



PL SERIES ROTARY LOBE PUMP

User Manual



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General Information

- This user manual relates to PETROLAND PL Series positive-displacement Lobe Pumps with non-contact rotors.
- The entire user manual must be read thoroughly before the pump is transported, lifted , installed, assembled and any other activity described in this user manual. Everyone who is to work with this pump must be read this user manual ve before it is taken into operation.
- Check that the delivery is complete and undamaged. Any deficiencies or damage must be reported immediately to the transport company and the supplier.
- The user is responsible for compliance with the safety requirements described in this user manual.
- If people who are expected to have a need to refer to the user manual are of a different linguistic origin than the language in which the user manual has been supplied , it is recommended that the user manual is translated into the language in question.
- In addition to the instructions contained in this user manual, we also refer to the prevailing local national laws and regulations . The Users responsible for compliance with these.
- The owner of the pump is responsible for ensuring that everyone who works with the pumps has the necessary background.
- In the event that this user manual or other regulations recommend the use of personal protective equipment.
- The pump may only be used under the operating conditions specified when the order was placed. Any deviation from the requirements, the user should contact supplier.
- The owner or user of the pump must ensure that this manual is updated.
- In the event that the pump is transferred to a third party, this user manual with any updated amendments and the operation Conditions defined when the order was submitted must accompany the pump.

PETROLAND assumes no liability for any personal injury or damage to the Lobe pump or other material damage resulting from;

- Any amendments to the pump not approved by PETROLAND.
- A failure to observe the safety regulations or other instructions in this user manual.
- The use of non-original PETROLAND spare parts.
- Any fault, blockage or breakdown in the pipe system

The owner or user is responsible for protecting the pipe system against faults, blockages and explosions.

1. Quality Management System

PETROLAND pumps are manufactured in accordance with PETROLAND's quality management system, which is certified by TÜV NORD in accordance with the requirements of ISO 9001:2008.

2. Testing of Pumps

- All PETROLAND Pums have been statically and dynamically tested in the factory.
- Static pressure testing is conducted to ensure that the pumps do not leak, and that they can maintain the specified pressures.
- The dynamic test is conducted to ensure that the pump can deliver the specified volume of liquid at the specified pressures.
- The pumps are tested with water.
- Pumps fitted with a heating/cooling jacket are also speacially tested to achieve extra safety to ensure that the heating/cooling liquid cannot pass into pump liquid.
- After testing the pump is emptied, but it has not been cleaned for test liquid in the factory.
- If the specific test certificate is demanded , contact PETROLAND to supply it certified by accredited institution accordance with international classification companies.
- All pumps are tested accordance with PETROLAND Quality Management System and International standard procedures.

3. EC Declaration of Conformity

PETROLAND pumps are CE-labelled from the factory and supplied with an EC Declaration of Conformity depending on whether the pump has been bought with or without a motor.

When fitting a PETROLAND pump in an existing system and connecting pumps and motors, we would point out that the whole plant/combination of motor and pump must be assessed and given a new CE label in order to ensure that the combination represents no new hazards with regard to health and safety.

A PETROLAND pump may not be put into operation until this CE labelling procedure has taken place. The manufacturer that ultimately assembles the final system is responsible for ensuring that such compliance is achieved. PETROLAND is not responsible for this compliance.

The above requirement is valid within the EC.

			
www.petroland.com.tr		Tel: +90 216 634 45 00 Pbx	
○ Pump Code: ○			
Flow Rate:	m ³ /h	Pressure:	Bar
Serial No:			

PETROLAND pump label

4. Working Principle

The pumps are of the positive displacement rotary type with lobed rotors. The volume at the inlet increases when the rotors rotate and the product is drawn into the pump. It is then transported in the space between the lobes and the periphery of the pump housing to the discharge side. The volume between the rotors is reduced here and the product is forced out through the outlet.

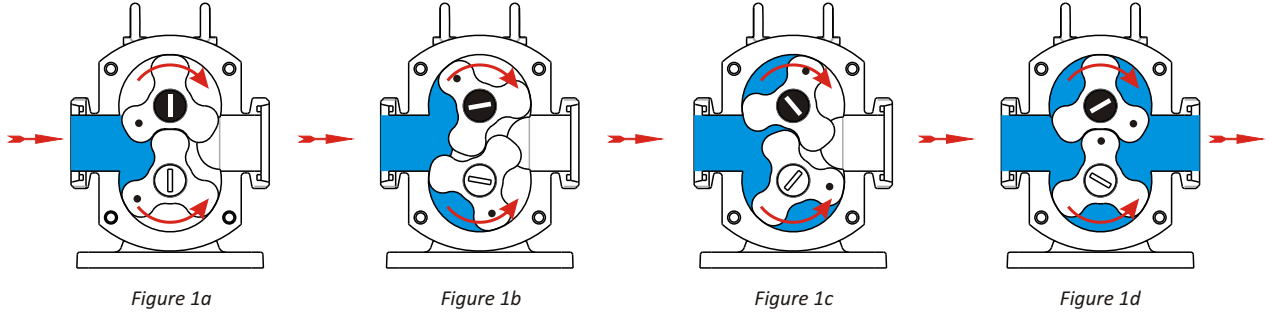


Figure 1: Shows the liquid flow through the PL Series Pump – seen from the front end.

① - DRIVE SHAFT

② - IDLE SHAFT

5. Direction of Rotation

Direction of flow all depends on rotation of the rotor. It is possible to change the flow direction by changing direction of rotation.



Figure 2a

Clockwise rotation / Suction on the left, discharge on the right



Figure 2b

Counter-Clockwise rotation / Suction on the right, discharge on the left

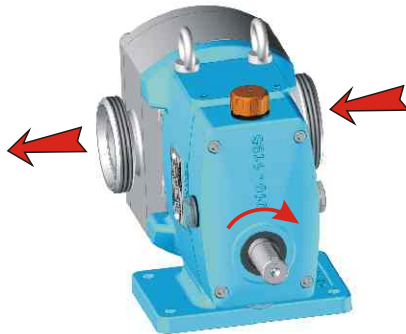


Figure 2c

Clockwise rotation / Suction on the right, discharge on the left

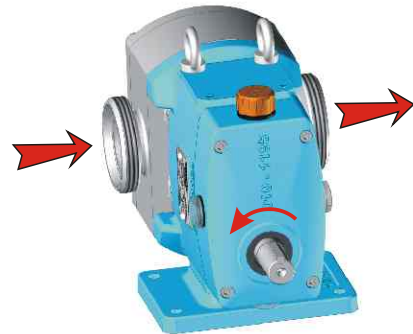


Figure 2d

Counter-Clockwise rotation / Suction on the left, discharge on right

Figure 2: Direction of suction/discharge accordance with direction of rotation.

6. Pump Versions

This user guide covers all standard versions of the PETROLAND PL Series pumps.

Pump sizes described in Table 1: A list of pump sizes based on the internal diameter of the pump's inlet/outlet.

Pump versions described in the section entitled "Pump models and sizes"

The versions shown in Section 12. Code System; the codes of the various pump versions together with an explanation of what they mean.

7. Pump Models and Sizes

The Petroland pump is supplied in the following pump models and sizes:

PL Series				
Model	Inlet / Outlet [mm]	Inlet / Outlet Flange Connection	Inlet / Outlet [inch]	Inlet / Outlet ANSI Flange
PL 125	25	DN25 - PN16	1"	150 - 300
PL 140	40	DN40 - PN16	1½"	150 - 300
PL 150	50	DN50 - PN16	2"	150 - 300
PL 250	50	DN50 - PN16	2"	150 - 300
PL 265	65	DN65 - PN16	2½"	150 - 300
PL 380	80	DN80 - PN16	3"	150 - 300
PL 3100	100	DN100 - PN16	4"	150 - 300
PL 4100	100	DN100 - PN16	4"	150 - 300
PL 4125	125	DN125 - PN16	5"	150 - 300

Table 1: Inlet/Outlet norm accordance with pump size. (Contact PETROLAND for different connection systems and norms.)



Figure 3: Shows what is designated as front and rear of the PETROLAND pump.

In this manual the front and the rear ends of the PETROLAND pump are referred to shows which end is called front and which is called rear.

8. Heating / Cooling Jackets

Petroland pumps can be fitted with a heating jacket on the front cover and on the casing . Heating jackets are used to keep the pump liquid fluid, and are often necessary when pumping highly viscous liquids or liquids that tend to coagulate.

We recommend that the pump be heated before operation.

The heating/cooling chambers are heated or cooled by connecting a separate circulatory system that circulates heating liquids such as water, steam or oil.



The pressure in the heating jacket may not exceed 10 bar.

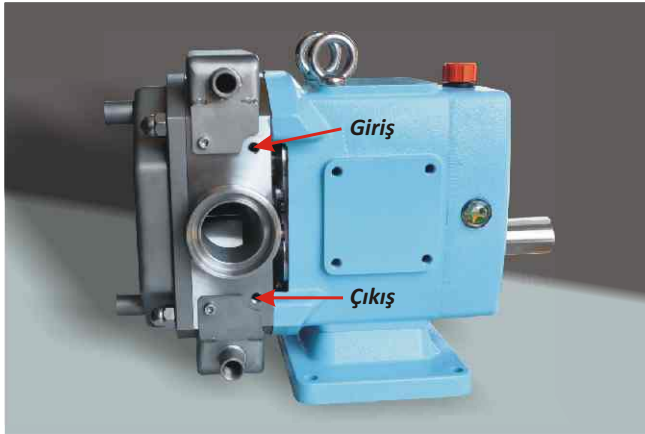


Figure 4: Inlet/Outlet of mechanical seal flushing liquid.

Jackets on the casing can be connected by flexible hosepipe for circulating

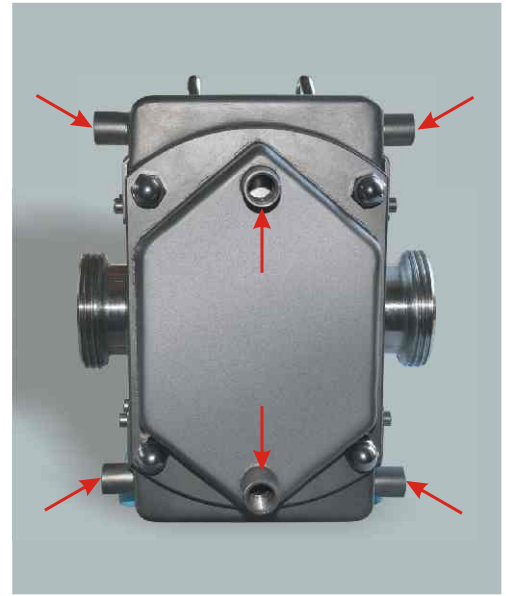


Figure 5: Inlet/Outlet of heating/cooling jacket.



Figure 6: Flexible connection hosepipe for jacketed casing design.

9. Rotor Clearance

Rotor Clearance must be precisely maintained to provide maximum pumping efficiency, yet prevent contact between rotors, rotor housing and front cover during operation.

If pump efficiency is below expectation or if parts contact has occurred during operation (within rated differential pressure) check rotor clearances and adjust if incorrect.

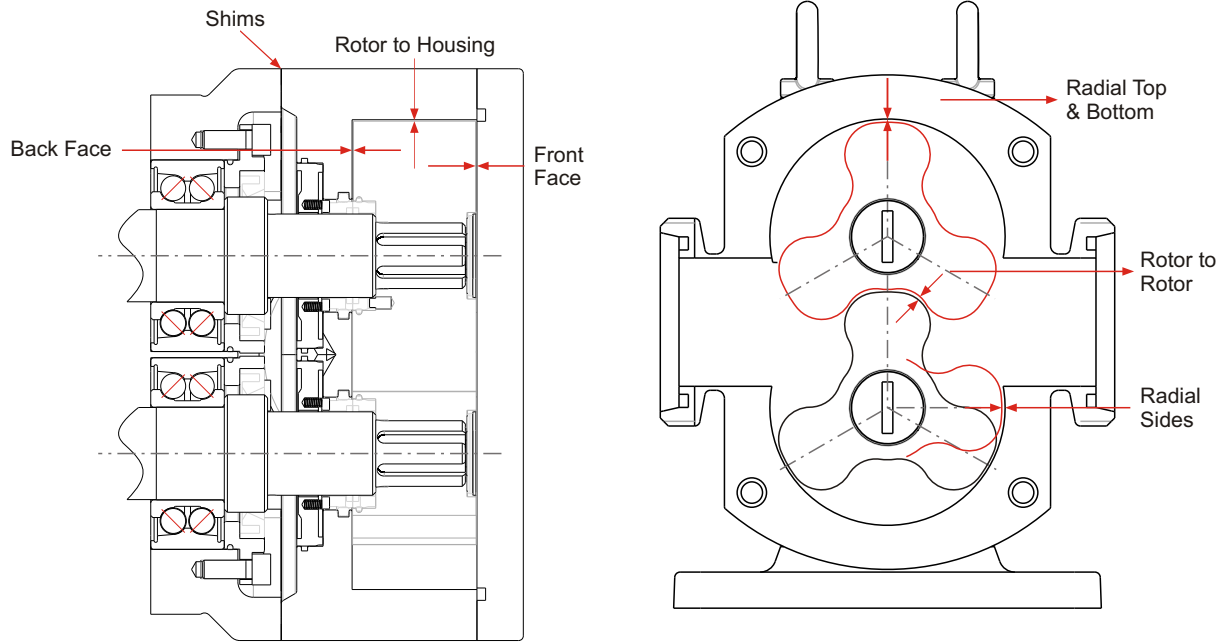


Figure 7: Shows the rotor clearances of PETROLAND Pump.

Standart Rotor Clearances [mm]					
Model	Back Face	Front Face	Radial Sides	Radial Top & Bottom	Rotor to Rotor
PL 125	0.15	0.15	0.15	0.12	0.12
PL 140	0.15	0.15	0.27	0.12	0.15
PL 150	0.15	0.15	0.3	0.15	0.15
PL 250	0.2	0.2	0.3	0.15	0.2
PL 265	0.2	0.2	0.4	0.2	0.2
PL 380	0.3	0.3	0.4	0.2	0.3
PL 3100	0.3	0.3	0.5	0.3	0.3
PL 4100	0.45	0.45	0.55	0.3	0.4
PL 4125	0.45	0.45	0.7	0.45	0.4

Table 2: Rotor clearances in millimeters.

There are two areas of rotor clearances as illustrated following:

- Rotor tip clearance- not adjustable set by manufacturer.
- Front and back face clearance – adjustable by shim.

Rotor width and body depth are fixed at manufacture. Therefore with the correct rotor size selected , the only maintenance adjustment that can be made is the proportion of front and rear clearance.

Measure the front clearance as follows:

1. The rotor to rotor housing back face clearance is maintained by the shim plate.
2. Check that the rotor housing is tight to gear box. And check the rotor bolts are tight.
3. Measure the clearance between the back face of the pump housing and the back of the rotor with a filler gauge. Check the reading with the recommended back face clearance.
4. If incorrect, adjust by adding or removing shim plates from behind the pump housing.
5. Check each rotor and adjust as necessary.

10. Rotor Timing

- Rotor timing must be precisely maintained to provide maximum pumping efficiency, yet prevent contact between rotors during operation.
- If pumping efficiency is below expectations, or if rotors contact during operation (within rated differential pressure), check rotor timing and adjust if incorrect.
- Also check rotor timing after any gearbox dismantling when the gears are removed and/or replaced.

Rotor timing should be check as described below:

1. Assemble each rotor in its normal location on the drive shaft and the idle shaft. Assemble each rotor bolt and tightened hand tight.
2. Rotate the shafts 30 degrees and measure gap as illustrated by arrows. Rotate the shaft 60 degrees the opposite direction and measure gap as illustrated.
3. The rotors are correctly timed when the gap measured at both locations are equal. If the gap is unequal, adjust the timing as follows.
4. Rotor timing is determined by the relative location of the two helical gears (Part No: 9) on the shafts. Gear spacers (Part No: 10) are used to adjust the location and timing . When adjusting timing, move only one of the two gears.
5. Place the wooden dowel between the rotors.
6. Bend away the tab of the lock washer (Part No: 7) on one shaft. Loosen the lock nut and temporarily insert shim stock between the gear and gear spacer. Tighten the lock nut reassemble , and recheck rotor timing.

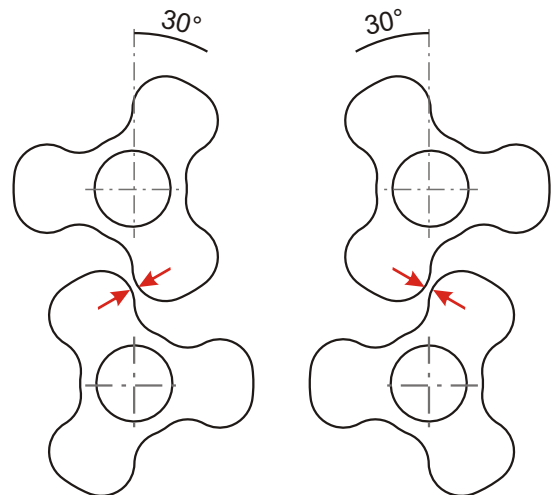


Figure 8: Shows the angle of testing the rotor clearance

- If rotor timing is correct, remove the gear and replace added other spacer or add shim equal in thickness to the shim stack temporarily added. Reassembly the gear and gear nut, tighten to the correct torque, and check rotor timing again to confirm that it is correct.
 - If rotor timing is incorrect, but closer to equal than original measurement, repeat previous adding shim stock.
 - If rotor timing is incorrect and more unequal than original measurement, remove temporary shim stock from one shaft and add instead to the other shaft.
7. Repeat above procedures until the timing gap is equal after gear spacers are in place and gear nuts are tightened to correct torque.
8. Reassemble the pump.

11. Safety Warnings

11.1. Safety Warnings —In General

- The pressure in the heating jacket may not exceed 10 bar.
- Lift the pump mechanically, if the pump's weight is more than the permitted number of kilos that people may lift.
- Do not place fingers in the pump's ports when lifting or handling the pump.
- Motors fitted with lifting eyes must be used to lift the whole pump, but only to lifting the motor separately.
- Lift of the pump should be performed in stable suspension points so that the pump is balanced and the lifting straps are not placed over sharp edges.
- Lift of the pump shall be performed in conformity with the lifting instructions in section ?. Lifting Pump (Figure ?).
- Carefully shield the coupling between the pump and motor.
- Bolt the pump securely to the foundation.
- Clean out any impurities from the pipe system before the pump is connected to it.
- Remove the protective plugs from the pump ports before connecting the pipes.
- Flange couplings must always be undertaken by skilled professionals.
- Achieve parallelism between the flanges and observe the maximum tightening torque to prevent tension in the pump casing.
- Threaded couplings must always be made by skilled professionals.
- Fit the pump unit with an emergency stop.
- Connect and adjust any monitoring and safety systems —controls, manometers, flowmeters, etc. —according to the operating condition for safe operation.
- Use suitable safety equipment when aerating the pump such as gloves, protective goggles etc. —depending on the pump liquid.
- Never bleed the pump in operation on account of the danger of squirting cold, hot, etching or poisonous liquids under pressure.
- Check daily that the max. allowed temperature is observed.
- The pump must be shielded when pumping hot liquids that create a surface temperature on the pump of more than +80° C. A warning sign must be displayed in a clearly visible location!
- PETROLAND pumps may not be used to pump liquids at a temperature higher than the liquid's ignition temperature and with reference to the maximum temperatures specified in the Table ? and no higher than the temperature in the Table ? depending on the type of elastomer.
- The shaft seal must not be adjusted during operation.
- When pumping hazardous liquids, circulate neutralising liquid before emptying the pump.
- The system must be depressurised before emptying the pump.



NEVER OPERATE THE PUMP DRY.

11.2. Safety Warnings —In Electricity

- Electrical couplings must always be established by authorised professionals, in accordance with the prevailing standards and directives.
- It is must to obey the national laws and local regulations addition to instructions of motor manufacturer.
- Set the protective motor switch maximum to the motor's rated current.
- Grounding must be connected to motor.
- It is must to check the motor plate to correct voltage, phase and frequency values are all adequate for local main network values before start-up.
- It is must to shut-off all electrical connections before any perform on motor/pump.
- Cables must to have no contact with pipe line, pump and motor body.
- Safety fuse must be adjusted accordance with operation values or 5% greater.
- We refer to use PTC (Passive Thermal Control-Thermistor) for motor. If PTC exists, contacts should be connected to motor's terminal box. This connection should be followed with control panel thermistor relay connection.
- Before electrical supply connected, check the shaft that can be rotated by hand easily.
- Schematics of motor connection should be found in terminal box or user manuals.
- Connection type is chosen accordance with power, main supply valves. Connection types of terminal box are shown on Table 3 and Figure 9.

Electrical Connection		
Main Supply Voltage / 3 ~ 400 V		
Delta Connection (9a)	Star Connection (9b)	Delta-Star Connection (9c)
Δ - Start	Y - Start	Y / Δ - Start

Table 3: Types of Electrical Start.

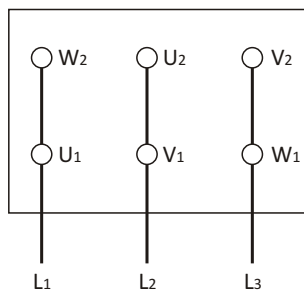


Figure 9a. Δ – Connection

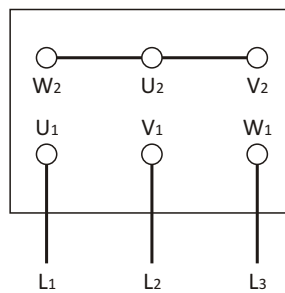


Figure 9b. Y – Connection

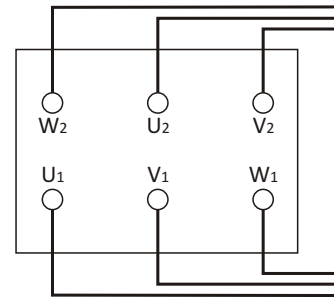
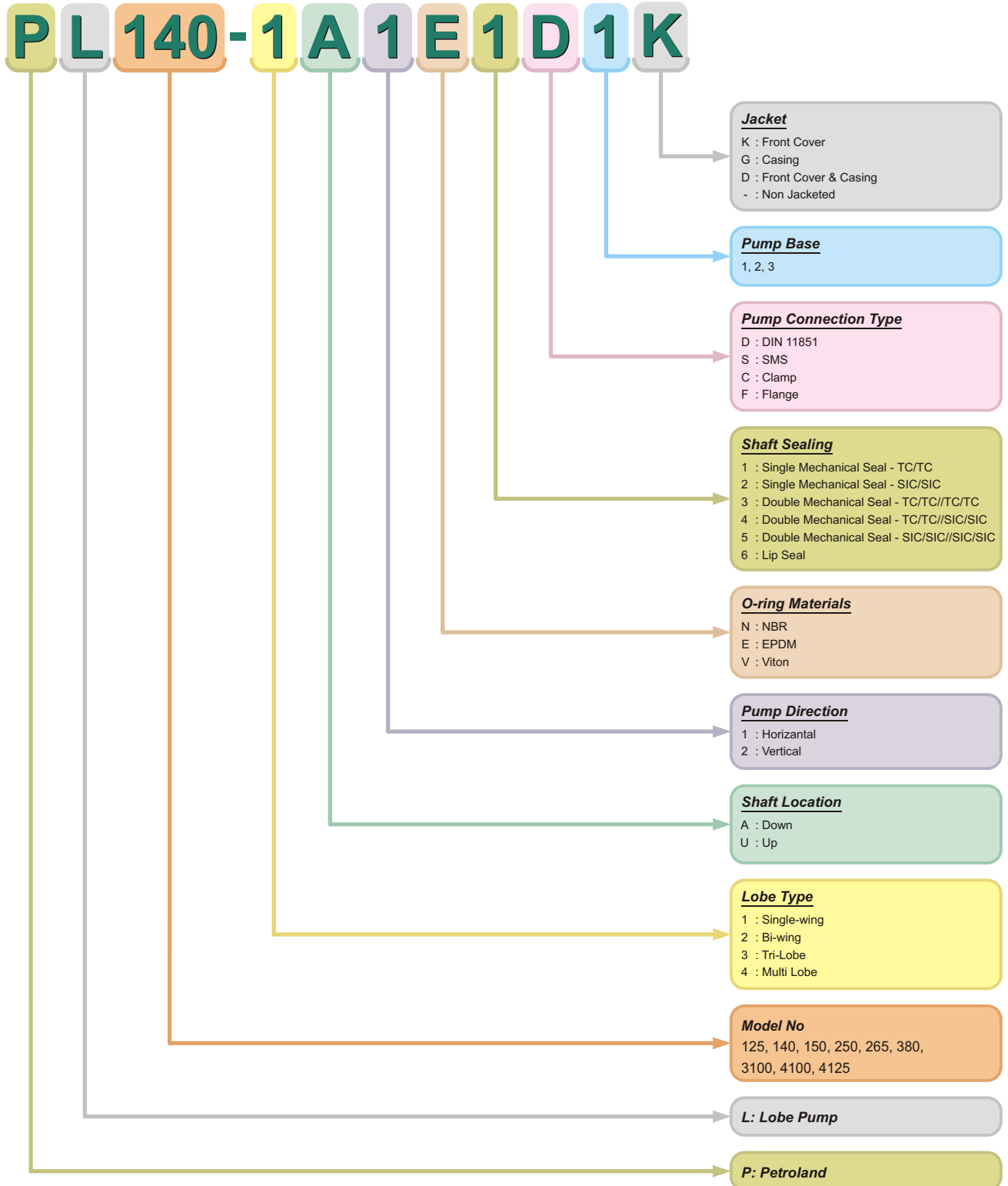


Figure 9c. Δ / Y – Connection

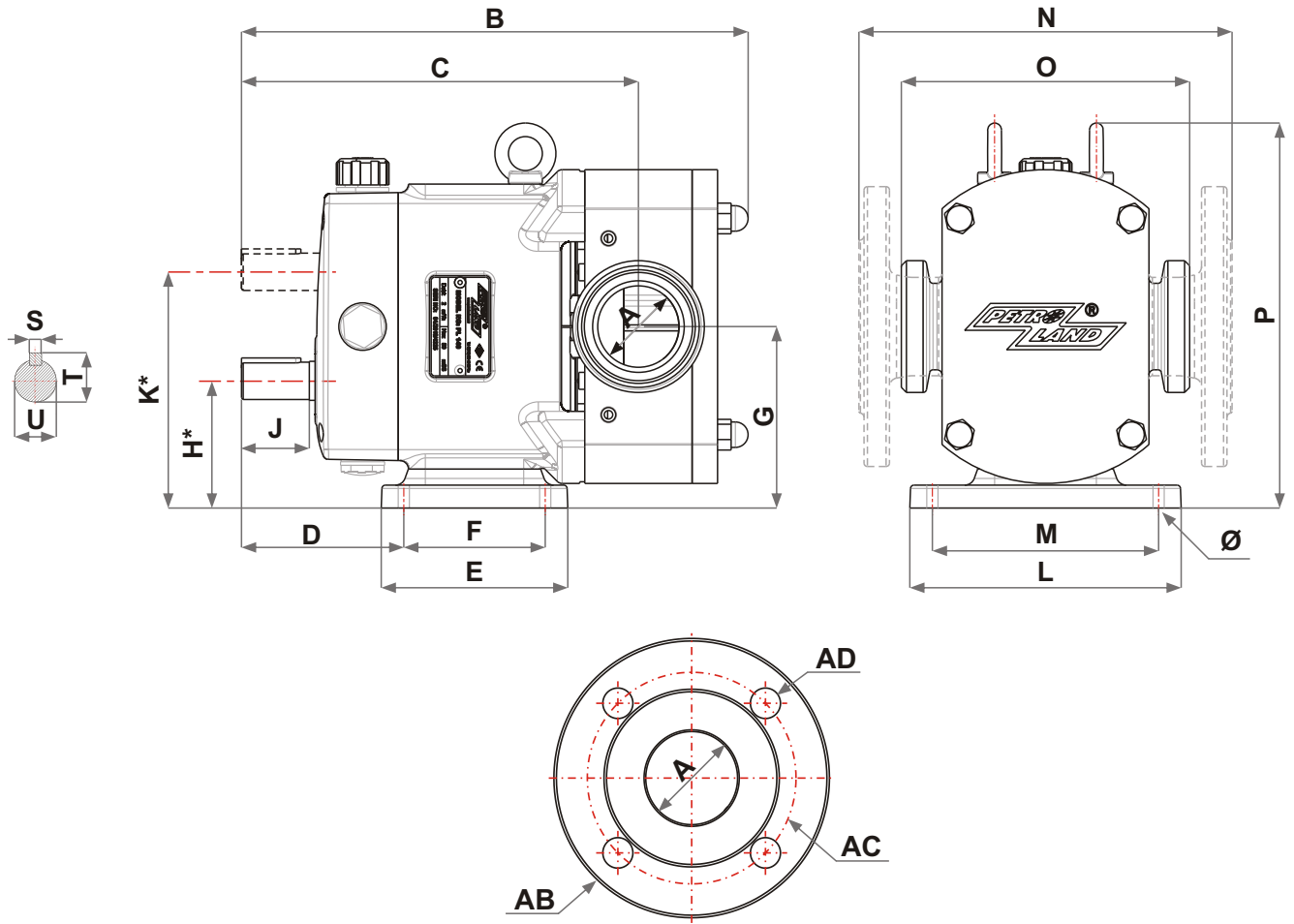
Figure 9: Types of electrical start.

12. Code System

The PETROLAND pump has a modular construction, and can be supplied in a large number of models. The pump's designation is made up of a series of codes which describe various features of the pump. Below is an example of some of the codes.



14. Pump Dimensions



Dimensions [mm]																						
Model No.:	A	B	C	D	E	F	G	H*	J	K*	L	M	N	O	P	Ø	S	T	U	AB	AC	AD
PL 125	25	274	220	97	110	80	107	75	40	139	160	134	220	174	227	10	6	25.5	22	115	85	14
PL 140	40	283	225	97	110	80	107	75	40	139	160	134	220	174	227	10	6	25.5	22	150	110	18
PL 150	50	300	234	97	110	80	107	75	40	139	160	134	220	170	227	10	6	25.5	22	165	125	18
PL 250	50	382	310	116	160	125	157	115	55	199	200	170	260	225	312	14	10	36	32	165	125	18
PL 265	65	407	322	116	160	125	157	115	55	199	200	170	260	220	312	14	10	36	32	185	145	18
PL 380	80	535	390	160	210	160	186	128	70	243	280	242	322	322	400	14	14	49	45	200	160	18
PL 3100	100	545	400	160	210	160	186	128	70	243	280	242	322	322	400	14	14	49	45	200	160	18
PL 4100	100	675	405	200	260	210	247	170	80	324	360	320	378	378	500	16	16	60	55	220	180	18
PL 4125	125	710	525	200	260	210	247	170	80	324	360	320	378	378	500	16	16	60	55	220	180	18

* H and K dimensions can be produced by 15 mm longer than dimension of standard design for the models PL 125, PL 140 and PL 150.

Table 5: Pump dimensions

15. Transporting The Pump

The pump must be secured properly on pallets or similar before transport and shipment. The pump should be transported in such a way that it is not damaged by impacts or blows during transit.

16. Lifting the pump

If the pump's weight is more than the permitted number of kilos that people may lift in accordance with the prevailing national rules at the location, it must be lifted mechanically.

We refer to the prevailing national rules at the location.

The table below shows the weight in kg of the various pump types in the various pump.

Weight of the Pumps (kg)								
Pump Sizes (Threaded Connection)								
PL 125	PL 140	PL 150	PL 250	PL 265	PL 380	PL 3100	PL 4100	PL 4125
13	21	24	46	52	95	102	180	210

Weight of the Pumps (kg)								
Pump Sizes (Flange Connection)								
PL 125	PL 140	PL 150	PL 250	PL 265	PL 380	PL 3100	PL 4100	PL 4125
18	26	29	52	60	105	112	195	225

Table 6: Table showing the weight in kg of the various pump types in the various pump sizes.

Lifting Instructions for Pumps

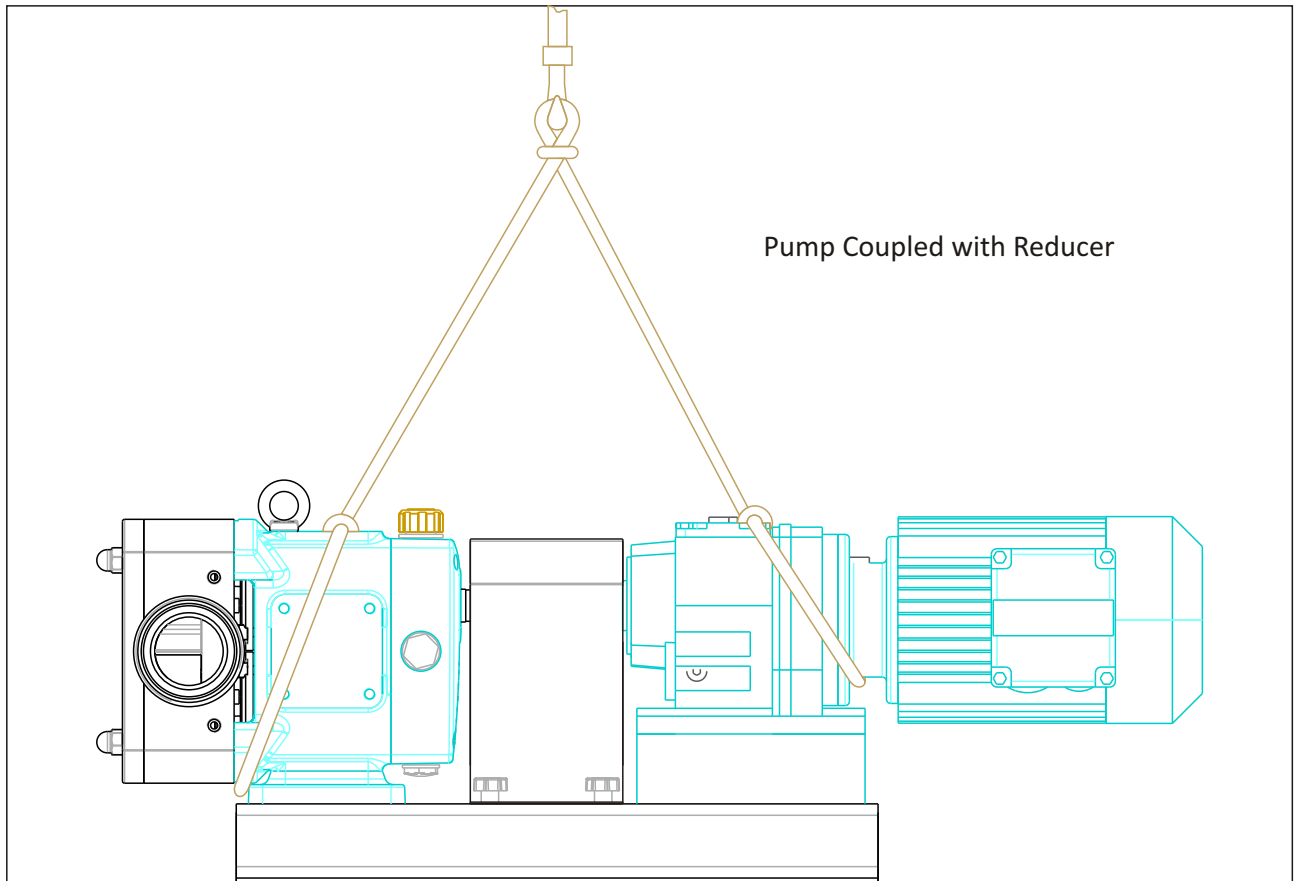
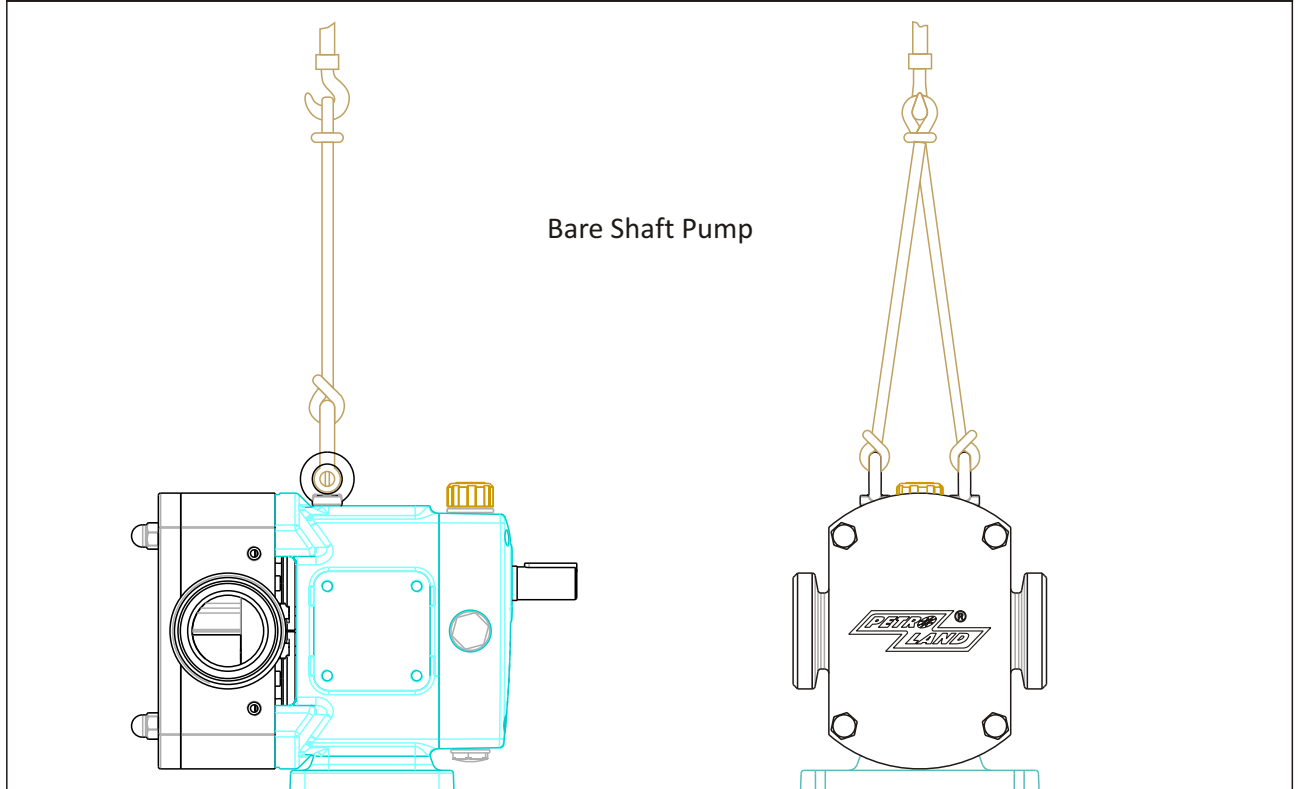


Figure 10: Lifting instructions for pumps.

17. Storage

Petroland Pumps are protected against corrosion at the factory. Flanges and pipe couplings are closed using plastic plugs. This protection will last for approximately six months, on the condition that the pump is stored indoors in a dry, dust-free, non-aggressive atmosphere.

- When stored for a longer period of time, the pump must be inspected after no more than six months depending on the storage conditions.
- The pump shaft must however be turned manually approx. every 4 weeks to avoid standstill damages to bearings and seals.

Avoid storage:
• In an environment containing chloride
• On foundations with continuous vibrations as the bearings may be damaged
• In unventilated rooms

Recommended storage:
• Indoors in a dry, dust-free, non-aggressive atmosphere
• In well-ventilated rooms to prevent condensation
• Flanges and pipe couplings using plastic plugs
• Pump packed if necessary in plastic film with moisture-absorbing Silica Gel bags

18. Connecting the motor and the pump

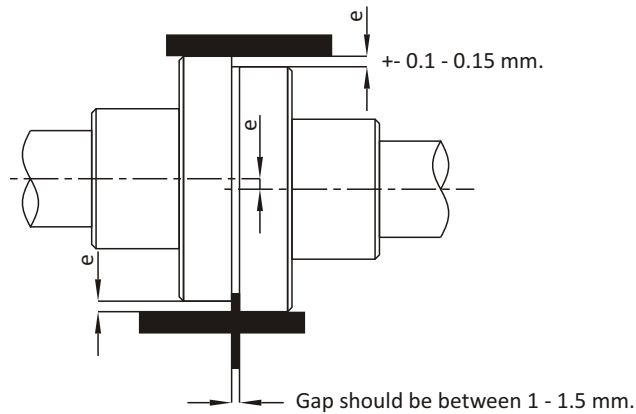
All items in this section must be read and observed by authorized and qualified person when installing PETROLAND pumps.

18.1. Aligning the motor and the pump



Carefully shield the coupling between the pump and motor. (See Figure 7)

18.2. Adjusting Coupling



Şekil 11: Adjusting elastical coupling.

18.3. Locating the pump onto base plate

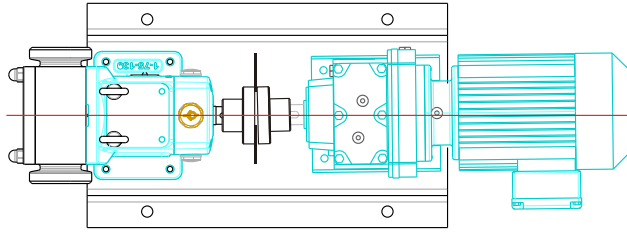


Figure 12a: Horizontally angular fault and its compensation

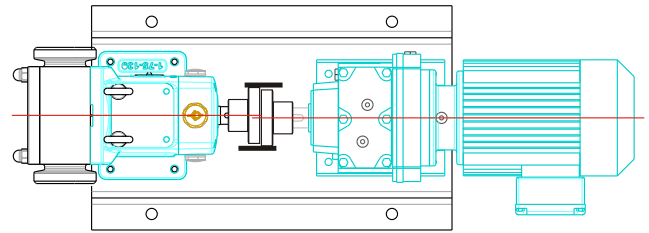


Figure 12c: Horizontally parallelism fault and its compensation

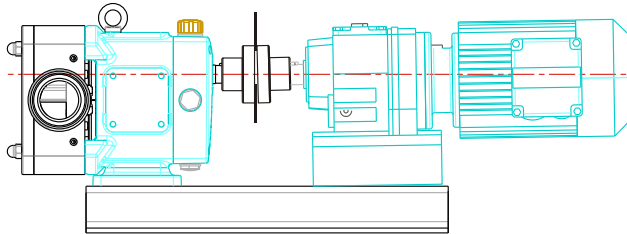


Figure 12b: Vertically angular fault and its compensation

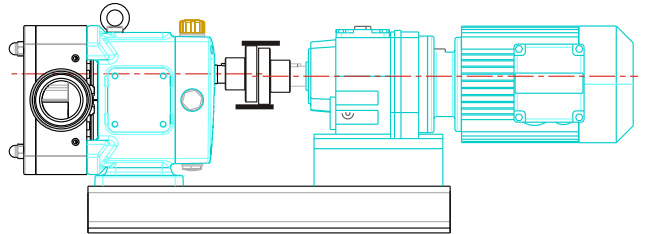


Figure 12d: Vertically parallelism fault and its compensation

19. Checking the Pump Before Starting

Pompa çalıştırılmadan önce kontrol edilecek:

- That the pump shaft can be turned around freely.
- That all isolating valves in the suction and pressure pipe are fully open, to avoid the pressure being too high and the pump running dry otherwise the pump may be damaged.
- That the inlet/outlet diameters are selected correct according to pipe line.
- That the pump is filled with fluid if the pump is not suction pump.
- That the pump does not need to be filled with fluid if the pump is suction pump and the suction line lets the fluid flow inside.
- That the diameter of the suction pipe line does not have size smaller than the diameter of inlet.



Before operation, Pump has to be checked for not having impurities such as metal pieces, slags etc. in housing .



DO NOT OPERATE TO THE PUMP DRY!

20. After starting the pump

PETROLAND pumps may only run without liquid flow for the short period required for self-priming —with regard to the slide bearings and shaft seals.

After starting the pump
• That the pump is drawing the liquid.
• That there is no cavitation in the pump casing
• That the speed is correct.
• That the direction of rotation is correct.
• That the pump is not vibrating or emitting a jarring sound.
• That there are no leaks by the pump
• That the mechanical shaft seal is fully sealed
• That the operating pressure is correct.
• That the pressure in the heating jacket does not exceed 10 bar —if the pump has one.

20.1. Cavitation

There must be no cavitation in the pump casing as this results in extensive damage to the pump. The cause of cavitation should be found and the problem solved.

Cavitation is defined as formation and deflation of steam-filled bubbles. This process may exist in areas within the pump where the pressure falls to a level below the steam pressure of the liquid. Always ensure that there is adequate pressure at the pump inlet to avoid cavitation so that the liquid does not boil or evaporate.

Always check that the pump suction pressure is greater than the liquid's steam pressure irrespective of the temperature. Cavitation can be ascertained in the form of vibrations and jarring sound from the pump. It may sound as if gravel was running through the pump. Cavitation arises when the vacuum in the pipe on the suction side is too high.

The increased vacuum may be caused by the following:

- That any filters in front of the pump are blocked or too narrow
- That the liquid viscosity is too high
- That the suction pipe is too long
- That the suction pipe is too narrow

Check if any filters fitted in front of the pump are blocked. If so, clean the filter thoroughly. If there is feed flow to the pump, you should bleed the pump before starting again. If there is no feed flow to the pump, the pump should be filled with liquid before start-up to avoid dry running as no dry running is allowed.

If this does not solve the problem, you should check some of the other options.

If cavitation is due to too high viscosity, the problem may be remedied by fitting a suction pipe with a larger diameter or by heating the pump liquid so to increase the fluidity of the liquid and in this way a lower viscosity.

If cavitation is due to the suction pipe being too long, this may be remedied by moving the pump closer to the tank from which the pump is drawing or by fitting a suction pipe with a larger diameter.

21. Paint of Pump

- All pumps produced in PETROLAND factory have been painted undercoat by thickness between 30-40 microns.
- PETROLAND's default color is "LIGHT BLUE". Consult to PETROLAND if other color is required.
- Thickness of paint is between 40-60 microns.

22. Pump Liquids



The pump must be shielded when pumping hot liquids that create a surface temperature on the pump of more than +80°C a warning sign must be displayed in a clearly visible location!



When pumping hot liquids, the pipes must be fitted with compensators to prevent tensions in the pump casing.

There are various maximum temperatures for Petroland pumps, depending on the pump type and the type of elastomer used max. 150°C. (See Table 7 - 8)

PUMP MODELS	TEMPERATURE
PL 125 - PL 140 - PL 150 - PL 250 - PL 265 PL 380 - PL 3100 - PL 4100 - PL 4125	150°C*

Table 7: * The pump liquid's maximum permitted temperature for the standard pump models temperature can be raised up to 200°C

Min./Max. Elastomer Temperature		
Elastomer type	Elastomer brand	Temperature
FKM	Viton®	– 20°C / + 200°C
FEP	Teflon® with Viton core	– 60°C / + 205°C
EPDM	Ethylene-propylene	– 65°C / + 120°C
FFKM	Kalrez®	– 50°C / + 316°C
NBR	Nitril	– 30°C / + 70°C
PTFE	Teflon	– 15°C / + 170°C

Table 8: The pump liquid's minimum/maximum temperature limits for the various elastomers used in Petroland pumps.

23. Maintenance

The pump must be inspected and maintained on an ongoing basis in accordance with the list below.

23.1. During daily inspection, check:

- That the pump does not vibrate or emit jarring sounds.
- That there is no cavitation inside the pump casing.
- That open ball bearings are lubricated.
- That any lubricating devices are in working order.
- That any circulation pipes —cooling, heating or pressurized water pipes are in working order.
- That power output and power consumption are correct.
- That flow and operational pressure is correct.
- That the max. allowed temperature is observed.

23.2. During weekly inspection, check:

- That any filters and drainage holes are clean.
- That mechanical shaft seals are not leaking.
- Whether flexible connection elements are worn. To be replaced if worn.
- That the O-rings are not worn. (In case of changing the shaft, O-Rings should be replaced with new ones.)
- That bearings and gears are lubricated periodic.



The pump will be supplied oil filled with Omala 150 of the Shell or equivalent. The oil should be primal changed after 200 hours of operations and be changed every 4000 hours under normal conditions.

23.3. Quarter yearly inspection, check:

- That the surfaces of cover, housing and rotors are not worn or free of damage.
- If there is any damage or wearing, It may caused by high pressure or worn ball bearings of the gearbox.

23.4. In connection with service work, check:

- All parts for wear and tear. Replace worn parts.
- That all parts are located correctly in connection with assembly.

23.5. Ordering spare parts

Please consult PETROLAND for all orders of spare part with information listed below;

- Model code and number of the pump.
- Serial number of the pump.
- Number of spare parts.

23.6. Tools Required for Disassembly and Assembly

- Special tool for rotors (see Figure 14)
- Spanner
- Allen wrench set
- Torque wrench
- Ø15-20mm plastic dowel (see Figure 14)
- Screwdriver
- Depth micrometer
- Feeler gauge
- Soft hammer (see Figure 20)
- Special needle for o-ring

23.7. Recommended Torque Values:

- Front cover nuts **100 ft-lbs**
- Gear/Rotor housing bolts **100 ft-lbs**
- Rotor bolts **60 ft-lbs**
- Gear lock nuts **140 ft-lbs**

23.8. Disassembly and Assembly of Pump Housing

Drain all products from the pump head prior to disassembly. Disconnect the suction and discharge piping from the pump. Loosen and remove the four cover dome nuts from the cover .

Remove the cover. If it is stuck, tap on the cover with a soft hammer. Remove the cover O-ring. Remove rotor-retaining bolts.

Use the special tool for removing these bolts. Place the plastic dowel between the rotors. Remove the rotor bolts and spring washers.



Figure 13: Disassembling the front cover.



Figure 14: Using the special tool for rotor bolts.



Figure 15: Disassembling rotor bolts.



Figure 16: Disassembling the lobes.

The face of mechanical seal can be replaced even if the housing is not disassembled.

Housing can be removed by sliding after the bolts are untightened.



Figure 17: Disassembling the ring of mechanical seal on the pump.



Figure 18: Disassembling the housing bolts.

Handle the shims with care to avoid lost and damage. If the housing is stuck, alternately tap on the back of inlet and outlet ports with a soft hammer.



Figure 19: Disassembling the housing.



Figure 20: Using the soft hammer.

Check all the part are cleaned and not worn. Change the part which has been worn or damaged. It is recommended to replace wetted elastomers durin reassembly.

It is recommended to replace wetted elastomers during reassembly.



Figure 21: Disassembling the shim plates.



Figure 22: Shim plates.

Disassembly of cover and rotor is enough to replace faces of mechanical seals.

Ring of mechanical seal can be disassembled by screwdriver easily.

Place the rotor on level surface and push the ring of mechanical seal.



Figure 23: Using screwdriver for the ring of mechanical seal.



Figure 24: Assembling the face of mechanical seal on the rotor.

Apply balanced force on the ring of mechanical seals.



Figure 25: Assembling the face of mechanical seal on the rotor.

Place the front side of the housing onto level surface. Tighten the bolts after fixing the mechanical seal onto back side of housing.



Figure 26: Assembling the case of mechanical seal.

Check that the mechanical seal is free of damage before replacement.



Figure 27: Tightening the case bolts of mechanical seal.



Figure 28: Single mechanical seal.

Check that the surface between gearbox and housing is completely clean and shim plates are not lost.



Figure 29: Assembling rotor bolts.



Figure 30: Fixing the pin of double mechanical seal.

24. Disassembly and Assembly of Gearbox

24.1. Disassembly of Gearbox

After disassembly of the housing, please follow the instructions written below for the disassembly of the gearbox.



It is recommended to mark the parts (Part no: 9, 10, 17) before the disassembly just for safe and easy assembly of these parts. Please place all part onto clean and level surface.

Remove the oil drain plug (Part no: 2) and drain the oil.

Remove the gearbox cover bolts (Part no: 1) from the rear cover (Part no: 5)

Pull the rear cover off the drive shaft extension. If the cover is stuck use a soft hammer carefully.



Figure 31: Disassembling the rear cover of the gearbox.



Figure 32: The locking tab of the bearing washer.

Remove the paper gasket from the rear cover. (Part no: 3)

Remove the o-ring on the surface of gearbox. (Part no: 6)

Straighten the locking tab of the bearing lock washer. (Part no: 8)

Remove the lock nut and lock nut washer from the drive shaft (Part no: 7, 8)

Pull the two gears off the pump shafts. (Part no: 9) If the gears are stuck, use screwdriver for pulling them off.



Figure 33: Disassembling the gears.

Remove the rear cover oil seal (Part no: 20) If the o-ring and gaskets have been damaged replace.



Figure 34: Disassembling the rear cover oil seal of the gearbox.

Place the surface which is side of the gearbox downward, apply force onto top of the drive and idle shafts. Hand press can be used if the force is not enough.

Heat the front bearing (Part no: 11, 18) 250°F / 120°C on the drive and idle shafts until they expand and drop off.



Figure 35: Disassembling the drive and idle shafts.

24.2. Assembly of Gearbox

Place the rotor on level surface. Lubricate the front and rear bearing areas of the drive and idle shafts with oil. Heat the front bearing and place the bearing over the shaft. (Part no: 11, 18)

Place the surface which is side of the gearbox upward, apply force onto top of the drive and idle shafts. Hand press can be used if the force is not enough.



Figure 36: Assembling the drive and idle shafts.



Figure 37: Assembling the lubricating cover of the gearbox.

Lubricate and install the front bearing oil seals (Part no: 20) Replace the o-ring and gasket if it is necessary.

Position both shaft gear keys (Part no:24)

Place gear , lock washer and lock nut onto the shafts and hand tighten.(Part no: 10)

Use a spanner wrench to tighten the gear lock nut on the drive shaft by 140 ft-lbs torque values.

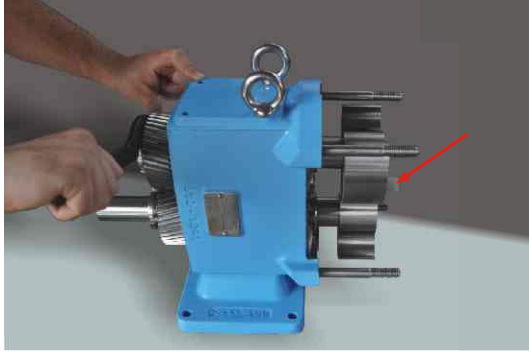


Figure 38: Tightening the set bolt.

Place the rotors over the shaft and use plastic dowel to avoid rotor to rotor contact. Tighten the bolts of shaft. (Part no: 37, 40)

Check the rotor position by rotating the shaft.

Place the cover of gearbox and tighten the screws.

Place and tighten the oil drain plugs.

Fill the oil reservoir with the oil after removing the oil safety valve. Omala 150 of the Shell or equivalent oil is recommended to fill the reservoir.

Level points should be taken into account during the filling of the reservoir (see Figure 40, 41)

Tighten the oil safety valve according to inlet/outlet directions.



Figure 39: Reference points of the keys.



Figure 40: Vertical inlet/outlet, reference points of oil levels.

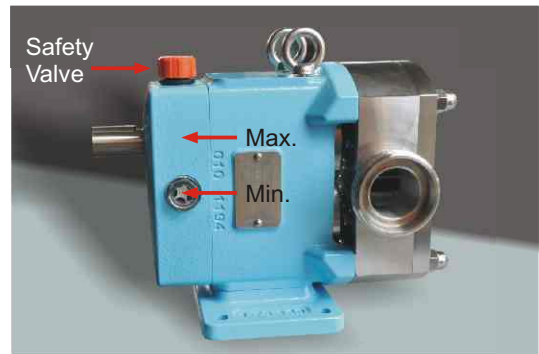


Figure 41: Horizontal inlet/outlet, reference points of oil levels.

25. Fault of Facilities and Troubleshooting

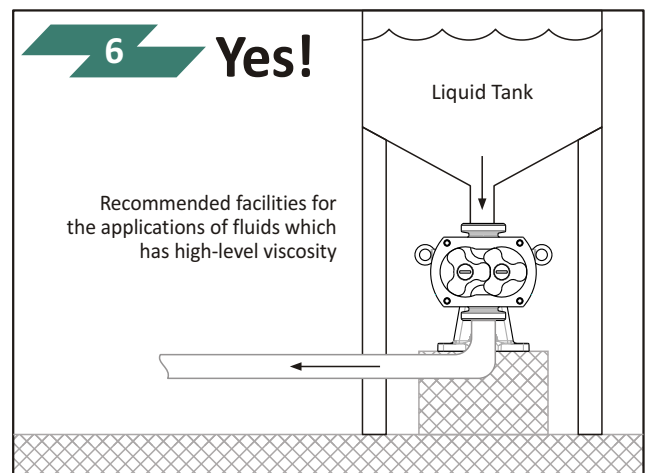
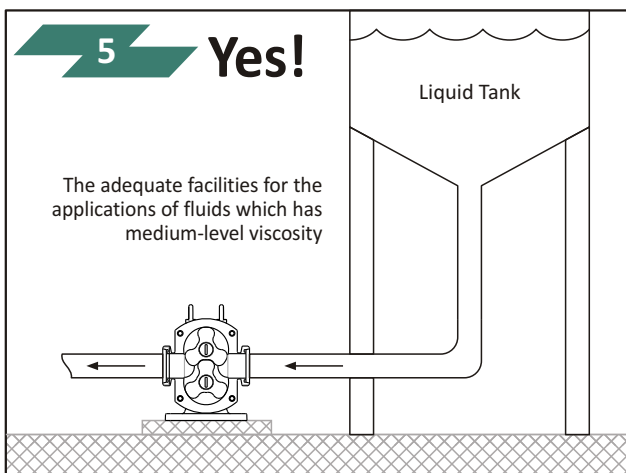
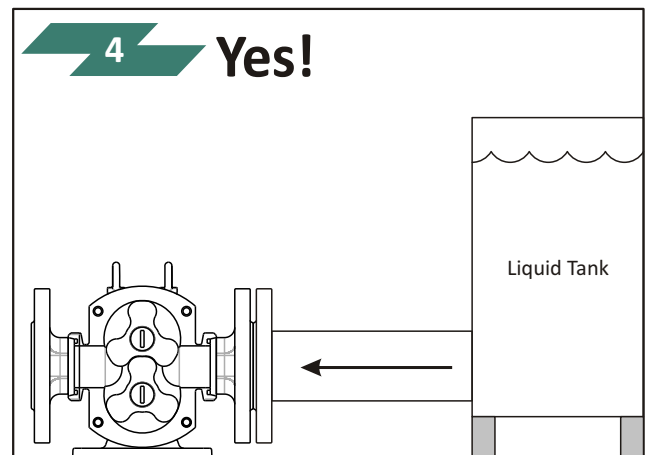
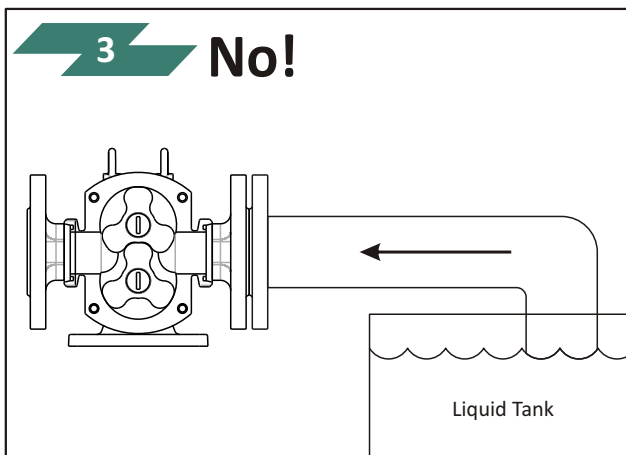
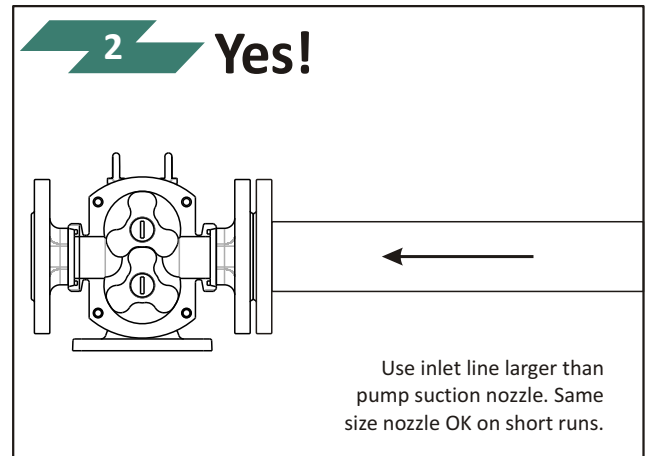
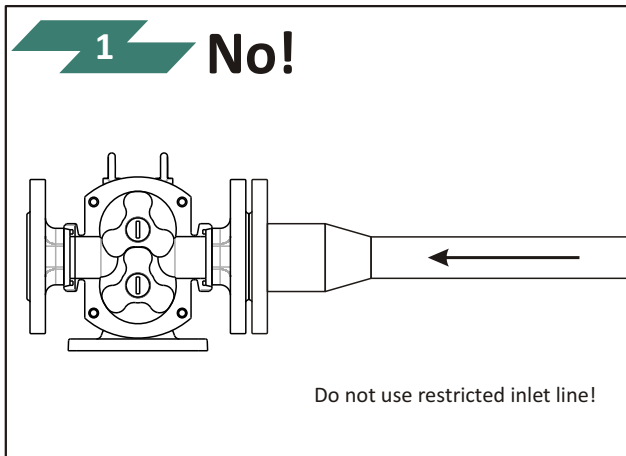


Figure 42: Fault of Facilities and Troubleshooting

26. Troubleshooting

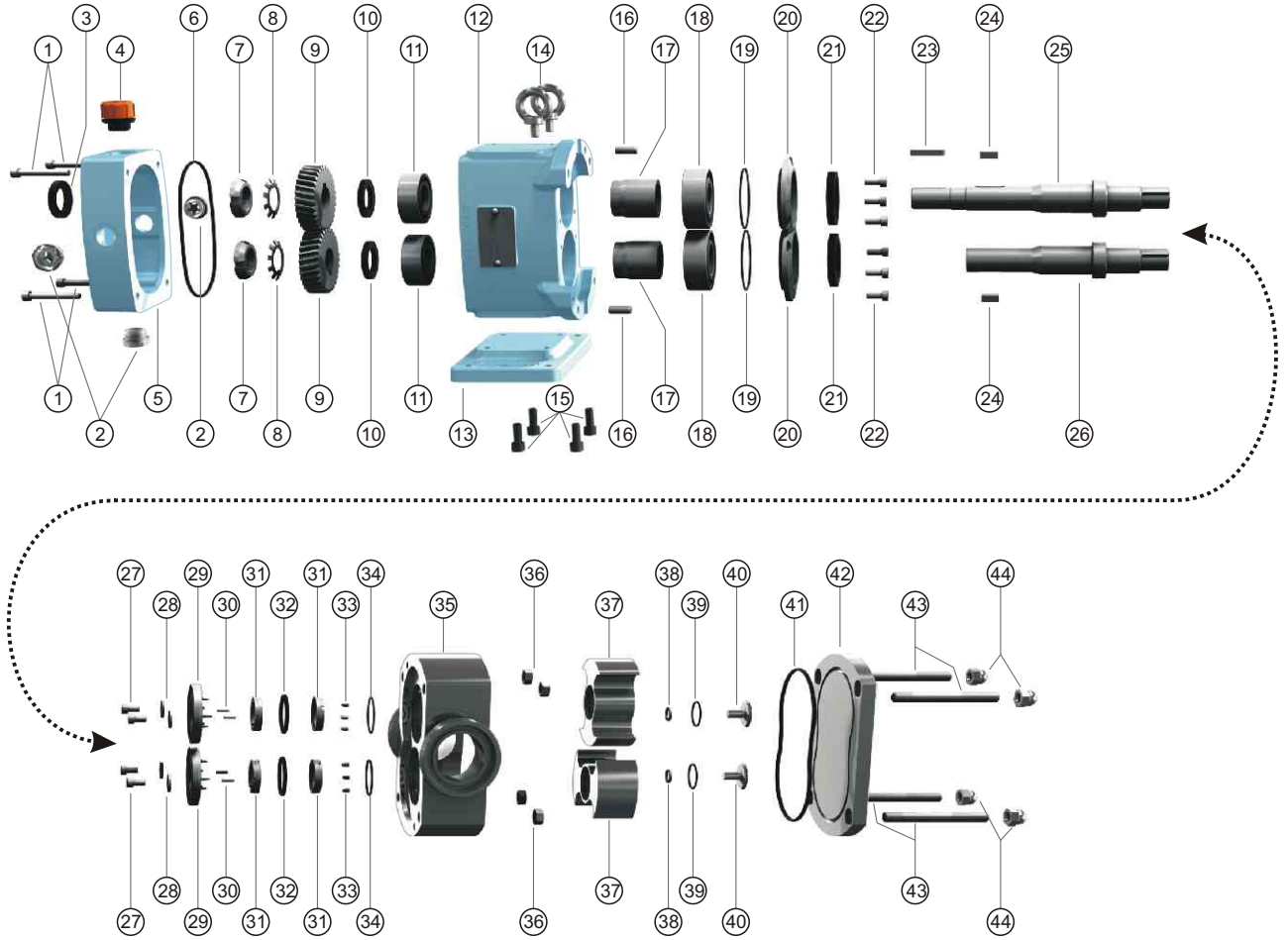
Problem										
10. Pumps stalls on start up										
9. The pump has jammed										
8. The pump is making a noise / vibration										
7. Excessive seal wear										
6. Excessive rotor wear										
5. The motor overheats										
4. The pump overheats										
3. The capacity is too low										
2. Irregular flow										
1. No flow										
Causes	1	2	3	4	5	6	7	8	9	10
1. Incorrect direction of rotation	X									
2. Pump not primed	X									
3. Insufficient NPSH available	X	X	X					X		
4. Product vapourising in suction line			X	X					X	
5. Air entering into suction line		X	X					X		
6. Gas in suction line	X	X	X					X		
7. Insufficient static suction head		X	X					X		
8. Product viscosity too high				X	X			X		X
9. Product viscosity too low			X							
10. Product temperature too high			X	X		X		X		X
11. Product temperature too low					X					X
12. Unexpected solids in product						X	X	X	X	
13. Discharge pressure too high			X	X	X	X		X	X	X
14. Rotorcase strained by pipework				X	X	X		X	X	
15. Pump speed too high					X			X		
16. Pump speed too low			X							
17. Seal flush inadequate				X	X	X	X	X	X	
18. Bearing / Timin gear wear				X	X	X	X	X	X	X

Table 9: Various problems that can arise and possible causes of the problems

27. Storing The User Manual

- This user manual must be retained throughout the pump's full service life, and must always accompany the pump.
- The user manual must be available to operators, repair engineers and any maintenance staff or other people who may be considered to have a need to refer to it.
- The user manual must also be stored visible, in the immediate vicinity of the pump.
- If this is not possible, there must be a prominent sign by the pump stating where the user manual is kept.
- It is also recommended that a copy of the user manual is stored somewhere else.

28. PL Serisi Lob Pompaların Yedek Parça Listesi



PARÇA NO	PARÇA ADI	PARÇA ADEDİ	PARÇA NO	PARÇA ADI	PARÇA ADEDİ	PARÇA NO	PARÇA ADI	PARÇA ADEDİ
1	Cover Screw (Imbus)	4	16	Rotor housing dowel pin	2	31	Mechanical seal face	4
2	Oil Plug, window/drain	3	17	Bearing spacer	2	32	Mechanical seal housing o-ring	2
3	Rear oil seal	1	18	Front ball bearing	2	33	Mechanical seal face fixing pin	6
4	Safety valve	1	19	Gearbox oil seal o-ring	2	34	Mechanical seal rotor o-ring	2
5	Gearbox cover	1	20	Gearbox oil seal	2	35	Casing	1
6	Gearbox o-ring	1	21	Gearbox oil seal gasket	2	36	Housing bolt	4
7	Lock nut	2	22	Oil seal screw (Imbus)	6	37	Rotor	2
8	Lock nut washer	2	23	Shaft key	1	38	Rotor screw spring washer	2
9	Timing gear	2	24	Timing gear key	2	39	Rotor screw o-ring	2
10	Timing gear washer	2	25	Drive shaft	1	40	Rotor screw	2
11	Rear ball bearing	2	26	Idle shaft	1	41	Front cover o-ring	1
12	Gearbox	1	27	Mechanical seal screw	4*	42	Front cover	1
13	Foot	1	28	Mechanical seal screw washer	4*	43	Rotor housing stud	4
14	Lifting eye	2	29	Mechanical seal casing	2	44	Front cover bolt	4
15	Foot screw (Imbus)	4	30	Mechanical seal pin	4			

* PL 250 ve üst modellerde 6 adet civata ve pul vardır.

Tablo 10: Lob pompaların parça listesi.

NOTES

This image shows a full page of white paper with horizontal dotted lines, typical of primary school writing paper. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

NOTES

A series of horizontal dotted lines for taking notes.



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