Standart

INSTRUCTION FOR INSTALLATION OPERATION & MAINTENANCE

SPO 100-400

OH2 Type Centrifugal Pump According to API 610

yaşamı koru! save life!

Instructions for Installation, Operation and Maintenance

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1. GENERAL

The objective of this manual is to:

• Instruct the users on installation, dismounting, maintenance and repair of the pump, and
• Describe methods of start-up, operation and stop of the pump.

1.1 Safety Signs

General Risk
Signifies safety precautions which if not applied may cause vital.

Electrical Risk
Warnings about the electrical current

ATTENTION **Safety instructions that if not applied may cause damage to the machine or operation.**

Explosive atmosphere
Information to prevent explosion in the explosive atmosphere as per EC Directive 94/9/EC (ATEX)

1.2 General Instructions

This manual should be made available at a safety place easily accessible by personnel responsible for safe operation and maintenance of the pump the qualified

• The authorized personnel should be experienced and well - informed about the related standards.
• The instructions given in this manual should be carefully read and applied at any phase of the installation and operating process of the pump.
• The user is responsible to ensure that the inspection and installation is performed by the authorized and qualified personnel, who read this manual thoroughly.
• The pump should never be operated beyond the operating conditions set forth in the purchase order. The reason is that the operating conditions set forth in the purchase order have been taken into consideration in the selection of the pump material and trial of the pump.
• If the pump is required to be operated apart from the conditions set forth in the purchase order, please contact with STANDART POMPA. Standart Pompa does not assume any responsibility for any damages that may arise from operation of the pump beyond the specified conditions without written consent.
• If the pump will not be installed at its place immediately after delivery, it should be stored at a clean and dry place where the ambient temperature does not change excessively. If the proper pre cautions are not taken, excessively low or high temperatures may cause serious damages to the pump.
• **Standart** Pompa does not accept any responsibility under warranty for any repair or replacement performed by the user or any other unauthorized persons.
• This manual does not include safety rules applicable at the place of use.

1.3 Safety Instructions

Always observe the following instructions to prevent any physical and/or property damages.

• Operate the pump only under the specified pump.
• Any tension, contraction and strain on the piping system should never transfer to the pump.
• Electric wiring of the engine and auxiliary components should definitely comply with the local rules and be performed by the authorized personnel.
• Never perform a ny work on the pump before the pump set is stopped completely.

Always disconnect power connection with the engine before you perform any work on the pump and make sure that no connection is made accidentally.

• Any work on the pump should always be performed by at least two workers.
• Clothing of the personnel to work on the pump should always be suitable for the works they **will** perform and/or the personnel should use necessary safety equipment.
• Never perform any work on the pump when it is hot.
• Never touch the hot pump and pipes by naked hand. The user personnel should take necessary warning precautions (e.g. warning signs, barricades, etc.).
• Always be careful when working on the pumps delivering hazardous liquids (e.g. acid or hazardous fluids).
• When the pump and pipes connected to the pump are under pressure, do not perform any work on the pump definitely.
• Once the work on the pump is over, put in place all safety shields previously removed.
• Never operate the pump in reverse direction.
• Never insert pour hands and fingers into any hold or openings of the pump.
• Do not trace on the pump and/or pipes connected to the pump.

1.3.1 CE signs and approvals

It is a legal requirement that machinery and equipment put into service within certain regions of the world shall conform with the applicable CE Marking Directives covering Machinery and, where applicable, Low Voltage Equipment, Electromagnetic Compatibility (EMC), Pressure Equipment Directive (PED) and Equipment for Potentially Explosive Atmospheres (ATEX).

Where applicable, the Directives and any additional Approvals, cover important safety aspects relating to machinery and equipment and the satisfactory provision of technical documents and safety instructions. Where applicable this document incorporates information relevant to these Directives and Approvals. To confirm the Approvals applying and if the product is CE marked, check the serial number plate markings and the Certification, see the last page of this document.

1.3.2 Explosive atmosphere

This section should be read carefully for the pumps operating at explosive atmospheres.

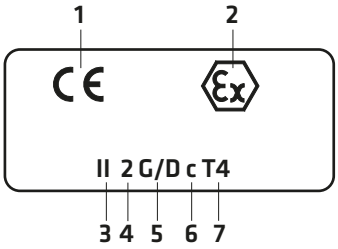
Only the products certificated for the explosive atmospheres should be used at the explosive atmospheres.

Detailed information about the operating conditions at the explosive atmospheres are found in Directive on Equipment for Potentially Explosive Atmospheres 94/9/EC (ATEX 95).

The pumps to be used at the explosive atmospheres should never be used at areas apart from the specified areas.

1.3.3 Labelling

Label on the pump is related with the pump only.



1- CE logo
2- Ex logo
3- Group
   I = Inside Mine
   II = Outside Mine
4- Category
   2 or M2 = High Level Protection
   3 = Normal Level Protection
5- Explosive Atmosphere [Gas(G) and/or Dust(D)]
6- Protection Type (Constructional Safety as per EN 13463-5)
7- Temperature Class

Coupling: It should be informed by the coupling manufacturer and the coupling should have ATEX sign on it.
Motor: It is required to be documented and labelled by the engine manufacturer.

1.3.4 Temperature classes and limits

During the pumping applications, the highest temperature occurs in the areas of the bearing area, packing area and spiral casing. The spiral casing temperature is almost same with that of the fluid delivered by the pump. If the pump casing is heated extern ally, the technical personnel should keep the temperatures under control according to the temperature classes.

Temperature classes given in the table and the highest permissible temperature for the pump during operation are shown in the following table.

Table 1

Temperature Class	Maximum Surface Temperature	Maximum Permissible Fluid Temperature
T3	200 °C	180 °C
T4	135 °C	110 °C

Temperature Limits

1.3.5 Track - Track

⚠ Pump and/or pump set should always be operated within the limits specified in the data sheet and label info.

The technical personnel should operate the pump within these limits and the status tracking system should be used for the pump set.
Use of the racking system is important especially for the following areas of the pump:

• Temperature values on the pump casing
• Temperature values in the packing area

In the systems where puffer liquid is supplied or double mechanical packing is available the buffer liquid should be observed.

• Temperature values in the bearing area

For proper operation of the bearings, it would also be useful to monitor vibration and temperature values in the roller bearing.

1.3.6 Constructional requirements

When explosive fluid is pumped, all parts under pressure should be made of ductile material.

Coupling protection housings should be made of non-sparking materials.

Mechanical packings should never be operated dry. The packing area should be filled with liquid completely as long as the pump operates. If you are sure that the packing area is filled with liquid, then the buffer liquid may be applied.
Frame of the pump and/or pump set should always be earthed.

1.3.7 Personnel qualification and training

All personnel involved in the operation, installation, inspection and maintenance of the unit must be qualified to carry out the work involved. If the personnel in question do not already possess the necessary knowledge and skill, appropriate training and instruction must be provided. If required the operator may commission the manufacturer / supplier to provide applicable training.

Always co-ordinate repair activity with operations and health and safety personnel, and follow all plant safety requirements and applicable safety and health laws and regulations.

1.4 Recycling

For products and arts which will not be used and scraped, use the local or private waste collection services. If it is not possible, consult the nearest authorized service centre of STANDART POMPA.

SPO 100-400

2- GENERAL DESCRIPTION OF THE PUMP

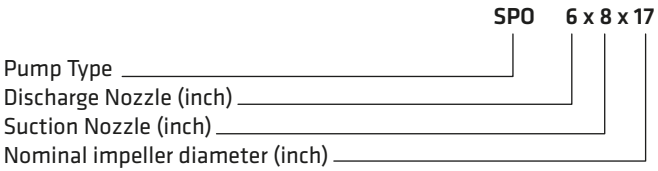
2.1- Description of the Pump

• SPO 100-400 type pumps are heavy service centrifugal pumps equipped with horizontal shaft, radial removable spiral, single-stage, end-suction, enclosed impeller, central mount (OH2) and back dismountable as per the edition API 610, Edition 11.

2.2- Intended Use

It is designed to use in the petrol, petrochemical and gas industries.

2.3- Denomination of the Pump



2.4 Pump Nameplate

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Model:		**Date of Production**	
Purchase No		**Working Temperature**	
Pump Serial No		**Casing Hydrostatic Test Pressure**	
Rated Flow			
Rated Head		**Bearing NDE / DE**	
Rated Speed		**Material of Const.**	
MAWP		**Impeller Diameter**	

OH2 Centrifugal Pump According to API 610 11th. edition.

2.5- Technical Specifications

Speed	: 1700 rpm
Discharge Flange	: 4"
Suction Flange	: 6"
Suction and Discharge Flange	: ANSI B16.5 Class 300
Operating Temperature	: 10 °C - 25 °C
Ambient Temperature (maximum)	: 40 °C
Casing Pressure (maximum)	: 51.1 bar
Liquid possible to deliver	: see Section 2.2

The service life of this product as determined and announced by the Ministry is 10 years.

3- UNPACKING, HANDLING and STORAGE

3.1- Unpacking

• Check whether the package has been damaged during transportation.
• Remove unpackaged pump and accessories (if any) carefully. Check whether they have been damaged during transportation.
• If any damage has occurred during transportation, notify SERVICE DEPARTMENT, STANDART POMPA and SHIPPING COMPANY about it immediately.
• Check whether all materials in the shipping list have been delivered. If there is any missing article, advise SERVICE DEPARTMENT, STANDART POMPA.

3.2- Handling

3.2.1- General warnings

⚠

• Abide by the rules at work to prevent occurrence of any accidents.
• Wear gloves, steel-tooled shoes and helmet during handling.
• You may use forklift, crane or hoisting ropes to lower wooden crates, packages, pallets or boxes depending on volume, weight and construction of them.

3.2.2- Lifting operation

• Determine the following points prior to lifting and handling the pump or pump and engine group on the joint frame.

- Total weight and centre of gravity,
- The largest outer dimensions, and
- Location of the lifting points.

• The load lifting capacity should comply with the weight of the pump or pump group.
• The pump or pump group should always be lifted and handled horizontally.
• Never stand under or near the load being lifted.
• Do not keep the load lifted longer than necessary.
• Accelerating and braking operations during the hoisting should not be performed in such a way that may be dangerous for the working personnel.

The pump or pump group should be hoisted as shown in the Figure 1a or Figure 1b in order to avoid from any deformation. (When the group is hoisted as a whole, never use the suspension hook of the engine.

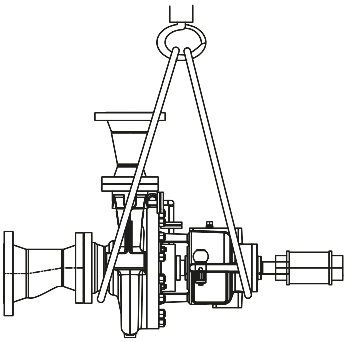


Figure 1a. *Bare Pump*

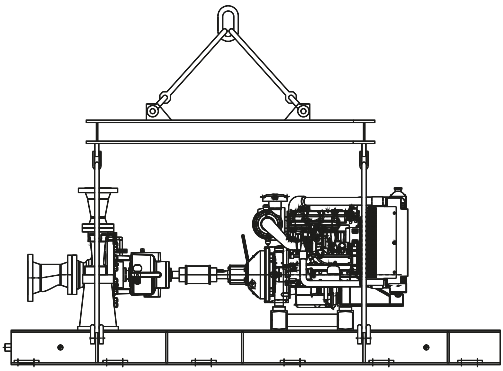


Figure 1b. *Joint Pump and Motor on the frame*

3.3- Storage

• If the pump will not be installed in place immediately, it should be stored at a clean and dry place free of any frost hazard without excessive change in the ambient temperature.
• If the pump bearings are of grease-applied ones, extra grease should be applied to the bearings to prevent moisture ingress around the shaft.
• Necessary precautions should be taken to protect the pump against humidity, dust, dirt and foreign materials.
• The pump should be rotated manually by some turns occasionally (e.g. once in a week) to prevent pitting on the bearing surfaces and sticking of the pump.

4- INSTALLATION ON SITE

ATTENTION Installation on site should be performed as per EN 60204-1 standard.

Installation of the pump on site and levelling and adjustments of it should be performed only by qualified personnel. Improper installation or pump base (foundation) may cause failure. Such situations are excluded from warranty.

4.1- Bare Pump

• If the pump is purchased as bare pump, then first a proper frame should be constructed to connect the pump and engine group. The frame should be designed and manufactured in such a way that it will have resistance to prevent vibration and deformation.
• If the pump is supplied without engine, proper engine and coupling should be selected before the group is installed.
• e following points should be taken into consideration when selecting engine:
- Maximum power drawn by the pump along the entire operating range,
- Running speed of the pump,
- Applicable power supply (frequence, voltage, etc.),
- Motor type (TEFC, Exproof, etc.),
- Motor connection form (pedestal, flanged, horizontal, vertical, etc.), and
• Rated engine power, rpm and type of drive should be taken into consideration when selecting coupling.

4.2- Preparation for Installation

Prior to installation of the pump in place:
• Suction and delivery flanges should be cleaned thoroughly.
• Protective film on the pump shaft should be removed.
• If the pump has been stored temporarily, the liquid oil in the bearings should be drained completely (in case of pumps manufactured with liquid oil) and the bearings should be cleaned by a proper cleaning agent and then oiled again. This operation is not required for the pumps lubricated by grease and for the pumps using enclosed type of ball bearing.

4.3- Installation Site

ATTENTION • The pump should be installed at a well-ventilated place free of freezing and explosion risk.

• There should be sufficient space around the pump being installed to allow easy access for maintenance of the pump as well as sufficient space above the pump to hoist it when required.
• Suction pipe of the pump should be short as far as possible.

4.3.1- General characteristics of the pump foundation (base)

ATTENTION You should work carefully for preparation of the pump base and installation of the pump group in place. Improper and careless installation may cause excessive vibration and premature wear of the pump equipment as well as pump failure.

• Sizes of the foundation concrete should be determined on basis of minimum 10% excess of the frame dimensions.
• Pump foundation should be independent of other foundation and platforms.
• Pump foundation should be capable to absorb vibrations and bear the loads to apply on the pump unit during operation.
• Place and dimension of the anchor bolts should be determined according to the hole dimensions of the pump unit.

• Washer should be used to prevent tension and distortion when tightening the foundation bolts.
• In order that the foundation bolts should align with the connection holes of the frame exactly and to allow for minor adjustments, the bolts are inserted into the bushings. The bushings should be place in such a way that they will not exceed top surface of the foundation concrete.

4.3.2- Placement of the Pump Group

• Preparation and pour of the foundation concrete mass.

-The concrete mass is formed according to its dimensions. (1)

-The locations of the anchor bolts are measured and marked carefully and Styrofoam (2) is cut tothe dimension, placed and fixed.

1.3 The concrete is poured
Volume ratio: Cement 1: sand 2: gravel 4
Concrete hardens within 7 days (hardening may be shortened by use of special cement).

1.4 Upon hardening of the concrete, the Styrofoam is burned and removed. Locations of the anchor bolts app ear in the concrete (2).

1.5 Top surface of the concrete and holes of the anchor bolts are cleaned.

2. Placement of the frame on the foundation concrete mass. (first adjustment)

2.1 Pump and engine is disassembled (removed) from the frame.

2.2 Anchor (3) and adjusting bolts (4) are mounted on the frame.

2.3 The frame is placed on the flattening chocks (5) and the anchor bolts (3) remain suspended in the holes (2). Make sure that the anchor bolts remain horizontal.

2.4 Levelness of the frame is controlled in both directions from the pump and engine placement location by use of precise spirit level 0,25 ÷ 0,40 mm/m is acceptable. The adjusting bolts (4) may be removed from the frame. Height of the chocks may be around 25-30 mm. The adjustment is made by shims and fish plates to be placed on the chocks.

2.5 Anchor holes are fileed with concrete. Anchor bolts (4) are thus fixed.
Volume ratio: Cement 1 : sand 1.5: gravel 3
Concrete hardens within 7 days (hardening time may be shortened by use of special cement).

3. Fixing of the frame on the foundation concrete mass exactly by adjustment.

3.1 The frame is adjusted exactly by means of adjusting bolts (4). Horizontality is controlled. Nuts of the anchor bolt are tightened. Final control is made. And thus the frame is fixed completely

3.2 The adjusting bolts are lifted up to the frame level.

3.3 The area about 30mm between the foundation concrete mass and frame is formed and concrete is poured through the holes (6) in the frame.
Volume ratio: Cement 1: sand 2
Concrete hardens within 2 days.

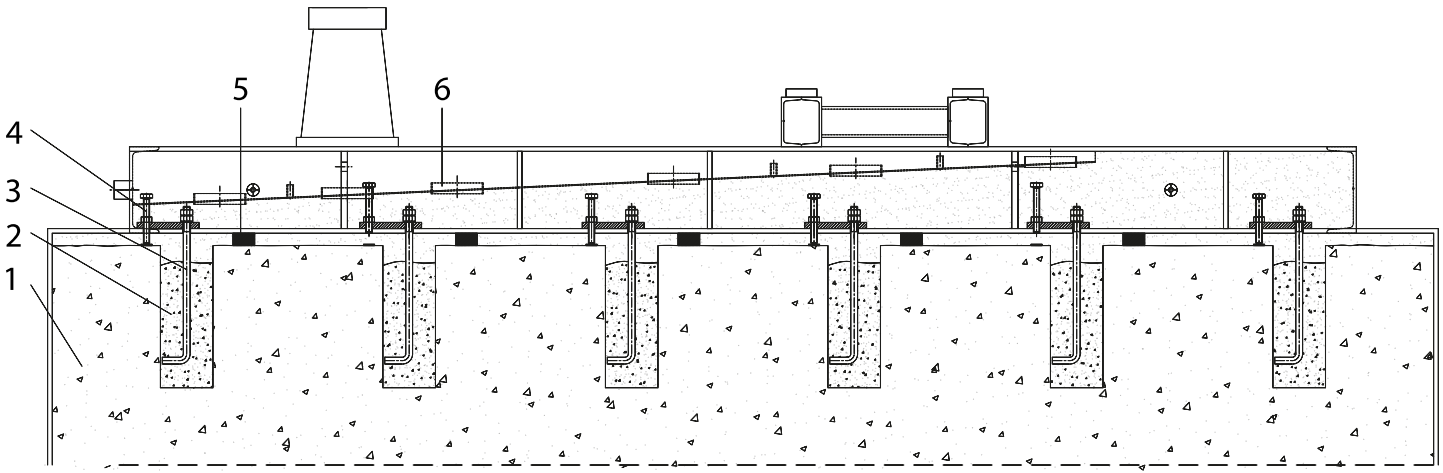
3.4 Frame remains adjusted and fixed on the foundation concrete.

3.5 Pump, coupling and engine are assembled.

3.6 Coupling adjustment is made on engine side. Adjustment is made by inserting shims under the engine mounts. Control is made by laser coupling adjusting unit. After coupling adjustment, the bolts of the engine mount are tightened and the adjusting nuts should not exceed the limit of 0.02 0.05 in terms of parallelism and angular alignment.

4. After pipe connections are made, it would be useful to control horizontality in both directions by use of precise spirit level.

5. Coupling protection is assembled to complete the assembly.



1. Concerete
2. Styrofoam
3. Anchor bolt
4. adjusting bolt
5. flattening wedge
6. hole for concrete

figure 2. *Preparation of the concrete foundation*

4.4- Installation of the Piping System

4.4.1- General

ATTENTION • Never use the pump as a point of support or bearer for the piping system.

• The piping system should be supported at points near to the pump. For this purpose, after completion of the installation of the piping system, loosen the bolts of the suction anddelivery flanges and control whether the piping system applies any tension on the pump.

• Rated diameter of the suction and delivery flanges of the pump are not indicator of the correct sizes of the suction and delivery pipes at all. The rated diameter of the pipes and accessories used should be equal to or larger than the inlet diameters of the pump at least. Never use pipes and accessories having smaller diameter than the inlet diameters of the pump. Especıally components such as bottom valve, strainer, dirt-retaining filter and check valves with larger free passage area should be preferred. In general, flow rates should not exceed 2m/s for the suction pipe and 3m/s for the delivery pipe. High speeds cause high pressure reduction and it, in turn, cause cavitation conditions on the suction pipe and loss arising from excessive friction on the delivery pipes.

• Pipe connections should be made with the flanges. Flange bolts should be made of proper material and in proper size. The flange bolts should be inserted between the flange bolts and centred in such way that it would not impair flow section.

• In case of excessive vibrations and systems operating with hot liquids, expansion parts should be used in order that any extra forces that may arise from thermal expansion are not transferred to the pump.

• Materials such as welding burrs, metal particles, sand and oakum arising from production of fhe piping system may remain in the pump and give damage to the pump. The suction and delivery flanges should be sealed blind washers in order to prevent such materials from entering into the pump during the assembly operations. After assembly, all pipe parts should be removed, cleaned, painted and reassembled. If dirt-retainer is used on the suction side of the pump, the dirt-retainer should be cleaned after working for several days.

4.4.2- Suction pipe

• The suction pipe should be definitely watertight and should not be arranged in a way to cause formation of air pockets. In other words, if it is supplied from a reservoir higher than it (system with elevated suction/supply), the suction pump should be slightly inclined towards the pump; and if the pump is supplied from a reservoir lower than it (system with suction depth), than the suction pipe should be gradually inclined slightly towards the pump.

• In order to keep the loss from friction, sharp elbows should not be used; and abrupt change of direction and section should be avoided and suction pipe should be made short as far as possible. If it is required to make change of section on a horizontal suction pipe, an eccentric conical spacer with its flat side on the top should be used.

• If the pump is supplied from a reservoir higher than it, an insulation valve should be used to keep the axis on the suction pipe horizontally. This valve should always be open when the pump operates and it should never be used as flow rate adjusting valve.(Caution: Throttle of the valve may cause the pump to operate with cavitation).

4.4.3- Delivery pipe

• A check valve should be connected on the delivery pipe, near the pump as far as possible in order to adjust the flow rate and delivery height.

• If the delivery height of the pump is more than 10 m or the delivery line is quite long, a check valve should be connected between the pump and flow rate adjusting valve on the delivery pipe in order to protect the pump against water hammers when stopping the pump or prevent backflow.

4.5 Permissible Forces and Moments on the Pump Flanges

Table 2

	Suction Nozzle 6"	Discharge Nozzle 4"
F_x	3100 N	1400 N
F_y	2500 N	1150 N
F_z	2050 N	1800 N
F_R	4500 N	2550 N
M_x	2300 Nm	1300 Nm
M_y	1200 Nm	700 Nm
M_z	1750 Nm	1000 Nm
M_R	3150 Nm	1800 Nm

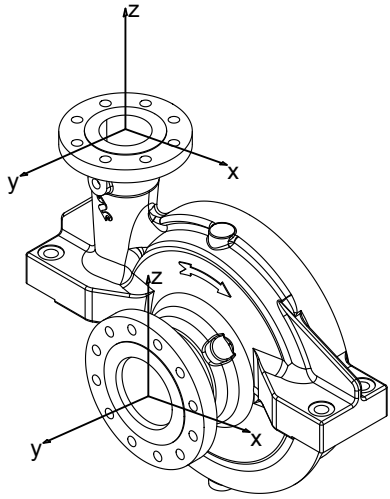


Figure 3.

* Force unit is Newton [N] and moment unit is Newton x Meter [N,m].
** Values given here are given for Cast Steel (A 216 grade WCB / GS-C 25).

4.6- Coupling Adjustment

ATTENTION After installation of the frame and system connections, the coupling adjustment should be controlled finally. The reason I that proper adjustment of the entire system is responsibility of the purchaser.

ATTENTION "Coupling Adjustment" is to ensure that the rotation axes of the engine and pump should be on the same plane. If SPO 100-400 type pump is ordered with engine and frame, it is delivered with the coupling adjustments made at the plant. However, this adjustment may be easily impaired during transportation, handling, installation on site and installation of the system. For this reason, the coupling adjustment should be performed again after installation of the group on site, disregarding the adjustment made at the plant.

• The most important factor for problem-free operation of the pump group is correct coupling adjustment. The basic reason of a number of problems such as vibration, noise, bearing heating and overload is a coupling unadjusted or improperly adjusted. For this reason, coupling adjustment should be performed very well and controlled frequently.

• Elastic coupling should not be regarded as a component to correct an improper adjustment. Elastic coupling does not correct a poor axial adjustment between the pump and engine and does not remove excessively poor adjustments.

• A metal part (steel ruler or gauge, etc.) and a precise caliper are) required to perform coupling adjustment (special equipment should be used for very fine and precise adjustment). Axial run-out of the coupling (see figure 4) should not exceed 0.1 mm.

• There may be two types of adjusting mistakes on the coupling:

a) Angular mistake
b) Parallel displacement mistake

• In order to control the angular mistake, the distance between two parts of the coupling should be measured mutually on horizontal and vertical planes. The clearances measures at these four points should be equal (Figure 5a,5b).

• In order to control the parallelism mistake, a gauge with straight edge is pressed on a part of the coupling in parallel to the axis and the position of the gauge related to other part is observed. The gauge should contact with both two parts simultaneously and along its entire edge. This process should be performed at two opposite places on the horizontal and vertical plane (Figure 5c, 5d).

• Adjustment mistakes may be on the horizontal and/or vertical plane. Mistakes on the vertical plane may be made by putting thin metal sheets under the pump or motor mounts and the mistakes on the horizontal plane by benefiting from the gaps in the connection holes or sliding the engine on the horizontal plane. Manner and order of the coupling adjustment is shown inthe Figures 5a, 5b, 5c and 5d, respectively.

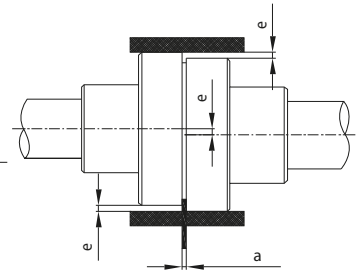


Figure 4. *Adjustment of the elastic coupling*

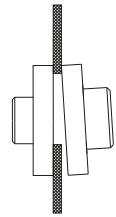


Figure 5a. Angular mistake on the horizontal plane and its correction

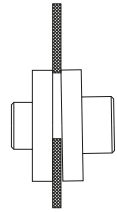


Figure 5b. *Angular mistake on the vertical plane and its correction*

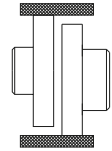


Figure 5c. Parallel displacement mistake on the horizontal plane and its correction

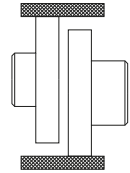


Figure 5d. Parallel displacement mistake on the vertical and its correction

4.7- Minimum Flow

If there is possibility of the pump operating with its delivery valve is closed completely (that is, at zero flow rate) or almost closed (that is, at very little rate), a by-pass valve should be used on the outlet flange of the pump or on the delivery pipe just after the pump, but in advance of the control valve should be used. If such a valve is not used and the pump operates for a long time, almost all power given by the engine converts to thermal energy and transfers to the delivered liquid. This situation may cause overheating and, consequently, cause significant failures.

4.8- Final Controls

• After all operations given above are completed, the coupling adjustment should be controlled once more in accordance with the section 4.6. And if it is incorrect, it should be corrected.
• The pump rotor should be rotated several times manually to make sure it rotates easily.
• All security guards should be put in place.
• And the pump group should be operated and you should allow until the operating and heating conditions are reached.
• At the end of this term, the pump is stopped and thin metal sheets are put under the engine mounts only to perform coupling adjustment for the last time.
• Final coupling adjustment is especially recommended to be performed at the operating temperature.

• The pump should never be operated before the safety guards are put in place. This is a security and safety rule at workplace which should be definitely observed.

5- START-UP / STOP

5.1- Preliminary Preparation

5.1.1- Oil control

• Bearings of the pumps which are lubricated by liquid oil are shipped oilless and this point is specified by a warning label. The pump bearings should be filled with liquid oil up to the indication level (see Figure 16).

5.1.2- For lubrication, see section 6.

5.1.3- Air venting and suction of the pump

• Make sure that the pump and suction pipe is completely full. It doesn't matter for the forced supply pumps. The suction valve, if any, is opened and the air plugs are loosened to bleed air and fill the pump completely.

ATTENTION Never allow dry operation of the pump.

5.1.4- Control for Direction of Rotation

• SPO 100-400 type pumps rotate clockwise when viewed from the engine to the pump. This direction is shown by an arrow on the pump and pump label. The pump should be operated for a very short time and stopped immediately to control whether it rotates in direction of the arrow. If the safety guard has been removed when performing this operation, it should be put in place again.

5.2- Start-up of the pump

• Make sure the suction valve is open and delivery valve is closed.
• After opening the valve completely, control whether the value read on the manometer is the value indicated at the operating point. If the reading on the manometer is smaller than the value at the operating point, throttle the valve and bring it to the point at the operating point. If the reading on the manometer is bigger, then control the piping system, especially the static height.

ATTENTION If any one of the following problems is observed when the pump operates at its rated speed, the pump should be stopped immediately and the problem should be removed:

• The pump does not deliver at all.
• The pump does not deliver sufficient liquid.
• Flow rate reduces.
• Delivery pressure is insufficient.
• Engine rotates excessively.
• Pump has excessive vibration.
• Pump operates very noisily.
• Bearings overheat.

5.2.1 Normal vibration levels, alarm and trip
For guidance, pumps generally fall under a classification for rigid support machines within the International rotating machinery standards and the recommended maximum levels below are based on those standards.

ATTENTION **Alarm and trip values for installed pumps should be based on the actual measurements new condition. Measuring vibration at regular intervals will then show any deterioration in pump or system operating conditions.**

Table 3

Vibration velocity – unfiltered **mm/s - r.m.s.**		**mm/s - r.m.s.**
Normal	**N**	≤ 5
Alarm	**N** x 1.25	≤ 6.2
Shutdown trip	**N** x 2.0	≤ 10

5.3- Stopping the Pump

• Close the delivery valve slowly.
• If there is any equipment on the delivery line to prevent water hammer or if the occurrence of water hammer is not dangerous, you may also stop the pump without closing the valve.
• Stop the engine. Make sure that the pump group stops properly and evenly.
• If external supply is made to the packing, close it to reduce the pressure on the body cover.
• If the pump will remain out of service for a long time, close the suction valve and auxiliary circuits, if any. In case of freezing risk and/or if the pump will not be used for an extended time, open the discharge plugs and empty the water in the pump completely or take necessary precautions against the risk of freezing.

5.4- Controls During Operation

• Never allow the pump to run dry.
• The pump should never be operated for a long time with the valve closed (zero flow rate).
• YThe bearing temperature should never exceed 50 °C above the ambient temperature. But it should never exceed 80 °C.
• When the pump operates, all valves for the auxiliary systems should be open.
• If the pump has mechanical packing, it does not require maintenance. Much liquid coming from the mechanical packing means that packing surfaces have worn out and it is required to be replaced.
• Inspect the elastic parts of the coupling regularly in certain intervals. You should replace the parts you observe any wear.
• Operate the standby pumps at least one time a week to keep them ready for operation. Inspect the auxiliary systems, if any, of these pumps as well.

6- **LUBRICATION**

ATTENTION **Make sure the bearings are lubricated regularly. Roller bearings operating dry may cause to overheating, sparkling and permanent damages.**

Lubrication of bearing is by oil circulation into the bearing housing provided by oil ring. A constant level oiler is normally furnished with the pump unless otherwise specified.

6.1- Oil ring Lubrication

Before filling the bearing housing reservoir, flush out the housing thoroughly with safety solvent and a leading grade of flushing oil, compatible with the lubricating oil that will be used. The reservoir is to be filled to appropriate level as illustrated in figure 6.

6.2- Lubrication Specification

The ideal bearing lubricant is a straight well refined, neutral mineral, preferably of the turbine type. It should not contain free acid, chlorine sulphur or more than a trace of free alkali.

When adding oil to the bearing, use proper oil of high quality.
For example:
- You may use SHELL TELLUS 46 cSt viscosity fort he pumps.

A: Oil discharge plug
B: Oil level sight glass
C: Overflow plug
D: Oiler Connection

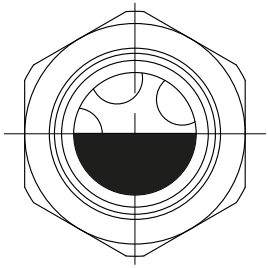


Figure 6. Oil level sight glass

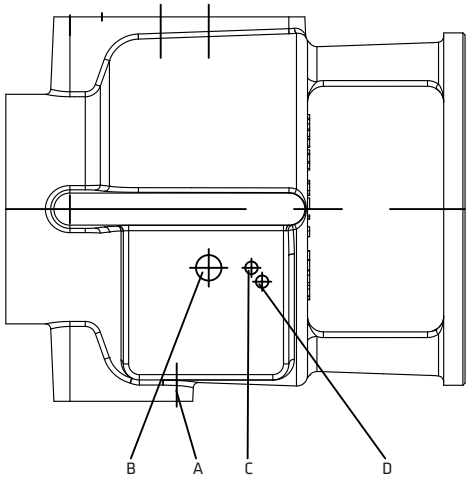


Figure 7. Holes for lubrication

ATTENTION **Watch the oil level. If the oil level is higher than the recommended one, the bearing temperature may rise high. If the oil level is low, then the bearings are not lubricated sufficiently and it may cause malfunctions.**

6.3- Trico oiler setting (standard)

a) Initial fill via top of housing, using overflow plug to establish correct level.
b) Release thumb screw and remove bottle. Establish a measurement from the centre line of the oiler connection in bearing housing to the upper cross arm of 6 mm; this can be obtained by completely screwing down the lower arm as illustrated on figure 7.
c) Fill bottle with recommended oil and install on holder. Remove and fill bottle as many times as is required to fill the bearing housing up to the cross arm level and no air bubbles appear in the bottle.
d) Remove bottle and ascertain that the oil level is 6 mm from the centre line of oiler connection. Adjust upper cross arm as required and lock in place with lower arm.

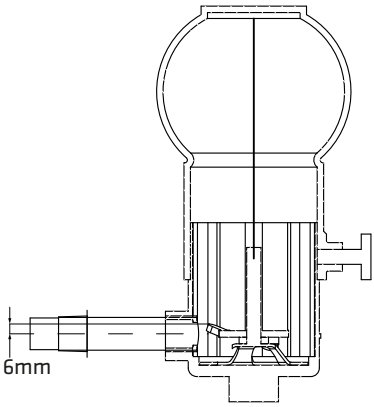


Figure 8. Trico Oiler

6.4- Oil lubricated bearings
Normal oil change intervals are 4000 operating hours or at least every 6 months. For pumps on hot service or in severely damp or corrosive atmosphere, the oil will require changing more frequently. Lubricant and bearing temperature analysis can be useful in optimising lubricant change intervals.

The lubricating oil should be a high quality mineral oil having foam inhibitors. Synthetic oils may also be used if checks show that the rubber oil seals will not be adversely affected.

ATTENTION **Bearing temperature should never exceed 50 C above the ambient temperature. But it should never exceed 80 C in any case.**

7- DISASSEMBLY, REPAIR AND ASSEMBLY

Befor working on the pump, always disconnect the electric connections and make sure you have taken all necessary precautions to avoid it operating accidentally.

Alwats observe the instructions given in the " Safety Instructions".

7.1- Disassembly

ATTENTION **Refer to sectional drawings for part numbers and identification.**

7.1.1- Disassembly of Pull Out Element

This is a pull from rear design, so it is not necessary to remove casing, or to detach suction or discharge piping, coupling hubs or to remove driver.

a) Remove all seal piping, related instrumentation and electrical equipment that will interfere with disassembly. Drain pump casing.

b) Disassemble and remove coupling guard and coupling spacer.

c) Place lifting straps around bearing bracket at seal area. Take a slight strain on slings.

d) Drain the bearing housing of oil. This can be done by removing the drain plug situated at the bottom of the bearing housing.

ATTENTION **Conduct analysis of the oil drained. If it is suitable for use, you may reuse it; if not, do not use it again and never discharge it, but send it to the recycling centre.**

e) It is advisable to thoroughly drain and dry off the baseplate before attempting any maintenance work on the pump.

f) Remove casing cover to casing main flange bolting. Install two jack screws (provided) in casing cover. Tighten jack screws evenly to separate joint between casing cover and casing.

g) Carefully withdraw pumping element from casing until impeller is clear of casing. Move pumping element to area where disassembly will be performed.

h) Correctly support pumping element in horizontal position.Release impeller locking screws and locknut on impeller. Remove impeller.

i) Remove and discard gasket from casing cover. Now rotate assembly so that the shaft axis is in the vertical plane with coupling end uppermost.

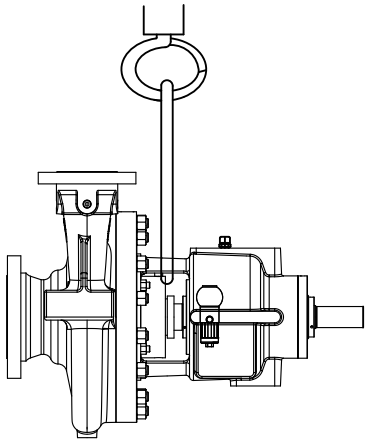


Figure. 9
location of lifting straps for removing pumping element

7.1.2- Mechanical seal disassembly

a) Refer to mechanical seal drawing and identify the seal setting plates on the front of the gland plate.
b) Rotate (or slide as appropriate for the design) the plates into the mechanical seal sleeve setting groove and then secure.
c) Slacken the screws locking the collar/seal sleeve onto the pump shaft.
d) Unscrew any pipework from the tapped ports on the periphery of the gland plate.
e) Remove the cap screws which secure the casing cover to the bearing housing.
f) With the casing cover suitably supported carefully remove the bearing housing and place horizontally on flat surface.
g) Remove the four nuts securing the gland plate to the casing cover. Returning to the casing cover (with the gland plate uppermost). Note - When oil ring lubrication is provided an additional ½" NPT plug is fitted in the top of the bearing
housing adjacent to the mushroom headed vent. Removal of the plug should enable the visual inspection of the ring.
h) Remove mechanical seal cartridge assembly.

ATTENTION Refer to any special instructions supplied with the mechanical seal.

7.1.3 Bearing housing disassembly
a) Looking at the bearing housing, remove impeller key (and throat bush if fitted).
b) Loosen clamping screws and remove both the deflectors from pump shaft.
c) Remove cap screws from bearing end covers, securing cover to bearing housing.
d) Remove bearing end covers remove and discard gasket. Remove labyrinth from bore of outboard end cover. Remove o-ring from labyrinth.
e) Place the bearing housing in a vertical position, (coupling end up) on blocking. Blocking must be of sufficient height to prevent shaft end from contacting the floor. To avoid damage to the oil rings, position them as shown.

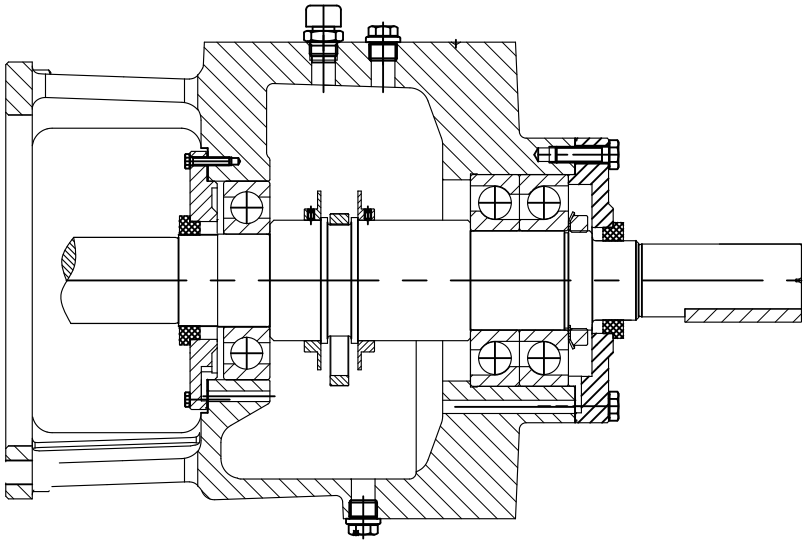


Figure 10.

f) Remove the shaft assembly from coupling end of bearing housing. Remove labyrinth from seal end of bearing housing. Remove o-ring from labyrinth.

Take care not to damage the oil rings.

g) Release locking tab of lock washer. Remove locknut and lock washer.
h) Bearings can be removed by the use of a press or puller. Bearing must be installed in the same manner as removed. It is suggested that each bearing be marked for sequence and direction.

ATTENTION **When removing bearings exert pressure on inner race only.**
Do not exert any pressure on outer bearing race. (See Section 7.6).

i) Remove oil rings and oil throwers from the shaft as appropriate.
j) Check the shaft for run out using "V" blocks or rollers placed under the bearing areas. Run out of shaft is not to exceed 0.05 mm.

7.2 Examination of parts

ATTENTION **Used parts must be inspected before assembly to ensure the pump will subsequently run properly.**
In particular, fault diagnosis is essential to enhance pump and plant reliability.

7.2.1 Casing, seal housing and impeller

a) Inspect for excessive wear, pitting, corrosion, erosion or damage and any sealing surface irregularities.
b) Replace as necessary.

7.2.2 Mechanical seal

a) Mechanical seal stationary and rotating faces should be inspected for signs of wear or cracks and replaced as necessary.
b) It is recommended that when reassembling mechanical seal new "O" rings and gaskets be used.
c) Refer to manufacturers drawing for assembly of mechanical seal. Refer to mechanical seal section within this manual for further details.

7.2.3 Throat Bush (If fitted)

a) Check the throat bush and replace if required. Note that the bush outside diameter should be the same diameter as the adjacent impeller wear ring.

7.2.4 Shaft

Replace if grooved, pitted or worn.

7.2.5 Gaskets and O-rings

After dismantling, discard and replace.

7.2.6 Bearings

a) It is recommended that bearings are not re-used after any removal from the shaft. In any case the bearings must be replaced not after 25000 operating hours.

b) If the bearing cannot be removed with the tools available never use a torch under any circumstances. Split the outer ring with a small hand grinder, saw through the ball/roller retainer, and split the inner ring about three quarters through with a grinder and break with a cold steel chisel.

ATTENTION **Do not attempt to inspect condition of bearings until they have been cleaned.**

c) Solvent for cleaning bearings should be in a clean container. Place bearings in solvent and let soak for a short time. Agitate the bearing around near the top of the container, giving it a turn now and then until it is clean. Rinse in a clean container of fresh solvent.

ATTENTION **Do not spin dirty bearings. Rotate them slowly while washing.**

d) Dry thoroughly cleaned bearings. If an air hose is used for drying, make sure it is clean dry air.

ATTENTION **Do not allow the bearings to spin by force of air. Hold the inner and outer rings to prevent bearing from spinning.**

e) Inspect bearings immediately. If there is any question as to the condition of a bearing do not hesitate to replace it. There are many conditions that contribute to the deterioration of the bearings. A qualified bearing representative should be consulted if there is any question of bearing condition.

f) Inspected bearings which will be reused should be packed with new grease or dipped in clean lubricating oil, covered with clean lint free rags or other suitable covering and placed in a clean box or carton until ready for installation.

ATTENTION **Under no circumstances the bearings are to be left exposed.**

7.2.7 Labyrinths or bearing isolators (if fitted)

a) The lubricant, bearings and bearing housing seals are to be inspected for contamination and damage. If oil bath lubrication is utilised, these provide useful information on operating conditions within the bearing housing.

b) If bearing damage is not due to normal wear and the lubricant contains adverse contaminants, the cause should be corrected before the pump is returned to service.

c) Labyrinth seals and bearing isolators should be inspected for damage but are normally non-wearing parts and can be re-used.

d) Bearing seals are not totally leak free devices. Oil from these may cause staining adjacent to the bearings.

7.3 Assembly

To assemble the pump consult the sectional drawings, Parts list and drawings
Ensure threads, gasket and O-ring mating faces are clean.

7.3.1 Wear rings

The impeller may be fitted with both front and rear wear rings or front ring only.
The impeller ring(s) are renewable and should be replaced when badly grooved, and/or when pump performance does not meet the system requirements. Whenever it becomes necessary to replace either wear ring, both rings involved (impeller and casing/casing cover) must be ordered and replaced as a set as they are furnished standard size only. Spare impeller wear rings are supplied with a material stock over outside diameter which has to be machined off after rings fitting on impeller. If an impeller with its wear rings is ordered as spare, it will be supplied fully machined, including wear rings outside diameter, to original dimensions. Casing wear rings are always supplied fully machined. Be sure to re-establish the original running clearance between the two wear rings involved by machining the fitted impeller ring.

7.3.1.1 Impeller wear rings

a) To remove impeller wear rings, mutually remove wear ring set screws or ground off tack weld. Rings can be machined off or grind two slots diametrically opposite across the width of the ring so it can be split apart. Use caution if ring is removed by grinding so as not to damage impeller hubs.

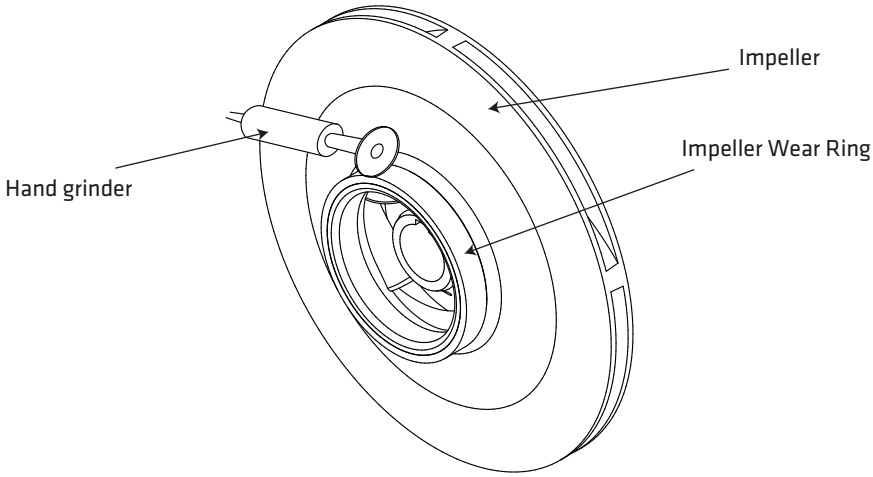


Figure 11.

b) Make sure ring fits on impeller are free of nicks or burrs. Heat new ring to 110 °C and install on impeller. Drill and tap new holes in impeller spaced half the circular distance from the previously used holes in the impeller. See sketch below.

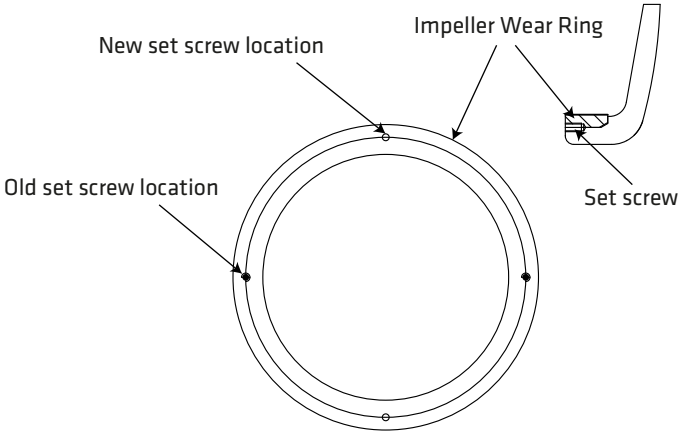


Figure 12.

ATTENTION **Impeller wear rings when installed must be machined to establish original diameter and running clearance. Whenever an impeller has new wear rings fitted it must be dynamically balanced before being reassembled. Refer to the Cross Sectional drawing for the requested running clearance.**

7.3.1.2 Casing wear rings

Each wear ring is locked against rotation with a cylindrical pin.

a) To remove the wear ring, press it out. If this method does not easily effect removal of the ring, it can be split apart. First, however, drill one or more holes in the face of the worn ring.

b) New rings to be installed must be shrunk by freezing when installing in casing or casing cover. Fit and secure with a locking pin. Replacement wear rings are furnished standard size in the bore. Check the running clearance between impeller and casing ring against the appropriate value.

7.3.2 Oil Thrower and Oil ring (if applicable)

Install thrower and oil ring (if supplied) onto shaft. Secure thrower to shaft by tightening set screws into the location groove in the shaft.

7.3.3 Bearings Housing

The ball bearings require correct handling and installation to ensure optimum performance. The following information is intended as a minimum to ensure that the bearings are handled and installed ensure that the bearings are handled and installed correctly.

7.3.3.1 Bearings handling

a) Do not remove new bearings from their storage package except for inspection, when stored for a long period of time or just prior to their installation.

b) Work area must be clean to ensure that no dirt or other contaminates will enter the bearings. Handle bearings with clean, dry hands and with clean, lint free rags. Lay bearings on clean paper and keep covered. Never expose bearings on a dirty bench or floor.

c) Do not wash a new bearing. It is already clean and the preservative should not be removed.

d) Before mounting, be sure shaft bearing areas are clean and free of nicks and burrs. Check the dimensions of these areas to ensure correct fit of bearings.

7.3.3.2 Bearing installation

Install the thrust and radial bearings in the same sequence and direction as removed. Apply below method when providing a heat source for expanding the inner race of the bearings to facilitate mounting.

a) Bearings still wrapped in their original intimate wrap are placed on a shelf in a temperature controlled oven, or in an enclosure lined with foil and heated with electric light bulbs. A temperature of 70 °C for one half hour should be sufficient.

b) When bearings are installed on the shaft make sure the bearing is installed squarely and is firmly seated. Hold bearing in place until it has cooled sufficiently so that it will not move from position. Cover bearings to protect them from dirt.

ATTENTION **When installing the bearings the mounting pressure should never be applied such a manner that it is transmitted through the rolling element. Apply the mounting force directly against, and only against, the inner ring.**

ATTENTION **Inner thrust bearing must be assembled against shoulder on shaft with the wide flange of the outer race towards the coupling. The outer thrust bearings is to be placed on the shaft with the wide flange of the outer race towards the inner bearing**

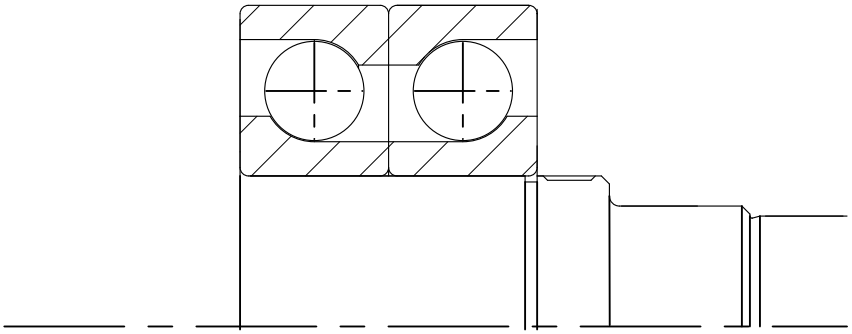


Figure 13.

d) When installing bearings on shaft, a slight heat is required to expand the inner bearing race. Heat for approximately 20 - 30 minutes.

e) Install the lock washer and locknut.

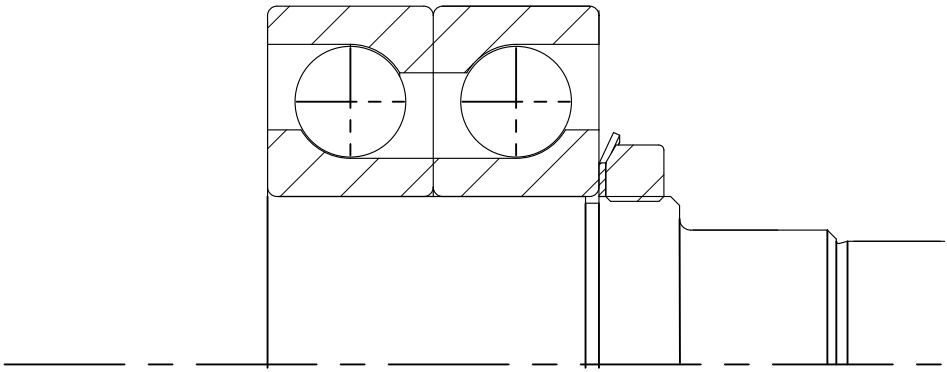


Figure 14.

f) Place the bearing housing in a vertical position on blocks in preparation for installation of shaft assembly. Make sure blocking is of sufficient height so that shaft will not contact the floor.

g) Suspend shaft vertically for installation into bearing housing. Position oil ring on shaft to prevent damage it enters bearing housing.

h) Lower the shaft assembly into the bearing housing. Install gasket and end cover. Torque bolts in accordance with Section 7.2.

i) Place bearing housing in a horizontal position suitably supported. Fit new o-rings into the grooves on each labyrinth. Working from the coupling end of the shaft the smaller labyrinth over the shaft and press into the bearing housing until it locates against the machined shoulder. It is held in place by the o-ring - no further fixing is required. Repeat the operation for the other labyrinth, working from the impeller end of shaft.

j) Install both the deflectors (impeller and coupling end) onto shaft. Position flingers approximately 1 mm from their respective labyrinth and secure with appropriate clamping screws.

k) Check the axial play of the shaft, it must be limited between 0.05 mm and 0.100 mm

7.3.4 Shaft seal

7.3.4.1 Shaft seal – mechanical seal

a) Fit new gasket in face of mechanical seal gland plate. Refit mechanical seal cartridge over the 4 gland studs on the casing cover ensuring correct orientation of the gland tappings (refer to mechanical seal assembly drawing). Secure with four nuts tightened to the torque specified in section 7.2.

b) Rig bearing housing assembly to hoist impeller end and shaft downwards. Carefully lower shaft end through seal sleeve until bearing housing locates on casing cover.

c) Secure bearing housing to cover.

d) Retighten mechanical seal drive collar set screws. Move setting plates from "transit" to "run" position. Refit screwed piping into mechanical seal gland plates.

ATTENTION **Refer to any special instructions supplied with the mechanical seal.**

7.3.5 Casing assembly

a) Install key and impeller. Install locking nut - noting left hand thread form. Torque nut to correct tightness. Fit and tighten lockscrew on end of locknut throat bush (if fitted).

b) Install a new spiral wound gasket into position on casing cover.

c) Rig assembly with lifting straps to an overhead hoist and carefully install the assembled pumping element into the casing.

ATTENTION **Use care when installing pumping element to avoid damage to the gasket.**

d) Install nuts on casing cover to casing studs. Torque nuts evenly to correct tightness. (See Section 7.2).

e) Install coupling key and coupling hub onto the pump shaft.

f) Re-install drain plug and fill the bearing housing to the prescribed level with fresh lubricating oil. (See Section 5.1.1).

g) Check to see if rotor runs freely by turning the shaft with a strap wrench or by hand. Make any corrections or adjustments.

h) Check driver rotation. Driver rotation must coincide with direction indicated by arrow on pump.

i) Align pump - motor coupling per "ALIGNMENT" instructions and install spacer piece. Install coupling guard.

j) Replace all auxiliary piping.

7.3.5.1- Tightening Torque

Table 4

Tightening Torque		
Screw Diameter	Maximum Torque (N.m)	
	Quality Class	
	8.8	10.9
M4	3.0	4.4
M5	5.9	8.7
M6	10	15
M8	25	36
M10	49	72
M12	85	125
M14	135	200
M16	210	310
M18	300	430
M20	425	610
M22	580	820
M24	730	1050
M27	1100	1550
M30	1450	2100
M33	1970	2770
M36	2530	3560

8- SPARE PARTS

• STANDART POMPA warrants to supply replacement parts of SPO 100-400 type pump for TEN YEARS from the manufacturing date. In other words, you may easily get the spare parts you need at any time.
• When you place order with us, please indicate the values written on the name plate

8.1 Recommended spares (according to API)

For start up purposes:

1 - Set of bearings (line and thrust)
2 - Sets of gaskets and o-ring
2 - Wear rings set (2 rotating + 2 stationary)
1 - Mechanical seals
1 - Labyrinth set (drive and impeller end)

For normal maintenance:

1 - Set of bearings (line and thrust)
2 - Sets of gaskets and o-ring
2 - Wear rings set (2 rotating + 2 stationary)
1 - Mechanical seals
1 - Labyrinth and deflector set (drive and impeller end)
1 - Shaft
1 - Impeller

9- Maintenance

9.1- Periodical Maintenance Schedule and Application Info

Period	Required Number of Personel	Required Time	Work to be Performed
Daily	1	10-15 min	• Check cavitation and bearings for noise. • Check engine amps an mains voltage. • Check bearing temperature (do not control the bear temperature manually, use thermometer
Weekly	1	20-30 min.	• Check suction-delivery pressure of the pump. • Check bearing temperature. • Check unusual noise. • Check vibration levels. • Check the seal area for leak. - There should be no leak on the mechanical seal. - See section 7.4 for seal application.
Monthly	1	20-30 min.	• Remove the housings and check shaft and other elements. • Check coupling adjustment and readjust, if required. • Check oil level in case of liquid oiled roller bearings and refill, if missing. • Check tihhtness between pump frame connection.
Annually	2	2-3 hour	• If the pump does not operate (spare), operate and check its condition. • Clean auxiliary elements of the pump (valves, manometer piping,etc). • Check axial play of the engine shaft. • Reassemble auxliary equipment and inspect their conditions. • If there is leak on the mechanical seal, replace the mechanical seal.
3 Years or 10000 hours	2	2-3 hour	• Disassemble the pump and inspect it generally. • Inspect and replace, if required. - Impellers - Wear Rings - Shaft - Key - O-rings - Roller bearings • Apply anti-corrosion to the non-machined surfaces.

Table 5

9.2- Failures, Causes and Remedy

This section gives failures that may be encountered during operation of SPO 100-400 type pump and their possible reasons (Table 6) and remedy methods (table 7).

Table 6

FAILURE	POSSIBLE CAUSE
Pump started up does not deliver water at all.	1-5-7-10-11-13
Flow rate reduces or no water delivery	2-3-8-14
Engine under excessive load	9-12-17-18-19-27-28
Bearings overheat	19-20-21-22-24
Pump has vibration	15-16-19-23-25
High noise level	4-6-26

Table 7

	POSSIBLE CAUSES	REMEDY METHODS
1	May be air in the pump and/or suction line	Fill the pump and suction pipe with liquid completely and repeat the start-up operation.
2	Air intake from the seal, suction pie or connections. Pump intakes liquid mixed with air.	Check all connections on the suction pipe. Check the seal and supply pressurized liquid to the seal, if required. Check immersion depth of the suciton pipe or bottom valve and increase the immersion depth, if required.
3	Air pocket in the suction pipe	Check inclination of the suction line and whether there are parts susceptible to formation of air pockets and if there are mage necessary correctyions.
4	Air in the liquid	Eddies occur due to insufficient immersion depth of the suction pipe causing to air intake. Check liquid level in the suction reservoir or increase immersion depth of the suction pipe / bottom valve.
5	Suction depth too much	If there is no obstacle leading to clogging in the suction, check friction loss on the suction line and use suction pipe with large diameter, if required. If the static suction depth is too much, you should either increase the liquid level in the suction reservoir or move the pump to a lower level.
6	Pump operates with cavitation	NPSH of the plant is very law. Check the liquid level in the suction reservoir. Check whether there is excessive friction loss on the suction line. Check whether the insulation valve on the suction line is completely open. If required, reduce the pump to a lower level and increase loadon the pump suction.
7	Delivery head of the pump is insufficient	Actual delivery head of the plant is higher than the specified one. Check the total static height and friction loss of the suction pipe. use of pipe with larger diameter may act as remedy. Check whether the valves are completely open.
8	Increased delivery head	Check whether the valves are completely one. Check whether there is any obstacle causing clogging in the suction pipe.
9	Pump operates at a lower delivery head.	Actual delivery head of the plant is less than the specified one. Machine the impeller diameter in accordance with the manufacturer's recommendation.
10	Pump returns reverse.	Check whether the engine's direction of rotation complies with the direction of rotation indicated on the pump casing o name plate.

Table 7 (continued)

	POSSIBLE CAUSES	REMEDY METHODS
11	Low speed	Check mains voltage and frequency or whether there is phase deficiency in the engine
12	Speed too high	Reduce the pump speed, if possible or machine the impeller diameter according to the manufacturer's recommendation.
13	Impeller, check valve or strainer clogged	Clean the impeller, check valve or strainer.
14	Impeller or strainer partly clogged	Clean the impeller or strainer.
15	Impeller partly clogged.	Clean the impeller.
16	Worn or broken impeller	Replace the impeller
17	Mechanical friction on the pump	Check whether there is obstacle or bending on the pump rotor.
18	Soft seals worn excessively	Loosen pressure bush of the seal
19	Coupling misadjusted	Check coupling rubber and readjust it.
20	Bearing covers too tight	Check the covers and make necessary corrections.
21	Flow rate is less than the required minimum flow rate	Increase the flow rate. Use by-pass valve or line, If required.
22	Too much grease on the bearing	Remove the excess grease.
23	Bent shaft	Chech the shaft and replace it, if required.
24	Insufficiet lubrication or lubricant contaminated.	Check amount of the lubricant. Clean the bearings and bearing housings and lubricate again.
25	Instable rotating parts	Check stability of the rotating parts.
26	Pump operates beyond the area of operation	Check the values of the area of operation
27	Density or viscosity of the delivered liquid is more than the specidied value.	Use engine of higher power.
28	Enging fault	Check the engine. Engine ventilation is not proper due to its position.

10- ESTIMATED NOISE LEVELS

Table 8

Engine Power P_N -(kW)	Noise Pressure Level (dBA) * (Pump and Engine)	
	1450 rpm	2900 rpm
<0.55	64	65
0.75	64	66
1.1	64	67
1.5	64	71
2.2	64	72
3	64	73
4	64	73
5.5	65	75
7.5	65	75
11	69	78
15	69	78

Table 8 (continued)

Engine Power P_N -(kW)	Noise Pressure Level (dBA) * (Pump and Engine)	
	1450 rpm	2900 rpm
18.5	71	78
22	71	79
30	73	81
37	73	81
45	76	84
55	76	84
75	77	85
90	78	85
110	80	87
132	80	87
160	80	87

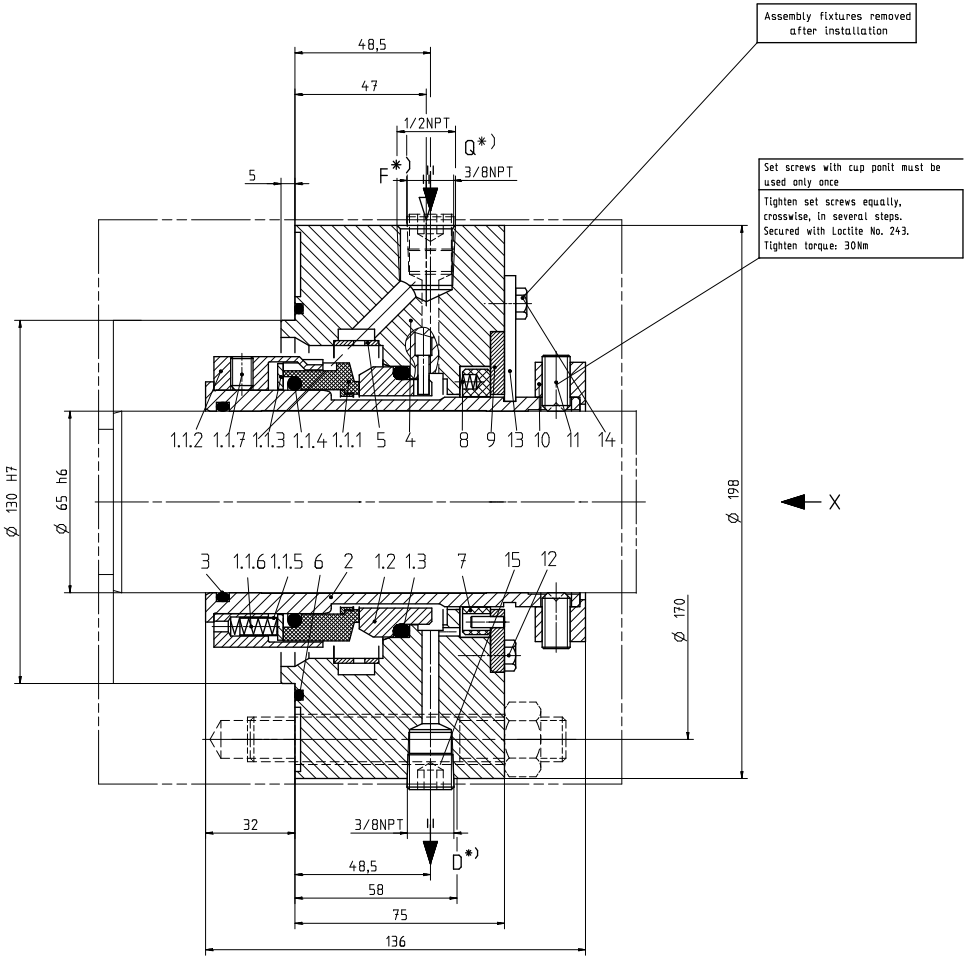
(*) Values measured 1m from the pump, on a free site on the surface reflecting the sound, without noise protection screen

(*) These values are valid provided the pump operates at the specified operation values and without cavitation.

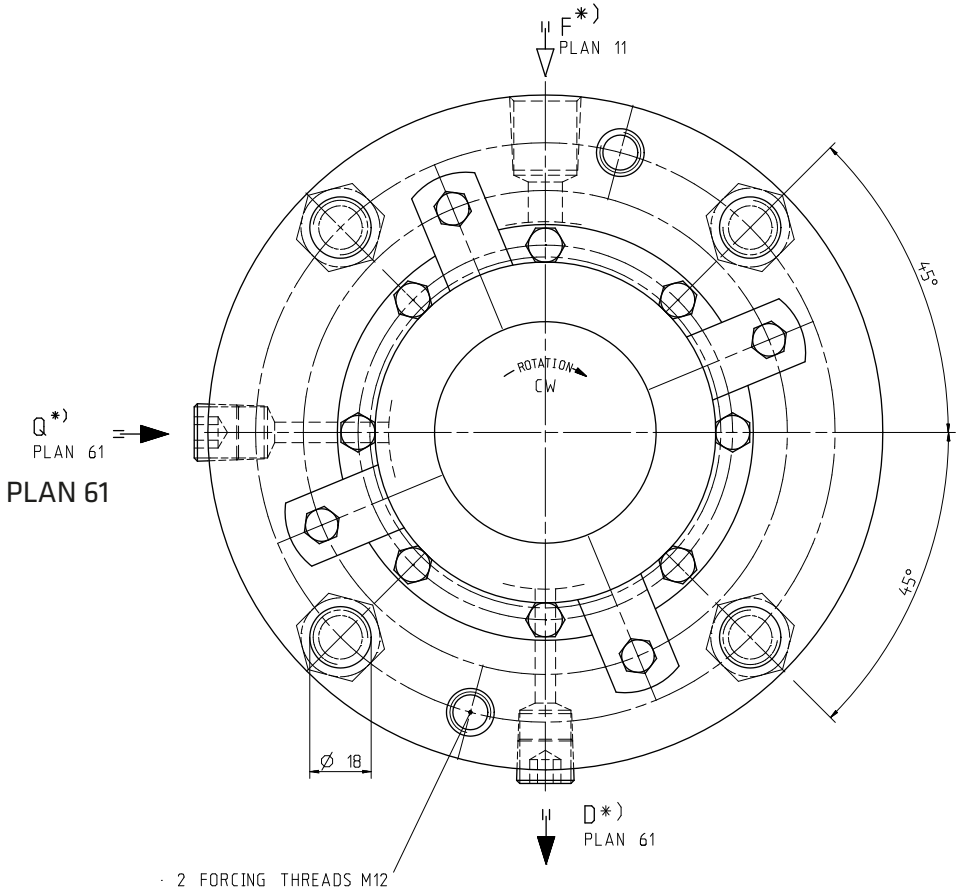
(*) If the pump operates at 60 Hz, increase the values given in the table by 1 dB for 1800 rpm and by 2 dB for 3600 rpm.

11- Mechanical Seal

11.1- Sectional Drawing



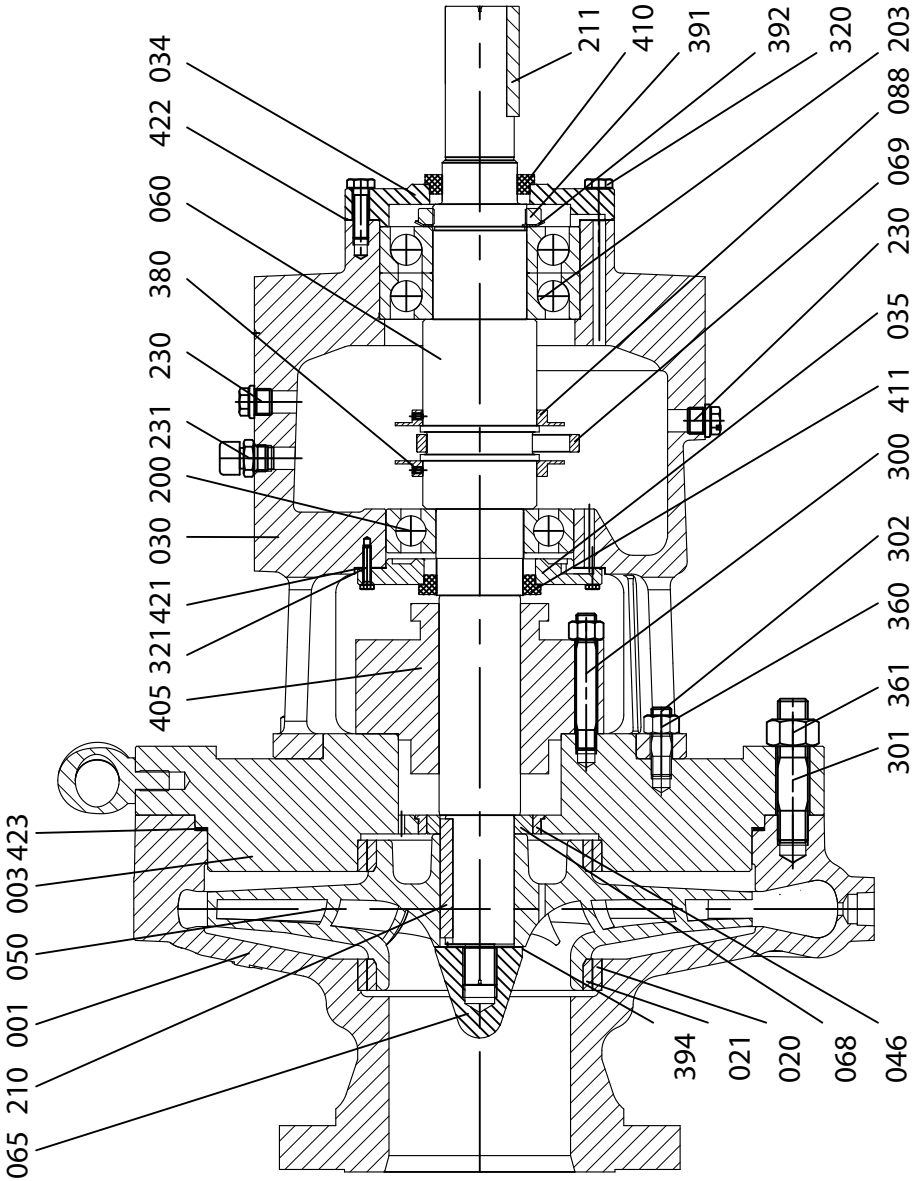
11.2- Flashing Plan



Description	Pos. / Item	Benennung	Werkstoffbezeichnung Material designation	ASTM-Bezeichnung ASTM designation	Stueck Qty.	Bemerkung / Remarks
TAPA	15	HEAD SCREW PLUG	A4-50/A4-70	ASTM A193 Gr.B8M(Cl 1/2)	2	
CIVATA	14	HEXAGON BOLT	A4-70	ASTM A193 Gr.B8M(Cl 2)	4	
MONTAJ KULAKCIGI	13	ASSEMBLY FIXTURE	1.4571	ASTM A276/A479 Type 316Ti	4	
CIVATA	12	HEXAGON BOLT	A4-70	ASTM A193 Gr.B8M(Cl 2)	8	
SETUSKUR	11	SET SCREW	45H COATED	ASTM F912M	6	
TAHRIK BILEZIGI	10	SET RING	1.4462	ASTM A276 Type S31803	1	
DESTEK RINGI	9	WASHER	1.4571	ASTM A276/A479 Type 316Ti	1	
YAY	8	SPRING	1.4571	ASTM A276/A479 Type 316Ti	4	
KISMA RINGI	7	THROTTLE RING	BUK01	CARBON GRAPHITE RESIN IMPREG.	1	
O-RING	6	O-RING	V	ASTM D 1418 (FKM)	1	
INSET	5	INSERT	1.4571	ASTM A276/A479 Type 316Ti	1	
GOVDE	4	COVER	1.4571	ASTM A276/A479 Type 316Ti	1	
O-RING	3	O-RING	V	ASTM D 1418 (FKM)	1	
MIL KOVANI	2	SHAFT SLEEVE	1.4571	ASTM A276/A479 Type 316Ti	1	
O-RING	1.3	O-RING	V	ASTM D 1418 (FKM)	1	
SABIT YUZEY	1.2	SEAT	BUKA22	SILICON CARBIDE, SINTERED PRESSURLESS	1	
SETUSKUR	1.1.7	SET SCREW	A4-70	ASTM A193 Gr.B8M(Cl 2)	2	
YAY	1.1.6	SPRING	2.4610 (HAST.C4)	N06455	8	
YAY KOVANI	1.1.5	SLEEVE	1.4571	ASTM A276/A479 Type 316Ti	8	
O-RING	1.1.4	O-RING	V	ASTM D 1418 (FKM)	1	
PUL	1.1.3	THRUST RING	1.4571	ASTM A276/A479 Type 316Ti	1	
TAHRIK KOVANI	1.1.2	DRIVER	1.4571	ASTM A276/A479 Type 316Ti	1	
DONER YUZEY	1.1.1	SEAL FACE	BUK003+1.4462	CARBON GRAPHITE ANTIMONY IMPREG. + ASTM A276 TYPE S31803	1	
YAY BASKILI UNITE	1.1	SPRING LOADED UNIT			1	H75V/75-BE
MEKANIK SALMASTRA	1	MECHANICAL SEAL			1	H75VN/75-00

12- Pump Sectional Drawing and Part List

12.1- Sectional Drawing



12.2- Part List

423	SPIRAL WOUND GASKET	-	454X 436X3,9
422	GASKET	BURASIL	214X 160,5X0,3
421	GASKET	BURASIL	195X 150,5X0,3
411	LABTECTA	-	69X 89
410	LABTECTA	-	60X 80
405	MECHANICAL SEAL	-	10-H75VN/75-E2
394	NUT FIXING WASHER	PASLANMAZ	72X 55X0,5
392	SAFETY WASHER	-	MB15
391	SAFETY NUT	-	KM15
380	SET SCREW	-	M5-8
361	NUT	Grade 10	M24
360	NUT	Grade 10	M16
321	HEXAGONBOLT	Grade 10.9	M6X1-30
320	HEXAGON BOLT	Grade 10.9	M12X1,75-40
302	STUD	Grade 10.9	M16X2-65
301	STUD	Grade 10.9	M24X3-115
300	STUD	Grade 10.9	M16X2-120
231	VENT	-	1/2"-14 NPT
230	BLIND PLUG	-	1/2"14 NPT
211	COUPLING KEY	ÇELİK	16X10X88
210	IMPELLER KEY	ÇELİK	16X10X95
203	ANGULAR CONTACT BEARING (7315 BECBM)	-	160X 75X37
200	BALL BEARING (6314 C3)	-	150X 70X35
088	SHIELD	BRONZ	-
069	OIL RING	BRONZ	130X 55X12
068	SHAFT BUSH	AISI 420	84,5X 55X15
065	IMPELLER NUT	1.4021	M27X3
060	SHAFT	AISI 420 QT 800	-
050	IMPELLER	CA6NM	-
046	THROTTLE BUSH	AISI 316	-
035	BEARING COVER, INNER	ÇELİK	-
034	BEARING COVER, OUTER	ÇELİK	-
030	ROLLER BEARING	GS-C 25	-
021	IMPELLER WORN RING	1.4021+QT	179,52X 165X25
020	COVER WEAR RING	1.4021+QT	195X 180X25
003	SEAL BEARING	GS-C 25	-
001	SPIRAL CASING	GS-C 25	-
PART NO.	PART NAME	MATERIAL	EXPLANATION

EC CERTIFICATE OF CONFORMITY

PRODUCTS: SPO TYPE PUMP
MANUFACTURER:

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Dudullu Organize San. Bölgesi 2. Cad. No:9
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t: +90 216 466 89 00 f: +90 216 415 88 60
www.standartpompa.com / info@standartpompa.com.tr

CONTENT: Centrifugal pump, motor

DIRECTIVES:

• Machinery Safety Directive 2006/42/EC

Applicable standarts
TS EN 809, TS EN ISO 12100:2010
TS EN 60204-1 (Valit for pumps with electric motor and base plate)

• Low Voltage Directive 2006/95/EC

Applicate standards: TS EN 60335-2-41

• ATEX Directive 94/9/EC (Applicable only for the products marked with ATEX on its name plate.)

Applicable standards : EN 1127-1, EN 13463-1:2009, EN 13463-5:2003

Standart
Pompa ve Makina
Sanayi Ticaret Anonim Şirketi

Şeref T. ÇELEBİ
Genel Müdür Yrd.

01.05.2016
İSTANBUL

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