

VESTAPOMP

M a k e s l i f e c o m f o r t a b l e

Instruction for Operation and Maintenance



ECO SKY

THERMAL OIL PUMPS

yaşamı koru! save life!

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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



Warning

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

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 are 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 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 precautions are not taken, excessively low or high temperatures may cause serious damages to the pump.
- 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 any 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 your hands and fingers into any hole 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 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 parts 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

ECO SKY PUMPS

2- GENERAL PUMP DESCRIPTION

2.1- Pump Description

- ECO SKY series pumps are horizontal, radially split volute casing type, single stage, end suction, air cooled centrifugal pumps with closed impeller.

2.2- Application Areas

- For the circulating of heat-transfer oils.
- At industrial plants, for transferring low viscosity industrial oil which does not chemically effect the pump material and does not contain abrasive solid particles.

2.3- Pump Designation

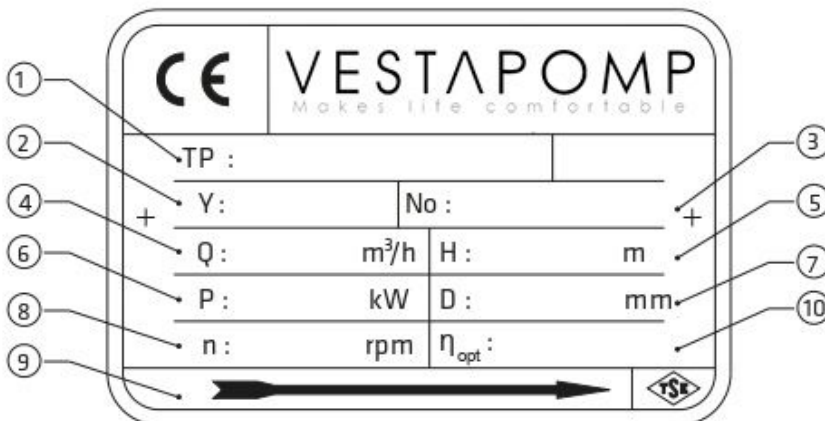
ECO SKY 100 - 250

Pump Type _____

Discharge Nozzle (DN-mm) _____

Nominal Impeller Diameter (mm) _____

2.4 Pump Nameplate



- 1- Pump Type and Size
- 2- Production Year
- 3- Serial No
- 4- Capacity
- 5- Head
- 6- Motor Power
- 7- Impeller Diameter
- 8- Speed
- 9- Direction of Rotation
- 10- Efficiency

2.5- Technical Information

Discharge Nozzle : DN 32 ... DN 125 mm
Operation Temperature : up to 340°C
Casing Pressure (max) : 10 bar (16 bar)
Permissible Liquids : 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, 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,
- Remove the liquid inside the pump, for preventing corrosion due to transportation.

3.2- Handling

3.2.1- General warnings



- Follow 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



ATTENTION

- Determine the following points prior to lifting and handling the pump or pump and motor 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 electric motor.

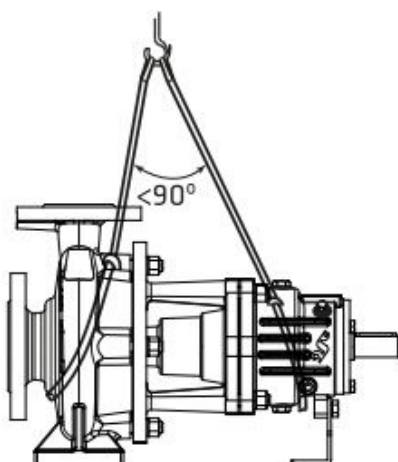


Figure 1a. Bare shaft pump

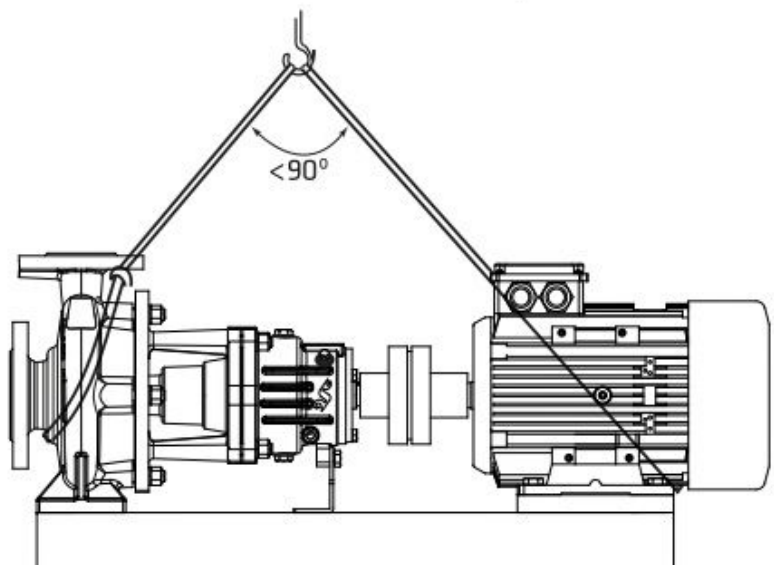


Figure 1b. Pump and motor on a common baseplate

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 Shaft Pump

- If the pump is purchased as bare shaft pump, then first a proper baseplate should be constructed to connect the pump and motor group. The baseplate 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 motor, proper motor and coupling should be selected before the group is installed.
- Following points should be taken into consideration when selecting motor:
 - Maximum power drawn by the pump along the entire operating range,
 - Running speed of the pump,
 - Applicable power supply (frequency, voltage, etc.),
 - Motor type (TEFC, Exproof, etc.),
 - Motor connection form (pedestal, flanged, horizontal, vertical, etc.), and
- Rated motor 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.

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 (baseplate)

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.

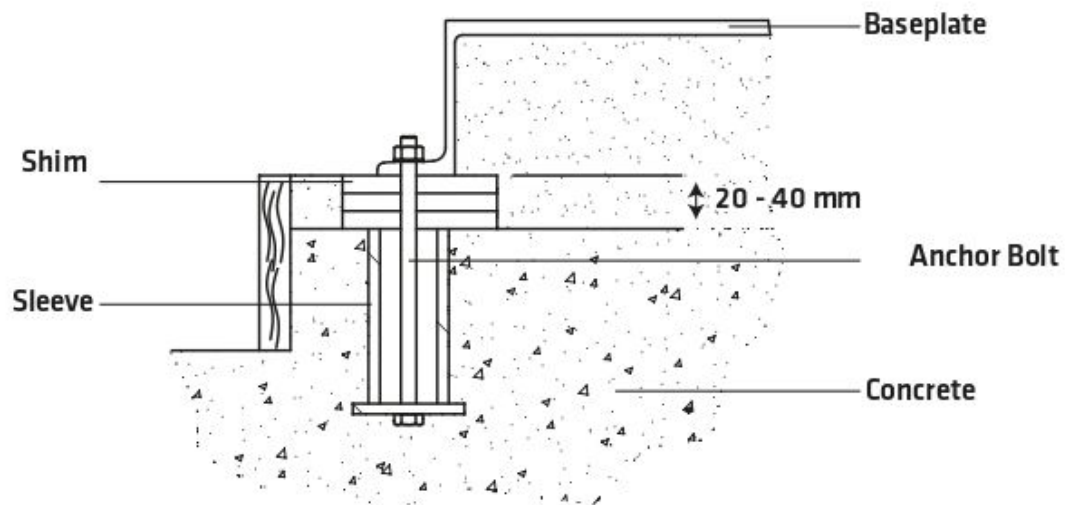


Figure 2. Foundation, baseplate and anchor bolt

- 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.
 - The locations of the anchor bolts are measured and marked carefully and Styrofoam is cut to the dimension, placed and fixed.
 - 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).
 - Upon hardening of the concrete, the Styrofoam is burned and removed. Locations of anchor bolts appear in the concrete.
 - Top surface of the concrete and holes of the anchor bolts are cleaned.
- Placement of the frame on the foundation concrete mass. (first adjustment)
 - Anchor bolts are mounted on the frame.
 - The frame is placed on the flattening chocks and the anchor bolts remain suspended in the holes. Make sure that the anchor bolts remain vertical.
 - 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.
 - Anchor holes are filled with concrete. Anchor bolts 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).

- Fixing of the frame on the foundation concrete mass exactly by adjustment.
 - The area about 30mm between the foundation concrete mass and frame is formed and concrete is poured through the holes in the frame.
Volume ratio: Cement 1: sand 2
Concrete hardens within 2 days.
 - Frame remains adjusted and fixed on the foundation concrete.

4.4- Installation of the Piping System

4.4.1- General Warning

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 and delivery flanges and control whether the piping system applies any tension on the pump. The maximum allowable forces and moments on the flanges are given in **Table 1**.
- 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. Especially 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 the 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.

Allowable Forces and Moments on Flange

Pump Type	Suction Flange								Discharge Flange							
	DN	F _x [N]	F _y [N]	F _z [N]	ΣF [N]	M _x [Nm]	M _y [Nm]	M _z [Nm]	DN	F _x [N]	F _y [N]	F _z [N]	ΣF [N]	M _x [Nm]	M _y [Nm]	M _z [Nm]
32-125 32-160 32-200 32-250	50	710	650	575	1125	615	430	490	32	390	365	455	705	475	325	365
40-125 40-160 40-200 40-250									40	500	455	550	870	590	400	470
50-125 50-160 50-200 50-250 50-315	65	900	800	700	1300	800	500	600	50	650	575	710	1125	615	435	490
65-125 65-160 65-200 65-250 65-315	80	1080	970	885	1700	685	490	565	65	800	735	910	1415	650	475	515
80-160 80-200 80-250 80-315	100	1450	1290	1165	2265	760	540	625	80	970	885	1080	1700	685	490	565
100-160 100-200 100-250 100-315	125	1720	1535	1375	2685	910	650	820	100	1290	1165	1450	2265	760	540	625
125-200 125-250	150	2150	1965	1720	3385	1080	750	885	125	1535	1375	1720	2685	910	650	820

Table 1

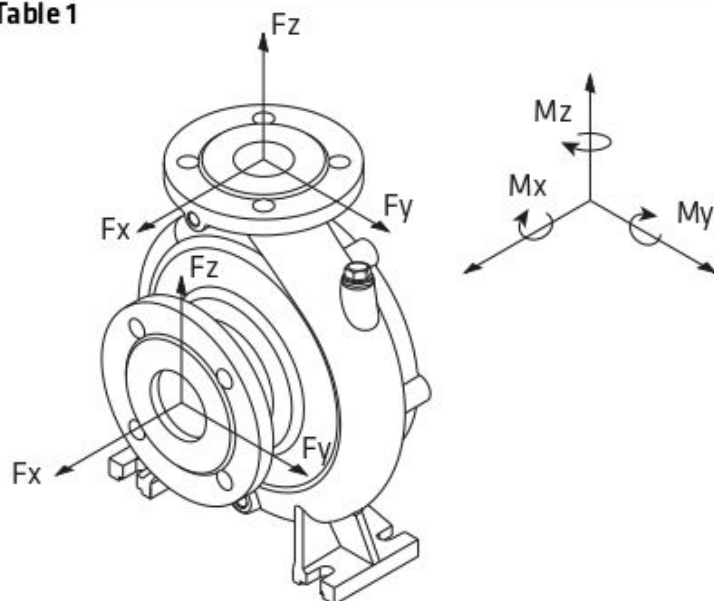


Figure 3.

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 declined towards the pump; and if the pump is supplied from a reservoir lower than it (system with suction depth), then the suction pipe should be gradually inclined slightly towards the pump. **Figure 4**

- 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.

- **The pump is supplied from a reservoir higher than it, an isolation 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).**

ATTENTION

4.4.3- Delivery pipe

- A flow control valve should be connected on the delivery pipe, near the pump as far as possible in order to adjust the flow rate and delivery head.

- If the delivery head 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.

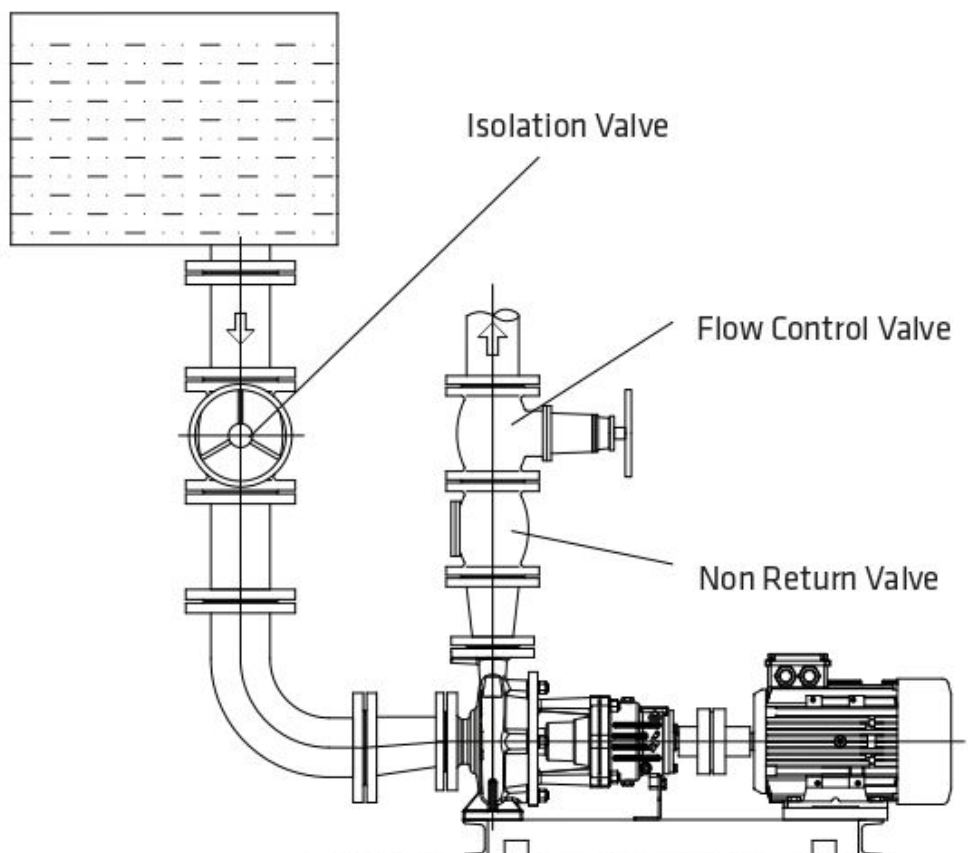


Figure 4. Suction Flooded

ATTENTION After installation of piping system, coupling alignment should be checked and if necessary it should be adjusted again.

4.4.4- Auxilliary pipe connections and accessories

- Depending on the application auxiliary pipe connections (for cooling, sealing and flushing of seal, drainage etc. necessary for the pumping system) and/or accessories to check operating conditions (pressure gauges, temperature gauges etc.) may be made up and lail.
- Pressure and vacuum gauges must be properly anchored and connected at the measuring points located on the pump flanges by means of or on the pipes close to the flanges approximately 8 mm diameter tubing with pig tail configuration to lessen pressure fluctuation. For safety purposes isolating and vent valves should be fitted before the gauges (**Figure 5**).
- Every pump is fitted with connections on the pump casing to drain the pump and the bearing bracket to evacuate the seal leakage from the stuffing box (**Figure 6,7**). If required the pump drain and seal leakage can be piped to a suitable reservoir. The pump draining piping must be fitted with an isolating valve and both must be suitable for the maximum operating pressure of the pump.

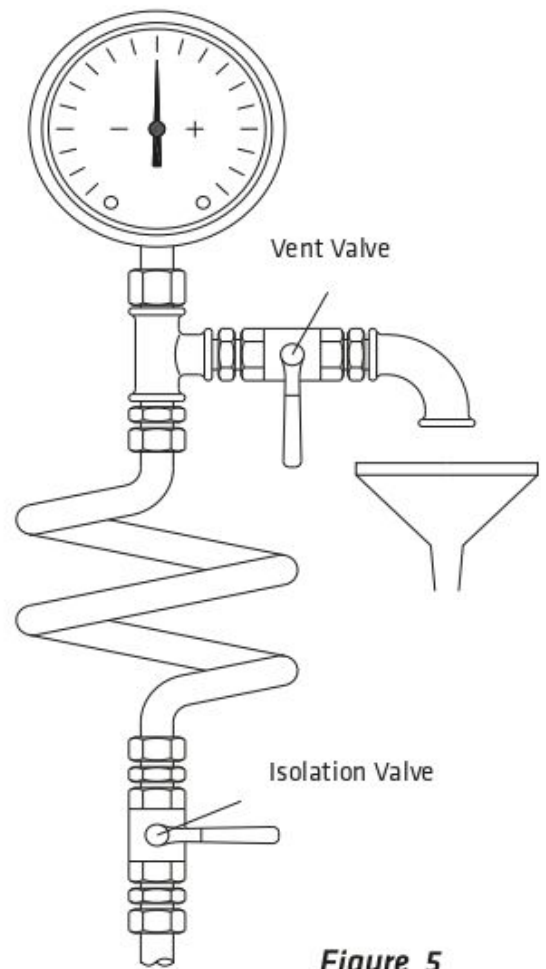


Figure 5

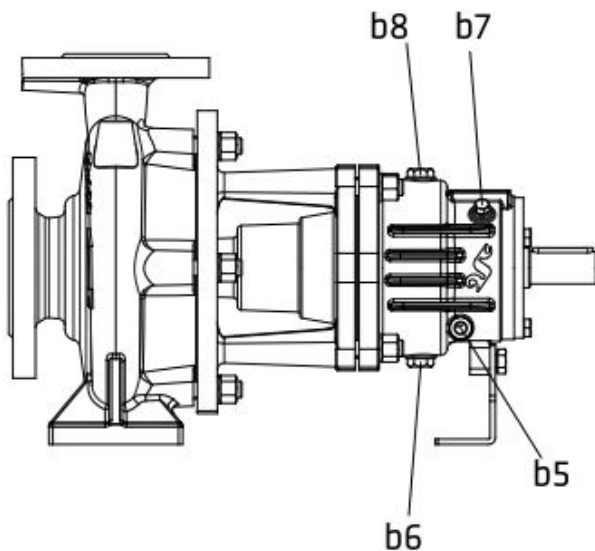


Figure 6

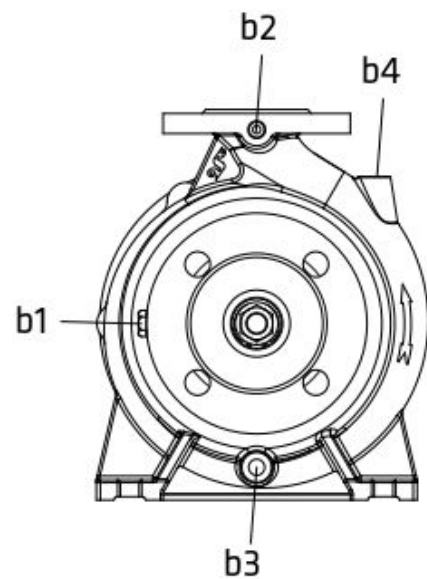


Figure 7

- b1** : Pressure gauge (suction)
- b2** : Pressure gauge (discharge)
- b3** : Draining
- b4** : Liquid filling
- b5** : Mechanical seal flow check
- b6** : Oil drain
- b7** : Greaser
- b8** : Air vent

4.5- Coupling Adjustment

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

ATTENTION “Coupling Adjustment” is to ensure that the rotation axes of the motor and pump should be on the same plane. If ECO SKY type pumps are ordered with motor and baseplate, it is delivered with the coupling adjustments made at the factory. 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 factory.

- 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 motor 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 8) 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 9a, 9b).

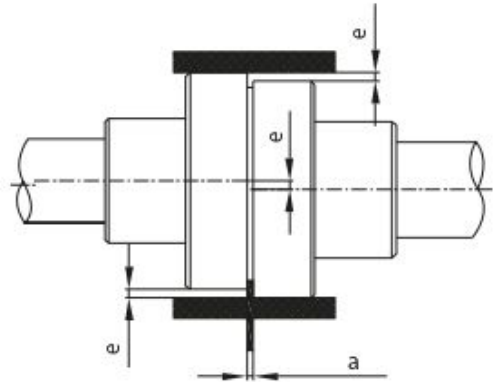


Figure 8. Aligning a flexible coupling

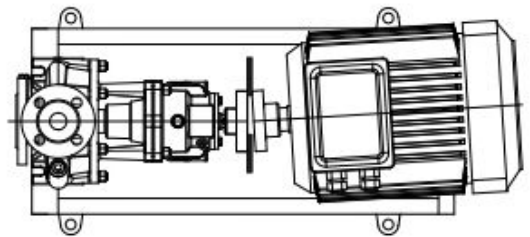


Figure 9a. Angle error in horizontal plane and adjustment

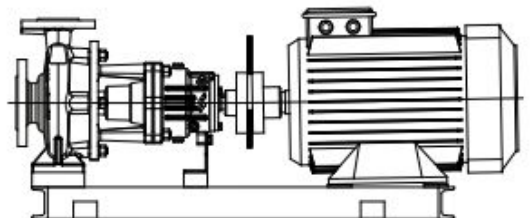


Figure 9b. Angle error in vertical plane and adjustment

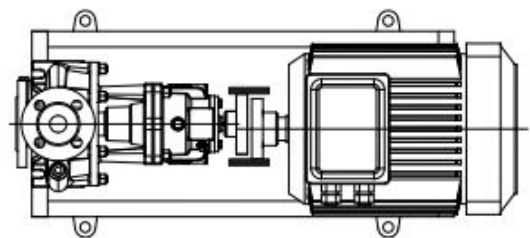


Figure 9c. Parallel sliding error in horizontal plane and adjustment.

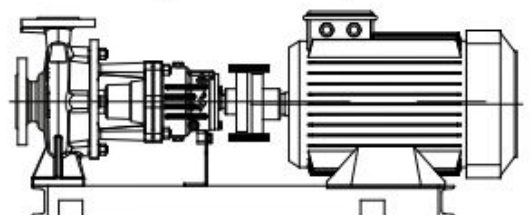


Figure 9d. Parallel sliding error in vertical plane and adjustment.

- 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 9c, 9d).

- 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 in the Figures 9a, 9b, 9c and 9d, respectively.

4.6- 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.

4.7- Electrical Connections



- The electrical motors have to be built in accordance with EN 60034-1.
- Enclosures of electrical motors and control systems on the pump unit shall as a minimum have protection in accordance with EN 60529 IP22. But in determining the degree of protection of enclosures of electrical motors and control systems on the pump unit the operating and environmental conditions must be taken into consideration.

- Electrical connection should be done by a qualified electrician. Current national regulation and motor manufacturer's instructions must be observed.
- Take all safety precautions listed in "Safety Instructions". Disconnect all power supplies prior to doing any work.
- The supply cable must be laid in such a way that it never touches the pipework, pump and motor casing.
- Check voltage, phase and frequency on motor nameplate with the mains.
- The electric motor must be protected against overloading by means of circuit breakers and/or fuses. Circuit breakers and fuses must be selected in accordance with full load amperage of the motor appearing on the motor rating plate.
- It is recommended to use PTC (passive thermal control) on motor, but this is optional depending on customer requirement. In case of using PTC, these should be connected via corresponding terminals in the terminal box and the PTC should be connected to the thermal trip mechanism.
- Prior to connection the electrical wiring rotate the pump shaft by hand to make sure rotor rotates easily.
- Connect the electrical wiring in accordance with local electrical codes and make sure to ground the motor.
- The connection diagram can be found in the terminal box of the motor or in the instruction manual.
- The mains connection on the terminal box depends on the nominal power of the motor, the power supply and the type of connection. The necessary connection of the bridges in the terminal box is shown in the following (*Table 2 ve Figure 10a, 10b, 10c*).

Type of switch	Motor Power $P_N \leq 4 \text{ kW}$	Motor Power $P_N > 4 \text{ kW}$
	Power Supply 3 ~ 400 V	Power Supply 3 ~ 400 V
direct	Y - connection (10b)	Δ - connection (10a)
Y / Δ - start	Impossible	Remove connection bridges (10c)

Table 2

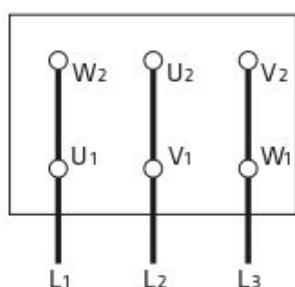


Figure 10a. Δ - connection

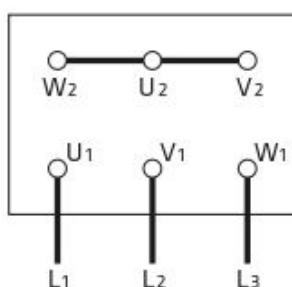


Figure 10b. Y - connection

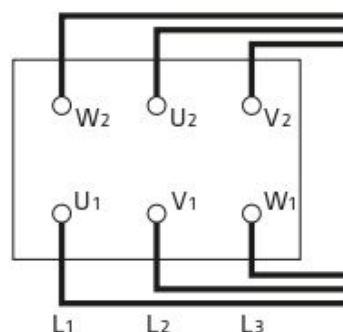


Figure 10c. Y / Δ - connection

ATTENTION

In the case of three-phase induction motors with Y - Δ connection it must be ensured that the change-over points between star and delta follow on from one another very quickly. Longer change-over times may result in pump damage (Table 4).

Motor Power	Y - set time
$\leq 30 \text{ kW}$ $> 30 \text{ kW}$	$< 3 \text{ second}$ $> 5 \text{ second}$

Table 3

4.8- Final Controls

- After all operations given above are completed, the coupling adjustment should be controlled once more in accordance with the section 4.5. 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 motor 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 / SHUT DOWN

5.1- Preparation

5.1.1- Lubrication control

- Grease lubricated bearings are factory packed with grease enough for one year operation before dispatch. Before initial start up pump it should be ascertained that no dirt has penetrated inside the bearing during transport or installation on site. Otherwise, the bearings should be cleaned out and repacked with fresh grease before start up.

- Check lubrication (see Section 6).

5.1.2- Venting and priming

- Make sure that the pump and suction pipes are completely filled up with the fluid. There is no problem for the pumps which have positive suction head. If there is a valve on suction line, it must be opened and air taps are loosened to enable the water replaces air in the pump, until it is completely full with water.
- Primarily, the air must be removed in bearing housing by breather. The bearing housing must be filled with the fluid which will be used in the pump, if it is required. Mechanical seal could be dry which disrupt the function of seal unless this process does apply.

ATTENTION Make sure the pump never runs dry.

5.1.3- Checking the direction of rotation

- ECO SKY type pumps rotate in clockwise when it is looked from coupling to the pump. This direction is already indicated on the pump nameplate by an arrow. Check this by switching the pump on, then off again immediately. Fit the coupling guard back in place if you took it out.

5.2- Start Up The Pump

- Check if the shut off valve in the suction line is open and the shut off valve in discharge line is closed.
- Switch on the circuit breaker and run the motor.
- Wait until the motor reaches the full speed (on star-delta running motors wait until it switches on delta).
- Open the discharge valve slowly while watching the ampermeter on the control panel (if the discharge line is empty do not turn on the valve fully open on first start up. Turn it on slowly to maintain the value on the ampermeter is under the rated current value of the motor).
- When the valve is if fully open, check the pressure on the manometer and see it is the same with the duty point pressure. If the pressure on the pressure gauge is lower than duty point pressure brings them to the duty point value by slightly closing the valve. If it is higher value, check your installation, especially geometric height again.

ATTENTION

The pump should be shut down at once and the trouble should be corrected if the pump is running at its rated speed and found any of the following faults:

- Pump doesn't deliver any water,
- Pump doesn't deliver enough water,
- Flow is going down,
- Discharge pressure is not enough,
- Driver overloaded,
- Vibration on pump,
- High noise level,
- Bearing overheating.

5.3- Shut Down The Pump

- Slowly close the shut-off valve in the discharge line.
- You may shut down pump without closing the shut-off valve if there is a device for water hammer protection on the discharge line or the water hammer is not a considerable level.
- Switch off the drive. Ensure the pump set runs down smoothly and quietly to a standstill.
- If the set is to remain out of services for a long time close the shut-off valve in the suction pipe. Close off the auxiliary connections. In the event of frost and/or prolonged standstill, drain the pump or otherwise protect against freezing.

5.4- Checks to be Made While The Pump Is Running

ATTENTION

- **The pump must never run dry.**
 - **Never run the pump for along period against a closed discharge valve (at zero flow)**
 - **The air should be evacuated from time to time in the bearing housing .**
-
- The bearing temperature may exceed the ambient temperature by up to 100 °C. But it must never rise above 120 °C.
 - The valves in the auxiliary lines must remain open while the pump is running.
 - The pump has a mechanical seal, experience only minor leakage or no visible leakage during operation. It is maintenance free. If there is considerable leakage from the seal, that means the seal surfaces are worn-out and it needs to be replaced. The operation life of the mechanical seal highly depends on the purity of the liquid. Leakage from the mechanical seal can be seen through "b5" hole.
 - The flexible coupling elements should be regularly checked and replaced as soon as they are shown signs of wear.
 - Occasionally check the motor current. Stop motor if the amperage is higher than usual; there may be jamming or friction in the pump. Make the necessary mechanical and electrical checks.
 - Stand-By pumps should be run for a short time at least once a week to ensure they are in constant readiness for operation. Check the integrity of auxiliary connections.

6- LUBRICATION

ATTENTION It must be ensured that the bearings are lubricated constantly. Dry operating bearings may cause overheating, spark and permanent damage.

- The bearings of ECO SKY type pump are grease lubricated.
- The roller bearings lubricated with grease are shipped with grease added in the factory.
- Recommended grease: SKF LGHP 2/5 High Performance Polyurea.
- See the attached Table 4 for bearing types and sizes.

Pump Size Group *	Shaft end $\varnothing$	Bearing Type
A	24	6306 Z C3
B	32	6308 Z C3

Table 4

* Refer to Section 11 for pump size group.

Application of Grease on the Bearing;

The grease must be replaced in every 12-14 months or at the end of each 3000 working hours. More frequent grease replacement may cause overheating and shortening of the bearing life.

ATTENTION The bearing temperature should not exceed ambient temperature by up to 100 C. At the same time it must never 120 C by itself.

The bearings of the pumps demounted for repair must be inspected and replaced, if necessary. It must be ensured that the greasing equipment and the reservoir are clean before adding grease to the bearings.

Grease in suitable amounts must be added to the bearings.

The temperatures of the bearings may increase in the case of adding excessive amount of grease. The temperatures of the bearings will decrease to the normal operating temperature when excessive grease is removed.

7- DISASSEMBLY AND REASSEMBLY



Before working on the pump, always disconnect the electrical connections and ensure that you take all the necessary actions to prevent undesired operation.



Strictly follow the instructions given in “Safety Instructions” section.

7.1- Disassembling the Pump

- Shut off the isolation valves on the suction and delivery line. Open the blind plug (230) and drain the liquid inside the pump.
- Dismantle the safety guards.

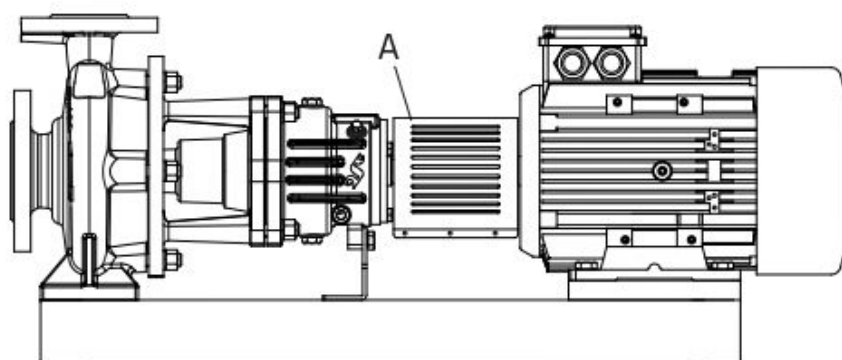
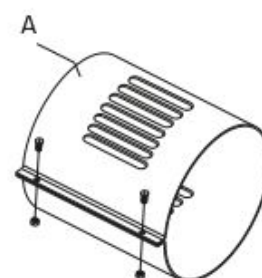


Figure 11



Safety guards

- Detach pump suction and discharge flanges and all auxiliary supply lines, disconnect the pump from the piping system. No need for this operation for the pumps where SPACER TYPE COUPLING is being used (back pull out design). For this application pump rotor assembly can be pulled out without dismantling the volute casing (001), (together with bearing housing and casing cover).
- Disconnect the motor from the pump.
- It is not necessary in spacer coupling applications.
- Remove the rotor section of the pump by demounting it from the baseplate.

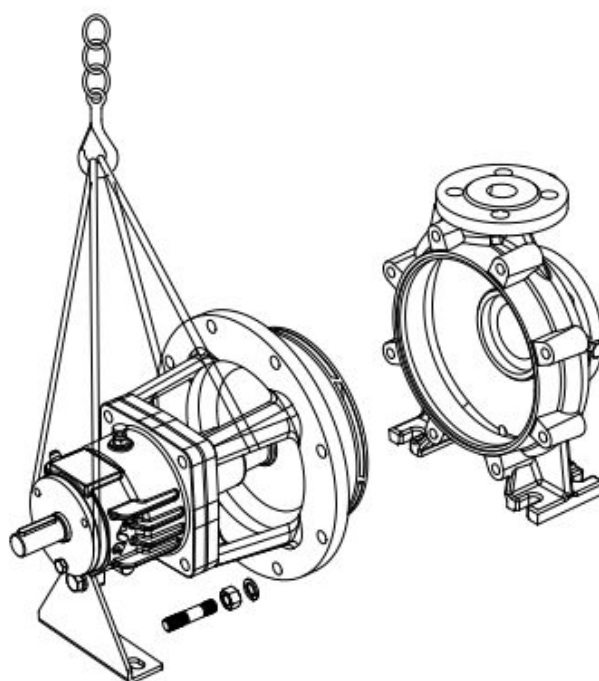


Figure 12. Demounting the pump rotor group

- Tighten the rope by tying the ropes connected to the lever to the bearing housing.
- Disconnect the bearing housing (030) from the volute casing (001) by removing the studs.
- Remove the spacer coupling on pumps using couplings with spacers.
- Remove the coupling part on the pump shaft (060) with the help of a puller.
- Remove the coupling key (211).
- Remove the impeller nut (065).

ATTENTION The sharp areas on the impeller edges can injure. Use protective gloves.

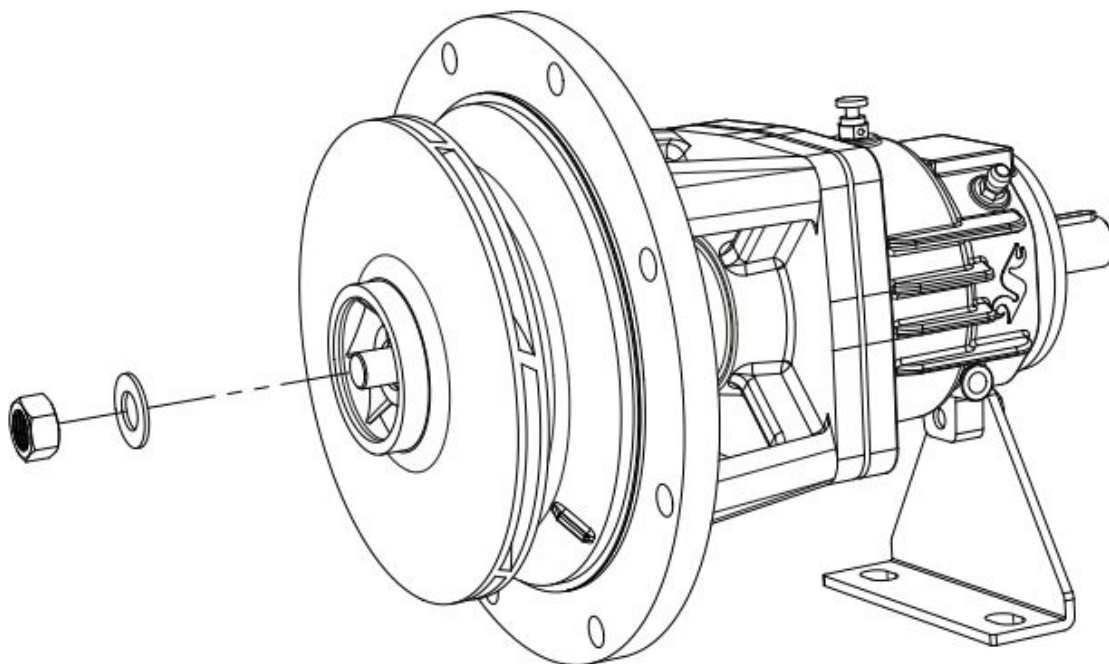


Figure 13. Disassembly of impeller

- Remove the impeller (050) with lever or screwdriver and etc.
- Remove the impeller key (210). Use rust remover solvent, if necessary.
- Remove the gasket (430).

ATTENTION The gaskets used after dismantling the pump must always be replaced.

- Remove the casing cover (003).
- Remove in order circlip (221), seal sleeve (069) and soft packings (400) from bearing housing (030)
- Refer to (Section 7.4) for soft packing.

ATTENTION Change sleeve bearing (036) in casing cover (003) if space between sleeve bearing and shaft reaches 2mm.

- Replace the gasket with a new one.
- Remove the circlip that binds to the shaft and spacer sleeve (067).
- Remove the mechanical seal (405).

ATTENTION Be careful when removing the mechanical seal. Any potential impact on the stationary element of the mechanical seal may cause the breakdown of the mechanical seal.

- Remove the bearing housing (030).
- Refer to (Section 7.4) for mechanical seal.
- Remove the bearing cover (034).
- Remove the circlip(220) from their slots.
- Pull off the bearings (200) from the shaft (060) by using a pull-off device.