

INSTALLATION, OPERATION AND MAINTENANCE MANUAL

E/EP PUMPS

E-3 / E-4 / E-6 / E-8 / EP-3 / EP-4 / EP-6



"Quality Management System
ISO 9000:2008".



Soluções em Bombeamento

IMBIL
Pumping Solutions

Dear Owner,

Congratulations! You have just purchased a simple piece of construction equipment, designed and produced with the most advanced technology, with excellent performance, and which provides for easy maintenance.

The purpose of this Manual is to inform the user about the details of the equipment and the correct techniques for Installation, Operation and Maintenance.

IMBIL recommends that the equipment is installed and taken care of as recommended by the good techniques and in accordance with the instructions contained within this Manual, and that it is used in accordance with the service conditions for which it was selected (flow, total manometric height, speed, voltage, frequency and temperature).

MODEL: SERIAL NUMBER: TAG: ROTOR Ø: ROTATION: DIRECTION: FLOW [F]: AMT/PRESSURE: YEAR MANUF.:	 Soluções em Bombeamento <table><tr><td>MODELO:</td><td></td></tr><tr><td>SÉRIE:</td><td></td></tr><tr><td>TAG:</td><td></td></tr><tr><td>ROTOR Ø:</td><td></td></tr><tr><td>ROTAÇÃO:</td><td></td></tr><tr><td>SENTIDO:</td><td></td></tr><tr><td>VAZÃO [Q]:</td><td></td></tr><tr><td>AMT/ PRESSÃO:</td><td></td></tr><tr><td>ANO FABR:</td><td></td></tr></table> IMBIL IND. E MAN DE BOMBAS ITA LTDA - www.imbil.com.br RUA JACOB AUDI, 690 ITAPIRA SP - Indústria Brasileira CNPJ: 51.482.776/0001-26 - FONE (19) 3843-9833	MODELO:		SÉRIE:		TAG:		ROTOR Ø:		ROTAÇÃO:		SENTIDO:		VAZÃO [Q]:		AMT/ PRESSÃO:		ANO FABR:	
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IMBIL is not responsible for defects that result from the non-observance of these service prescriptions and recommends that this Manual is used by the staff responsible for the installation, operation and maintenance.

If there is a consultation about the equipment or ordering spare parts, indicate the code of the part, model, pump line and also the serial number found on the identification plate.

NOTE

IMBIL asks that the customer, after receiving the **WARRANTEE STATEMENT** for the equipment, fills out the information and sends the stub to IMBIL, making the exchange of information between IMBIL and the CUSTOMER easier.

TABLE OF CONTENTS

SAFETY – SECTION 1	Page 03
INSTALLATION – SECTION 2	Page 03
PRE-ASSEMBLY INSPECTION	Page 03
POSITIONING THE PUMP	Page 04
• Assembly	Page 04
SUCTION AND DISCHARGE LINE	Page 04
• Configuration of the Lines	Page 04
• Pipes/Pump Connection	Page 04
SUCTION LINES	Page 04
• Connections	Page 04
DISCHARGE LINE	Page 04
• Siphoning	Page 04
• By-Pass Lines	Page 04
ALIGNMENT	Page 05
• Activation by Coupling	Page 05
• Activation by Belt	Page 05
OPERATION – SECTION 3	Page 06
PRIMING	Page 06
OPERATION	Page 06
• Lines with by-pass	Page 06
• Lines without by-pass	Page 06
• Temperature of the Liquid and Overheating	Page 06
STOP	Page 07
VERIFYING THE TEMPERATURE OF THE BEARINGS	Page 07
PROBLEMS AND SOLUTIONS – SECTION 4	Page 07
LIST OF PARTS FOR THE E / EP PUMPS - SECTION 5	Page 10
MAINTENANCE AND REPAIRS – SECTION 6	Page 11
DISMANTLING OF THE PUMP AND THE MECHANICAL SEAL	Page 11
• Removal of the Frontal Inspection Lid and Wear Plate	Page 11
• Removal of the Flap	Page 11
• Removal of the Revolving Set	Page 11
• Removal of the Rotor	Page 11
• Removal of the Mechanical Seal	Page 12
• Removal and Dismantling of the Axle and Bearings	Page 12
• Assembly and Installation of the Axle and Bearings	Page 12
• Assembly of the Mechanical Seal	Page 13
• Installation of the Rotor	Page 14
• Installation of the Revolving Set	Page 15
• Assembly of the Flap	Page 15
• Installation of the Frontal Inspection Lid	Page 15
MAINTENANCE OF THE PRESSURE RELIEF VALVE	Page 16
• Final Assembly of the Pump	Page 16
LUBRICATION	Page 16
• Mechanical Seal Set	Page 16
• Bearings	Page 16

SAFETY – SECTION 1

See the operating manual provided by the manufacturer of the drive unit before starting the operation.

Before trying to open or handle the pump, you must:

1. Be familiar with the content of the manual.
2. Disconnect the energy feed source to guarantee that the pump remains inoperative.
3. Allow the pump to cool down, if it is overheated.
4. Check the temperature before opening any lid, plate or connection.
5. Close the suction and discharge valves.
6. Slowly and carefully bleed the pump.
7. Drain the pump.

This pump is designed to handle most non-volatile and non-corrosive liquids, containing specific solids.

Do not try to pump volatile, corrosive or flammable materials, which may damage the pump and, as a result, place people at risk.

Do not remove plates, lids, indication instruments, plugs or connections from an overheated pump. The pressure of the interior steam will cause the parts to be ejected with great force during removal. Allow the pump to cool down before handling it.

INSTALLATION – SECTION 2

This section offers generic recommendations and procedures that are necessary for inspection, positioning and adjustment of the pump and the lines.

Most of the information relates to the facilities with *static elevation, where the pump is positioned above the level of the liquid to be pumped*.

In cases of facilities with *flooded suction, where the liquid supplies the pressurized pump*, certain characteristics, such as assembly, and configuration of the lines and primer, must be specifically designed for each situation. Since the pressure supplied to the pump is critical, with regards to performance and safety, make sure that the input pressure is limited to 50% of the maximum allowable operating pressure, as indicated on the pump's efficiency curve.

PRE-ASSEMBLY INSPECTION

Before installation, check to see if there is any damage that has occurred during transport.

Proceed as follows:

- Check to see if there are cracks, dents, damaged threading or other visible damages.
- Check to see if there are loose parts and tighten them.
- Check the direction of the rotation marked on the pump. Check if the axle rotates counter-clockwise, from the side of the rotor.
- Check the levels and lubricate if necessary. If the pump or the drive unit is stored for more than 12 months, some of the components or lubricants may have exceeded the maximum time for storage and need to be *inspected or replaced* to guarantee the maximum efficiency of the pump.

POSITIONING THE PUMP

Assembly

Leveling the unit is essential for proper functioning.

The complete rotating set may be removed by opening the frontal inspection lid or the opposite side after separating the drive unit, in order to provide the necessary space for removal.

SUCTION AND DISCHARGE LINE

Configuration of the Lines

Keep the suction and discharge lines as straight as possible to minimize pressure losses due to friction. Use the smaller number of elbows and gaskets and, if necessary, use those that are the long radius type to minimize loss of pressure.

Pipes/Pump Connections

Before tightening a connection flange, provide perfect alignment between the flange and the pump intake. Never pull a pipe into place by tightening the screws of the flange and/or couplings.

The pipes closes to the pump should be independently supported in order to prevent tension on the pump. If hoses are used, they should be properly supported when full of liquid and under pressure.

SUCTION LINES

To prevent air pockets, which may affect the priming process, the suction line should be as short and straight as possible. When the operation involves lifting the liquid in the suction, the line must always have a tilt ascending in the direction of the pump intake. If, at any point in the line, there is a descending tilt, pockets of air will form.

Connections

The suction lines should be the same gauge as the pump intake. If reductions are used, they must be the eccentric type, installed with the flat side up, in order to prevent air pockets from forming. Normally, valves are not used in the suction line. If there is one installed, its handle should be in the horizontal position to prevent pockets of air from forming.

DISCHARGE LINES

Siphoning

Do not end the discharge line at a level that is lower than that of the liquid being pumped, unless a siphon break valve is installed on the line. If not, a siphon action may occur, damaging the pump.

By-pass Lines

During the priming cycle, the air from the suction line must be released into the atmosphere using a by-pass line installed between the discharge side of the pump and the flap.

A self-priming pump *will not prime* if there is a sufficient column of static water to keep the discharge flap closed.

NOTE

The by-pass line must be sized so that it does not affect the discharge capacity of the pump. The diameter of the by-pass line must be at least 25 mm (1 inch) to prevent clogging.

ALIGNMENT

On a set activated using elastic coupling or by a “V” type belt, assembly must be done so that the axles are aligned and parallel to each other. It is very important that the alignment is verified after assembly of the pump and pipes, before starting it.

The alignment of the set must be verified before starting the pump. Before starting the verification, check to see that all the anchoring screws are tightened. The screws on the base of the pump and the drive unit should also be firmly tightened.

Alignment in one direction may change the alignment of the other. Check each procedure after changing the alignment.

Activation by coupling

When using couplings, the axles must be aligned on the horizontal and vertical planes. Most couplings require a specific clearance between the drive shaft and the driven shaft. Consult the maintenance literature of the coupling manufacturer.

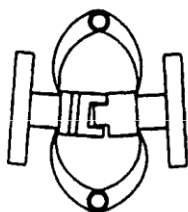


Figure 1 A – Flexible Coupling

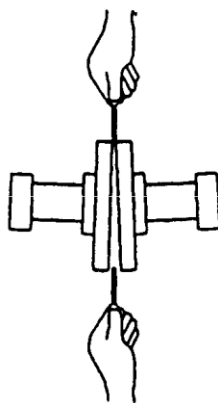
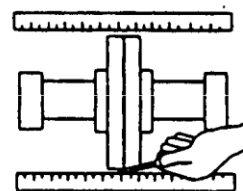


Figure 1 B – Rigid Coupling



The flexible couplings should be aligned. This can be done using a caliper (See Figure 1A). The rigid couplings must be aligned using a caliber strip to measure the distance between the two halves of the part. (See Figure 1B). Check the parallel adjustment, laying a ruler on both halves of the coupling, on the upper, lower and side parts.

Activation by belt

When activation is done by a belt, the axles of the pump and the actuator must be parallel, the pulleys aligned and the belts correctly stretched.

Never start the pump without having protection over the rotating parts.

Rotating parts that are exposed can catch on clothes, fingers or tools, and cause serious injuries to people.

OPERATION – SECTION 3

The rotation of the pump and the operating conditions must be within the range of efficiency.

PRIMER

Install the pump and the lines as described in *INSTALLATION – Section 2*. Check that the lines are securely assembled. Check if the pump is duly lubricated.

This pump is self-priming but must never be put into operation unless there is liquid inside it.

Add liquid to the inside of the pump when:

1. The pump is being put into operation for the first time.
2. The pump is not used for a considerably long period of time.
3. The liquid inside the pump has evaporated.

Once the pump has been filled, it will prime as many times as necessary.

After the pump is filled, replace and tighten the filler cap. Do not start the pump unless all the lines are firmly assembled. If they are not, the liquid, forced under pressure, may cause personal injuries.

To fill the pump, remove the filler cap, on the top of the body of the pump, and add clean liquid until it is completely full. Replace the cap or the plug.

NOTE

The threaded passage on the inner wall of the casing opposite the flap, is blocked by a plug and must be kept closed so that the priming is maintained.

OPERATION

Lines with By-pass

If the by-pass line is open, the air from the suction line will be unloaded into the tank during the priming cycle. The liquid, then, will continue circulating through the by-pass line while the pump is operating.

Lines without By-pass

Open all the valves of the discharge line and start the pump. The primer is indicated by a positive reading on the manometer of the discharge line or by quieter operation. The pump may not prime immediately because the line should fill beforehand. If the pump does not complete the priming in 5 (five) minutes, stop the operation and check to see if air has entered in the suction line.

Temperature of the Liquid and Overheating

The maximum temperature of the liquid for this pump is 71°C. Do not operate it with temperatures higher than this.

Overheating may occur if the suction or discharge line valves are closed. The operation of the pump with the valves closed may cause the liquid to boil, increase the internal pressure of the pump and cause rupturing or even explosion of the casing of the pump.

If overheating occurs, stop the pump and let it cool down before handling it.

Fill the pump again with cold liquid.

To prevent breakage or explosion caused by overheating, this pump is equipped with a release valve that will open if the internal pressure reaches the critical point. If the pump overheats, stop the operation immediately and allow the unit to cool completely. *Carefully approach any overheated pump.* It is advisable to replace the release valve with each general repair or every time it is activated by overheating. *Never* replace this valve for one that is not specified.

STOP

Never suddenly interrupt the flow of the liquid. If the pumped liquid stops quickly, pressure surges may be transmitted to the pump and pipes, causing damages to the equipment. Always close all the valves slowly.

If the pumps are activated by internal combustion motor, reduce the rotation slowly and allow the motor to operate at a low speed before stopping.

If the application requires a very high repression, close the gate valve slowly before stopping the pump.

VERIFYING THE TEMPERATURE OF THE BEARINGS

Temperatures of up to 71°C are considered normal for bearings. They can operate safely at up to 82°C.

The temperature of the bearings can be measured by placing a tape thermometer in contact with them.

A sudden increase in the operating temperature of the bearings indicates that they are close to breaking point. Verify that the lubricant of the bearings is in accordance with what is recommended. The overheating of the bearings may also be caused by the misalignment of the axle and excessive vibration.

New bearings may present initial temperatures that are higher than normal. However, after some time of continuous operation, the temperature should return to normal level.

PROBLEMS AND SOLUTIONS – SECTION 4

Before trying to open or repair the pump:

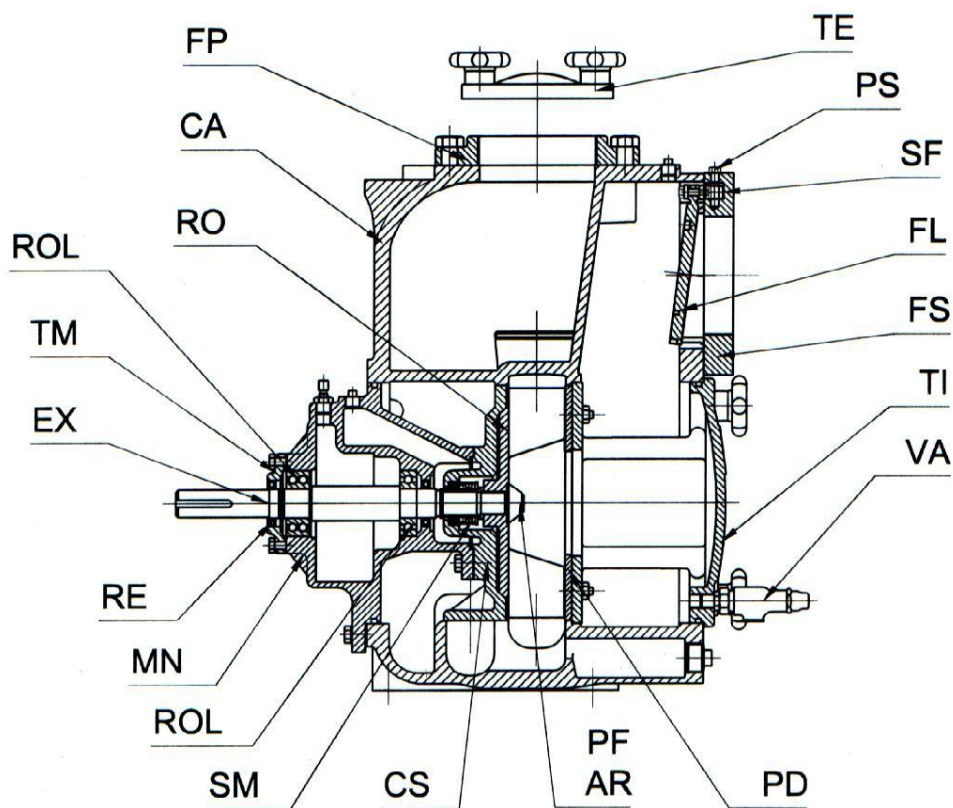
1. *Familiarize yourself with this Manual.*
2. *Turn off the drive unit to verify that the pump remains inoperative.*
3. *Allow the pump to cool in case it has overheated.*
4. *Verify the temperature before opening plates, lids or plugs.*
5. *Close the suction and discharge valves.*
6. *Allow the pump gases to escape.*
7. *Drain the pump.*

	PROBABLE CAUSE	PROBABLE SOLUTION
NON-PRIMING PUMP	There is an insufficient amount of liquid for the pump. Flap contaminated or defective. Air has entered the suction line. Collapse of the internal lining of the suction hose. Mechanical seal or gasket of the pump worn or leaking. Elevated suction or height of excessive repression.	Add liquid to the pump. See PRIMER. Clean or substitute the flap. Repair the leak. Replace the suction hose. Check the pump vacuum. Replace the seal or the gasket. Check the installation of the lines and install a by-pass line. See INSTALLATION.
THE PUMP STOPS OR DOES NOT PRODUCE THE SPECIFIED FLOW OR PRESSURE	Air has entered the suction line. Collapse of the internal lining of the suction hose. Mechanical seal or gasket of the pump worn or leaking. Suction inlet not immersed to the appropriate level or the tank is too small. Rotor or other wear parts are excessively worn down or damaged. Rotor is blocked. Pump rotation is very low. Very high repression. Suction height is very elevated.	Repair the air intake. Replace the suction hose. Check the pump vacuum. Replace the seal or the gasket. Check the installation and correct the level of submersion to the extent necessary. Replace the parts that have excessive wear. Remove the particles from the rotor. Check the output of the motor. Check that the belts and couplings are sliding. Install a by-pass line. Measure the elevation with the help of a vacuum gauge. Reduce the height and or losses due to friction in the suction line.

PUMP REQUIRES EXCESSIVE POWER	Pump rotation is very high.	Check the output of the drive unit. Verify that the pulleys and couplings are properly sized.
	Very low repression.	Adjust the discharge valve.
	Solution is highly concentrated.	Dilute if possible.
	Seized bearing(s).	Disassemble the pump and check the bearings.
PUMP CLOGS OFTEN	Discharge flow is very low.	Open the discharge valve completely to increase the flow and increase the controlled rotation (internal explosion motors).
	Flap blocked or stuck.	Clean the flap.
	Solution is highly concentrated.	Dilute if possible
EXCESSIVE NOISE	Pump cavitation.	Reduce the suction elevation and/or losses due to friction in the suction line. Note the reading of the vacuum gauge and consult with our authorized representatives.
	Pumping loaded with air.	Locate and eliminate the sources when air enters the system.
	Pump or drive unit is not properly attached.	Tighten attachments.
	Rotor is blocked or damaged.	Clean or replace the rotor or damaged parts.
BEARINGS ARE OPERATING AT A HIGH HEAT	The operating temperature of the bearing(s) is high but within the limits.	Check the temperature often to monitor any excessive and sudden increase.
	Lubrication level is low or lubrication is incorrect.	Check the level and the type of lubricant.
	The suction and discharge lines are not properly attached.	Check the attachment of the lines.
	Drive unit is misaligned.	Align the drive unit.

LIST OF PARTS FOR THE E / EP PUMPS - SECTION 5

Code	Quantity	Description
CA	01	Casing
FP	01	Pressure flange
FS	01	Suction flange
TE	01	Filler cap
MN	01	Bushing
TM	01	Bushing cap
RE	01	Oil seal
EX	01	Axle
ROL	01	Ball bearings
ROL	01	Ball bearings
PF	01	Rotor Allen screw
AR	01	Washer
CS	01	Casing of the machine seal
RO	01	Rotor
PD	01	Wear plate
TI	01	Inspection lid
VA	01	Pressure release valve
SF	01	Flap support
PS	01	Flap support pin
FL	01	Flap
SM	01	Mechanical seal



MAINTENANCE AND REPAIR – SECTION 6

DISASSEMBLING THE PUMP AND THE MECHANICAL SEAL

Many maintenance functions can be performed by draining the pump and removing the set from the frontal inspection lid. If a larger repair is needed, the lines and the drive unit should be disconnected from the pump. The information that follows is a guide for complete disassembly.

Before beginning maintenance on the pump, turn off the drive unit, to ensure that the pump remains inoperative. Close all the suction and discharge line valves.

For disassembly and repair of the drive unit, consult a representative.

Before starting disassembly and maintenance of the pump:

1. Familiarize yourself with this manual.
2. Turn off the drive unit to ensure that the pump remains inoperative.
3. Allow the pump to cool down if it is overheated.
4. Verify the temperature before opening plates, lids or plugs.
5. Close the suction and discharge valves.
6. Release the pump pressure slowly and carefully.
7. Drain the pump.

Removal of the Frontal Inspection Lid and the Wear Plate

- Remove the plug from the casing and drain the pump.
- Remove the nuts and pull the set from the frontal inspection lid and the wear plate of the casing.
- Inspect the wear plate and replace it if necessary.
- Inspect the “O” ring of the frontal inspection lid.
- Clean and reinstall the plug.

Removal of the Flap

- Remove the Flap pin.
- Reach the Flap through the opening of the frontal inspection lid and pull the entire set.

Removal of the Revolving Set

- Remove the drive unit, providing space to remove the Revolving Set.
- Remove the plug from the casing of the mechanical seal and drain the lubricant from the seal.
- Lock the rotor and remove the attachment screw and the washer.
- Remove the pressure screws and washers that secure the revolving set to the pump casing and remove the revolving set.
- Remove the “O” ring from the set.

Removal of the Rotor

- After having removed the revolving set from the pump casing, loosen the rotor from the axle.
- Inspect the rotor and replace it if it is cracked or worn.

Removal of the Mechanical Seal

- Remove the sleeve and the rotating part from the mechanical seal
 - Place the plate of the seal on a flat surface.
 - Use a wooden pin and push the rear part to the stationary seat, the “O” rings and the stationary element may be removed.
 - Remove the “O” ring from the sleeve.
-

Removal and Disassembly of the Axle and Bearings

NOTE

Disassemble the axle and the bearings only when there is evidence of wear or damage. Disassembly of the axle and the bearings in the field is not recommended. These services should be done by qualified personnel at a properly equipped workshop. The bearings should be kept free from any dirt or foreign materials. Do not turn the bearings when they are dry. This may cause premature failure.

- Remove the plug from the bearings casing and drain the lubricant.
 - Remove the bearing cover and the retainer.
 - Remove the bearings casing gasket and force the retainer out of the cover.
 - Place a block of wood on the end of the axle, next to the rotor, and hit it with a hammer to remove the set from the axle and bearings from the bearings casing.
 - Clean and inspect the bearings, while still assembled.
 - Clean the bearings casing, axle and components (except the bearings) with a soft cloth that is soaked with cleaning solvent.
 - Inspect the parts to detect excessive wear or damage and replace them if necessary.
 - Fully clean the bearings with new cleaning solvent and dry them with compressed, filtered air and cover them with a layer of thin oil.
 - Spin the bearings with your hands to check for jerks or to see if they stick, and inspect the ball bearings.
 - If the bearings need to be replaced, remove the abutment ring from the bearing and use an extractor to remove them from the axle.
 - Push the internal oil retainer and release it from the casing.
-

Assembly and Installation of the Axle and Bearings

- Clean the bearings casing, axle and components (except the bearings) with a soft cloth that is soaked with cleaning solvent.
- Inspect the parts to detect excessive wear or damage and replace them if necessary.
- Inspect the axle to detect distortions, marks or scratches on the threading next to the rotor, buff out minor flaws with a fine file or sandpaper.
- Replace the axle if it is defective.
- Position the retainer next to the rotor in the cavity of the bearings casing.
- Press the retainer into the casing until the face is completely parallel.

NOTE

Position the bearing next to the rotor on the axle with the sealed side turned toward the rotor. Position the external bearing on the axle with the abutment ring on the external diameter of the bearing to the side of the motor.

When assembling the bearings on the axle, never press or hit the cap, the ball bearings or the bearing cage. Only press on the cube.

- The bearings may be heated to facilitate assembly, an induction heater, hot oil bath or electrical oven can be used to heat the bearings (they should never be heated with a direct flame or directly over a hot flame).
- Heat the bearings at a uniform temperature that is no higher than 120°C.
- Assemble the bearings, sliding them onto the axle, one at a time, until they are totally at the abutment (this should be done quickly, in a continuous movement, to prevent the bearings from cooling and sticking to the axle).
- After installed and cooled, check that there has been no movement of the bearings during cooling, which separate then from the abutment.
- If this has happened, press the bearings against the abutment, using an appropriately sized sleeve.
- If heating was not used, use an appropriately sized sleeve and a mechanical or hydraulic press to assemble the bearings on the axle.
- Attach drive side bearing with the retaining ring.
- Introduce the axle with the bearings assembled to the casing until the drive side retaining ring abuts the bearings casing.
- Press the external oil retainer on the bearing lid.
- Assemble the bearing lid cover and the bearing cover.
- Lubricate the bearings casing.

Assembly of the Mechanical Seal

NOTE

A new seal must be installed every time the seal is removed from the pump. The wear marks of the polished parts do not match the second assembly. Reusing the seal could cause premature defects.

- Clean the cavity of the mechanical seal and the axle with a soft cloth soaked with new cleaning solvent.
- Inspect the cavity of the stationary abutment ring, looking for dirt; the cavity of the stationary seat should be completely clean before installing the seal.
- Lubricate the “O” ring of the axle sleeve and the “O” ring of the stationary seat with a small amount of thin oil.
- If the casing of the mechanical seal has been removed, install the gasket of the casing.
- Attach the axle to the bushing, and with the fixation screws, attach the lid of the bushing.
- To prevent damages to the “O” ring of the sleeve on the threading of the axle, stretch the “O” ring on a piece of tubing, put the tubing over the threading of the axle and roll the “O” ring over the tubing to the axle.
- Remove the tubing and continue rolling the “O” ring along the axle until it rests against the lug of the axle.

When installing a **new mechanical seal set**:

- Remove the protective film between the faces of the seal.
- Lubricate the “O” ring of the stationary seat with thin oil.
- Install the stationary element of the seal on the stationary seat and press the stationary set into the cavity of the casing of the seal until it completely abuts the bottom of the cavity (the use of a plastic tube may help in this operation).
- Slide the revolving part of the seal (which consists of the sleeve, the axle, centralizing washer of the spring, retainer and accordion of the spring, and the revolving element) over the axle until the faces of the seal are touching.
- Proceed with the assembly as described in the section, **Installation of the Rotor**.

If, in **case of emergency**, there is the need to use the **used seal**:

- Carefully separate the revolving and stationary faces from the retainer, the accordion and the stationary abutment.
- Handle the parts of the seal extremely carefully to prevent damage. Be careful not to contaminate the polished surfaces. Even fingerprints can decrease the life of the seal. If necessary, clean the surfaces with a non-oil based solvent and a clean, lint-free cloth. Lightly rub it in circles to avoid scratching the surfaces.
- *Carefully* wash the metal parts and let them dry completely.
- Inspect the components of the seal to see if there is wear, scratches or deep scores that could cause leaks.
- Inspect the sleeves to see if there are cavities or cuts at both ends.
- If any of the components show signs of wear, or if the sleeve is damaged, replace the entire seal. *Never mix new pieces with used pieces.*
- Install the stationary element of the seal on the stationary seat and press the stationary set into the cavity of the seal casing until it rests fully on the bottom of the cavity (the use of a plastic tube may help in this operation, the internal diameter should be slightly larger than the external diameter of the sleeve).
- Slide the revolving part of the seal (which consists of the sleeve, the axle, centralizing washer of the spring, retainer and accordion of the spring, and the revolving element) over the axle until the faces of the seal are touching.
- Proceed with the assembly as described in the section, **Installation of the Rotor**.

Installation of the Rotor

- Inspect the rotor and replace it if cracked or it has excessive wear.
- See if there is dirt or damage to the threads of the rotor and the axle, clean and lubricate if necessary.

NOTE

The axle and rotor threading should be completely clean before installing the rotor. Even the slightest amount of dirt on the threading may cause the rotor to seize on the axle, making future disassembly difficult or even impossible without damaging the rotor or axle.

- Apply an anti-seizing product to the threading of the rotor and screw the rotor onto the axle until it cannot be tightened any more.

NOTE

*Proceed in accordance with the section **Installation of the Revolving Set** before assembling the attachment screw and the washer of the rotor. The revolving set should be installed on the casing of the pump in order to tighten the attachment screw.*

- After the revolving set is installed on the casing of the pump, lubricate the threading of the attachment screw with penetrating and anti-seizing oil and install the washer of the rotor and tighten the attachment screw.

Installation of the Revolving Set

NOTE

If the pump has been completely disassembled, it is recommended that the internal retention valve and the inspection lid are assembled at this time. The inspection lid should be installed so that any adjustments can be made on the looseness of the rotor.

- Install the “O” ring of the bearings casing and lubricate with thin grease.
- Leave the revolving set loose on the pump casing, being careful to not damage the “O” ring.
- Attach the revolving set to the pump casing with the attachment screws. *Do not* completely tighten the attachment screws until the frontal inspection lid has been assembled and the looseness of the surface of the rotor has been adjusted.
- A space of 0.5 to 0.7 mm between the rotor and the wear plate is recommended for maximum efficiency of the pump.
- After the rotor drags the wear plate, adjust the set using the adjustment screws.

Assembly of the Flap

NOTE

The Flap must be completely replaced. Parts of this set are not sold separately. It is essential that the wear plate is not assembled in order to be able to assemble the Flap.

- Inspect the flap set and replace if necessary.
- Reach, with your hand, the internal retention valve assembly spot by opening the inspection lid and positioning the valve adapter in the assembly slot of the suction flange.
- Align the adapter with the opening of the flange and attach the set with the pin of the retaining valve.
- If the suction and discharge flanges have been removed, install the respective gaskets, apply a gasket-seal to both coinciding surfaces, and attach them to the pump casing with the screws.

Installation of the Frontal Inspection Lid

- If the wear plate has been removed and replaced, carefully center it on the inspection lid and attach it with the pressure screw and washer (the wear plate *must* be concentric to prevent seizure when the frontal inspection lid is mounted).
- Replace the “O” ring and lubricate with a generous amount of No. 2 grease.

- Remove scales and particles from the surfaces that may interfere or prevent a good seal at the contact with the pump casing.
- Make sure that the wear plate does not touch the rotor.

NOTE

To facilitate future disassembly, apply a film of grease or penetrating oil to the lug of the inspection lid, or to any surface that comes in contact with the pump casing. This will prevent the formation of rust and scales.

- Attach the frontal inspection lid set by uniformly tightening the nuts, not tightening them too much, but just enough to guarantee a good seal on the lug of the rear lid.
- Make sure that the wear plate is not fastened to the casing.

MAINTENANCE OF THE PRESSURE RELEASE VALVE

It is recommended that the pressure release valve is replaced with each complete maintenance operation or when the pump overheats and the valve is triggered. Periodically, the valve should be removed for inspection and cleaning. When assembling the release valve, apply a sealant to the threading of the valve. Position the release valve with the discharge side directed downward.

Final Assembly of the Pump

- Install the spline on the axle and connect it to the drive unit.
- Ensure that safety guards are installed over the revolving parts.
- Install the suction and discharge lines and open all the valves.
- Ensure that all the connections of the line are properly tightened, supported and secure.
- Ensure that the pump and the drive unit have been properly lubricated.
- Remove the set from the fill lid and fill the pump casing with clean liquid.
- Reinstall the fill lid and tighten it.

LUBRICATION

ATTENTION: THE PUMP CANNOT OPERATE WITHOUT OIL ON THE BUSHING

Mechanical Seal Set

Before starting the pump, remove the vent plug and fill the casing of the mechanical seal with SAE 30 oil without detergent.

Bearings

- Regularly check the oil level through the display, keeping the level in the middle of the display. When needed, add SAE 30 oil, without detergent, through the hole of the vent, not filling it to a level that is too high, since this may result in the overheating of the bearings and premature failure.
- Under normal conditions, drain the bearings casing once a year and fill it with clean oil. Change the oil more often if the pump operates continuously or if it is installed in an environment that is subject to sudden changes in temperature.

NOTE

Regularly monitor the condition of the lubricant to check for the presence of rust or condensation. This is especially important where significant temperature variations occur.

- For operating conditions in low temperatures, check with the oil supplier to obtain the most suitable type of oil.

Table of Recommended Oils

Manufacturer	Up to 3000 rpm	over 3000 rpm
CASTROL	HYSPIN - 68	HYSPIN - 46
ATLANTIC	EUREKA - 68	EUREKA - 46
ESSO	TURBINE OIL - 68	TURBINE OIL - 46
MOBIL OIL	DTE - 26	DTE - 24
IPIRANGA	IPTUR AW - 68	IPTURAW - 46
PETROBRÁS	MARBRAX TR - 68	MARBRAX TR - 46
SHELL	TELLUS -68	TELLUS - 46
TEXACO	REGAL R & O - 68	REGAL R & O - 46

When these are not available, use SAE 20 or SAE 30 for automobiles, do not use HD.