



English

Installation, Operation and Maintenance Instructions

Luna LE Lobe Pump

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EC Declaration

as defined by Machinery Directive 98/37/EC, and subsequent revisions.

EC Declaration of Incorporation

This declaration is only valid when the machinery has been supplied without drive unit.

In this case, the machinery meets the requirements of the said directive and is intended for incorporation into other machinery or for assembly with other machinery in order to constitute relevant machinery as defined by the said directive including any amendments, which are valid at the time of supply.

IMPORTANT

This machinery must not be put into service until the relevant machinery into which it is to be incorporated has been declared in conformity to the said directive.

This declaration is only valid when the machinery has been installed, operated and maintained in accordance with these instructions and safety guidelines contained within as well as instructions supplied for equipment assembled with or intended for use with this equipment.

The following harmonised standards are applicable:

BS EN 809

BS EN ISO 12100 Parts 1 & 2

EC Declaration of Conformity

This declaration is only valid when the machinery has been supplied with drive unit.

In this case the machinery meets the requirements of the said directive including any amendments which are valid at the time of supply.

IMPORTANT

This declaration is only valid when the machinery has been installed, operated and maintained in accordance with these instructions and safety guidelines contained within as well as instructions supplied for equipment assembled with or intended for use with this equipment.



Mr G.D. Thomas, Chief Engineer

Installation, Operation & Maintenance Instructions

INSTALLATION

1.1 INSTALLATION AND SAFETY RECOMMENDATIONS

In common with other items of process plant a pump must be installed correctly to ensure satisfactory and safe operation. The pump must also be maintained to a suitable standard. Following these recommendations will ensure that the safety of personnel and satisfactory operation of the pump is achieved.

1.2.1. GENERAL

When handling harmful or objectionable materials, adequate ventilation must be provided in order to disperse dangerous concentrations of vapours. It is recommended that wherever possible, Mono pumps should be installed with provision for adequate lighting, thus ensuring that effective maintenance can be carried out in satisfactory conditions. With certain product materials, a hosing down facility with adequate draining will simplify maintenance and prolong the life of pump components.

1.2.2. SYSTEM DESIGN & INSTALLATION

At the system design stage, consideration must be given to provision of filler plugs, and the installation of non-return and/or isolating valves. Pumps cannot be reliably used as non-return valves. Pumps in parallel and those with high static discharge head must be fitted with non-return valves.

The pumps must also be protected by suitable devices against over pressure and dry running.

1.3.1 HANDLING



During installation and maintenance, attention must be paid to the safe handling of all items. Where a pump or its components weigh in excess of 20 kg (45lb) it is recommended that suitable lifting tackle should be used to ensure that personal injury or damage to components does not occur.

For safe handling of both bareshaft pumps and pump units (pump/ gearbox/motor etc.) slings should be used. The position of the slings will depend upon the specific pump/unit construction and should be carried out by personnel with the relevant experience to ensure that the pump is not damaged and injury to personnel does not occur.

If eyebolts do exist then these should only be used for lifting the individual components for which they are supplied.

1.3.2 STORAGE AND INFREQUENT OPERATION

The situation where a pump is used infrequently is also covered by the instructions in this section.

1. Store pump inside wherever possible or if this is not feasible then provide protective covering. Do not allow moisture to collect around the pump.
2. Remove the drain plug, if fitted. Any inspection plates fitted should also be removed to ensure that the suction housing can drain and dry completely.
3. See Manufacturers Instructions for motor/gearbox/drive instructions for storage procedures.

LONG TERM STORAGE

IMMEDIATELY PRIOR TO INSTALLATION AND STARTING

Before installing the pump please ensure that all plugs and inspection plates are replaced.



1.4 ELECTRICAL



Electrical connection should only be made using equipment suitable for both rating and environment. Where any doubts exist regarding the suitability of equipment, Mono Pumps Limited, should be consulted before proceeding. Normally the Mono pump should be installed with starting equipment arranged to give direct on line starting.

Earthing points will be provided on electric drives (if supplied) and it is essential that these are correctly connected. When the motor is being wired and checked for rotation, the start/stop sequence must be instantaneous to prevent dry running (see 2) or pressurising upstream equipment. (Check direction arrow on pump nameplate). The electrical installation should include appropriate isolating equipment to ensure that the pump unit is safe to work on.

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1.5 PRESSURE RELIEF VALVES AND NON-RETURN VALVES

1. It is recommended that a suitable safety device is installed on the discharge side of the pump to prevent over-pressurisation of the system.
2. It is also recommended that a non-return valve is installed on the discharge side of the pump to prevent reverse flow through the system. When both are installed it is advised that the relief valve is positioned closer to the pump than the non-return valve.
Refer to section 2 page 9.

IMPORTANT



The pump must never run against a closed inlet or outlet valve, as this could result in mechanical failure.

1.6 GENERAL SAFETY



GREAT CARE MUST BE TAKEN TO PROTECT ALL ELECTRICAL EQUIPMENT FROM SPLASHING WHEN HOSING DOWN. WHERE MONO PUMPS LIMITED HAVE SUPPLIED A BARESHAFT PUMP THE ONUS IS ON THE USER TO FIT ADEQUATE GUARDS IN COMPLIANCE WITH THE REQUIREMENTS OF THE RELEVANT REGULATIONS.

All nuts and bolts, securing flanges and base mounting fixtures must be checked for tightness before operation. To eliminate vibration, the pump must be correctly aligned with the drive unit, and all guards must be securely fixed in position. When commissioning the plant, all joints in the system must be checked thoroughly for leakage.

If, when starting, the pump does not appear to operate correctly, the plant must be shut down immediately and the cause of the malfunction established before operations are recommenced. It is recommended that depending upon plant system operation, either a combined vacuum and pressure gauge, or a vacuum gauge only be fitted to the pump inlet port, and a pressure gauge fitted to the outlet port, these will then continuously monitor the pump operating conditions.

1.7 DUTY CONDITIONS

Pumps should only be installed on duties for which Mono Pumps Limited have specified the materials of construction, flow rates, pressure, temperature, speed etc. Where dangerous materials are to be pumped, consideration must be given to the safe discharge from relief valves, gland drains etc.

IF THE DUTY SHOULD BE CHANGED, MONO PUMPS LIMITED SHOULD BE CONTACTED AND THEIR RECOMMENDATIONS SOUGHT IN THE INTEREST OF APPLICATION, SAFETY OF PLANT, EFFICIENCY AND PUMP LIFE.

2. START-UP PROCEDURE

Pumps must be filled with liquid before starting. When the pump is stopped, sufficient liquid will normally be trapped in the rotor/stator assembly to provide lubrication upon restarting.

If, however, the pump has been left standing for an appreciable time, moved to a new location, or has been dismantled and re-assembled, it must be refilled with liquid and given a few turns before starting.

2.0 PUMP ROTATION

Pump rotation is bi-directional.

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2.1. GLAND PACKING

Where a pump is supplied fitted with gland packing (manufactured from a non-asbestos material), the gland will require adjustment during the initial running in period. Newly packed glands must be allowed to run-in with only finger tight compression on the gland follower nuts. This should continue for about 3 days. The gland follower should be gradually tightened over the next week to achieve a leakage rate as shown in the table below. Gland followers should be adjusted at regular intervals to maintain the recommended leakage flow rate. Under normal working conditions a slight drip from the gland under pressure assists in cooling and lubricating the packing. **A correctly adjusted gland will always have small leakage of fluid.**

Typical Leakage Rates from Packed Glands

<u>Up to 50mm shaft diameter</u>	<u>2 drops per minute</u>
<u>50 ... 75mm shaft diameter</u>	<u>3 drops per minute</u>
<u>75 ... 100mm shaft diameter</u>	<u>4 drops per minute</u>
<u>100 ... 125mm shaft diameter</u>	<u>5 drops per minute</u>
<u>125 ... 160mm shaft diameter</u>	<u>6 drops per minute</u>

A gland drip is, however, undesirable when handling corrosive, degreasing, or abrasive materials. Under these conditions the gland must be tightened the minimum amount whilst the pump is running to ensure satisfactory sealing when under pressure, or to stop entry of air when under suction conditions.

The gland leakage of toxic, corrosive or hazardous liquids can cause problems of compatibility with the pumps materials of construction.

Provision of a gland drain should be considered, especially for the leakage of hazardous products.



CARE IS REQUIRED WHEN ADJUSTING THE GLAND WHILST PUMP IS RUNNING.

2.1.1 MECHANICAL SEALS - ALL PUMPS

When a mechanical seal is fitted to the pump it may be necessary to provide a barrier fluid to some part of the seal. This should be provided in line with the seal manufacturers instructions.

2.2. GUARDS



In the interests of safety, and in accordance with the U.K. Health and Safety at Work Act 1974, all guards must be replaced after necessary adjustments have been made to the pump.

2.3 WARNING/CONTROL DEVICE

Prior to operating the pump, if any warning or control devices are fitted these must be set in accordance with their specific instructions.

2.4 PUMP OPERATING TEMPERATURE

The range of temperatures the pump surfaces will develop is dependent upon factors such as product temperature and ambient temperature of the installation. There may be instances where the external pump surface can exceed 50°C.

In these instances, personnel must be made aware of this and suitable warnings/guarding used.

2.5 NOISE LEVELS

1. The noise sound pressure level will not exceed 85dB at one metre distance from the pump.
2. This is based on a typical installation and does not necessarily include noise from other sources or any contribution from building reverberation.

2.6 LUBRICATION

Pumps fitted with bearings should be inspected periodically to see if lubricant replenishment is necessary. Recommended lubricants and quantities are given in **section 5 page 7**.

Periodic bearing inspection is necessary to maintain optimum bearing performance. The most expedient time to inspect is during periods of regular scheduled equipment downtime - for routine maintenance or for any other reason.

Under tropical or other arduous conditions, however, a more frequent examination may be necessary. It is therefore advisable to establish a correct maintenance schedule or periodic inspection.

Torque Tightening Figures

Tightening torques

Pump size	Item.42 rotor locking	Item.52 rotor case	Item.51 end cover
LE 110 - 115	83	18	18
LE 220	127	32	32
LE 330 - 390	223	54	54
LE 440	348	127	54

Values of the driving torques - Nm

Item numbers refer to exploded view section 5, page 1.

Pressure Relief Valves

2.7.1 - Internal relief valve (on the cover)

- 1 - The relief valve, assembled directly on the pump front cover, is reversible and driven by a spring compressed by an adjuster.
- 2 - The adjustment of the relief valve is carried out in the site of assemblage because the extent of the recycle depends on the speed of the pump, on the specific weight and viscosity of the product.
- 3 - In order to avoid continuous vibrations, the relief valve must be adjusted in such way that it starts operating at a pressure greater than 10% of the operating pressure.

TYPES OF MOTIVATING FORCE FOR VALVE OF RELIEF/BY-PASS INNER	
PUMP SIZE	REGULATION PRESSURE (BAR)
	0 ÷ 5
LE 110-115	Ø5 36 x 53 cod. 422F010
LE 220	Ø5 36 x 53 cod. 422F010
LE 330 - 390	SL 38 x 63 cod. 422F003
LE440	SL 50 x 63 cod. 422F006

2.7.2 - Adjustment of the internal relief valve fig. 3.2

- 1 - Start the pump after loosening the relief valve, i.e. with the spring not under pressure.
- 2 - Tighten the adjusting screw (59) by gradually putting the spring under pressure, checking that the pressure at the outlet port of the pump does not exceed the maximum allowed pressure.
- 3 - By operating the adjusting screw and checking with a probe (see fig.3.1), find the critical opening point of the valve at the desired pressure.
- 4 - Compress the spring by about a 1/4 of a screw turn beyond the critical opening point, in order to avoid vibrations.
- 5 - Position the adjustment retainer (62) and lock it with the special screw (65).

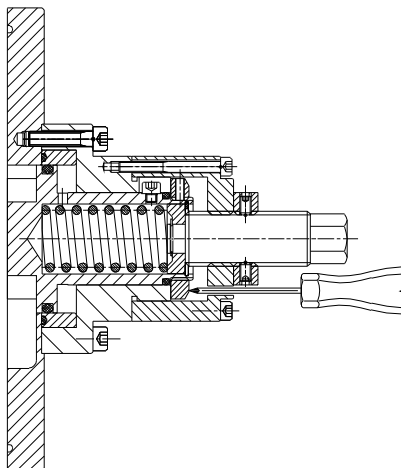


Fig.3.1

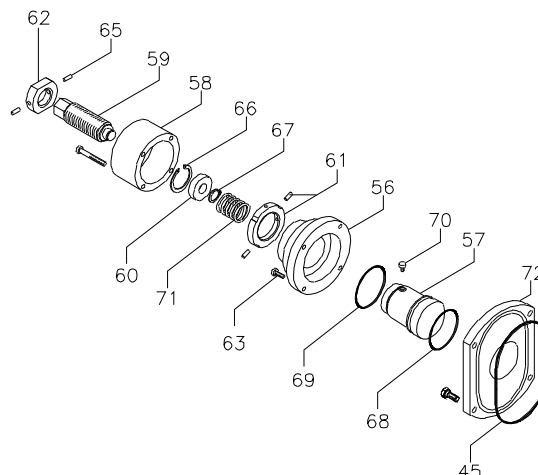


Fig.3.2 Relief valve and manual by-pass valve

2.7.3 - Manual by-pass valve

- 1 - The relief valve can also be used as a manual by-pass to adjust the capacity.
- 2 - Loosening the register screw (59), release the pressure on the spring so that to remove the piston (57) from the pumping chamber, letting part of the pumped liquid go back into the sucking chamber.
- 3 - This operation is not allowed with volatile liquids or with products sensitive to temperature increase, due to product continuous recycle.
- 4 - For products with viscosity over 15000 Cps, if you have to recycle the whole pumped product, we suggest you should arrange in line a by-pass, rightly proportionate, so that it allows the whole flow transit.

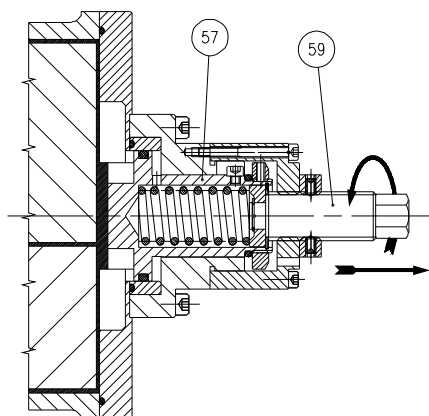


Fig.13

Pressure Relief Valves

2.7.4 - Pneumatic pressure relief valve

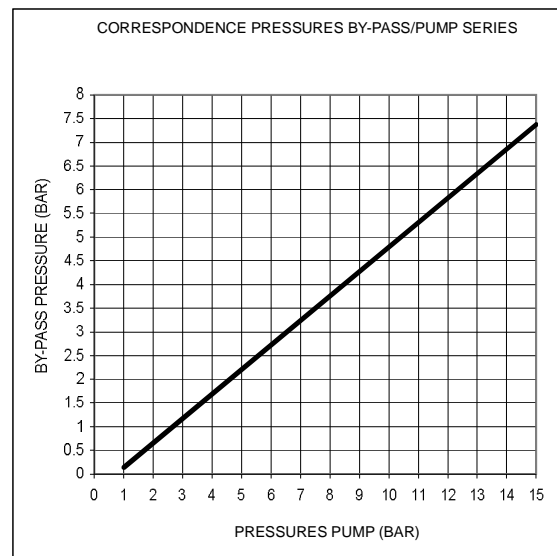
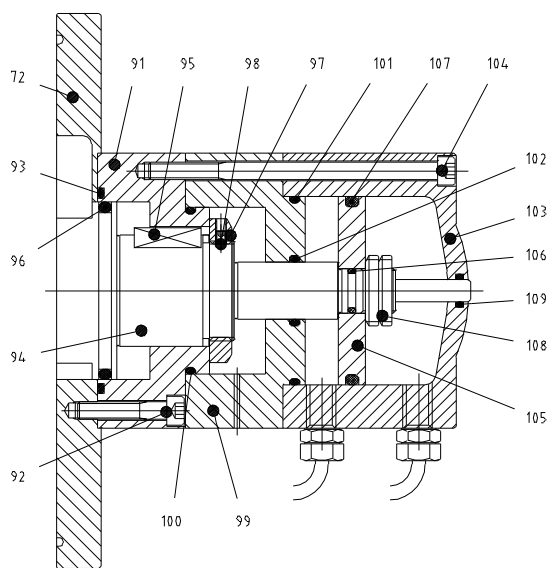
Valve, assembled on the cover, consist mainly of a cylindrical case and a piston. At one side of piston there is a discharge pressure of pump, at the other side a chamber with the pressure of pneumatic circuit. As the air force over piston is greater than liquid pressure, valve is closed; when the situation change (outlet pressure the value of compressed air) piston leave out. So the pressure opposite discharge decrease.

Adjustment of by-pass means to feed air side of piston at a pressure value corresponding the limited liquid pressure value you want in system.

2.7.5 - Adjustment of pneumatic relief valve

The adjustment of valve have to be made on site because it's necessary connect it on pneumatic system. In order to execute the adjustment we suggest to use, as reference for dimensioning of pneumatic system, graphic inserted, where you can see the correspondence between pressure at one side (pump) and at the other side (valve) of piston.

- 1 Start the pump after connecting relief valve with pneumatic system
- 2 Following graphic indication, feed air side of piston with a test pressure.
- 3 With a manometer, applied at the discharge pipe, check outlet pressure; then increase and decrease the value of pneumatic circuit pressure just to achieve the balance value. In order to avoid continuous vibrations, valve have to be set at a 10% value over critical pressure.



2.7.6 - External relief/by-pass valve

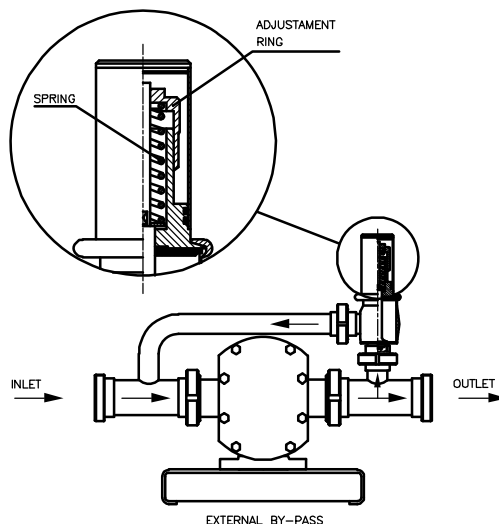
The external relief valve consists of a spring valve placed on a bridge pipe that connects the outlet with the inlet and can be used also as a by-pass to recycle all or part of the pumped liquid.

On this valve, the regulation of the sealing pressure is entrusted to the loading of a spring that can be more or less compressed.

This system is unidirectional, therefore if the direction of the pump is inverted, it is essential to invert also the position of the valve that, in any case, must always be on the discharge side.

Different types of springs can be chosen according to the operating pressure.

The adjustment must be carried out in the site of assemblage by operating manually the special adjustment ring.



Pressure Relief Valves

Available springs for external relief valves

Valve size	REGULATION PRESSURE (BAR)				
	Spring "A"	Spring "B"	Spring "C"	Spring "D"	Spring "E"
DN 25	1 ÷ 2	1,2 ÷ 3,4	2,3 ÷ 6,3	4 ÷ 13	
DN 32	0,6 ÷ 1,7	0,8 ÷ 3,2	1,8 ÷ 6,1	2,8÷10,5	
DN 40	0,5 ÷ 1,5	0,6 ÷ 2,4	1,7 ÷ 6	2 ÷ 8	
DN 50	0,1 ÷ 0,5	0,2 ÷ 1,1	0,2 ÷ 3	1,5÷5,8	1,8÷12
DN 65	0 ÷ 0,1	0,1 ÷ 0,5	0,2 ÷ 1,6	0,3÷3,4	1 ÷ 7
DN 80			0,05÷1,8	0,1÷2,8	0,2 ÷ 5
DN 100					0,15÷3,4

2.8 - Earth connection

The connection must be carried out by means of a NO7Vk type wire with a 16 mm². sec. with yellow-green insulation and crimped wire terminals.

2.9 - Residual risk areas

Not with standing the accident-prevention devices provided on the Pump unit, possible residual risk areas may be present due to a possible improper maintenance intervention by the personnel in charge.

If the Pump unit is used for pumping special materials (for example chemical substances), before beginning any maintenance operation, refer to the safety card of the product in order to wear the proper ISD (Individual Safety Devices) recommended when handling these products.

Installation, Operation & Maintenance Instructions

3 PUMP UNITS

Where a pump unit is dismantled and re-assembled, consideration must be given to ensure that where appropriate the following steps are covered.

1. Correct alignment of pump/gearbox
2. Use of appropriate couplings & bushes
3. Use of appropriate belts & pulleys correctly tensioned.

3.1 CLEANING PRIOR TO OPERATION

i. Non Food Use

During the commissioning of a new pump or recommissioning of an overhauled pump, it is advisable to clean the pump prior to the initial operation of the pump in the process.

ii. Food Use

When a pump has been supplied for a food application, it is important to ensure that the pump is clean prior to initial operation of the pump.

Therefore, it is important that a clean-in-place treatment is executed on the pump at the following times:-

1. When the pump is first commissioned for use.
2. When any spare components are fitted into the wetted area of the pump.

3.2 EXPLOSIVE PRODUCTS/ HAZARDOUS ATMOSPHERES

In certain instances the product being pumped may well be of a hazardous nature.

In these installations consideration must be given to provide suitable protection and appropriate warnings to safeguard personnel and plant.

3.3 ACCESS PORTS



Where access ports are fitted then the following steps must be followed prior to removal:

1. Pump must be shut down and the electrical supply isolated.
2. Protective clothing should be worn, especially if the pumped product is obnoxious.

3. Remove access plate with care utilising where possible drip trays to collect product leakage.

Access ports are included to assist in removing blockages and to allow a visual check on the components within the suction chamber.

It is not to be considered as an additional method in dismantling the pump.

Re-assembly of the plate should be completed using new gaskets prior to the pump being switched on.

4 ASSEMBLY AND DISMANTLING

Section 3 contains the steps to dismantle and re-assemble the pump. All fastenings must be tightened securely and when identified the appropriate torque figures should be used.

4.1 USE OF ITEMS NOT APPROVED OR MANUFACTURED BY MONO PUMPS LIMITED

The pump and its components have been designed to ensure that the pump will operate safely within the guidelines covered by the legislation.

As a consequence Mono Pumps Limited have declared the machine safe to use for the duty specified as defined by the Declaration of Incorporation or Conformity that is issued with this Instruction Manual.

The use of replacement items that are not approved by or manufactured by Mono Pumps Limited may affect the safe operation of the pump and it may therefore become a safety hazard to both operators and other equipment. In these instances the Declaration provided will therefore become invalid. The guarantee referenced in the Terms and Conditions of Sale will also be invalidated if replacement items are used that are not approved or manufactured by Mono Pumps Limited.



DISPOSAL OF WORN COMPONENTS

When replacing wearing parts, please ensure disposal of used parts is carried out in compliance with local environmental legislation. Particular care should be taken when disposing of lubricants.

Routine Maintenance

5 Daily checks

- 1 - Visual check of all sealing devices and of general working.
- 2 - If a leakage from mechanical seal occurs, arrange a replacement as soon as possible in order to avoid the product enters the bearing housing.

6 Weekly checks

- 1 - Check the oil level of the pump and of the motor unit; if necessary top up by means of oil according to manufacturer instructions.
- 2 - Check the rotor case and clean it, removing possible product deposits.
- 3 - Check that no seizures between rotors or among rotors and static surfaces of rotor case have occurred.
- 4 - Check the by-pass valve, when arranged, is not blocked after long working pause. To see it, it's necessary to untighten completely the adjusting screw (59) and re-arrange it in its initial position, indicated by retainer (62).

7 Six-month checks

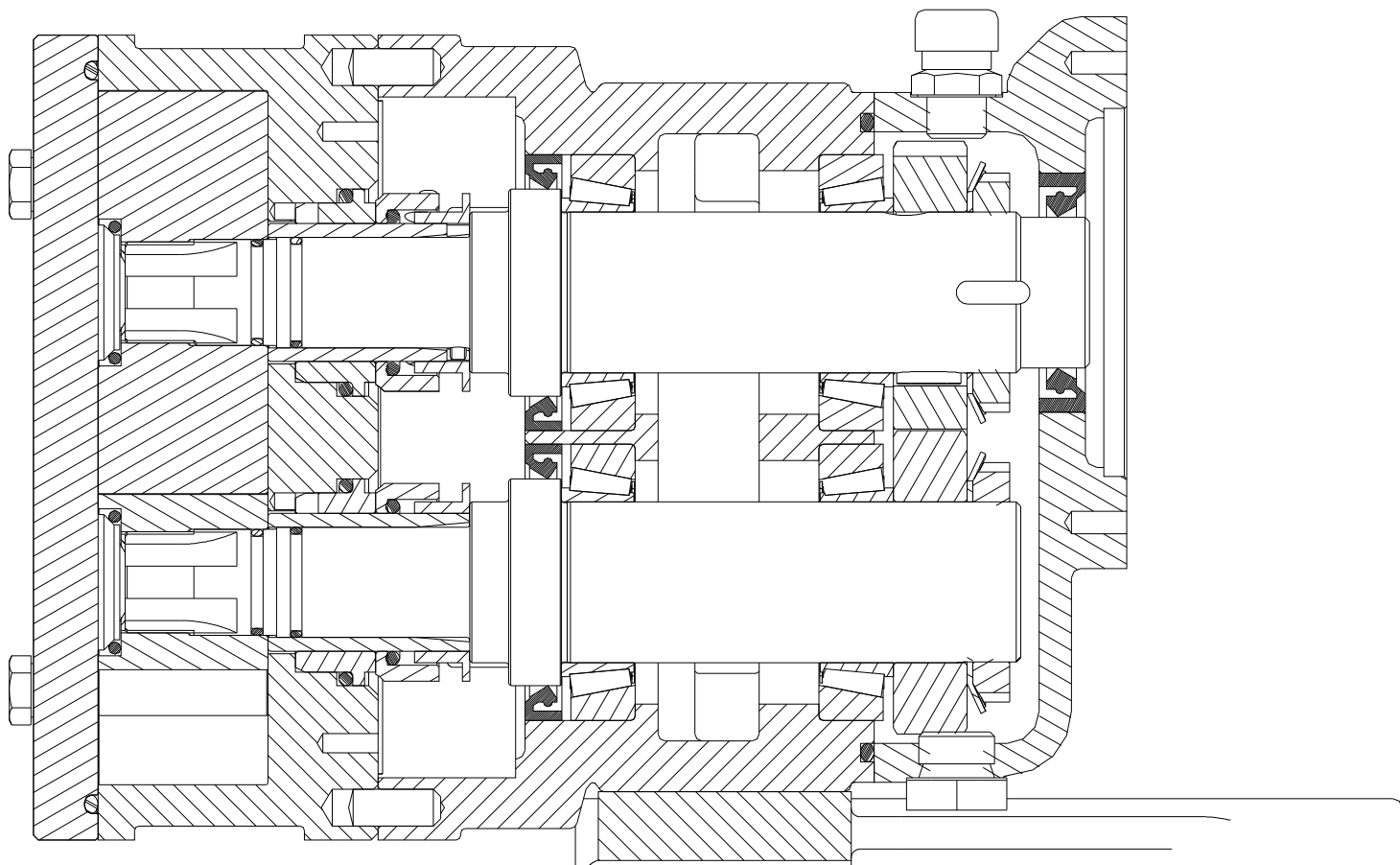
- 1 - If the pump works constantly at high temperature, over 120°C, check the lubricant oil health; if it has become dark, arrange its replacement.
- 2 - Check the timing gears don't allow the rotors get in touch; otherwise replace the worn gears.
- 3 - Check the shaft stiffness; if they show a min. axial or radial play, replace the bearings.
- 4 - Check the corrosion of the bearing housing; if necessary arrange its repainting by means of a paint, suitable to protect it from a quick wear. The MONO standard pumps are painted with:
BRIGHT EPOXID ENAMEL RAL 7032.

NOTE

If you carry out these checks systematically, the pump will keep its initial performance for many years.

Pump Assembly & Dismantling Instructions

PUMP ASSEMBLY AND DISASSEMBLY INSTRUCTIONS
mod. LE110 - LE115 - LE220 - LE330 - LE390 - LE440

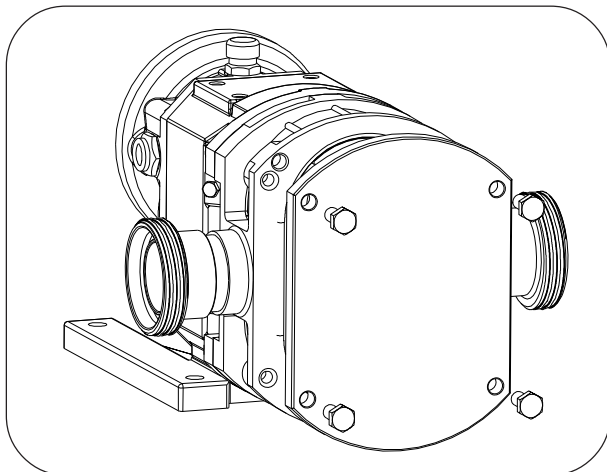


Pump Assembly & Dismantling Instructions

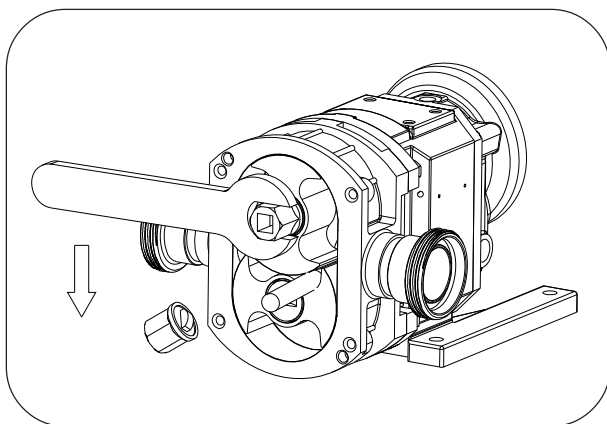
ROTOR CASE DISASSEMBLY

Before removing the cover, make sure that the pump and the motor are insulated, the pump is cool enough to touch it safely, all the fluids are discharged, and make sure that the pump, the flushing system of the seals and the jackets are insulated and depressurised. If the end cover is provided with a by-pass valve, refer to the corresponding section.

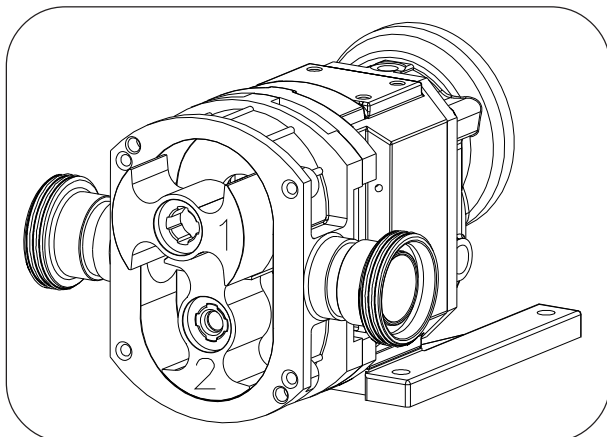
Then, proceed as follows:



- 1 Remove the front screws and exert leverage in the provided slots cover

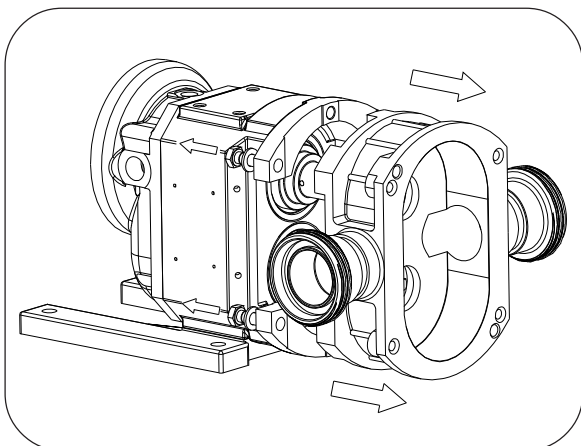


- 2 Unscrew counter-clockwise the rotor nuts with the special equipped wrench by placing a non metal element between the rotors to stop turning.

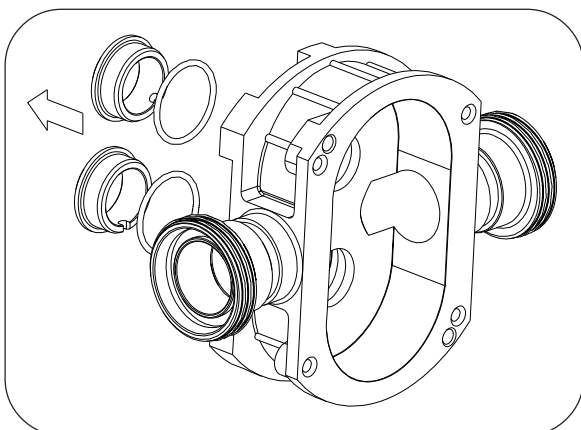


- 3 Remove the rotors taking care you don't damage them with metallic tools, pay attention to the reference marked on the rotors and on the shafts (1 -2) to position them correctly during the assembly.

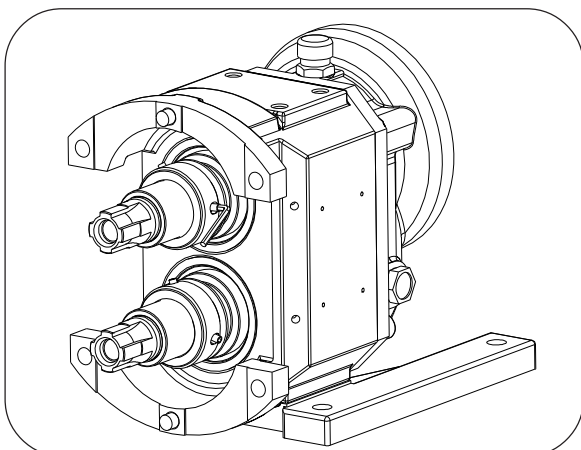
Pump Assembly & Dismantling Instructions



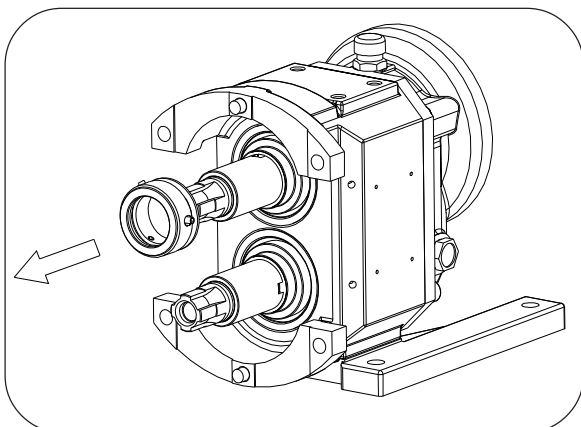
4 Unscrew the rear screws and remove the rotor case.



5 Remove the stationary part of the seal from the rotor case.

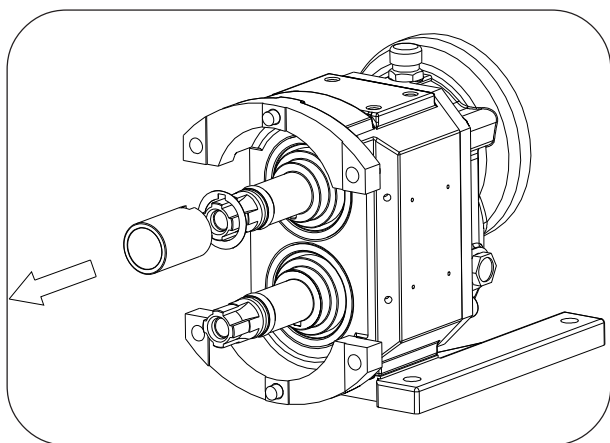


6 Untighten the socket head screws on mechanical seal.



7 Remove the rotating part of the seal from its housing on the bush.

Pump Assembly & Dismantling Instructions



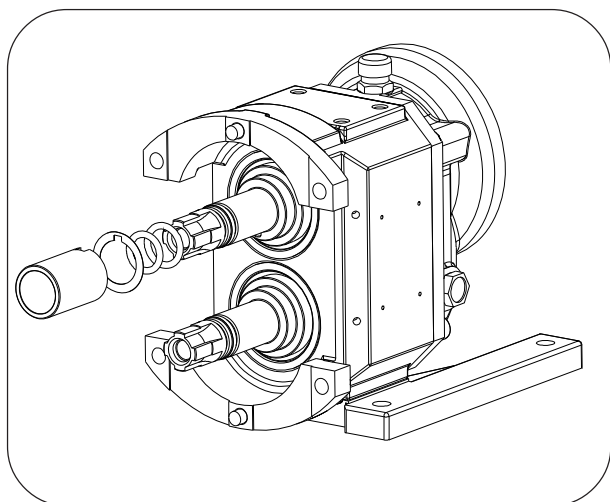
8 Remove the bush and the spacers for the axial adjustment.

Rotor case assembly



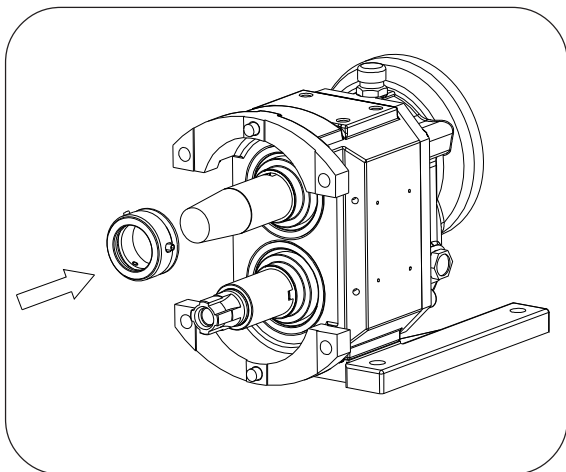
IMPORTANT!

DURING THE FOLLOWING OPERATIONS, TAKE CARE YOU DON'T DAMAGE THE LAPPED SEAL SURFACE, DON'T PLACE THEM ON THE WORKBENCHES AND HANDLE THEM WITH CLEAN HANDS.

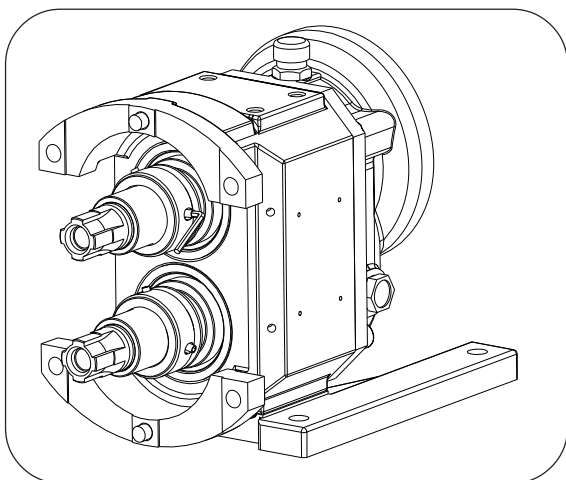


9 Clean the shafts thoroughly and insert the lightly lubricated O-Rings. First insert the spacers for the axial adjustment, referring to the “Rotor play” table and then the bush, by aligning carefully the slot with the stop pin already positioned on the shaft

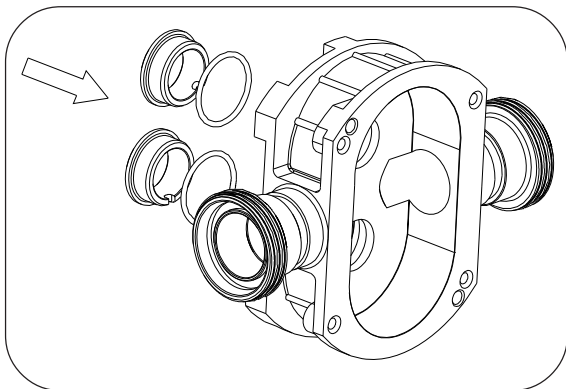
Pump Assembly & Dismantling Instructions



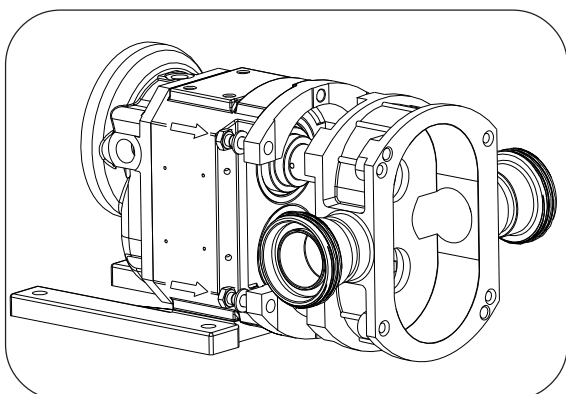
- 10** Insert the rotating part of the seal, if possible, by means of a tapered bush. Press manually without using metallic tools. Prevent that the socket screws of the seals from coinciding with the bush slots.



- 11** Be sure the mechanical seals and bushes stand on the shaft shoulder and tighten by degrees the socket head screws. We suggest you should use a thread locking adhesive in order to avoid their untightening on work.

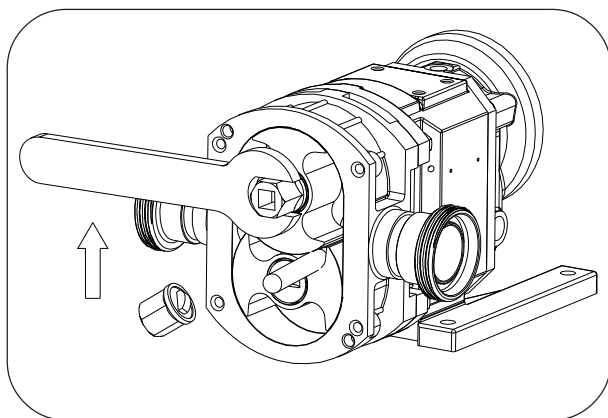


- 12** Assemble the stationary part of the seal on rotor case, taking care to align the slot with the retainer pin already arranged on seat bottom.



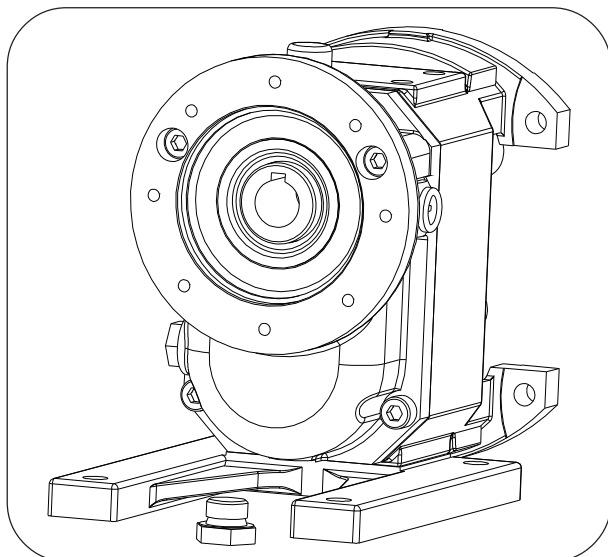
- 13** Clean carefully the seal slide surfaces and assemble the rotor case delicate in order not to damage the seals and be sure it is well set on pins. Clamp the black nuts.

Pump Assembly & Dismantling Instructions

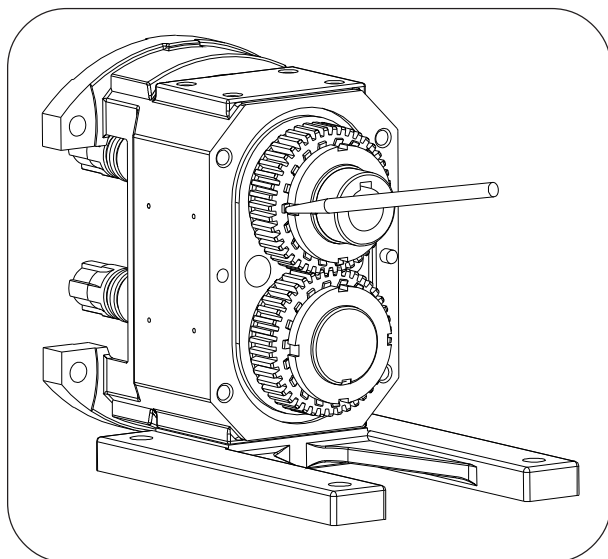


- 14** Assemble the rotors, setting them on pitch setting, according to reference marks (1-2). Clamp the rotor nuts (see tab.4.2"tightening torques"). In order to stop turning, interpose a non metal element between rotors.

Bearing housing disassembly

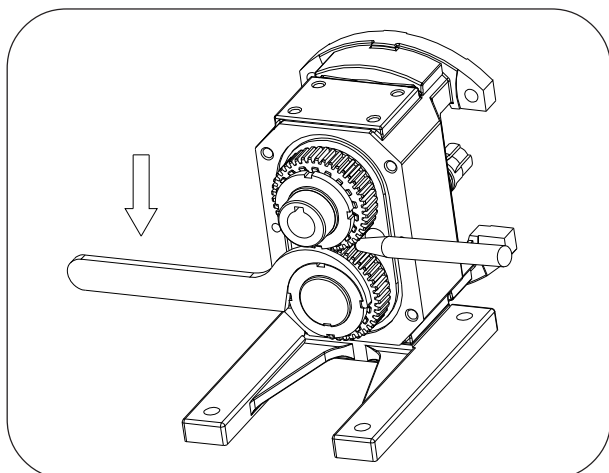


- 15** After disassembling the rotor case, remove the oil from the bearing housing.

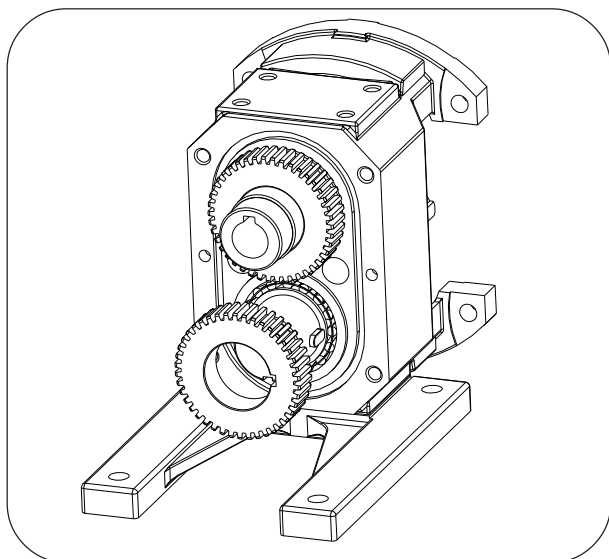


- 16** Remove the gear cover and disconnect the retainer keys on keys on lock washers.

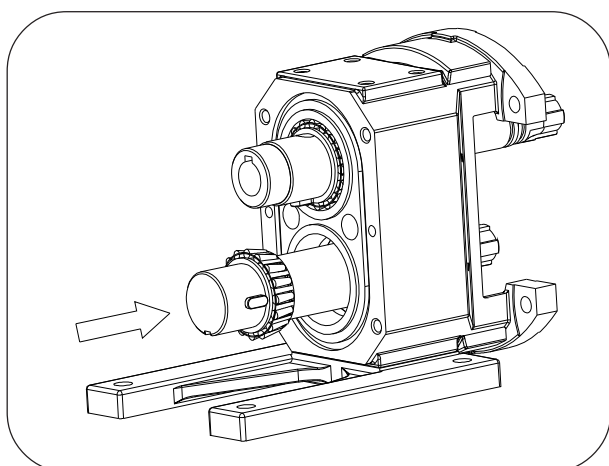
Pump Assembly & Dismantling Instructions



17 Unscrew the retainer ring nut, inserting a non metal wedge between gears in order to stop turning.



18 Extract the gears, exerting leverage between the bearing housing and the gears side, without damaging the toothing outline.



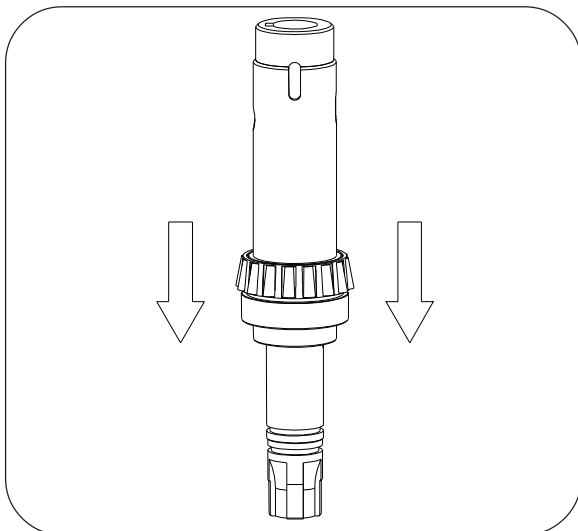
19 Extract the shafts by means of a non metal hammer.

Pump Assembly & Dismantling Instructions

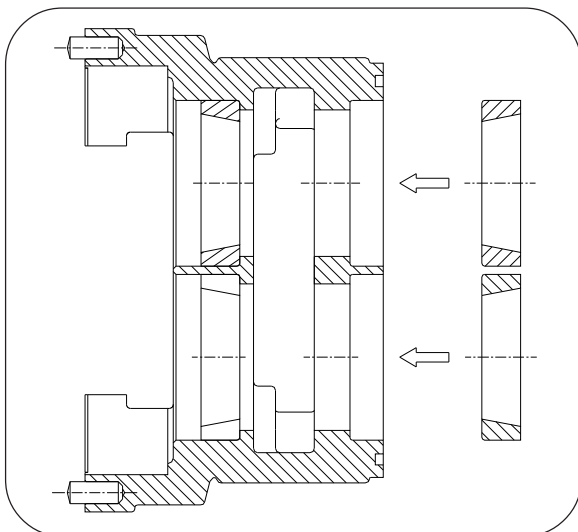
Bearing housing assembly (Setting and preloading the bearings)

Each shaft is supported by two conical roller bearings that must be preloaded in order to prevent any floating of the shafts. The bearings must be changed if one of the shafts is moving

The shaft assembly is carried out as follows:



20 USE GLOVES. Heat to approximately 150° the inner rings of the front bearings and assemble them on the shafts

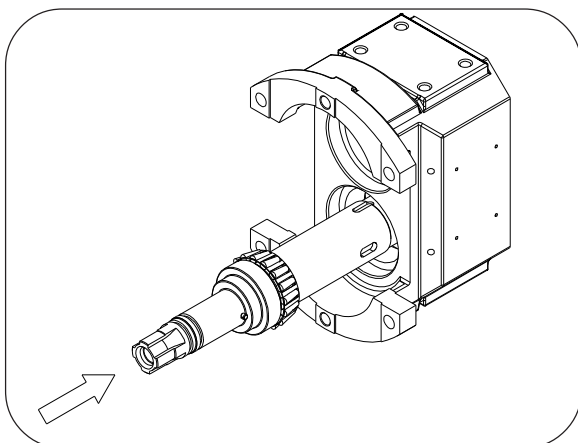


21 Set the bearing outer race into their, front and back, housing.



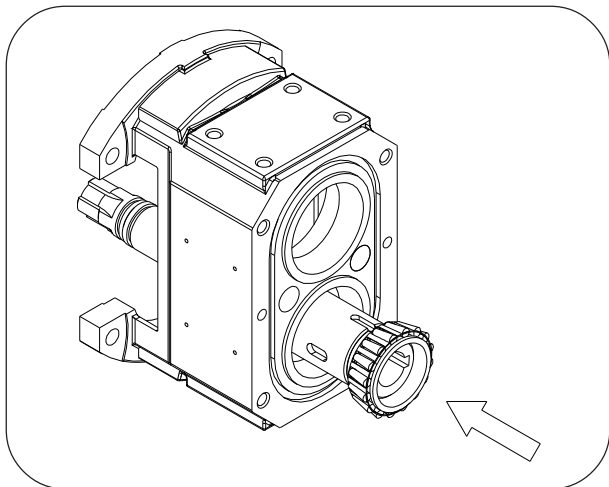
CAUTION

The bearings must be "O" assembled.

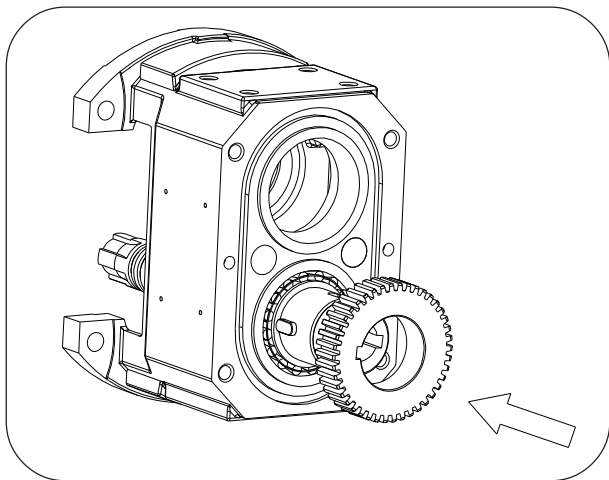


22 Insert a shaft in the gear case from the front and position it in such a way that the inner ring of the front bearing is in contact with the outer race.

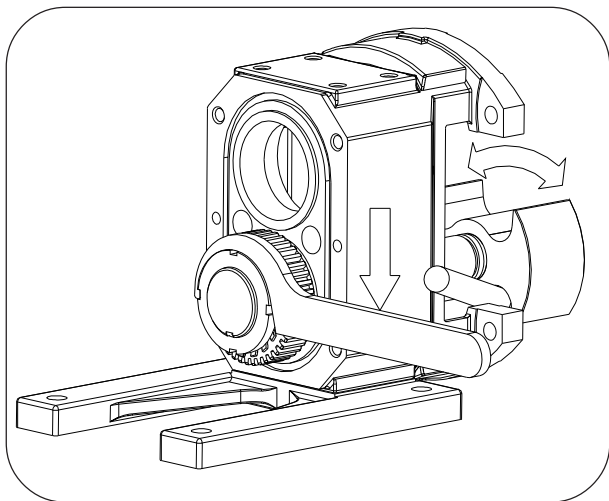
Pump Assembly & Dismantling Instructions



23 Insert the inner ring of the rear bearing in the outer race

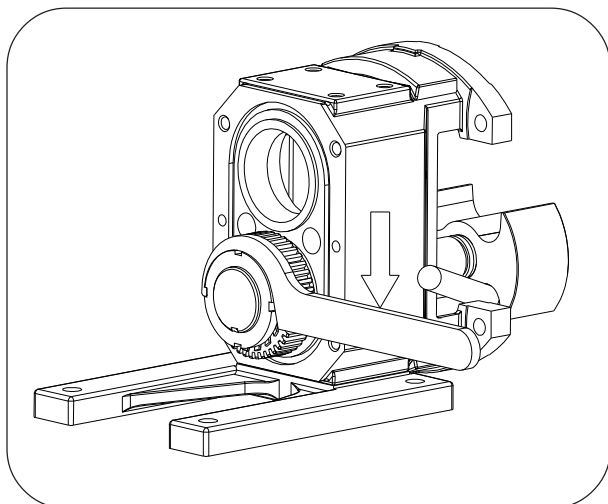


24 After inserting the key on the shaft, insert the gear

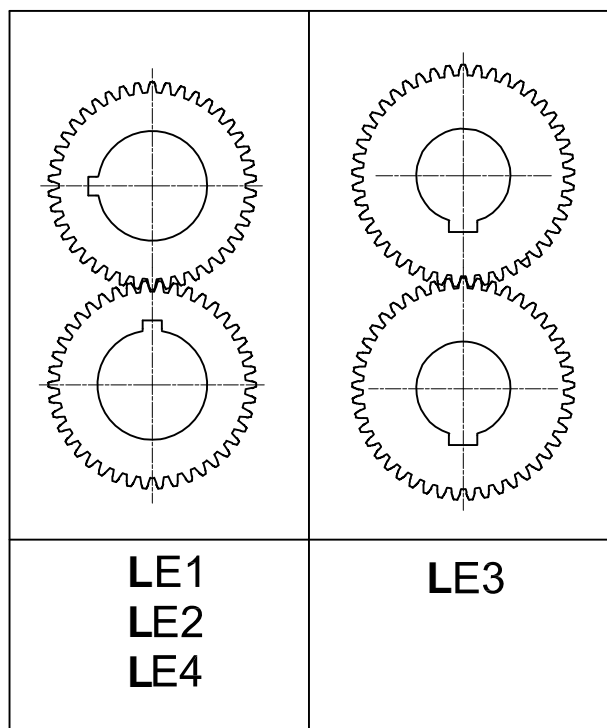


25 Insert the safety washer and the ring. Tighten manually the ring nut of the gear in order to keep everything in position, by eliminating any end floating. To adjust the rollers of the bearings in their housing, tighten repeatedly the ring nut with the wrench and rotate the shaft in one direction and in the other. In order to carry out the tightening and in the other. In order to insert a rotor on the shaft and with the help of a non-metallic body, to stop turning when tightening. After packing the bearings, loosen the ring nut slightly and tighten again manually without forcing with the wrench.

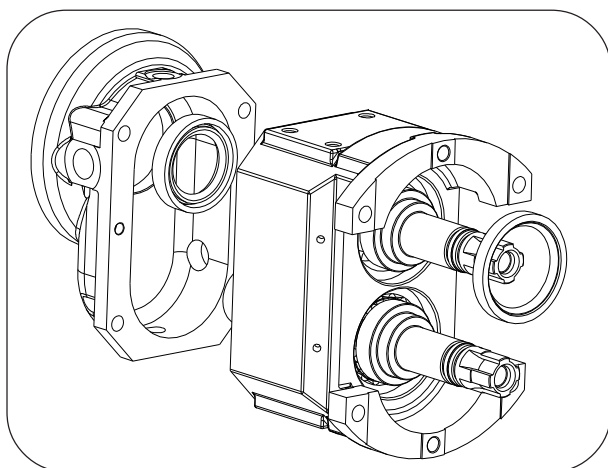
Pump Assembly & Dismantling Instructions



- 26** The preload of the bearing is carried out by tightening the ring further, with the wrench, by the angle between the two hollow for the safety washers. Finish by **BENDING THE SAFETY WASHERS** to block the ring *nut*.

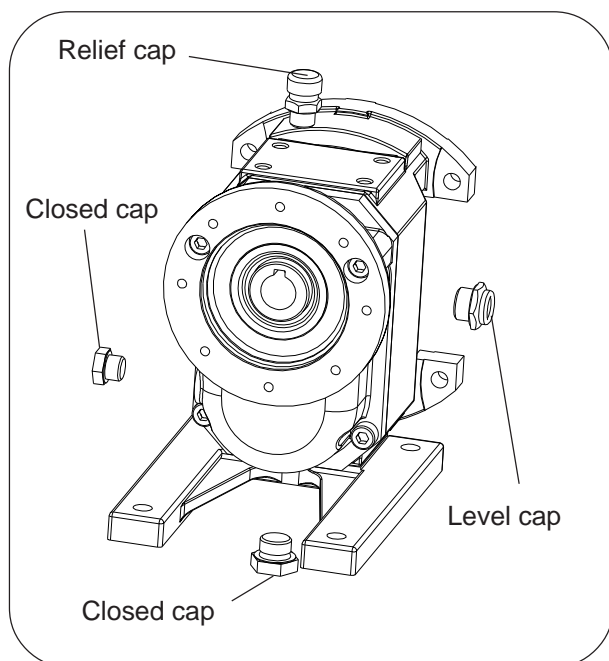


Repeat the procedure 22-27 for the other shaft.
NOTE: when assemble the second gear, turn the shaft in order to respect the right key timing (refer to the following table).



- 27** Insert the front oil seal rings in their housing and the rear one on the cover.

Pump Assembly & Dismantling Instructions



- 28** After mounting the caps and the pins, assemble the gear cover, taking care to set the o-ring gasket. Fill the bearing housing with oil (quantity as per tab.10).

Spare Parts List

Pos No.	DESCRIPTION	Qty No.	PART No. BY MODEL					
			LE 110	LE 115	LE 220	LE 330	LE 390	L E 440
1	BARING HOUSING	1	2001G011	2001G011	2001G012	2001G013	2001G013	2001G014
2	GEAR COVER version F1	1	2001G020	2001G020	2001G023	2001G026	2001G026	2001G029
	GEAR COVER version F2	1	2001G020	2001G020	2001G024	2001G027	2001G027	2001G030
	GEAR COVER version F3	1	2001G021	2001G021	2001G023	-	-	2001G031
	GEAR COVER version F4	1	2001G021	2001G021	2001G025	-	-	-
	GEAR COVER version F5	1	2001G022	2001G022	-	-	-	-
3	DRIVING SHAFT version F1	1	2004B071	2004B074	2004B077	2004B080	2004B080	2004B084
	DRIVING SHAFT version F2	1	2004B072	2004B075	2004B078	2004B081	2004B081	2004B085
	DRIVING SHAFT version F3	1	2004B071	2004B074	2004B078	-	-	2004B088
	DRIVING SHAFT version F4	1	2004B073	2004B076	2004B078	-	-	-
	DRIVING SHAFT version F5	1	2004B073	2004B076	-	-	-	-
4	DRIVEN SHAFT (all versions)	1	2004B090	2004B091	2004B092	2004B093	2004B093	2004B094
5	GEAR	2	2008M051	2008M051	2008M052	2008M053	2008M053	2008M054
11	AXIAL ADJUSTMENT SPACER	VAR.	433A011-2-3	433A011-2-3	433A021-2-3	433A031-2-3	433A031-2-3	433A041-2-3
12	SCREW	2	411A08X50	411A08X50	411A10X60	411A10X70	411A10X70	411A12X30
13	GEAR COVER PIN	2	417A6X14	417A6X14	417A6X14	417A6X14	417A6X14	417A08X20
15	GEAR COVER O-RING	1	404T4437	404T4437	404T4562	404T4675	404T4675	404T4900
17	OIL SEAL RING	1	403Y335210	403Y335210	403Y38528	403Y476510	403Y476510	403Y658510D
18	OIL SEAL RING	2	403Y45608D	403Y45608D	403Y50688D	403Y64808D	403Y64808D	403Y8211012
19	KEY	2	418F06X14	418F06X14	418F08X18	418F10X22	418F10X22	418F12X28
23	GEAR RING NUT	2	415F35	415F35	415F40	415F50	415F50	415F70
24	WASHER	2	416F35	416F35	416F40	416F50	416F50	416F70
25	OIL VENT CAP	1	407L14S	407L14S	407L12S	407L12S	407L12S	407L12S
26	OIL CAP	1	407L14T	407L14T	407L12T	407L12T	407L12T	407L12T
27	OIL LEVEL	1	407L38L	407L38L	407L12L	407L12L	407L12L	407L12L
28	FOOT	1	2001G111	2001G111	2001G112	2001G113	2001G113	2001G114
29	CONICAL ROLLER BEARING	4	406FTS356016	406FTS356016	406F32008X	406F32010X	406F32010X	406F32014X
30	OIL CAP	1	407L38T	407L38T	407L12T	407L12T	407L12T	407L12T
31	VERTICAL FOOT	2	2001A301	2001A301	2001A302	2001A303	2001A303	2001A304
32	SCREW	8	411A08X20	411A08X20	411A10X20	411A12X25	411A12X25	411A14X30
33	COUNTERFLANGE FOR ENLARGED INLET PORT	1	-	2006B045	2006B046	2006B047		2006B048
34	O-RING	1	-	404T3281	404T4350	404T4500		404T4650
40	ROTOR CASE (see separate list)	1	23 02	23 03	23 05	23 07	23 17	23 09
41	316 STAINLESS STEEL DUAL WING ROT.PISTON	2	2005B151	2005B152	2005B154	2005B156	2005B161	2005B158
	ANTI-SEIZURE ALLOY DUAL WING ROT.PISTON	2	2005&141	2005&142	2005&144	2005&146	2005&149	2005&148
42	LOCKING NUT for STANDARD ROTOR	2	2004B121	2004B121	2004B122	2004B123	2004B126	2004B124
43	O-RING	2	404T4100	404T4100	404T4118	404T4162	404T4162	404T158
44	STANDARD FRONT COVER	1	2006B081	2006B081	2006B082	2006B083	2006B083	2006B084
45	FRONT COVER O-RING	1	404T4525	404T4525	404T4625	404T4750	404T4750	404T81025
48	BACK PIN	2	417A08X20	417A08X20	417A10X20	417A12X25	417A12X25	417A12X25
49	FRONT PIN	2	417A08X16	417A08X16	417A08X16	417A08X16	417A08X16	417A08X16
50	O-RING	2	404T2075	404T2075	404T2093	404T2137	404T2137	404T3168
51	SCREW	4 8 ⁽¹⁾	410A08X22	410A08X22	410A10X28	410A10X30	410A10X30	410A12X35
53	PLANE WASHER	4	412A08	412A08	412A10	412A12	412A12	412A16

(1) FOR LE 330-390-440 MODEL



Spare Parts List

POS. No.	DESCRIPTION	Q.ty No.	PART No. BY MODEL					
			LE 110	LE 115	LE 220	LE 330	LE 390	LE 440
	BY PASS - COMPLETE RELIEF VALVE	1	2013B061	2013B061	2013B062	2013B063	2013B063	2013B064
56	BY PASS SUPPORT	1	2013L021	2013L021	2013L021	2013L022	2013L022	2013L023
57	BY PASS PISTON	1	2013B051	2013B051	2013B052	2013B053	2013B053	2013B054
58	BY PASS COVER	1	2013L029	2013L029	2013L029	2013L029	2013L029	2013L030
59	BY PASS ADJUSTMENT SCREW	1	2013B031	2013B031	2013B031	2013B031	2013B031	2013B031
60	THRUST WASHER	1	2013L032	2013L032	2013L032	2013L032	2013L032	2013L033
61	ADJUSTMENT RING NUT	1	2013B034	2013B034	2013B034	2013B34	2013B34	2013B035
62	BY PASS ADJUSTMENT RETAINER	1	2013L036	2013L036	2013L036	2013L036	2013L036	2013L036
63	SCREW	4	411A06X20	411A06X20	411A06X20	411A08X35	411A08X35	411A10X40
64	SCREW	4	411A06X55	411A06X55	411A06X55	411A06X55	411A06X55	411A08X60
65	SCREW	2	420A06X06	420A06X06	420A06X06	420A06X06	420A06X06	420A06X06
66	SPLIT RING	1	421A38I	421A38I	421A38I	421A38I	421A38I	421A52I
67	SPLIT RING	1	421A16E	421A16E	421A16E	421A16E	421A16E	421A16E
68	O-RING	1	404T4200	404T4200	404T4200	404T6275	404T6275	404T189
69	O-RING	1	404T3250	404T3250	404T3250	404T4337	404T4337	404T4462
70	SCREW	1	411A06X10	411A06X10	411A06X10	411A06X10	411A06X10	411A06X10
71	SPRING	1	422F010	422F010	422F010	422F003	422F003	422F006
72	END COVER FOR BY PASS	1	2006B036	2006B036	2006B037	2006B038	2006B038	2006B039
89	SCREW	2	411A08X20	411A08X20	411A10X20	411A10X25	411A10X25	411A12X30
90	CAP FOR HOLLOW SHAFT	1	4034Y010	4034Y010	4034Y010	4034Y010	4034Y010	4034Y012
91	PNEUMATIC BY PASS SUPPORT	1	2013B039	2013B039	2013B039	2013B032	2013B032	2013B032
92	VTCEI SCREW	4	411A06X35	411A06X35	411A06X35	411A08X40	411A08X40	411A08X40
93	SUPPORT O-RING	1	404T3250	404T3250	404T3250	404T4337	404T4337	404T4462
94	PNEUMATIC BY-PASS PISTON	1	2013B029	2013B029	2013B030	2013B035	2013B035	2013B038
95	LINGUETTA KEY	1	418A14X30	418A14X30	418A14X30	418A14X30	418A14X30	418A14X30
96	PISTON O-RING	1	404T4200	404T4200	404T4200	404T6275	404T6275	404T189
97	ADJUSTMENT RING NUT	1	2013A034	2013A034	2013A034	2013A034	2013A034	2013A034
98	SCREW	2	420A05X06	420A05X06	420A05X06	420A05X06	420A05X06	420A05X06
99	PNEUMATIC BY PASS COVER	1	2013A032	2013A032	2013A032	2013A030	2013A030	2013A031
100	BACK COVER O-RING	1	404T4275	404T4275	404T4275	404T4275	404T4275	404T4312
101	FRONT COVER O-RING	1	404T4312	404T4312	404T4312	404T4312	404T4312	404T4475
102	PISTON-COVER O-RING	1	404T134	404T134	404T134	404T134	404T134	404T134
103	PNEUMATIC BY PASS JACKET	1	2013A035	2013A035	2013A035	2013A036	2013A036	2013A037
104	SCREW	4	411A06X110	411A06X110	411A06X110	411A08X130	411A08X130	411A10X130
105	THRUST RING	1	2013L024	2013L024	2013L024	2013L024	2013L024	2013L025
106	PISTON ROD-THRUST O-RING	1	404T119	404T119	404T119	404T119	404T119	404T119
107	THRUST-JACKET O-RING	1	404T6300	404T6300	404T6300	404T6300	404T6300	404T8450
108	RING NUT	2	415F20AUT	415F20AUT	415F20AUT	415F20AUT	415F20AUT	415F20AUT
111	HEATED FRONT COVER	1	2006B086	2006B086	2006B087	2006B088	2006B088	2006B089
112	ASEPTIC FRONT COVER	1	2006B121	2006B121	2006B122	2006B123	2006B123	2006B124
113	COVER HEATING CHAMBER	1	2006B161	2006B161	2006B162	2006B163	2006B163	2006B164
114	SCREW FOR COVER HEATING CHAMBER	4 6 ⁽¹⁾	411A06X16	411A06X16	411A06X16	411A06X16	411A06X16	411A06X16
115	O-RING	1	404T4375	404T4375	404T4500	404T4587	404T4587	404T4750
116	O-RING	1	404V007	404V007	404V4625	404V4750	404V4750	404V009

(1) FOR LE 440 MODEL

Spare Parts List

Pos No.	DESCRIPTION	Qty No.	PART No. BY MODEL					
			LE 110	LE 115	LE 220	LE 330	LE 390	LE 440
117	O-RING	1	404V008	404V008	404V4675	404V4825	404V4825	404V010
118	ASEPTIC PORT COUNTERFLANGE	2	2006B181	2006B181	2006B182	2006B184	2006B184	2006B185
119	O-RING	2	404V3168	404V3168	404V3212	404V4325	404V4325	404V4426
120	O-RING	2	404V3231	404V3231	404V3275	404V4412	404V4412	404V4525
121	SCREW	8 12 ⁽¹⁾	411A06X20	411A06X20	411A06X20	411A08X20	411A08X20	411A08X20
200	SEAL STOP PIN	2	2014B200	2014B200	2014B200	2014B200	2014B200	2014B200
201	SINGLE MECHANICAL SEAL	2	SEE LIST MECHANICAL SEELS CODES					
218	SCREW	4	410A08X22	410A08X22	410A10X30	410A12X30	410A12X30	410A16X40
220	FLUSHING SEAL BOX	2	2014B141	2014B141	2014B142	2014B143	2014B143	2014B144
221	O-RING	2	404T3218	404T3218	404T168	404T4312	404T4312	404T4437
222	SCREW	6	411A05X30	411A05X30	411A06X35	411A06X40	411A06X40	411A10X40
223	SEAL RING UM	2	402V57486	402V57486	402V705510	402V857010	402V857010	402V1109510
224	TURNING RING	2	2004B341	2004B341	2004B342	2004B343	2004B343	2004B344
225	O-RING	2	404T2137	404T2137	404T3181	404T4237	404T4237	404T4312
226	SCREW	6	420A04X05	420A04X05	420A05X05	420A06X05	420A06X05	420A06X06
227	PIN	4	417A06X10	417A06X10	417A06X12	417A06X12	417A06X12	417A08X15
239	SEALS PROTECTION	2	4034Y001	4034Y001	4034Y002	4034Y003	4034Y003	4034Y004
240	SEAL RING UM VITON	4	402V45356	402V45356	402V48405	402V705510	402V705510	402V857010
	SEAL RING UM EPDM	4	402U45356	402U45356	402U48405	402U705510	402U705510	402U857010
	SEAL RING POLYMER S1	2	402Q45357	402Q45357	402Q48406	402Q70558	402Q70558	402Q857010
241	SEAL RING BUSH	2	2004B321	2004B321	2004B322	2004B323	2004B323	2004B324
242	O-RING	2	404T2081	404T2081	404T2100	404T3143	404T3143	404T3200
244	"UM" SEAL RING SUPPORT	2	2014B051	2014B051	2014B052	2014B053	2014B053	2014B054
	"S1" SEAL RING SUPPORT	2	2014B061	2014B061	2014B062	2014B063	2014B063	2014B064
245	O-RING	2	404T3218	404T3218	404T168	404T4312	404T4312	404T4437
246	SCREW	6	410A05X14	410A05X14	410A06X12	410A06X25	410A06X25	410A10X25
247	PIN	4	-	-	-	417A06X16	417A06X16	417A08X15
248	SCREW	6	410A05X10	410A05X10	410A06X12	410A06X14	410A06X14	410A10X25
280	PTFE PACKING RING KIT	1	205P38506	205P38506	205P45576	205P60768	205P60768	205P80968
281	STUFFING BOX SEAL BUSH	2	2004B331	2004B331	2004B332	2004B333	2004B333	2004B334
284	STUFFING BOX SEAL SUPPORT	2	2014B071	2014B071	2014B072	2014B073	2014B073	2014B074
285	O-RING	2	404T3218	404T3218	404T168	404T4312	404T4312	404T4437
286	SCREW	6	411A05X14	411A05X14	411A06X16	411A06X20	411A06X20	411A10X16
287	PIN	4	417A06X08	417A06X08	417A06X10	417A06X10	417A06X10	417A08X12
288	PACKING GLAND	2	2014B101	2014B101	2014B102	2014B103	2014B103	2014B104
289	SCREW	4	410A05X16	410A05X16	410A06X20	410A08X20	410A08X20	410A10X25
291	FLUSHED STUFFING BOX SEAL SUPPORT	2	2014B077	2014B077	2014B078	2014B079	2014B079	2014B080
292	HYDRAULIC RING	2	2014B121	2014B121	2014B122	2014B123	2014B123	2014B124
299	ELASTIC PIN	2	430A3,5X08	430A3,5X08	430A3,5X08	430A04X10	430A04X10	430A05X12
300	BUSH FOR MECANICAL SEAL	2	2004B311	2004B311	2004B312	2004B313	2004B313	2004B314
301	WRENCH FOR ROTOR CLAMPING NUT	1	2004C145	2004C145	2004C145	2004C146	2004C146	2004C146
302	SCREW	4	410A05X10	410A05X10	410A05X10	410A05X10	410A05X10	410A05X10
304	NAME PLATE	1	44301026	44301026	44301026	44301026	44301026	44301026
305	RIVET	4	44301027	44301027	44301027	44301027	44301027	44301027

(1) FOR LE 330-390-440 MODEL

Spare Parts List

COMPONENT CODE

PART CODE	2 = Spare parts-Components 4 = Commercial parts		0	4	V	1	6	8
PRODUCT CATEGORIES								
MATERIALS	A = AISI 304 Stainless Steel	L = Aluminium						
	B = AISI 316 Stainless Steel	M = Carbon steel						
	D = Duplex SAF 2507	N = Brass						
	& = ASTM A-494 Alloy	P = Teflon (P.T.F.E.)						
	F = Iron	Q = Polymer						
	G = G25 Cast iron	T = NBR Rubber						
	H = Hastelloy-Alloy C276	U = EPDM Rubber						
	KA = Kalrez°	V = Viton° Rubber						
	I = Monel	Y = Natural rubber						
	J = Titanium	Z = Electric material						
PROGRESSIVE NUMERATION ACCORDING TO SIZE								

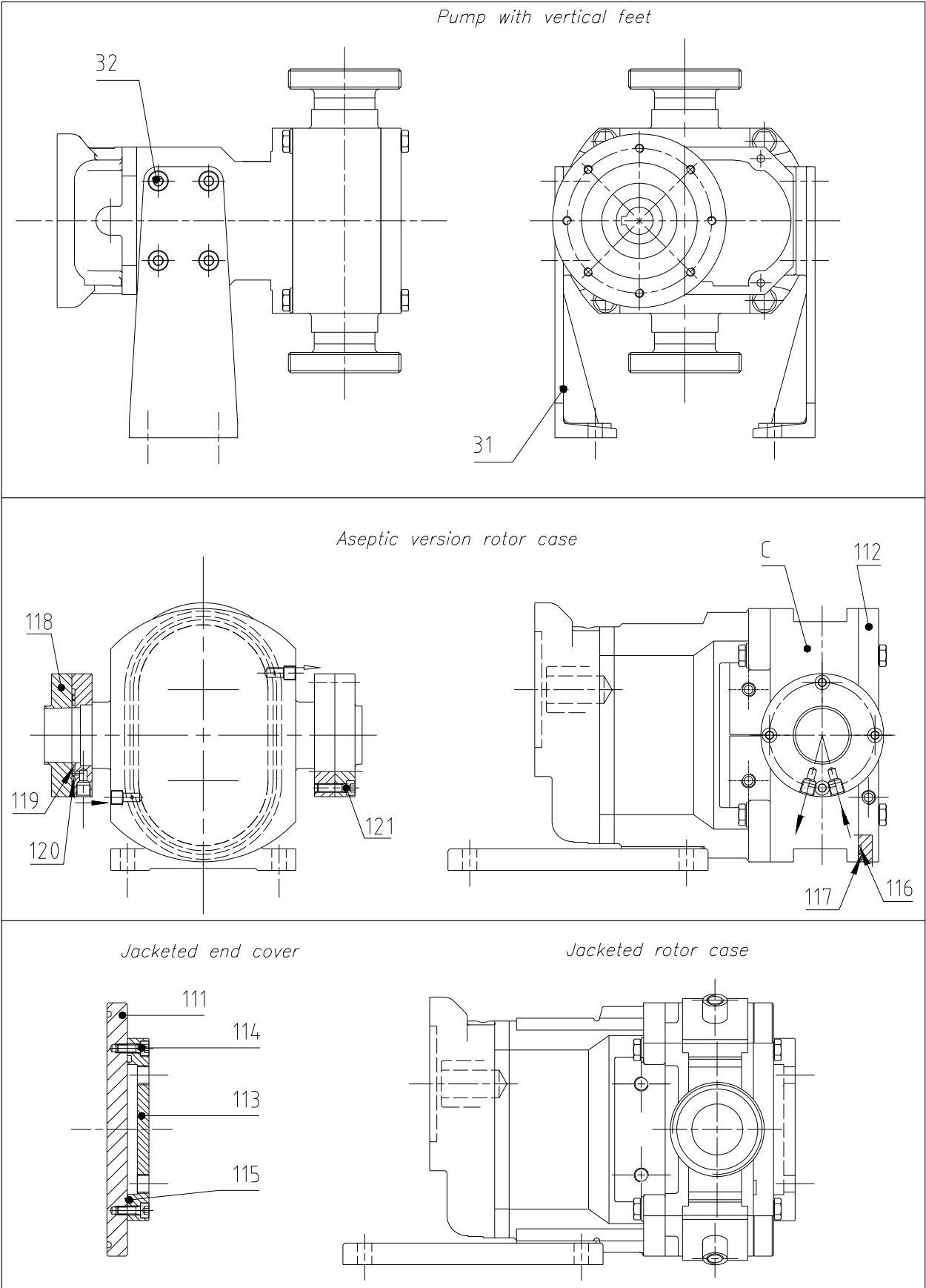
Example: O-ring 168 in Viton° code=404V168

PUMP BODY CODE

PART CODE	2= Finished components 5= Semi-finished components 6= Raw melted components	2	3	1	0	2	B	0	7
CATEGORY	3= Category to which it belongs								
VERSION	0 = Standard								
	1 = Standard heated								
	2 = Aseptic								
	3 = Aseptic heated								
	6 = Enlarged inlet port								
	7 = Enlarged-heated inlet port								
SEAL TYPE	0= Lip and mechanical seals								
	1= Packing glands								
	9= Special								
CONNECTION PORTS	0 = BSP male gas thread								
	1 = PN 16 UNI 2278 flanges								
	2 = DIN 11851								
	3 = SMS								
	4 = RJT (BS)								
	5 = IDF - ISS								
	6 = CLAMP								
	7 = Female gas thread								
	8 = Fitting for wine making								
9 = Special									
MATERIAL	B - H - I - J - R								
PROGRESSIVE NUMERATION ACCORDING TO SIZE									

Example: body with mechanical seals - DIN ports - heated - AISI 316 - LB430 code

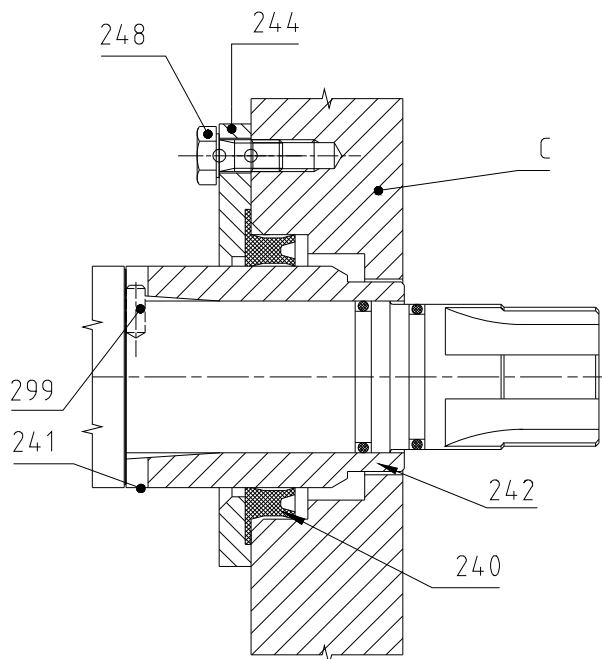
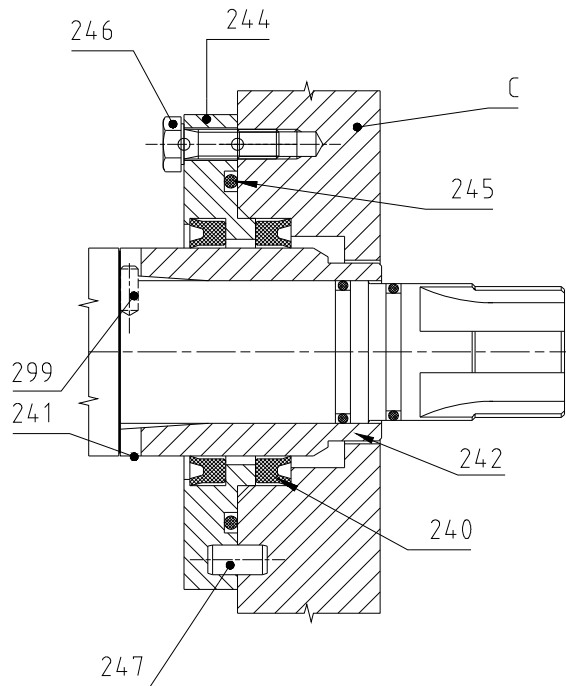
Spare Parts List



Spare Parts List

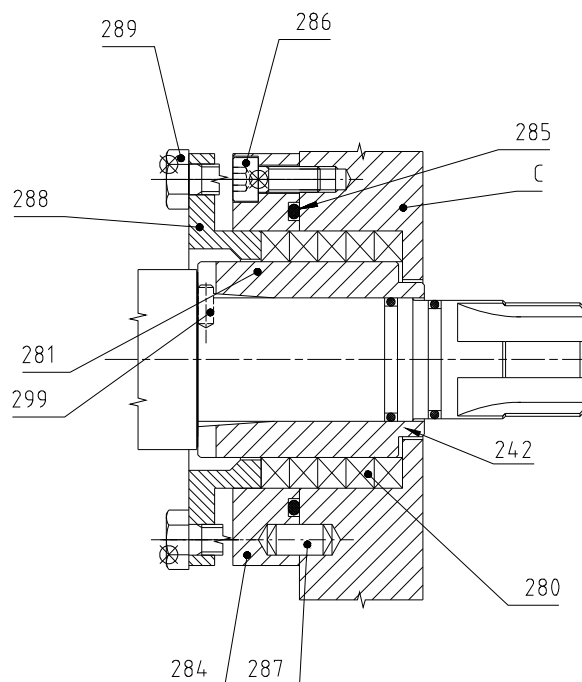
Seals for LE110, LE115, LE220, LE330, LE390 & LE440.

LIP SEAL

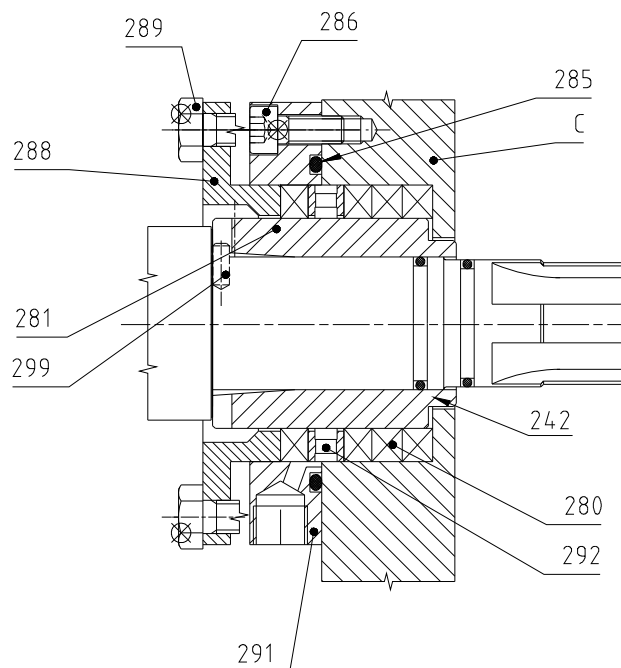


Spare Parts List

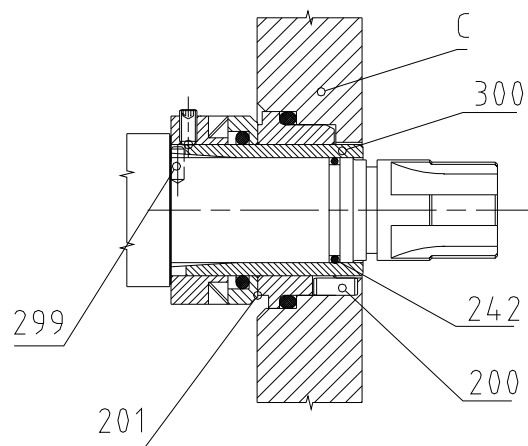
PACKING GLAND



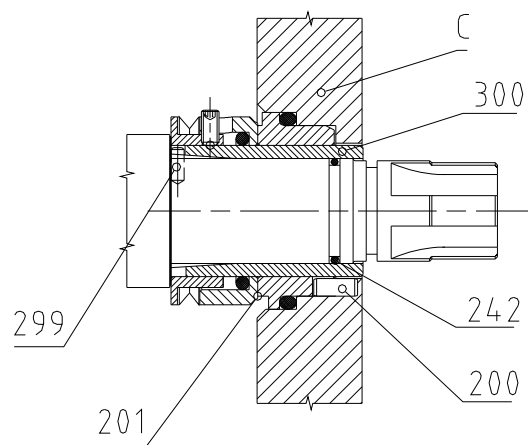
PACKING GLAND WITH HYDRAULIC *BARRIER*



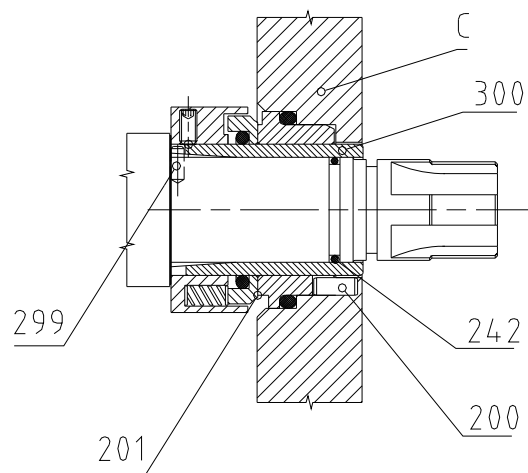
Spare Parts List



ROTARY MECHANICAL SEAL TYPE “KL2A”



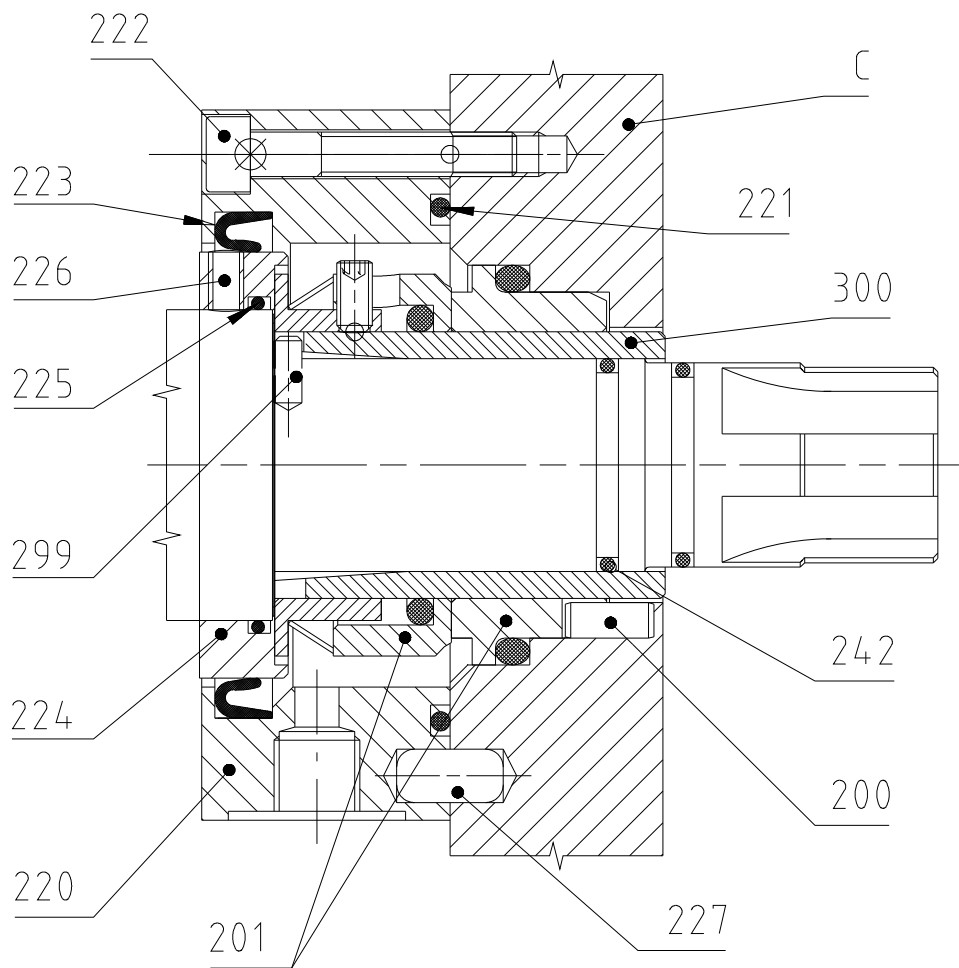
ROTARY MECHANICAL SEAL TYPE “U7K”



ROTARY MECHANICAL SEAL TYPE “C5E”

Spare Parts list

FLUSHED MECHANICAL SEAL

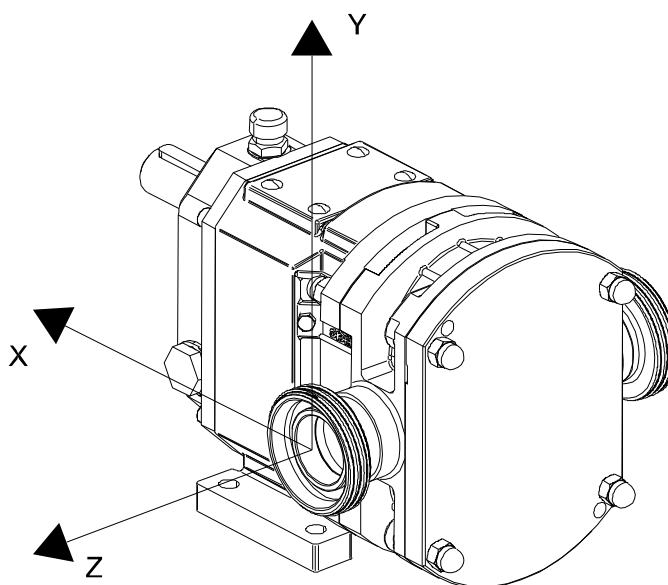


This technical drawing is an exploded view of a mechanical assembly, showing various components and their relative positions. The parts are numbered as follows:

- 1**: Main housing or base plate.
- 2**: Small pin or screw.
- 3**: Long cylindrical shaft or tube.
- 4**: Another long cylindrical shaft or tube.
- 5**: Gears or sprockets of different sizes.
- 11**: Small cylindrical components, possibly bushings or spacers.
- 12**: Small pin or screw.
- 13**: Small pin or screw.
- 15**: Small pin or screw.
- 17**: Ring or flange component.
- 18**: Circular flange or cover plate.
- 19**: Gears or sprockets.
- 23**: Gears or sprockets.
- 24**: Gears or sprockets.
- 25**: Small pin or screw.
- 26**: Small pin or screw.
- 27**: Small pin or screw.
- 28**: Rectangular plate or bracket.
- 29**: Flange or ring components.
- 30**: Small pin or screw.
- 302**: Small rectangular components, possibly spacers or washers.
- 303**: Small pin or screw.
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Maximum Nozzle Loads

Pump Type	FORCES				TORQUE			
	F _x (N)	F _y (N)	F _z (N)	EF (N)	M _x (Nm)	M _y (Nm)	M _z (Nm)	EM (Nm)
LE100	65	55	75	113	110	85	70	140
LE110/115	105	95	120	186	125	100	90	164
LE215	145	130	160	252	130	110	95	172
LE220	190	180	220	342	140	115	100	183
LE325	210	200	250	383	150	120	110	197
LE330/390	240	230	280	435	160	130	110	206
LE430/440	255	245	300	464	175	150	130	230
LE470/490	260	250	305	472	180	150	130	234
LE550/570	340	340	355	598	190	160	150	255
LE660/680	405	405	440	722	200	180	170	276



Recommended Lubrication & Service Intervals

Lubricants

<i>BRAND</i>	<i>WORKING TEMPERATURE</i>	
	<i>da/ from -20°C a +90°C</i>	<i>da/ from +90°C a +150°C</i>
ESSO	SPARTAN EP 68	SPARTAN EP 150
SHELL	OMALA OIL 68	OMALA OIL 150
CASTROL	ALPHA SP 68	ALPHA SP 150
BP	ENERGOL GR-XP 100	ENERGOL GR-XP 150
MOBIL	MOBILGEAR 626	MOBILGEAR 629
AGIP	BLASIA 68	BLASIA 150
FINA	GIRAN 100	GIRAN 150

Advised lubricants

<i>PUMP MODEL</i>	<i>LITRES</i>
LE 110 / 115	0,3
LE 220	0,8
LE 330 / 390	2
LE 440	4

Oil quantity

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Perth	T.	08 9303 0444	F.	08 9303 4430
Darwin	T.	08 8931 3300	F.	08 8931 3200
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