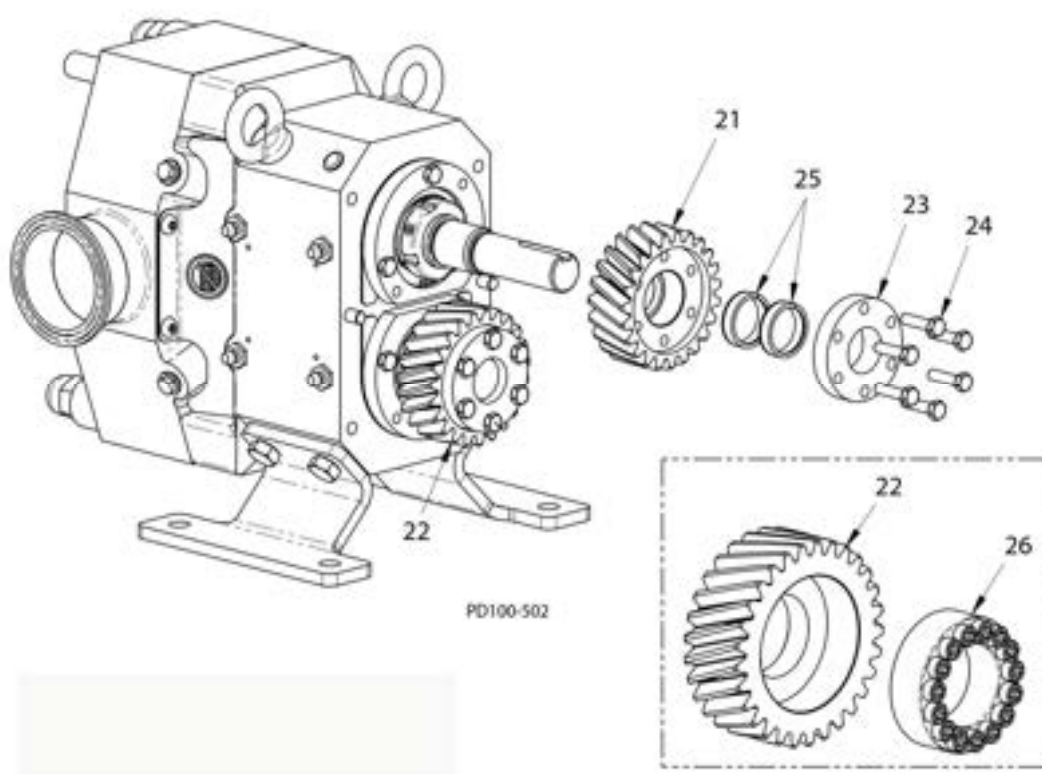


Fig. 61: Gear Mounting

1. All contact surfaces of the screws, locking elements, gears, and shafts must be clean and slightly oiled with a light lubricant. Do not use oils containing molybdenum disulfide (MoS₂).
2. Assemble the gear (Figure 61, item 22) and locking components onto the lay shaft.
 - For models 25-1 to 50-1, this refers to the locking elements (Figure 61, item 25), clamp ring (item 23), and screws (item 24).
 - For models 50-2 to 100-1, this refers to the locking assembly (Figure 61, item 26 (inset)).
3. The locking elements (Figure 61, item 25, detailed in Figure 60) consist of a slit inner ring and a slit outer ring. For proper performance, the elements must be assembled in the following order: inner ring (A), outer ring (B), inner ring (A), outer ring (B); with the slits in the rings (item C) staggered 180° apart as shown in Figure 60.
4. Tighten the screws evenly by hand.

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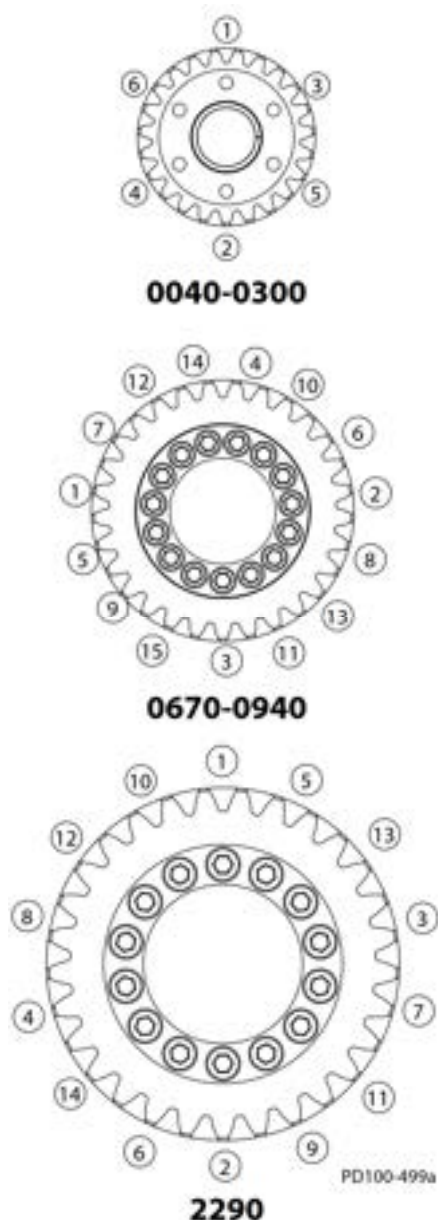


Fig. 62: Screw Tightening Patterns

Tab. 10: Screw torque

Pump model	Screw torque	
	Step 1	Final
25-1	3 Nm	6 Nm
25-2		
40-1		
40-2		
50-1		
50-2	5 Nm	10 Nm
80-1		
100-1		
100-1	13 Nm	25 Nm

Tab. 11: Rotor clearances

Pump model	Clearance A and B (mm)	
	Max.	Min.
25-1	0.30	0.18
25-2	0.33	0.21
40-1		
40-2	0.45	0.25
50-1		
50-2	0.59	0.35
80-1		
100-1	0.71	0.51

- Following a diametrically opposite sequence, tighten the screws to the value shown in Table 10 for "Step 1." Do not turn any screw more than 1/4 turn at a time, to ensure that the clamp load is applied evenly. Suggested patterns are provided in Figure 62, listed by model number.
- Following the same sequence as in Step 4, tighten the screws to the value shown in Table 10 under the heading "Final."
- Re-check each screw one-by-one to ensure that the specified torque value has been reached. The process is complete when no screw moves when torque is applied.
- Assemble the gear (Figure 61, item 21) and locking components onto the drive shaft.
- Tighten the screws evenly by hand so that the locking components begin to grip the shaft.
- Check the rotor-to-rotor clearance at the positions shown in Figure 63.

7. MAINTENANCE

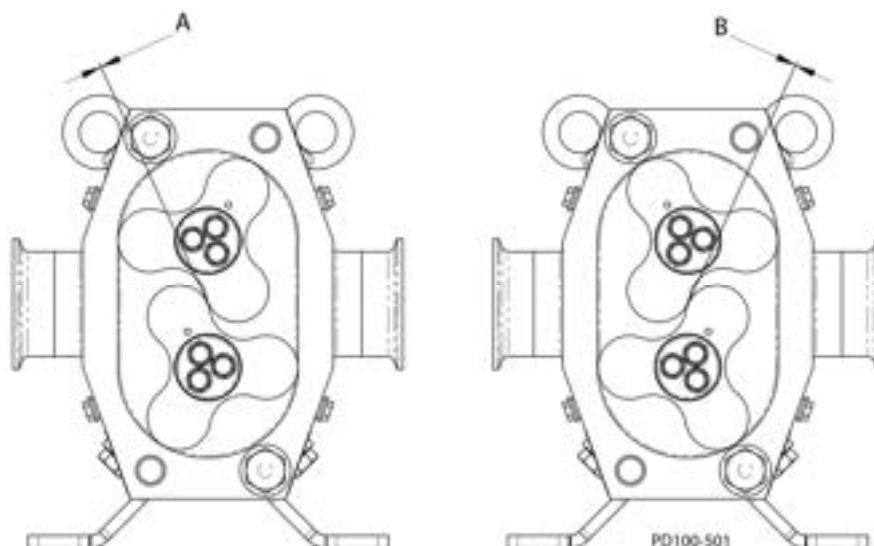


Fig. 63: Rotor Clearance

11. The "A" and "B" clearance dimensions shown in Figure 63 must be within the ranges specified in Table 11 at all positions. Adjust the gear position on the drive shaft as required.
12. Following a diametrically opposite sequence, tighten the screws to the value shown in Table 10 for "Step 1." Do not turn any screw more than a 1/4 turn at a time to ensure that the clamp load is applied evenly.
13. Following the same sequence as in step 4, tighten the screws to the value shown in Table 10 under the heading "Final."
14. Re-check each screw one-by-one to ensure that the specified torque value has been reached. The process is complete when no screw moves when torque is applied.

7.8.11. Verify rotor clearance

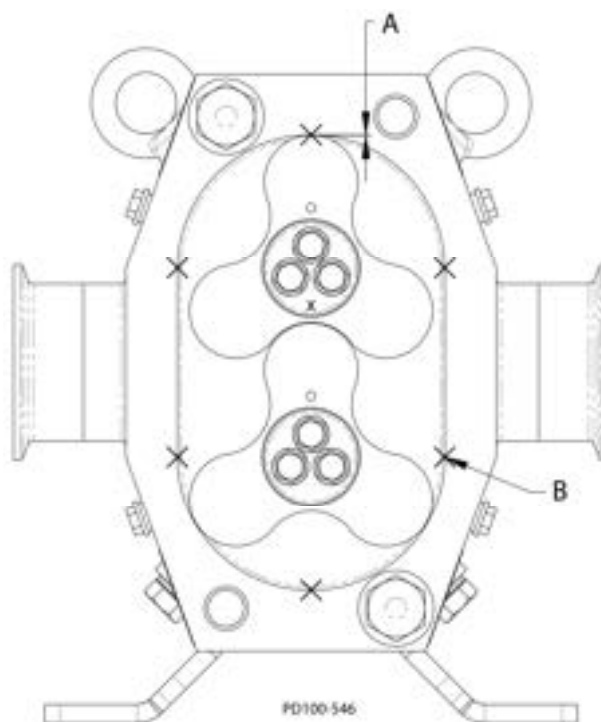


Fig. 64: Radial Clearance Check

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Tab. 12: Radial clearances

Pump model	Radial clearance (mm)	
	Max.	Min.
25-1 25-2 40-1	0.18	0.11
40-2 50-1	0.27	0.15
50-2 80-1	0.39	0.23
100-1	0.42	0.25

1. With the rotors synchronized, measure the radial clearance of each lobe (Figure 64, item A) and verify that the clearance falls within the range shown in Table 12.
2. Check clearance at all six points in the body as shown. See Figure 64, item B.

7.8.12. Gear cover installation

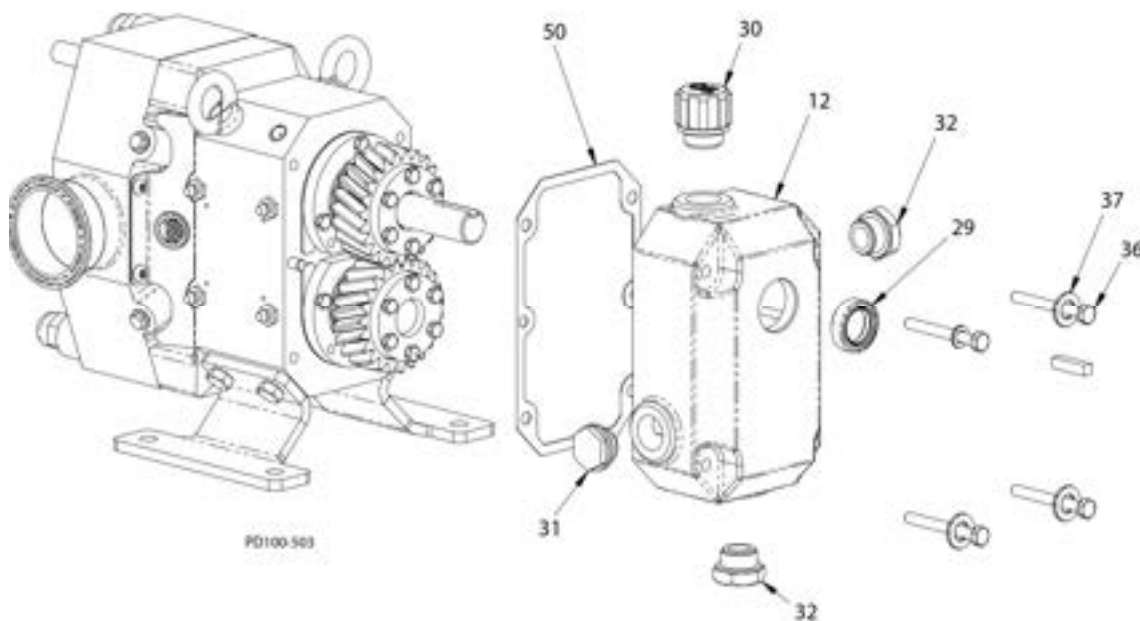


Fig. 65: Gear Cover Installation

Tab. 13: Oil volume

Pump model	Oil volume (ml)	
	Max.	Min.
25-1 25-2 40-1 40-2 50-1	100	170
50-2 80-1	325	490
100-1	625	1125

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Tab. 14: Grease volume

Pump model	Grease volume (ml)	
	Front bearing	Rear bearing
25-1 25-2 40-1 40-2 50-1	8.7	8.2
50-2 80-1	16.6	17.1
100-1	43.2	39.6

1. Press the input shaft seal (Figure 65, item 29) into the bore of the gear cover (item 12).
2. Place the gasket (item 50) over the dowel pins in the gear case.
3. Lubricate the inside diameter of the seal with bearing grease and install the gear cover. Use care to prevent damage to the lip seal when installing the cover.
4. Install the cap screws (item 36) and washers (item 37) and tighten them evenly.
5. Install the oil plugs (item 32) and level indicator plug (item 31) into the appropriate locations for the pump mounting position.
6. Fill with oil and install the breather plug (item 30). Table 13 provides oil capacity by pump size and mounting position. The oil level should reach the center of the level indicator.
7. Grease the bearings. See Table 14 for the approximate volume of grease required for the initial charge. For re-greasing a pump in service, see Table 3.

7.8.13. Cover installation

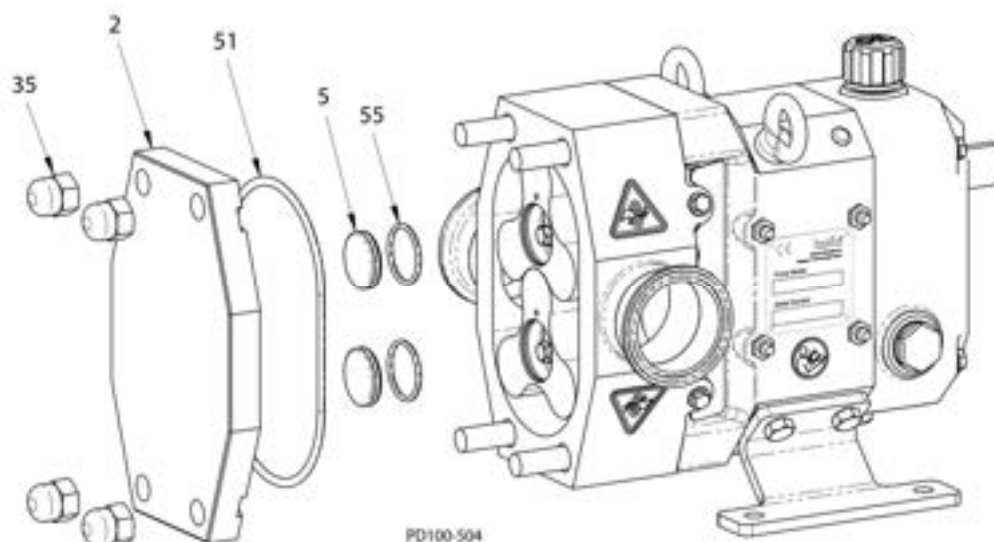


Fig. 66: Cover Installation

1. Install the screw cap O-ring (Figure 66, item 55) into the groove in the screw cap (item 5) and install it in the rotor bore. The O-ring snaps into the groove in the rotor bore.
2. Install the cover O-ring (item 51) into the groove in the cover.

7. MAINTENANCE

3. Remove the acorn nuts and spacers used to secure the pump body.
4. Install the cover (item 2) over the studs and fasten it securely with acorn nuts (item 35).
The pump should rotate freely by hand with no binding or dragging.
5. Check that all labels are in place and legible. See chapter 2.0: *"Replacement Labels"*.

Tab. 15: Nut and screw torque reference

Pump model	Rotor lug screw		Cover nut		Bearing nut lock screw		Gear locking assembly	
	Hex	Torque	Hex	Torque	Hex	Torque	Hex	Torque
25-1 25-2 40-1 40-2 50-1	9 mm	24 Nm	19 mm	71 Nm	2.5 mm	4 Nm	8 mm	6 Nm
50-2 80-1	13 mm	70 Nm	24 mm	172 Nm	3 mm	8 Nm	5 mm	10 Nm
100-1	18 mm	160 Nm	30 mm	347 Nm	3 mm	8 Nm	6 mm	25 Nm

8. TROUBLESHOOTING

8. TROUBLESHOOTING

Problem	Possible cause	Suggested action
No flow, pump rotors are not turning.	Drive motor not running.	Check resets, fuses, circuit breakers.
	Keys sheared or missing.	Replace.
	Drive belts, power transmission components slipping or broken.	Replace or adjust.
	Pump shaft, keys, or gears sheared.	Inspect: and replace parts as necessary.
No flow, pump rotors are turning.	Rotors turn in the wrong direction.	Check motor hookup to reverse motor rotation.
	Relief valve not properly adjusted, or held open by foreign material.	Adjust or clear valve.
No flow, pump not priming.	Valve closed in inlet line.	Open valve.
	Inlet line clogged or restricted.	Clear line, clean filters, etc.
	Air leaks due to bad gaskets or pipe connections.	Replace gaskets; check lines for leakage (can be done by air, by pressure or by filling with liquid and pressurizing with air).
	Pump speed too slow.	Increase pump speed.
	Liquid drains or siphons from system during off periods.	Use foot valve or check valves. Filling inlet lines with material before startup may solve startup priming problems due to no material in system.
	"Air" lock caused by fluids which "gas off", or vaporize, or allow gas to come out of solution during off periods.	Install and use a manual or automatic air bleed from pump or lines near pump.
	Extra clearance rotors, worn pump.	Increase pump speed, use foot valve to improve priming.
	Net inlet pressure available too low.	Check Net Inlet Pressure Available & Net Inlet Pressure Required. Change inlet system as needed.
	On "Vacuum" inlet system: On initial start-up, atmospheric "blow back" prevents pump from developing enough differential pressure to start flow.	Install check valve in discharge line.
Insufficient flow.	Speed too low to obtain desired flow.	Check flow-speed curve (available from customer service) and adjust as necessary.
	Air leak due to bad seals, gadgets or pipe connections.	Replace seals, check inlet fittings.

8. TROUBLESHOOTING

Noisy operation caused by mechanical problems.	Strainers, foot valves, inlet fittings or lines clogged.	Clear lines. If problem continues, inlet system may require changing.
	Inlet line size too small, inlet line too long. Too many fittings or valves. Foot valve, strainers too small.	Increase inlet line size. Reduce length, minimize direction and size changes, reduce number of fittings.
	NIPA - Net Inlet Pressure Available at Pump is too low.	Raise liquid level in source tank to increase Net Inlet Pressure (NIPA). Increase Net Inlet Pressure Available at Pump by raising or pressurizing source tank. Select larger pump size with ("starved" pump inlet) lower Net Inlet Pressure Required.
	Fluid viscosity greater than expected.	Reduce pump speed and accept lower flow or change system to reduce line losses. Increase temperature of product to reduce viscosity.
	Fluid temperature higher than expected (vapor pressure higher).	Reduce temperature, reduce speed and accept lower flow or change system to increase Net Inlet Pressure Available.
Insufficient flow. Flow being bypassed somewhere.	Flow diverted in branch line, open valve, etc.	Check system and controls.
	Relief valve not adjusted or jammed.	Clear or adjust valve.
Insufficient flow. High slip.	Hot (HC) or extra clearance rotors on "cold" fluid, and/or low viscosity fluid.	Replace with standard clearance rotors.
	Worn pump.	Increase pump speed (within limits). Replace rotors, have pump remanufactured.
	High pressure.	Reduce pressure by adjusting system settings or hardware.
Noisy operation caused by fluid.	Cavitation due to high fluid viscosity. High vapor pressure fluid. High temperature.	Slow down pump, reduce temperature, change system setup.
	Cavitation due to Net Inlet Pressure Available less than Net Inlet Pressure Required.	Increase NIPA - Net Inlet Pressure Required or reduce NIPR - Net Inlet Pressure Required. Contact customer service if necessary.
	Air or gas in fluid caused by leaks in the piping.	Check system and fix any leaks.
	Air or gas in fluid caused by dissolved gas or naturally aerated products.	Minimize discharge pressure (also see Cavitation).
Noisy operation caused by mechanical problems.	Rotor to body contact due to improper assembly of pump.	Check clearances and adjust shimming.
	Rotor to body contact caused by distortion of pump due to improper piping installation.	Change piping installation to eliminate piping stress and distortion on body.
	Pressures required higher than the pump is rated for.	Reduce discharge pressure required.

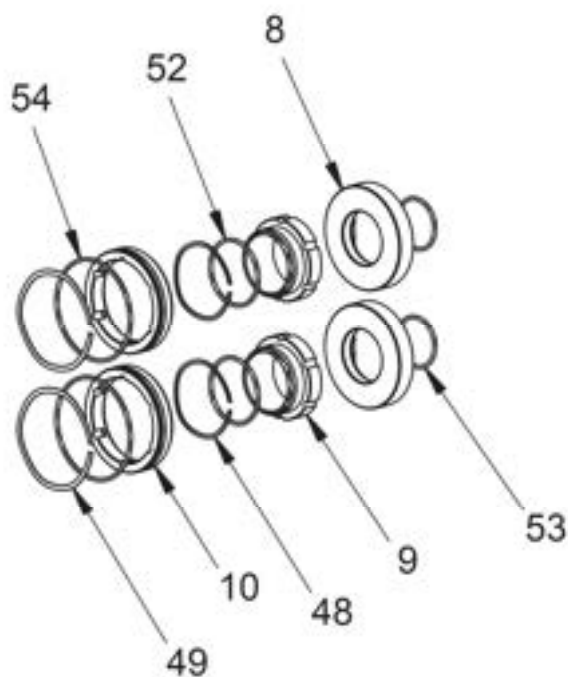
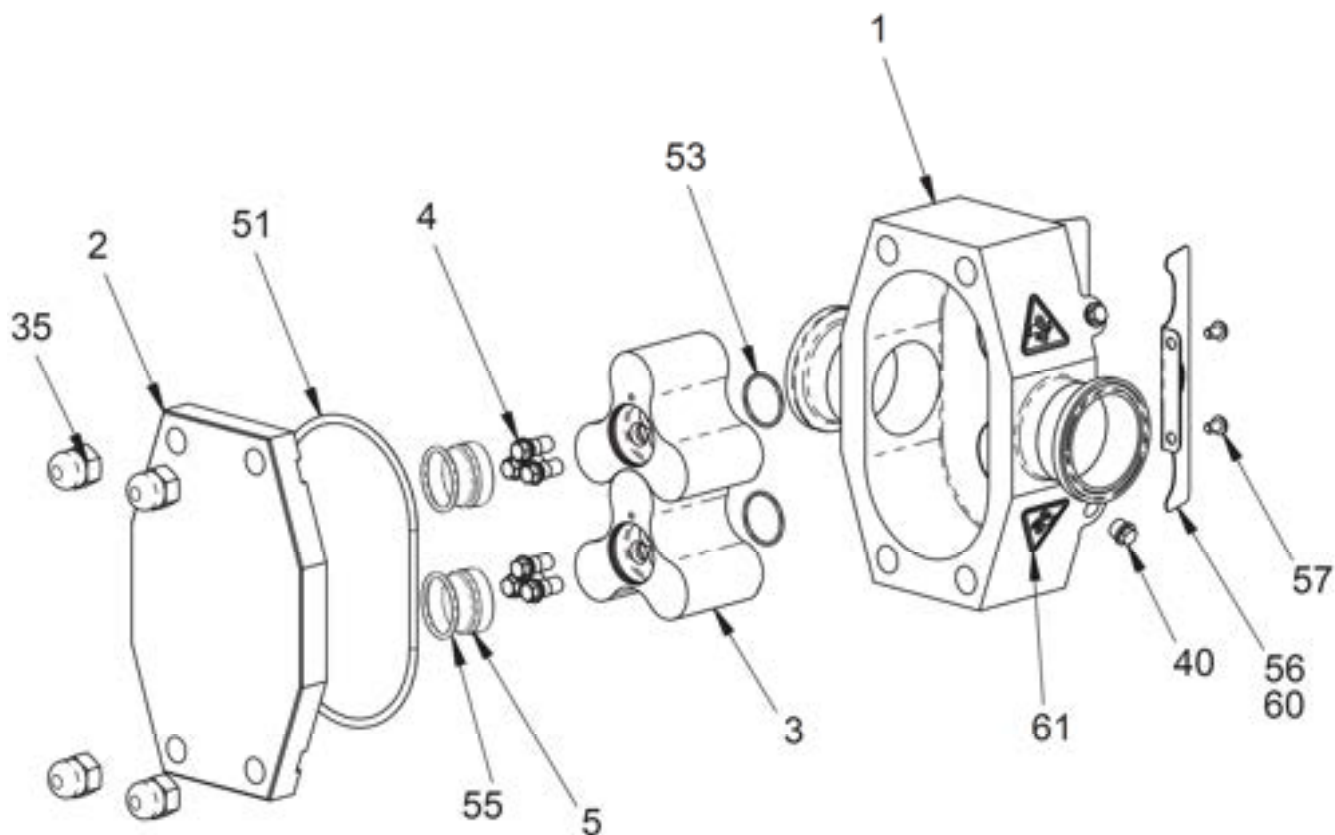
8. TROUBLESHOOTING

	Rotor to body contact caused by worn bearings.	Rebuild with new bearings and lubricate regularly.
	Rotor to Rotor Contact caused by loose or not correctly timed gears.	This has caused severe damage to components - rebuild with new parts.
	Rotor to Rotor Contact caused by sheared keys.	This has caused severe damage to components - rebuild with new parts.
	Rotor to Rotor Contact caused by worn gear splines.	This has caused severe damage to components - rebuild with new parts.
	Drive noise caused by gear trains, chains, couplings, bearings.	Repair or replace drive parts. Check bearings for damage and replace as necessary.
Pump requires excessive power (overheats, stalls, high current draw, breakers trip).	Higher than expected viscosity losses.	If within pump rating, increase drive size.
	Higher than expected pressures.	Reduce pump speed. Increase line sizes.
	Fluid is colder with a higher viscosity than expected.	Heat fluid, insulate lines or heat trace lines. Increase line sizes.
	Fluid sets in line and pump during shutdown.	Insulate lines or heat trace lines. Install a "soft start" drive. Install a recirculating bypass system. Flush system with a non-setting fluid.
	Fluid builds up on pump surfaces.	Replace the pump with more running clearances.
Short pump service life.	Pumping abrasives.	Larger pumps at slower speeds.
	Speeds and pressures higher than rated.	Reduce speeds and pressures by making changes in the system. Replace pump with a large model with higher pressure ratings.
	Worn bearings and gears due to lack of lubrication.	Check and replace bearing and gears as necessary. Adjust lubrication schedule to decrease time between lubrication.
	Misalignment of drive and piping (Excessive over hung load or misaligned couplings).	Check alignment of piping and drive. Adjust as necessary.

9. PARTS LISTS

9. PARTS LISTS

9.1. Model 25-1 to 50-1 Pump Parts (-A- exploded view)



PD100-505

9. PARTS LISTS

9.2. Model 25-1 to 50-1 Pump Parts (-A- BOM Items)

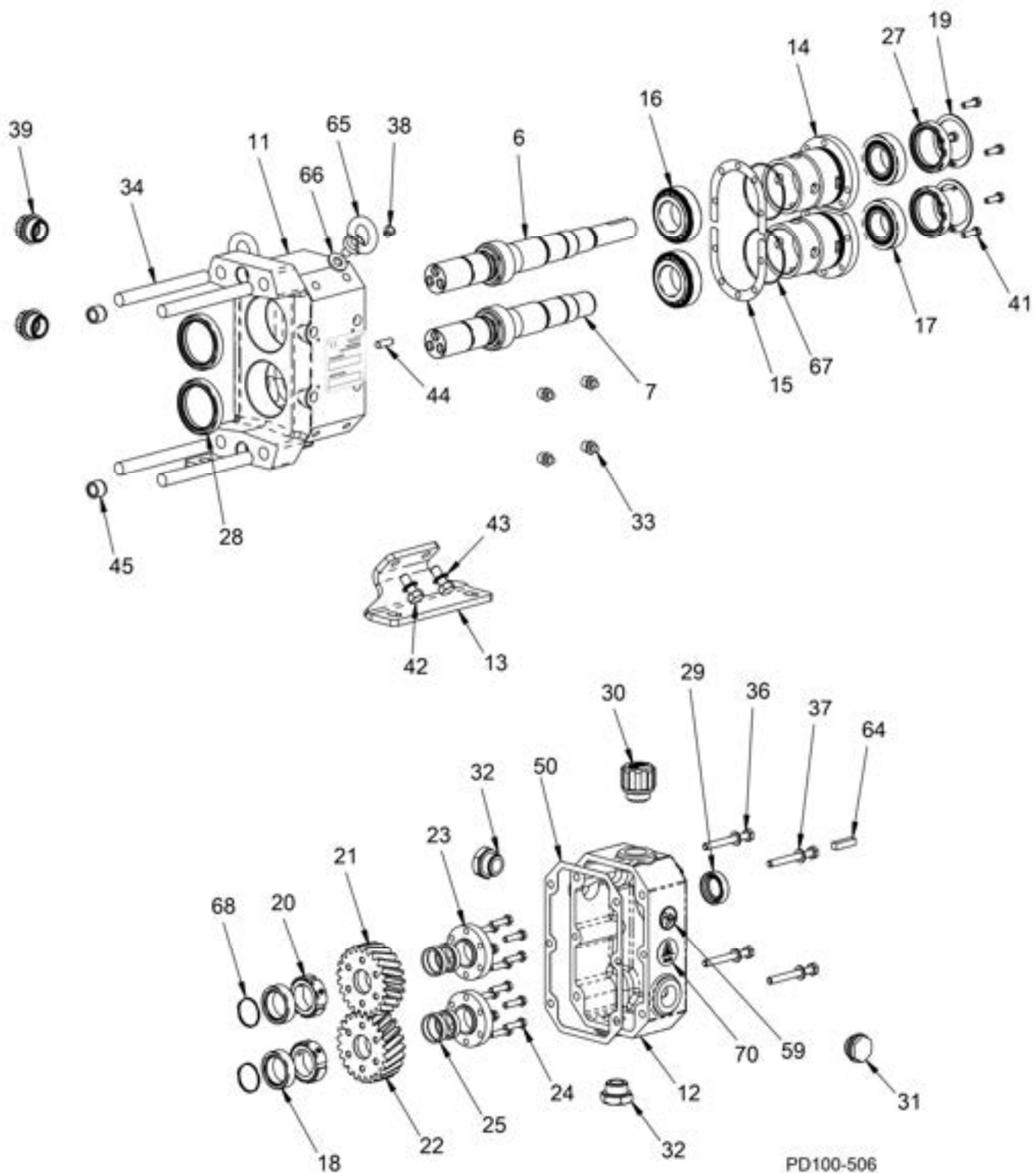
Item	Description	Qty	Part number by model					Notes
			25-1	25-2	40-1	50-1	50-2	
1	Finished body assembly - ISO 2852	1	HAP127255	HAP127256	HAP127257	HAP127258	HAP127259	
	Finished body assembly - DIN 11851		HAP127264	HAP127265	HAP127266	HAP127267	HAP127268	
	Body assembly - DIN 2633		HAP127933	HAP127934	HAP127935	HAP127936	HAP127937	
	Finished body assembly - SMS 1145		HAP138030	HAP138031	HAP138032	HAP138033	HAP138034	
2	Cover	1	HAP127172	HAP127173	HAP127173	HAP127174	HAP127174	
3	Rotor	2	HAP127407	HAP127408	HAP127409	HAP127410	HAP127411	
4	Rotor lug screw	6	HAP127416	HAP127416	HAP127416	HAP127416	HAP127416	
5	Cover-rotor screw	2	HAP127944	HAP127944	HAP127944	HAP127944	HAP127944	
8	Seal seat - stainless steel	2	HAP127207	HAP127207	HAP127207	HAP127207	HAP127207	
	Seal seat - silicon carbide	2	HAP127210	HAP127210	HAP127210	HAP127210	HAP127210	
9	Inner seal - carbon	2	HAP127610	HAP127610	HAP127610	HAP127610	HAP127610	
	Inner seal - silicon carbide	2	HAP127216	HAP127216	HAP127216	HAP127216	HAP127216	
10	Outer seal - carbon	2	HAP127613	HAP127613	HAP127613	HAP127613	HAP127613	
35	Acorn nut	4	HAP127285	HAP127285	HAP127285	HAP127285	HAP127285	
40	Plug 1/8 BSP poly (flush ports)	4	HAP127484	HAP127484	HAP127484	HAP127484	HAP127484	
48	Wave spring - inner seal	2	HAP127222	HAP127222	HAP127222	HAP127222	HAP127222	
49	Wave spring - outer seal	2	HAP127225	HAP127225	HAP127225	HAP127225	HAP127225	
51	O-ring - cover FKM	1	HAP127432	HAP127434	HAP127434	HAP127436	HAP127436	1
	O-ring - cover EPDM	1	HAP127433	HAP127435	HAP127435	HAP127437	HAP127437	1
52	O-ring - inner seal FKM	2	HAP127454	HAP127454	HAP127454	HAP127454	HAP127454	1
	O-ring - inner seal EPDM	2	HAP127455	HAP127455	HAP127455	HAP127455	HAP127455	1
53	O-ring - seal seat/rotor hub FKM	4	HAP127448	HAP127448	HAP127448	HAP127448	HAP127448	1
	O-ring - seal seat/rotor hub EPDM	4	HAP127449	HAP127449	HAP127449	HAP127449	HAP127449	1
54	O-ring - outer seal FKM	2	HAP127456	HAP127456	HAP127456	HAP127456	HAP127456	1
	O-ring - outer seal EPDM	2	HAP127457	HAP127457	HAP127457	HAP127457	HAP127457	1
55	O-ring - rotor screw cover FKM	2	HAP127442	HAP127442	HAP127442	HAP127442	HAP127442	1
	O-ring - rotor screw cover EPDM	2	HAP127443	HAP127443	HAP127443	HAP127443	HAP127443	1
56	Guard - shaft seal	2	HAP127381	HAP127381	HAP127381	HAP127381	HAP127381	
57	BHCS-M5X8 18-8 SS	4	HAP127384	HAP127384	HAP127384	HAP127384	HAP127384	
60	Label - ISO Guard	2	HAP127388	HAP127388	HAP127388	HAP127388	HAP127388	
61	Label - ISO entanglement hazard	4	HAP127387	HAP127387	HAP127387	HAP127387	HAP127387	

Notes:

1. FKM is standard; EPDM is optional.

9. PARTS LISTS

9.3. Model 25-1 to 50-1 Pump Parts (-B- exploded view)



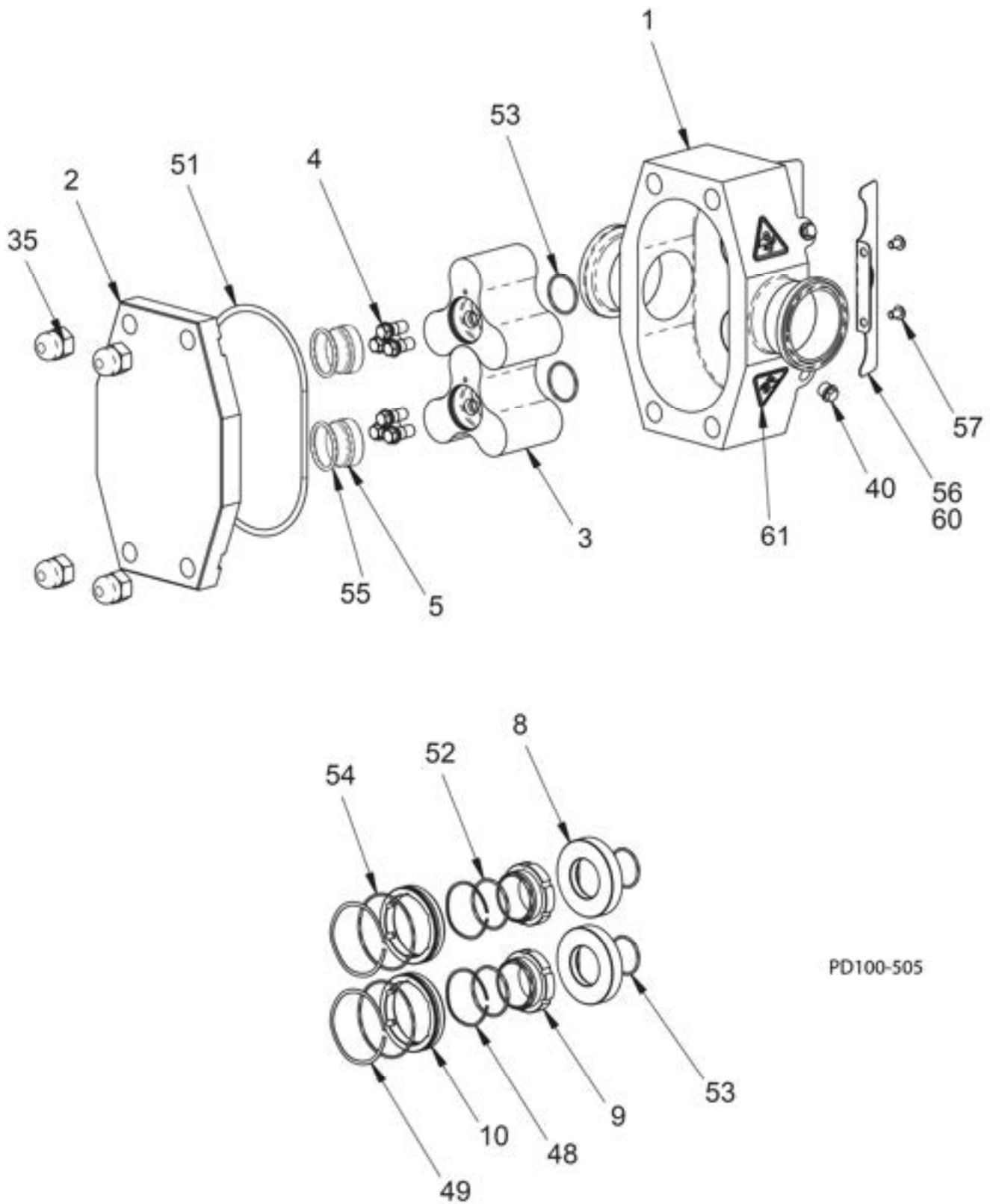
9. PARTS LISTS

9.4. Model 25-1 to 50-1 Pump Parts (-B- BOM Items)

Item	Description	Qty	Part number by model					Notes
			25-1	25-2	40-1	50-1	50-2	
6	Drive shaft	1	HAP127389	HAP127391	HAP127393	HAP127395	HAP127397	
7	Lay shaft	1	HAP127390	HAP127392	HAP127394	HAP127396	HAP127398	
11	Bearing housing (gearcase)	1	HAP127160	HAP127160	HAP127160	HAP127160	HAP127160	
12	Gear cover	1	HAP127166	HAP127166	HAP127166	HAP127166	HAP127166	
13	Mounting foot	2	HAP127201	HAP127201	HAP127201	HAP127201	HAP127201	
14	Bearing case	2	HAP127180	HAP127180	HAP127180	HAP127180	HAP127180	
15	Shim-axial positioning - 0.025	A/R	HAP127504	HAP127504	HAP127504	HAP127504	HAP127504	
	Shim-axial positioning - 0.05		HAP127426	HAP127426	HAP127426	HAP127426	HAP127426	
	Shim-axial positioning - 0.10		HAP127427	HAP127427	HAP127427	HAP127427	HAP127427	
	Shim-axial positioning - 1.0		HAP127505	HAP127505	HAP127505	HAP127505	HAP127505	
16	Front bearing	2	HAP127288	HAP127288	HAP127288	HAP127288	HAP127288	
17	Rear bearing	2	HAP127291	HAP127291	HAP127291	HAP127291	HAP127291	
18	Seal sleeve	2	HAP127198	HAP127198	HAP127198	HAP127198	HAP127198	
19	Retaining ring - rear bearing seal	2	HAP127319	HAP127319	HAP127319	HAP127319	HAP127319	
20	Bearing lock nut	2	HAP127586	HAP127586	HAP127586	HAP127586	HAP127586	
21	Helical gear RH	1	HAP127137	HAP127137	HAP127137	HAP127137	HAP127137	
22	Helical gear LH	1	HAP127138	HAP127138	HAP127138	HAP127138	HAP127138	
23	Clamp ring - gear	2	HAP127526	HAP127526	HAP127526	HAP127526	HAP127526	
24	HHCS - clamp plate	12	HAP127528	HAP127528	HAP127528	HAP127528	HAP127528	
25	Locking element	4	HAP127527	HAP127527	HAP127527	HAP127527	HAP127527	
27	Seal - rear bearing	2	HAP127306	HAP127306	HAP127306	HAP127306	HAP127306	
28	Seal - front bearing	2	HAP127303	HAP127303	HAP127303	HAP127303	HAP127303	
29	Seal - input shaft	1	HAP127309	HAP127309	HAP127309	HAP127309	HAP127309	
30	Breather plug	1	HAP127314	HAP127314	HAP127314	HAP127314	HAP127314	
31	Level indicator plug	1	HAP127315	HAP127315	HAP127315	HAP127315	HAP127315	
32	Oil plug	2	HAP127313	HAP127313	HAP127313	HAP127313	HAP127313	
33	Grease fitting - G/18 BSPT	4	HAP127312	HAP127312	HAP127312	HAP127312	HAP127312	
34	Cover stud	4	HAP127183	HAP127184	HAP127185	HAP127185	HAP127186	
36	HHCS - gear cover	4	HAP127475	HAP127475	HAP127475	HAP127475	HAP127475	
37	Washer - gear cover	4	HAP127480	HAP127480	HAP127480	HAP127480	HAP127480	
38	Plug - tapped hole	4	HAP127379	HAP127379	HAP127379	HAP127379	HAP127379	
39	Plastic plug - grease cleanout	2	HAP127483	HAP127483	HAP127483	HAP127483	HAP127483	
41	HHCS - bearing case	6	HAP127472	HAP127472	HAP127472	HAP127472	HAP127472	
42	HHCS - mounting foot	4	HAP127478	HAP127478	HAP127478	HAP127478	HAP127478	
44	Dowel pin - M6x18	2	HAP127377	HAP127377	HAP127377	HAP127377	HAP127377	
45	Dowel bushing - G-series	2	HAP127376	HAP127376	HAP127376	HAP127376	HAP127376	
46	Dowel pin - M10x20 (not shown)	2	HAP127378	HAP127378	HAP127378	HAP127378	HAP127378	
47	Dowel pin - (seal stop pin) (not shown)	6	HAP127282	HAP127282	HAP127282	HAP127282	HAP127282	
50	Gear cover gasket	1	HAP127204	HAP127204	HAP127204	HAP127204	HAP127204	
59	Label - ISO read manual	1	HAP127385	HAP127385	HAP127385	HAP127385	HAP127385	
64	Key - input shaft	1	HAP127316	HAP127316	HAP127316	HAP127316	HAP127316	
65	Eyebolt	2	HAP127487	HAP127487	HAP127487	HAP127487	HAP127487	
66	Eyebolt washer - rubber	2	HAP127510	HAP127510	HAP127510	HAP127510	HAP127510	
67	O-ring - bearing case Buna N	2	HAP127580	HAP127580	HAP127580	HAP127580	HAP127580	
68	O-ring - seal sleeve Buna N	2	HAP127583	HAP127583	HAP127583	HAP127583	HAP127583	
70	Label - 3-A	1	125096+	125096+	125096+	125096+	125096+	

9. PARTS LISTS

9.5. Model 50-2 to 100-1 Pump Parts (-A- exploded view)



9. PARTS LISTS

9.6. Model 50-2 to 100-1 Pump Parts (-A- BOM Items)

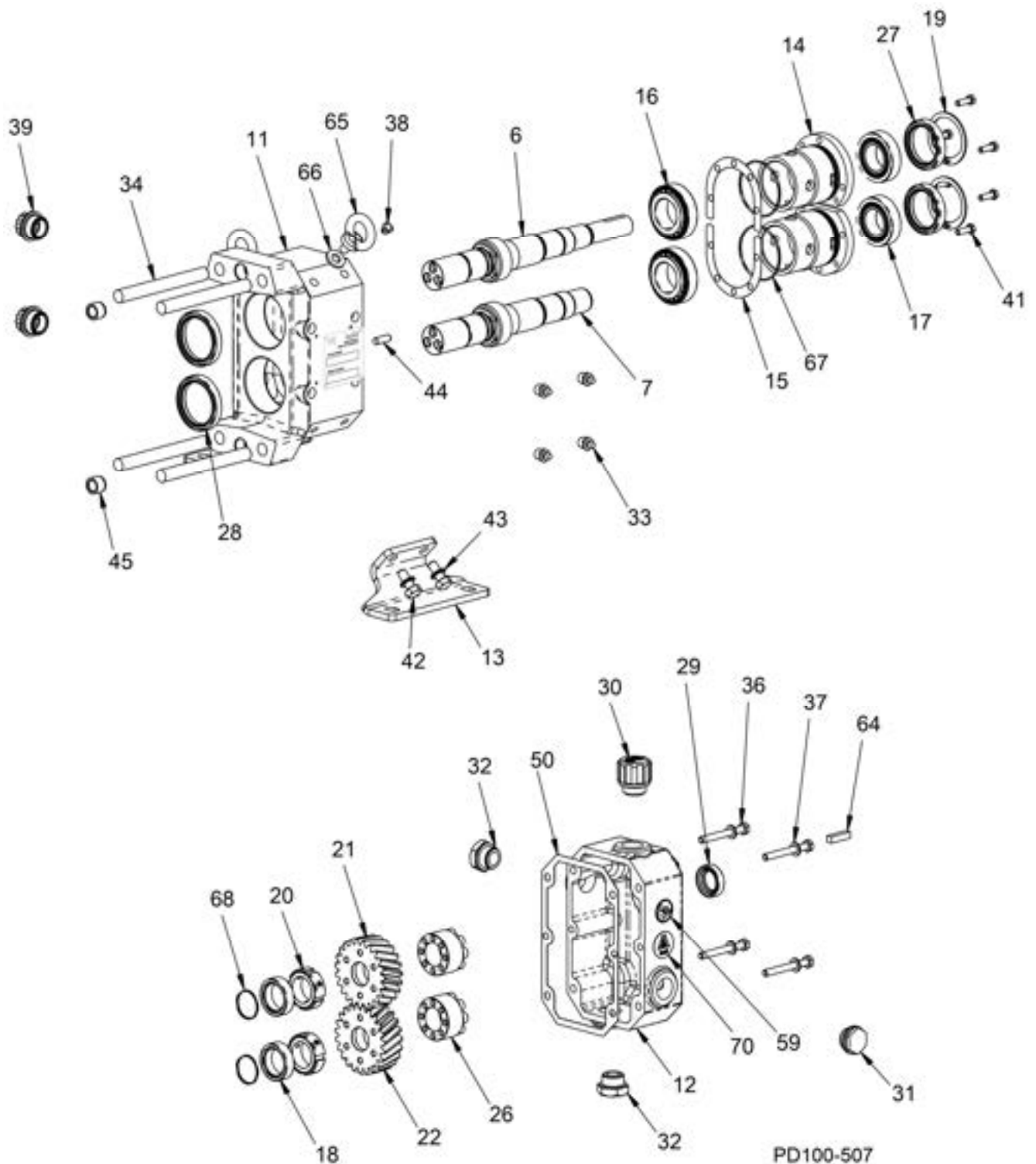
Item	Description	Qty	Part number by model			Notes
			50-2	80-1	100-1	
1	Finished body assembly - ISO 2852	1	HAP127260	HAP127261	HAP127262	
	Finished body assembly - DIN 11851		HAP127269	HAP127270	HAP127271	
	Finished body assembly - DIN 2633		HAP127938	HAP127939	HAP127940	
	Finished body assembly - SMS 1145		HAP138035	HAP138036	HAP138037	
2	Cover	1	HAP127175	HAP127175	HAP127176	
3	Rotor	2	HAP127412	HAP127413	HAP127414	
4	Rotor lug screw	6	HAP127417	HAP127417	HAP127418	
5	Cover-rotor screw	2	HAP127945	HAP127945	HAP127946	
8	Seal seat - stainless steel	2	HAP127208	HAP127208	HAP127209	
	Seal seat - silicon carbide	2	HAP127211	HAP127211	HAP127212	
9	Inner seal - carbon	2	HAP127611	HAP127611	HAP127612	
	Inner seal - silicon carbide	2	HAP127217	HAP127217	HAP127218	
10	Outer seal - carbon	2	HAP127614	HAP127614	HAP127615	
35	Acorn nut	4	HAP127286	HAP127286	HAP127287	
40	Plug 1/8 BSP poly (flush ports)	4	HAP127484	HAP127484	HAP127484	
48	Wave spring – inner seal	2	HAP127223	HAP127223	HAP127224	
49	Wave spring – outer seal	2	HAP127226	HAP127226	HAP127227	
51	O-ring - cover FKM	1	HAP127438	HAP127438	HAP127440	1
	O-ring - cover EPDM	1	HAP127439	HAP127439	HAP127441	1
52	O-ring - inner seal FKM	2	HAP127460	HAP127460	HAP127458	1
	O-ring - inner seal EPDM	2	HAP127461	HAP127461	HAP127459	1
53	O-ring - seal seat/rotor hub FKM	4	HAP127450	HAP127450	HAP127452	1
	O-ring - seal seat/rotor hub EPDM	4	HAP127451	HAP127451	HAP127453	1
54	O-ring - outer seal FKM	2	HAP127462	HAP127462	HAP127464	1
	O-ring - outer seal EPDM	2	HAP127463	HAP127463	HAP127465	1
55	O-ring - rotor screw cover FKM	2	HAP127450	HAP127450	HAP127446	1
	O-ring - rotor screw cover EPDM	2	HAP127451	HAP127451	HAP127447	1
56	Guard - shaft seal	2	HAP127382	HAP127382	HAP127383	
57	BHCS-M5X8 18-8 SS	4	HAP127384	HAP127384	HAP127384	
60	Label - ISO Guard	2	HAP127388	HAP127388	HAP127388	
61	Label - ISO entanglement hazard	4	HAP127387	HAP127387	HAP127387	

Notes:

1. FKM is standard; EPDM is optional.

9. PARTS LISTS

9.7. Model 50-2 to 100-1 Pump Parts (-B- exploded view)



9. PARTS LISTS

9.8. Model 50-2 to 100-1 Pump Parts (-B- BOM Items)

Item	Description	Qty	Part number by model			Notes
			50-2	80-1	100-1	
6	Drive shaft	1	HAP127399	HAP127401	HAP127403	
7	Lay shaft	1	HAP127400	HAP127402	HAP127404	
11	Bearing housing (gearcase)	1	HAP127161	HAP127161	HAP127162	
12	Gear cover	1	HAP127167	HAP127167	HAP127168	
13	Mounting foot	2	HAP127202	HAP127202	HAP127203	
14	Bearing case	2	HAP127181	HAP127181	HAP127182	
15	Shim-axial positioning - 0.025	A/R	HAP127506	HAP127506	HAP127508	
	Shim-axial positioning - 0.05		HAP127428	HAP127428	HAP127430	
	Shim-axial positioning - 0.10		HAP127429	HAP127429	HAP127431	
	Shim-axial positioning - 1.0		HAP127507	HAP127507	HAP127509	
16	Front bearing	2	HAP127289	HAP127289	HAP127290	
17	Rear bearing	2	HAP127292	HAP127292	HAP127293	
18	Seal sleeve	2	HAP127199	HAP127199	HAP127200	
19	Retaining ring - rear bearing seal	2	HAP127320	HAP127320	HAP127321	
20	Bearing lock nut	2	HAP127587	HAP127587	HAP127588	
21	Helical gear RH	1	HAP127139	HAP127139	HAP127141	
22	Helical gear LH	1	HAP127140	HAP127140	HAP127142	
26	Locking assembly	2	HAP127529	HAP127529	HAP127530	
27	Seal - rear bearing	2	HAP127947	HAP127947	HAP127305	
28	Seal - front bearing	2	HAP127304	HAP127304	HAP127305	
29	Seal - input shaft	1	HAP127310	HAP127310	HAP127307	
30	Breather plug	1	HAP127314	HAP127314	HAP127314	
31	Level indicator plug	1	HAP127315	HAP127315	HAP127315	
32	Oil plug	2	HAP127313	HAP127313	HAP127313	
33	Grease fitting - G/18 BSPT	4	HAP127312	HAP127312	HAP127312	
34	Cover stud	4	HAP127187	HAP127188	HAP127189	
36	HHCS - gear cover	4	HAP127476	HAP127476	HAP127477	
37	Washer - gear cover	4	HAP127481	HAP127481	HAP127482	
38	Plug - tapped hole	4	HAP127380	HAP127380	HAP127380	
39	Plastic plug - grease cleanout	2	HAP127483	HAP127483	HAP127483	
41	HHCS - bearing case	6	HAP127473	HAP127473	HAP127474	
42	HHCS - mounting foot	4	HAP127479	HAP127479	HAP127479	
44	Dowel pin - M6x18	2	HAP127377	HAP127377	HAP127377	
45	Dowel bushing - G-series	2	HAP127376	HAP127376	HAP127376	
46	Dowel pin - M10x20 (not shown)	2	HAP127378	HAP127378	HAP127378	
47	Dowel pin - (seal stop pin) (not shown)	6	HAP127283	HAP127283	HAP127284	
50	Gear cover gasket	1	HAP127205	HAP127205	HAP127206	
59	Label - ISO read manual	1	HAP127386	HAP127386	HAP127386	
64	Key - input shaft	1	HAP127317	HAP127317	HAP127318	
65	Eyebolt	2	HAP127488	HAP127488	HAP127488	
66	Eyebolt washer - rubber	2	HAP127511	HAP127511	HAP127511	
67	O-ring - bearing case Buna N	2	HAP127581	HAP127581	HAP127582	
68	O-ring - seal sleeve Buna N	2	HAP127584	HAP127584	HAP127585	
70	Label - 3-A	1	125096+	125096+	125096+	

9. PARTS LISTS

9.9. Maintenance kits



MAINTENANCE KIT INDEX						
Model	O-ring		Product seal	Double seal	Rotor replacement	
	FKM	EPDM	SiC vs. SiC			
25-1	HAP1462	HAP1478	HAP1485	HAP1454	HAP2048	
25-2	HAP1452	HAP1481			HAP3841	
40-1		HAP2047				
40-2	HAP1453	HAP1482			HAP2046	
50-1					HAP1873	
50-2	HAP1463	HAP1483	HAP1486	HAP1465	HAP1909	
80-1					HAP1972	
100-1	HAP1464	HAP1484	HAP1487	HAP1466	HAP3842	

Tab. 16: Recommended maintenance schedule

Item	Maintenance interval
Replace Gear Oil	Every 1000 hours. See chapter. 8.2.2.: "Gear Oil".
Grease Bearings	Every 250 hours. See chapter 7.2.3.: "Bearing Lubrication".
Replace O-Rings	Every time O-rings are removed.

NOTE:

1. An O-ring kit and a product seal kit shall be used in conjunction with a relevant double seal kit to assemble a complete double mechanical seal.
2. For seals and rotors, component life varies widely between different applications. Inspect for wear and replace as needed. See chapter 7.4.: "Maintenance Inspection Chart".

10. WARRANTY

10. WARRANTY

10.1. Warranty form

Company:					
Telephone:				Fax:	
Address:					
Country:		Contact Name:			
E-mail:					
Delivery Date:		Date of pump installation:			
Pump type:					
Serial No (see name plate or stamped on pump housing):					
Description of the fault:					
The installation:					
Liquid:					
Temperature [°C]:		Viscosity [cPs]:		Spec grav. [kg/m ³):	pH-value:
Content of particles:		% , of max size [mm]:			
Flow [l/min]:		Duty [h/day]:		No of starts per day:	
Discharge head [bar]:		Suction head / lift [m]:			
Air pressure [bar]:		Quality of the air (filter, micron, lubrication):			
Other:					
Place for sketch of installation:					

10. WARRANTY

10.2. Returning parts

When returning parts to Tapflo please follow this procedure:

- Consult Tapflo for shipping instructions.
- Cleanse or neutralize and rinse the part/pump. Make sure the part/pump is completely empty from liquid.
- Pack the return articles carefully to prevent any damage during transportation.

Goods will not be accepted unless the above procedure has been complied with.

10.3. Warranty

Tapflo warrants products under conditions as stated below for a period of not more than 5 years from installation and not more than 6 years from date of manufacturing.

1. The following terms and conditions apply to the sale of machinery, components and related services and products, of Tapflo (hereinafter "the products").
2. Tapflo (the manufacturer) warrants that:
 - a. its products are free of defects in material, design and workmanship at the time of original purchase;
 - b. its products will function in accordance with Tapflo operative manuals; Tapflo does not guarantee that the product will meet the precise needs of the Customer, except for those purposes set out in any invitation to render documents or other documents specifically made available to Tapflo before entering into this agreement;
 - c. high quality materials are used in the construction of the pumps and that machining and assembly are carried out to the highest standards.

Except as expressly stated above, Tapflo makes no warranties, express or implied, concerning the products, including all warranties of fitness for a particular purpose.

3. This warranty shall not be applicable in circumstances other than defects in material, design, and workmanship. In particular warranty shall not cover the following:
 - a. Periodic checks, maintenance, repair and replacement of parts due to normal wear and tear (seals, O-rings, rubber items, diaphragms, air valves etc.);
 - b. Damage to the product resulting from:
 - b.1. Tampering with, abuse or misuse, including but not limited to failure to use the product for its normal purposes as stated at the time of purchase or in accordance with Tapflo instructions for use and maintenance of the product, or the installation or improper ventilation or use of the product in a manner inconsistent with the technical or safety standard in force;
 - b.2. Repairs performed by non-skilled personnel or use of non-original Tapflo parts;
 - b.3. Accidents or any cause beyond the control of Tapflo, including but not limited to lightning, water, fire, earthquake, and public disturbances, etc.;

10. WARRANTY

4. The warrantee shall cover the replacement or repairing of any parts, which is documented faulty due to construction or assembling, with new or repaired parts free of charges delivered by Tapflo. Parts subjected to normal tear and wear shall not be covered by the warranty. Tapflo shall decide as to whether the defective or faulty part shall be replaced or repaired.
5. The warrantee of the products shall be valid for a period in accordance to the current law from the date of delivery, under the condition that notice of the alleged defect to the products or parts thereof be given to Tapflo in written within the mandatory term of 8 days from the discovery. Repair or replacement under the terms of this warranty shall not give a right to an extension to, or a new commencement of, the period of warranty.
6. Repair or replacement under the terms of this warranty shall not give a right to an extension to, or a new commencement of, the period of warranty. Repair or replacement under the terms of this warranty may be fulfilled with functionally equivalent reconditioned units. Tapflo qualified personnel shall be solely entitled to carry out repair or replacement of faulty parts after careful examination of the pump. Replaced faulty parts or components will become the property of Tapflo.
7. The products are built in accordance with standard CE normative and are tested (where applicable) by Tapflo. Approval and tests by other control authority are for the customer's account. The products shall not be considered defective in materials, design or workmanship if they need to be adapted, changed or adjusted to conform to national or local technical or safety standards in force in any country other than that for which the unit was originally designed and manufactured. This warranty shall not reimburse such adaptations, changes or adjustments, or attempt to do so, whether properly performed or not, nor any damage resulting from them, nor any adaptation, change or adjustments to upgrade the products from their normal purpose as described in the products operative manual without the prior written consent of Tapflo.
8. Installation, including electric and other connections to utility mains according to Tapflo drawings, is for the cost and responsibility of the customer, unless otherwise agreed in writing.
9. Tapflo will not be liable on any claim, whether in contract, tort, or otherwise, for any indirect, special, incidental, or consequential damages, caused to the customer or to third parties, including loss of profits, arising by any possible infringement of par. 3 above or by the customer or third parties being in the impossibility of using the products.

Steady the above, Tapflo liability to the customer or third parties from any claim, whether in contract, tort, or otherwise, shall be limited to the total amount paid by the customer for the product that caused the damages.

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