Be sure to issue the customer's pump operation personnel with copies of this manual.

IOM-TH_ENG-R3

EBARA Standardized Centrifugal Pump Model TH Series Instruction Manual

CAUTION

Thank you for choosing the EBARA Model TH Standardized Pump. EBARA takes every caution in manufacturing the product for safe use by the customer. However, handling this pump in an inappropriate manner may reduce its functional capacity and result in an accident.
This operation manual explains the proper procedures concerning the installation, operation, and maintenance of the product. This manual should be read before conducting operation and maintenance and inspections on this pump.
Installation personnel must provide copies of this manual to the customer's pump operation, maintenance and inspection personnel. Keep this manual in a safe place where it can be consulted at any time.

To installation personnel:

Be sure to issue the customer's pump operation, maintenance, and inspection personnel with copies of this manual.

CONTENTS

SPECIFICATIONS

Standard Specifications

Temperature		Up to 105°C
Max. suction pressure		10 bar
Flanges		ANSI B16.1 125 lb or ANSI B16.1 250 lb
Max. working pressure		Up to 16 bar (check flange pressure)
Assembly		TH: Long-coupled THD: Close-coupled
Construction	Impeller	Closed
	Shaft seal	Up to 150-250: Mechanical seal Type 21 (up to 12 bar) 150-315 and above: Mechanical seal with gland
	Bearing	Oil lubricated bearing (TH)
Materials	Casing	ASTM A48 CL250
	Impeller	ASTM A48 CL250
	Shaft	SAE 1045
	Shaft sleeve	AISI 304
Electric motor		Three-phase Totally Enclosed, Fan Cooled (IP55)

Option Specifications

Temperature		Up to 180°C (check availability for the pump size)
Shaft seal		Packing or mechanical seal with gland
Materials	Casing	Ductile iron, carbon steel, bronze or stainless steel
	Impeller	Ductile iron, carbon steel, bronze or stainless steel
Baseplate		Structural steel or ISO 3661
Driver		Internal combustion engine

INTRODUCTION

Read this manual before handling or servicing this pump. EBARA pump, when properly installed, will provide satisfactory and reliable service. We recommend reading the instructions in this manual, step by step, keeping in view to simplify repair services, maintenance and installation.

WARNING:
Failure to read and follow the recommendations described can result in serious physical injury and/or equipment damage.

This literature should be seen as an integral part of the installation and maintenance of the pump and it must be stored in suitable place for quick reference whenever necessary. These instructions were prepared for a pump that works with packing, mechanical seals and bearings lubricated by oil. If these instructions are obsolete, ask for a new copy to EBARA.

TRANSPORTATION

Inspection and Receiving

After removing equipment from packaging, check documents attached the product and check any damage occurred during transportation or handling.

In case an irregularity has been confirmed as missing components or damage to the equipment, immediately notify the responsible for transportation.

WARNING:
Be aware of the differences between 50 Hz and 60 Hz devices:
- *Pumps with 50 Hz specifications will overload when operated at 60 Hz, causing the motor to burn.*
- *Pumps with 60 Hz specifications will poorly perform when operated at 50Hz.*

Handling

TH Series pumps must be moved with care and safety, in order to avoid accidents or equipment damage. Heavy components of the assembly, when moved individually, should be lifted using its own lug, as shown in Figure 1.

Pump-motor assembly must be lifted as shown in Figure 2.

WARNING:
Failure to properly lift and support this equipment can result in serious physical injury and/or equipment damage.

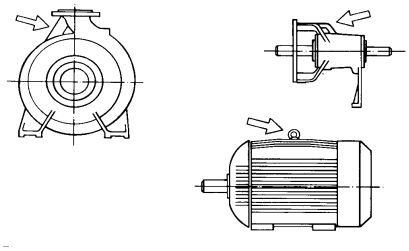


Figure 1 – Transportation of components using lug

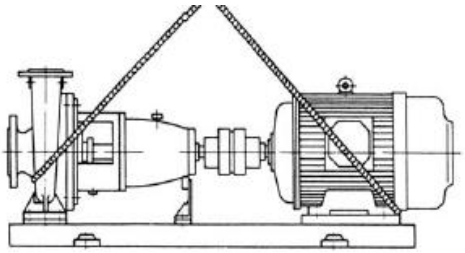


Figure 2 – Transportation of pump-motor assembly

STORAGE

TH Series pumps receive corrosion inhibitor special treatment in factory.

This treatment is applied in the inner parts of the pump and areas that do not receive any painting process, lasting one year. In case the pumps are stored for longer periods, perform a new treatment every 12 months, according to the instructions below:

Disassemble the pump and clean the internal parts with organic solvents (kerosene or benzine), completely removing the old protective film.

Apply with a brush a new layer of protective liquid and, after drying, assemble the pump.

When disassembling the pump, clean mechanical seal with compressed air. The mechanical seal must never be lubricated.

Suction and discharge nozzles must always be covered to prevent the entry of foreign objects inside the pump.

Bearings with oil lubrication are supplied without oil and must remain in this condition until use.

Assembled pumps should be turned manually every 15 days. If it is difficult to move them by hand, use a box spanner, protecting the shaft surface at the point of application.

INSTALLATION

Our pumps should be installed by skilled and trained personnel, following recommendations showed here. Pump service life significantly depends on a well-executed installation. In case of doubt, consult our Technical Department.

Installation Site

Select a place for installation of pump, driver, coupling and baseplate as follows:

A. Clear, well-ventilated and dry place and easily accessible for inspection and maintenance. If pump is installed outdoors, we recommend proper weather protection.

B. NPSH available of installation must be greater than NPSH required by the pump at all possible operating points of the pump. In case of doubt, consult EBARA representative.

FOUNDATION

Concrete is the most suitable material for the foundation execution. Concrete provides a rigid base with minimum deflections and vibration. It can be performed on the ground, structures or floors of buildings, taking care to check the permissible load, which must withstand the weight of the pump-motor assembly and concrete foundation.

Foundation can be made using a wooden template box, positioning the anchor bolts correctly.

Put the anchor bolts in the template box, as illustrated in Figure 3.

Check the drawing provided with the pump for exact location of the anchor bolts.

Concrete foundation should have a thickness between 200 and 400 mm.

Usual ratio of material used to make concrete is as follow: 1 part of cement, 3 parts of sand and 4 parts of stone.

Foundation should be perfectly level. This leveling should be made placing metallic chock blocks of the same height together with anchor bolts.

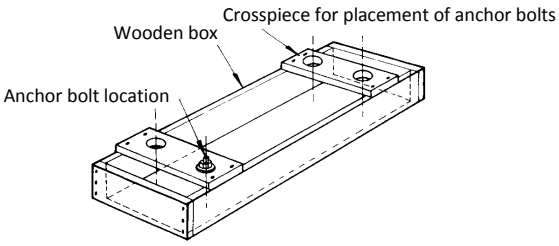


Figure 3 – Location and fitting of anchor bolts

Before installing pump-motor assembly in the concrete foundation, wait until it is completely dried.

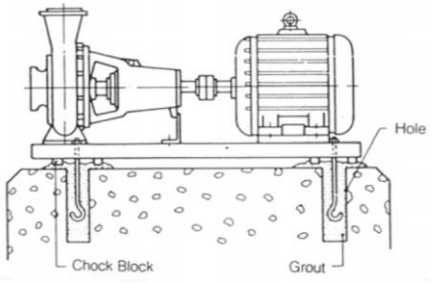


Figure 4 – Base grouting

CAUTION ON INSTALLATION AND LEVELING OF THE UNIT

When the assembly is received with pump and driver mounted on a baseplate, this assembly must be installed on concrete foundation and piping disconnected.

Piping must not be connected until alignment procedure is finished.

Install pump-motor assembly as follows:

Install pump-motor assembly on concrete foundation, so that anchor bolts enter the baseplate holes.

Using a precision level, check transversal and longitudinal level of baseplate. If it is out of level, loosen anchor bolts nuts and insert shims to correct the leveling.

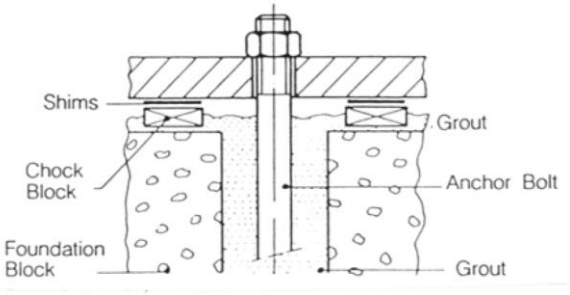


Figure 5 – Attaching and leveling of pump baseplate

Note: Pumps and drivers installed on baseplate are aligned before leaving the factory. However, we recommend realign pump-motor assembly after unit is installed in your place, due to the baseplate flexibility.

PUMP-MOTOR ASSEMBLY ALIGNMENT

WARNING:

- *Follow shaft alignment procedures in order to prevent catastrophic failure of drive components or unintended contact of rotating parts.*
- *Always disconnect and lock out power to the driver before you perform any installation or maintenance tasks.*

Alignment is necessary in the following cases:

1. After unit leveling over concrete foundation.
2. After pump-motor assembly is grouted and anchor bolts is tightened
3. After pump piping is installed.

Proper alignment provides an efficient, reliable and trouble-free pump operation. Misalignment can be the cause of the following problems:

a. Pump noise during operation.

b. Assembly vibrations.

c. Bearings with premature failure.

d. Unit displacement in the concrete foundation.

Perform alignment procedure as follows:

a. Check axial clearance of coupling every 90°, according Figure 6. Axial clearances should be examined using feeler gauge.

b. Use a straight edge to check radial alignment, according Figure 6. Place the straight edge across the two rims of the sleeve coupling and check if there is no light path between the edge and the coupling. Perform verification every 90°.

The maximum admissible radial clearance is 0.2 mm.

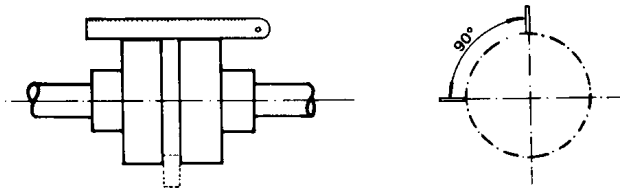
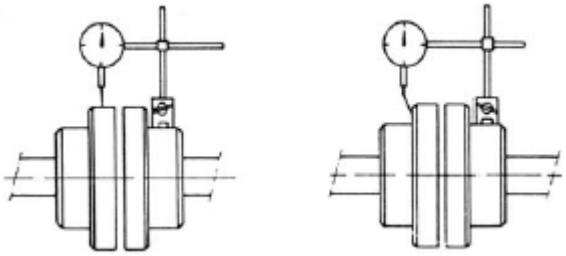


Figure 6 – Alignment with straight edge and feeler gauge.

To align the assembly, loosen the driver bolts and move driver laterally or insert shims as required.

After tighten driver bolts, recheck the alignment.

Coupling Alignment can be performed using dial indicator, according Figure 7. Proceed as follows:



Radial Axial

Figure 7 – Coupling alignment using dial indicator

1. Mark a reference line on coupling sleeves.
2. Move the dial to zero.
3. Move manually the coupling half in which the instrument is fixed.
4. Make dial Reading to determinate if the assembly requires some alignment adjustment.

GROUTING

Unless there is some specific information on the technical drawing of the pump-motor assembly, the metal base must be completely filled with grout.

When the alignment is correct, the anchor bolts must be properly tightened, but not too much. In this condition the unit may be grouted. The anchor should not be fully tightened until grout has hardened. Normally that happens 48 hours after application.

Grouting is necessary to get a vibration-free operation, except in cases of portable units or other technical reason.

When grouting, follow these steps:

- Pour the grout into the cavities of the baseplate, avoiding the formation of air pockets or gaps.
- After piping has been connected and anchor bolts have been tightened, check the alignment of the assembly again.
- Approximately 14 days after grouting or when it becomes completely dry, paint its edges in order to protect against moisture.

PIPING INSTALLATION

WARNING:
Never draw piping into place by using force at the nozzles of the pump. This can impose dangerous strains on the unit and cause misalignment between the pump and driver. Pipe strain affects the operation of the pump, which results in physical injury and damage to the equipment.

Connect the suction and discharge piping to the pump only after the complete hardening of the grout in the baseplate.

Suction and discharge piping should be as straight and short as possible and without foreign matter.

The piping should never be moved to their positions using flange bolts.

The piping must be independently supported and placed so that expansion and contraction caused by temperature changes do not cause misalignment.

If there are temperature variations of the pumped liquid, it must be installed expansion joints to compensate for possible piping expansion.

If installation requires a low level of noise, we recommend the installation of rubber joints between the flanges of the pump and piping.

Suction Piping

Improper installation of the suction piping is a potential source of failure in the pump-motor assembly. So, you should be aware of the following instructions:

Choose suitable suction piping diameter so the liquid velocity is less than 2 m/s.

With negative suction, suction piping diameter should be at least equal to or larger than pump suction nozzle.

Curves and accessories should be used as a minimum. Pressure losses and air entrance is avoided.

In order to be free of air pockets, the horizontal section of piping should be installed with a gradual slope, according Figures 8 and 9.

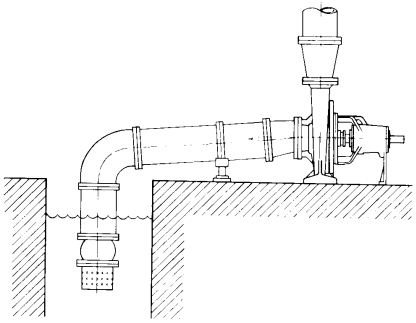


Figure 8 – Negative suction – Suction piping installation

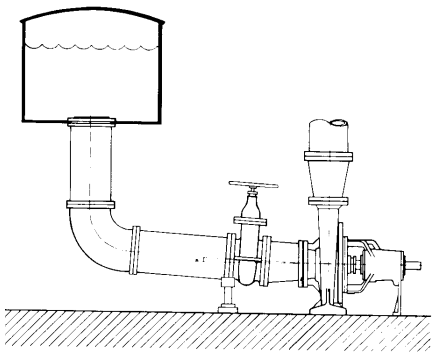


Figure 9 – Positive suction – Suction piping installation

To avoid swirling, the suction piping end must enter the liquid level with a minimum depth of two times the suction piping diameter.

On installations equipped with foot valve, observe that the free passage area should be 1.5 times the cross sectional area of the suction pipeline.

With negative suction, never use a register in the suction piping.

Install a strainer in the suction piping and periodically inspect it.

In order to not apply stress or tension to the casing, suction piping should be adequately supported.

Discharge Piping

When the diameters of the pump and pipeline flanges are different, the connections should be done using a concentric reduction.

Water hammer control devices should be installed on the discharge piping to prevent any kind of force to the equipment.

On the points where it is necessary to bleed the air in the pipeline, vent valves should be installed.

We suggest installing a discharge valve in the discharge piping to properly adjust the operating point.

In order to not apply stress or tension to the casing, discharge piping should be adequately supported.

DRIVER INSTALLATION

Internal Combustion Engines

When the engine is installed on the field, on an EBARA baseplate, sometimes it is necessary to make holes for the installation of engine bolts. Such holes should be made proceeding as follows:

Place the baseplate with pump on the foundation and, then, check the base leveling.

Install the engine on the baseplate and, then, align the coupling sleeves.

Mark the locations of drilling of engine bolts.

Remove the engine and make the holes and threads in the baseplate.

Place the engine on the baseplate and proceed the complete alignment.

The efficient and safe operation of a pumping unit that uses gas, diesel or benzine engine requires an installation that meets the following requirements:

a. Good ventilation in order to keep the ambient temperature as low as possible and provide proper combustion.

b. Efficient exhaust system for combustion gases to be discharged with minimal backpressure.

c. Adequate capacity of fuel supply system and according to local legislation.

d. Accessible space for any engine maintenance.

e. Correct pump speed. Internal combustion engine speed is determined by its manufacturer.

We recommend that the operator is familiar with the installation and maintenance manual of the engine, which is provided by its manufacturer.

Electric Motors

WARNING:

- *You must earth (ground) all electrical equipment.*
- *Electrical connections must be made by certified electricians in compliance with all international, national, state and local rules.*
- *Make sure that any one of three terminals of three-phase motor is not loose or disconnected. Running the motor with only two terminals connected could a phase interruption, burning out the motor.*

Connect the electric motor in the supplied current, according to the rules of the local power company. The network voltage and capacity of electrical conductors must agree with the data on the motor nameplate.

The wiring diagram of electric motors, printed on the motor nameplate, guides the correct connection of the ends to the power network, according voltage available on the site.

It is required to install fuses, starter and protective devices.

It is required to earth (ground) electric motors according local regulations.

Disconnect the coupling sleeves and momentarily turn on the motor to check if the rotation direction is the same as indicated at the pump.

If it is a three-phase motor, change its rotation direction, if necessary, inverting the phases.

LUBRICATION

Oil Lubricated Bearing

WARNING:
Make sure to properly lubricate the bearings. Failure to do so can result in excess heat generation, sparks and premature failure.

The pumps are delivered from the factory without oil in the bearing bracket.

Bearing oil should be periodically completed and the oil level should be between the two marks on the dipstick, and completely replaced every 2500 hours of operation. Oil change should be performed as follows:

Remove the bearing bracket plug and completely drain the oil. After reassembling the plug, fill with recommended oil until the level is between the existing marks on the dipstick.

Execute this procedure with pump-motor assembly disconnected.

Use SAE 30 oil without HD or recommended oils according following table below:

Manufacturer	Up to 3000 rpm	Above 3000 rpm
ATLANTIC	EUREKA – 68	EUREKA – 46
CASTROL	HYS PIN AWS – 68	HYS PIN AWS – 46
ESSO	TURBINE OIL – 68	TURBINE OIL – 46
MOBIL OIL	DTE – 26	DTE – 24
IPIRANGA	IPTUR AW – 68	IPTUR AW – 46
PETROBRAS	MARBRAX TR – 68	MARBRAX TR – 46
SHELL	TELLUS – 68	TELLUS – 46
TEXACO	REGAL R&O – 68	REGAL R&O – 46
PROMAX BARDHAL	MAXLUB MA - 20	MAXLUB MA - 15

Table 1 – Oil specifications

PACKING MAINTENANCE

When pumps are stopped for long periods, the packing gets dry and it will need maintenance.

Replacement is also necessary when it is not possible tightening gland cover nuts and the leaking is more than 100 drops/min. When replacing, only use packing ring with the same specification as original.

Packing Replacement

- Stop the pump.
- Loosen the gland cover and remove it.
- Using an appropriate extractor, remove all the packing rings as well as the lantern ring.
- Remove all vestiges of packing and clean the stuffing box chamber.
- Check is shaft sleeve is damaged or has deep grooves. If so, replace by a new one.

To know how many packing rings should be used in the stuffing box, procced as follows:

- Using a ruler, measure the depth of stuffing box. Subtract the value of lantern ring thickness. Divide the result by packing ring thickness. The result is the number of packing rings to be used.

Make a spiral with the packing using a dowel with the same diameter as the pump shaft.

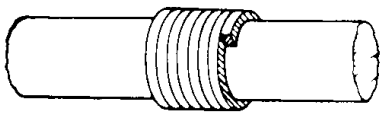


Figure 10 – Packing spiral

Cut new packing rings with oblique edges (45°).

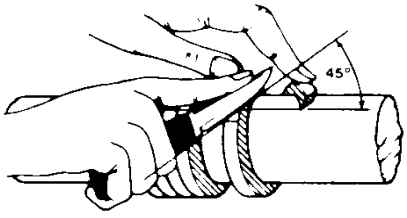


Figure 11 – Packing ring cutting

To facilitate packing rings assembling, lubricate the inner and outer diameters of each packing ring with grease.

Introduce each ring into the stuffing box. The packing rings should be mounted with their ends positioned 90° from each other.

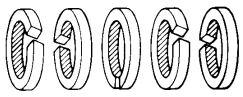


Figure 12 – Packing rings assembling.

Do not forget to install the lantern ring in the original position.

Place the packing rings using the gland cover.

Turn the shaft after installation of each ring.

After placing the last packing ring, install the gland cover. Tighten the nuts by hand.

Turn the shaft and check if the gland cover does not touch the shaft.

Follow the item “First Starting Procedure” to adjust the gland cover.

New packing requires a time to set and, during this initial period, it is necessary frequent adjustments.

MECHANICAL SEAL

Due to several assembling options of mechanical seals, maintenance should be done according to instructions of mechanical seal manufacturer that follow the pump.

WEAR RINGS

TH Series pumps are supplied with replaceable wear rings of casing and casing cover.

When the radial clearance exceeds 1 mm, the wear ring should be replaced. Proceed as follows:

- Remove the worn ring.
- Carefully clean the housing of the ring.
- Apply a thin layer of high strength retaining compound “Loctite 635” in the contact areas of housing and new ring.
- Using a rubber mallet or a wooden dowel, install the ring in its housing.
- Remove the excess of retaining compound and wait until it is cured.
- Clean the new wear ring.

The ring should be free of grease.

FIRST STARTING PROCEDURE

1. Check if the pump-motor assembly is aligned and securely fastened to the baseplate.

2. Check the piping is free of leakage, especially the suction piping.

3. Connect and run auxiliary pipelines and connections, if any.

4. Check bearing oil level. Use SAE 30 oil without HD.

5. Place the coupling guard and secure it to the baseplate.

6. Prime the pump. Remove the plug from the top of the casing. Fill with water or pumped liquid through the hole. Replace the plug.

Note: Priming can also be performed using vacuum system or directly when it is a positive suction installation.

7. Check the rotation direction of the driver with a quick start. If the rotation direction is wrong, invert the electric motor connection.

8. Close discharge valve and open suction valve, if any.

9. Start the driver.

10. Slowly open discharge valve. Check driver current. Driver power should not exceed nominal value.

11. Check the packing is leaking normally. Never leave packing without drip, because this may cause packing heating and burning.

Note: It is recommended, especially for single-phase small drivers, to check if the rotating assembly is turning freely before start the driver, to prevent the drive undergoes unnecessary efforts and fail. This driver failure is NOT covered by product warranty.

PROCEDURE DURING OPERATION

WARNING:

- *Do not overload the driver. This can result in unexpected heat generation and equipment damage.*
- *Make sure to operate the pump at or near the rated conditions. Failure to do so can result in pump damage from cavitation or recirculation.*
- *Never operate with a blocked suction and discharge. Operation, even for a brief period under these conditions, can cause confined pumped fluid to overheat.*
- *To prevent an accident if the pump stops running or an abnormality occurs, immediately turn off the power switch. Contact the shop from where you ordered the pump or EBARA to perform an inspection and maintenance on the pump.*
- *Do not touch the rotating parts such as the shaft, etc. while the pump is running. Since these parts rotate at high speed, doing so could result in injury.*
- *If the pumped liquid is hot, keep your hands off the pump. The pump´s surfaces will be hot, and you could get burned if you touch them.*
- *Do not touch the motor. The motor´s surface will be hot, and you could get burned if you touch them.*
- *Do not cover the motor with a blanket or cloth. Doing so could over heat the motor, setting a fire.*

1. Check operating point of the driver, adjusting discharge valve. Under no circumstances, the drive should work with current above the nominal value. If this occurs, recalculate the operating point and, if necessary, adjust impeller diameter for the new point. In case of doubt, consult our Technical Department.

Note: Pumps are adjusted at the factory for the operating point that they were purchased.

2. Assure that pump runs without unusual noises and vibration-free. If this occurs, check assembly alignment.

3. Packing requires a certain period to set in the first hours of pump operation. So, adjust the packing by tightening gland cover nuts. When packing reaches the set stage, a weekly inspection should be enough.

The perfect operation of packing occurs with a leaking between 30 and 100 drops per minute.

4. Periodically check bearing temperature. Under normal operating conditions, such temperature should not exceed 93°C. Always use recommended lubricating oil.

SHUTDOWN PROCEDURE

WARNING:

- *If there is a power failure, turn the power switch off. Otherwise, the pump may start-up suddenly when the power supply is resumed, exposing personnel to danger.*
- *When the pump is out of use for prolonged periods such as the wintertime, water inside the pump could freeze, causing damage to the pump. Accordingly, in such situation, either drain all water from the pump or provide thermal insulation to prevent the water from freezing.*

1. Slowly close the discharge valve.
2. Turn off the driver.
3. Close the auxiliary pipelines.
4. Close the suction valve, if any.

RECOMMENDED SPARE PARTS

To reduce as much as possible waiting time for spare parts orders to the factory, we suggest always maintain a local stock of the following parts:

a) A set of bearings, lip seals and gaskets.

b) Wear ring set.

c) O-rings.

d) A packing set, which should be purchased locally.

For installations where downtime is critical, it should be maintained locally a complete stock of all rotating elements.

For quickly and safely order of spare parts, please provide the following information:

a) Pump model and size, according nameplate data.

b) Pump serial number, according nameplate data.

c) Number and designation for each requested part.

d) Quantity requested for each part.

Note: The characteristics of materials, specifications, dimensions, drawings and application information shown in this manual are subject to substitution and modification without prior notice by EBARA.

ASSEMBLY - THD (CLOSE-COUPLED)

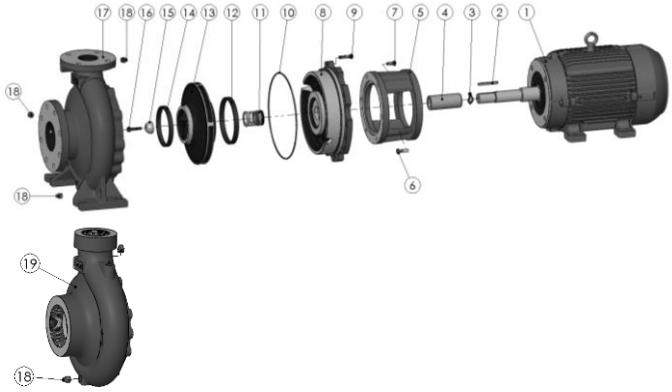
WARNING:

- *Disassembly/assembly and repair of the pump should only be performed by specialist maintenance technicians. Otherwise, error by personnel can result in serious physical injury and/or equipment damage.*
- *Always disconnect and lock out power to the driver before you perform any installation or maintenance tasks. Failure to disconnect and lock out driver power will result in serious physical injury.*
- *The unit and the components can be heavy. Use proper lifting method.*
- *Allow all system and pump components to cool before you handle them to prevent physical injury.*
- *The pump can handle hazardous and toxic fluids. Identify the contents of the pump and observe proper decontamination procedures in order to eliminate the possible exposure to any hazardous or toxic fluids. Wear the proper personal protective equipment. You must handle and dispose of pumped fluid in compliance with the applicable environmental regulations.*
- *Avoid injury. Some components can have sharp edges. Wear appropriate gloves while handling these parts.*

Notes:

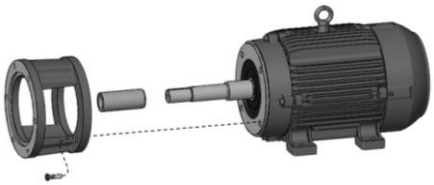
- ***Make sure that all replacement parts are available before you start to assemble/disassemble the pump.***
- ***Make sure that all appropriate tools are available before you start to assemble/disassemble the pump.***

Exploded view:

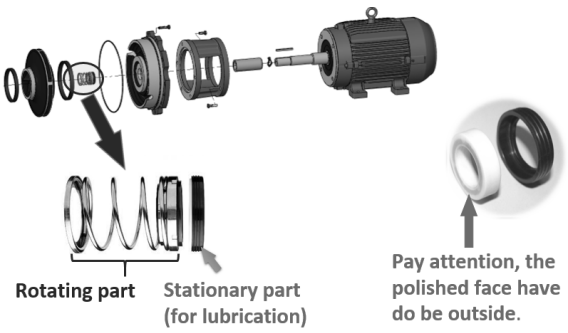


Step 1: Insert the O-ring (item 3) and shaft sleeve (item 4) at the motor shaft.

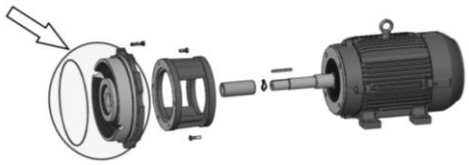
Step 2: Use the screws (item 6) to fix the bracket to motor-flange.



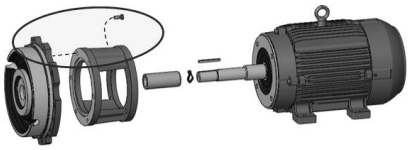
Step 3: Insert the stationary part of mechanical seal (item 11) into case cover (item 8) using alcohol gel or water for lubricating. Use a soft face tool to avoid damages on it.



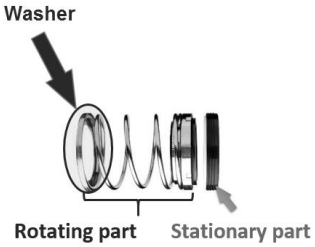
Step 4: Fix O-ring (item 10) at case cover (item 8) using Vaseline. At this step, do not use any kind of adhesive, because this should cause chemical damage at rubber/elastomer.



Step 5 - A: Place the case cover (item 8) at bracket (item 5). Use the hex head bolts (item 7).



Step 5 - B: Place the rotating part of mechanical seal, positioning the washer to impeller side and centred.



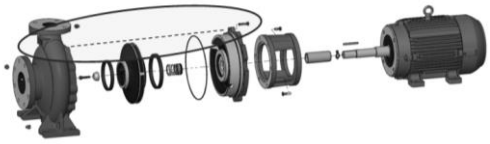
Step 6: Insert the key (item 2) into motor shaft.

Step 7 A: If necessary, insert the wear ring (rear), (item 12) at impeller (item 13), using a soft face hammer. Normally the wear ring is inserted in factory.

Step 7 B: Place the impeller (item 13) on motor shaft, and fix it using Allen Screw (item 16) and washer (item 15). Some pump sizes use hex head bolt (item 16) instead.

Step 8: If necessary, insert the wear ring (front), (item 14) at casing (item 17), using a soft face hammer.

After that, place the casing (item 17) at case cover (item 8). Use the hex head bolts (item 9) to fix it.

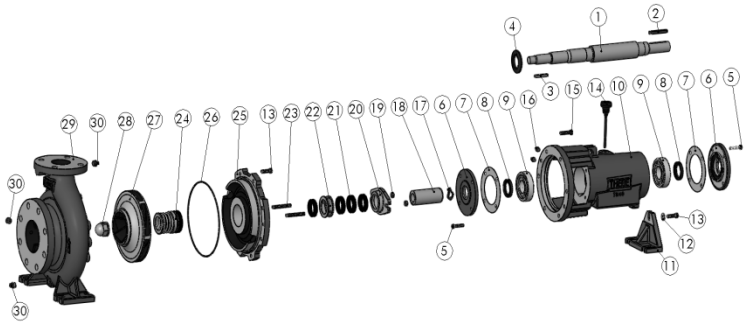


If you need remove the plugs (item 18), use Loctite 567 adhesive before you fix them.

Note: For disassemble the pump, follow the steps above in an inverse order.

ASSEMBLY - TH (LONG-COUPLED)

Exploded view:



- **Step 1:**

Heat the bearings (item 9) to perform the assembly on the shaft (item 1).

Note: If possible, we recommend using induction heater to facilitate assembly of bearings.

- **Step 2:**

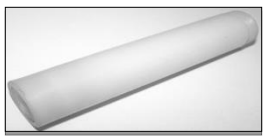
Place the gaskets (item 7) and then assemble the lip seals (item 8) in the bearing cover (item 6).

* Do not use any adhesive type to place the gasket (item 7).

* Use a nylon device to place the lip seals (item 8).

Lip seal

Gasket

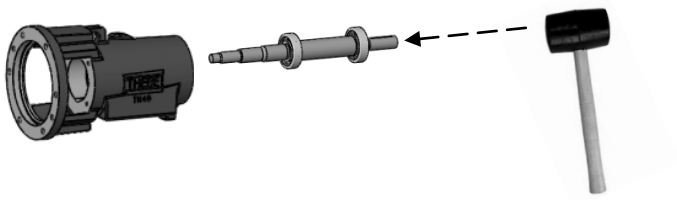


Device to place the lip seal

- **Step 3:**

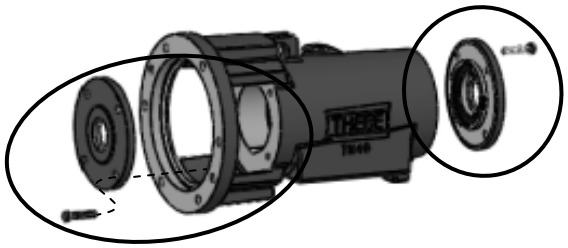
Install the shaft (item 1) with the bearings (item 9) into the bearing housing (item 10) according the illustration below.

>>> Use soft face hammer to make the assembly.



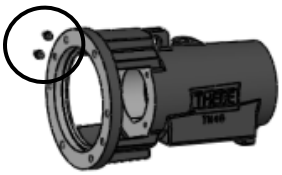
- **Step 4:**

Attach the bearing covers (item 6) and fasten the hex head bolts (item 5).



- **Step 5:**

If you need assemble the plugs (item 16) use chemical locking (preferably **LOCTITE 567**) and install them in the bearing housing (item 10).



Note: This procedure will be performed only if the bearing housing (item 10) is without the plugs (item 16) installed.

➢ PACKING Assembly procedure

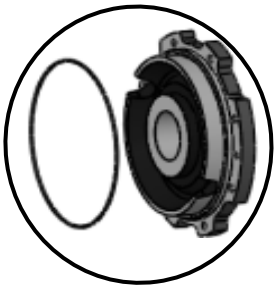
- **PACKING Preparation**

Proceed according “Packing Replacement” (Page 8).

- **<u>Case Cover preparation</u>**

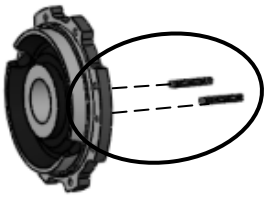
- **Step 1.1:**

Install the O-ring (item 26) using some vaseline to facilitate fixation on the case cover (item 25). It is recommended not to use any kind of adhesive in the assembly of the O-ring (item 26).



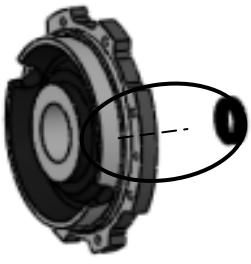
- **Step 1.2:**

Place the studs (item 23) in the case cover (item 25).



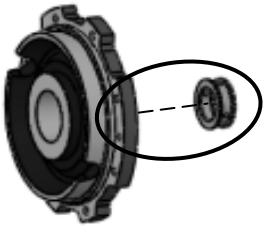
- **Step 1.3:**

With the case cover (item 25) prepared, insert the packing (item 21).



- **Step 1.4:**

Place the lantern ring (item 22) in the case cover (item 25).



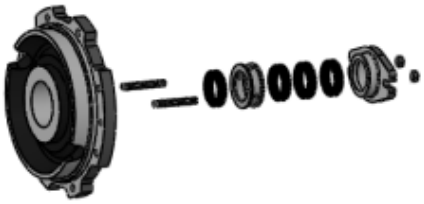
- **Step 1.5:**

Place the remaining packings (item 21) in the case cover (item 25).

Note: The packings (item 21) should be mounted with their ends positioned 90° from each other as attached image:

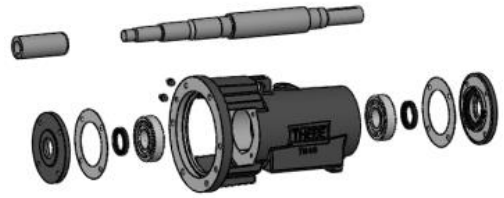
- **Step 1.6:**

Install the gland (item 20) and evenly hand-tighten the sext nuts (item 19).



- **Step 1.7:**

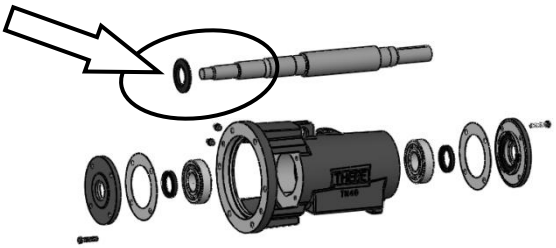
Place the O-ring (item 17) and shaft sleeve (item 18) on the shaft (item 1).



- **Step 1.8:**

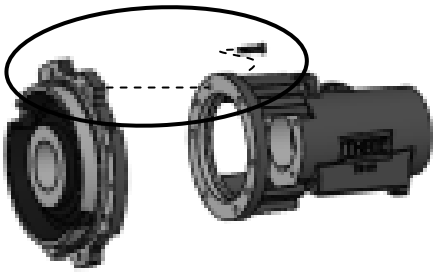
Place the thrower (item 4) on the shaft.

Note: Remember that the thrower (item 4) is only used for assembly of pumps with packing.



- **Step 1.9:**

Use hex head bolts (item 15) to fasten the case cover (item 25) to bearing housing (item 10).

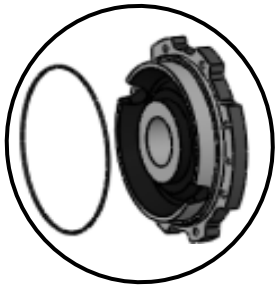


Continue from step 2.5.

➢ SEAL Assembly Procedure

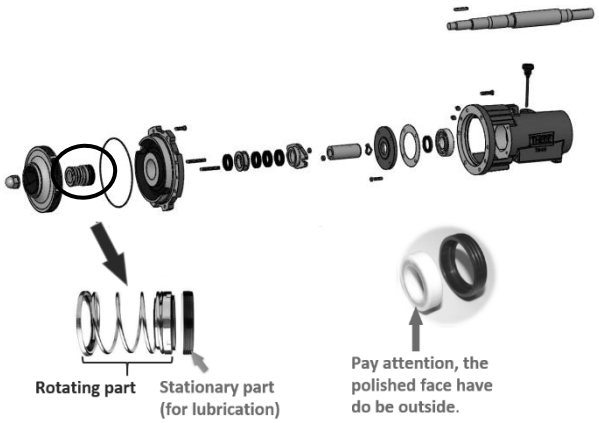
- **Step 2.1:**

Fix O-ring (item 26) at case cover (item 25) using Vaseline. At this step, do not use any kind of adhesive, because this should cause chemical damage at rubber/elastomer.



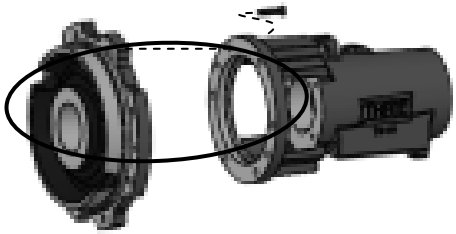
- **Step 2.2:**

Insert the stationary part of mechanical seal (item 11) into case cover (item 8) using alcohol gel or water for lubricating. Use a soft face tool to avoid damages on it.



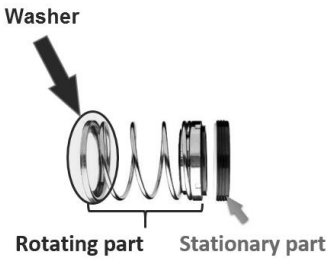
- **Step 2.3:**

Use hex head bolts (item 15) to fix the case cover (item 25) to bearing housing (item 10).



- **Step 2.4:**

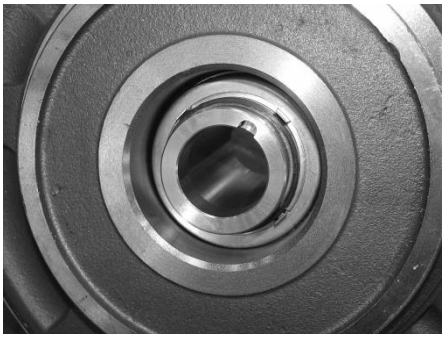
Place the other part of the mechanical seal (rotating part) on the shaft sleeve (item 18), positioning the washer to impeller side and centered.



Lubricate the rotating part with alcohol gel to facilitate assembly.

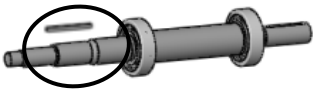
Check the direction of the sleeve to assemble the rotating part.

Place de shaft sleeve (item 18) and O-ring (item 17) on the shaft (item 1).



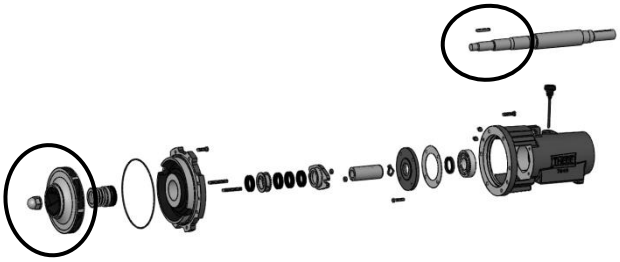
- **Step 2.5:**

Insert the key (item 3) on the shaft (item 1).



- **Step 2.6:**

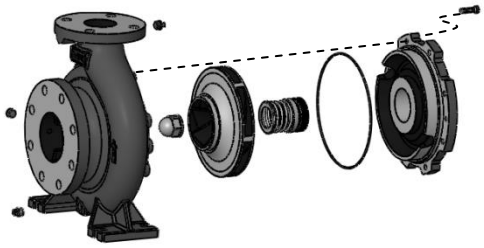
Install the impeller (item 27). Lock the shaft with a device and tight firmly the shaft nut (item 28).



- **Step 2.7:**

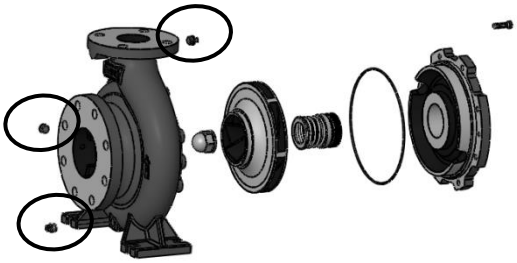
Install the back-pull-out assembly in the casing (item 29).

Install the casing bolts (item 13) and tighten them.



- **Step 2.8:**

If you need assemble the plugs (item 30) use chemical locking (preferably **LOCTITE 567**) to install them in the pump casing (item 29).

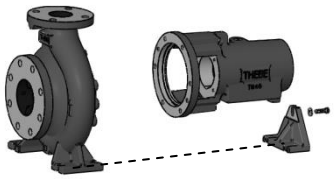


Note: This procedure will be performed only if the pump casing (item 29) is without the plugs (item 30) installed.

- **Step 2.9:**

Attach the support foot (item 11) and fasten the hex head bolts (item 13) and flat washer (item 12).

Note: Install the support foot (item 11) aligned with the pump casing (item 29).



- **Step 2.10:**

Place the oil level indicator (item 14).

EXPLODED VIEW / PART LIST

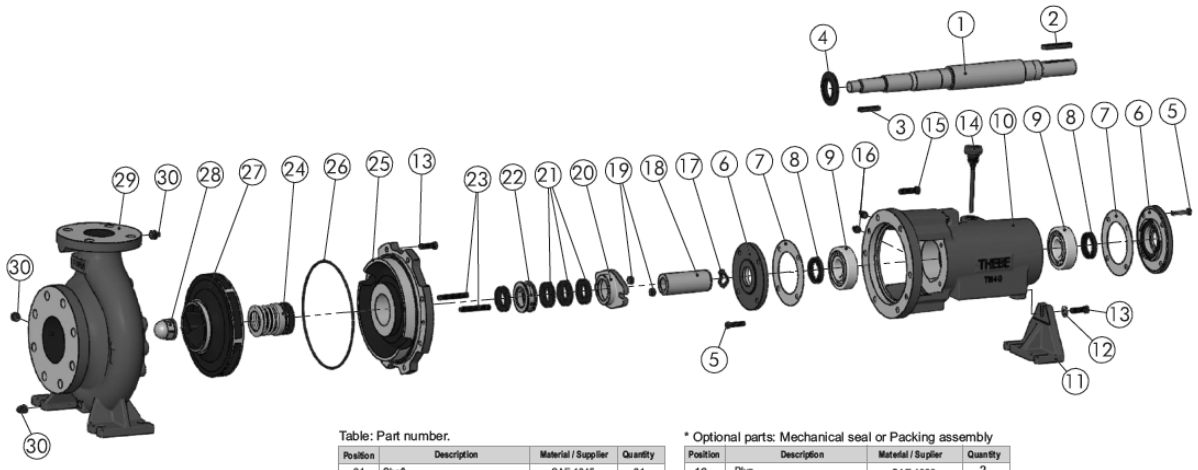


Table: Part number.

Position	Description	Material / Supplier	Quantity
01	Shaft	SAE 1045	01
02	Key	SAE 1020	01
03	Key	SAE 1020	01
04	Thrower	Nitrile Rubber	01
05	Screw	SAE 1020	02
06	Bearing cover	ASTM A48 CL250	02
07	Gasket	Velumoid	02
08	Lip seal	Sabó	02
09	Ball Bearing	NSK/SKF/FAG	02
10	Bearing Housing	ASTM A48 CL250	01
11	Support foot	ASTM A48 CL200	01
12	Flat washer	SAE 1020	01
13	Screw	SAE 1020	02
14	Oil level indicator	PVC	01
15	Screw	SAE 1020	01

* Optional parts: Mechanical seal or Packing assembly

Position	Description	Material / Suplier	Quantity
16	Plug	SAE 1020	2
17	O'ring	Buna(N)	1
18	Shaft sleeve	AISI-304	1
19	* Nut	SAE 1020	2
20	* Gland	ASTM A48 CL200	1
21	* Packing	Graphite-tapes (TEADIT)	4
22	* Lantern ring	ASTM A48 CL200	1
23	* Stud	SAE 1020	2
24	* Mechanical seal	Ceramic/Graphite/Buna (N)	1
25	Case Cover	ASTM A48 CL250	1
26	O'ing	Buna(N)	1
27	Impeller	ASTM A48 CL250	1
28	Shaft nut	SAE 1045 / AISI-316	1
29	Pump casing	ASTM A48 CL250	1
30	Plug	SAE 1020	3

Figure 13 – Long-coupled pump with mechanical seal / packing

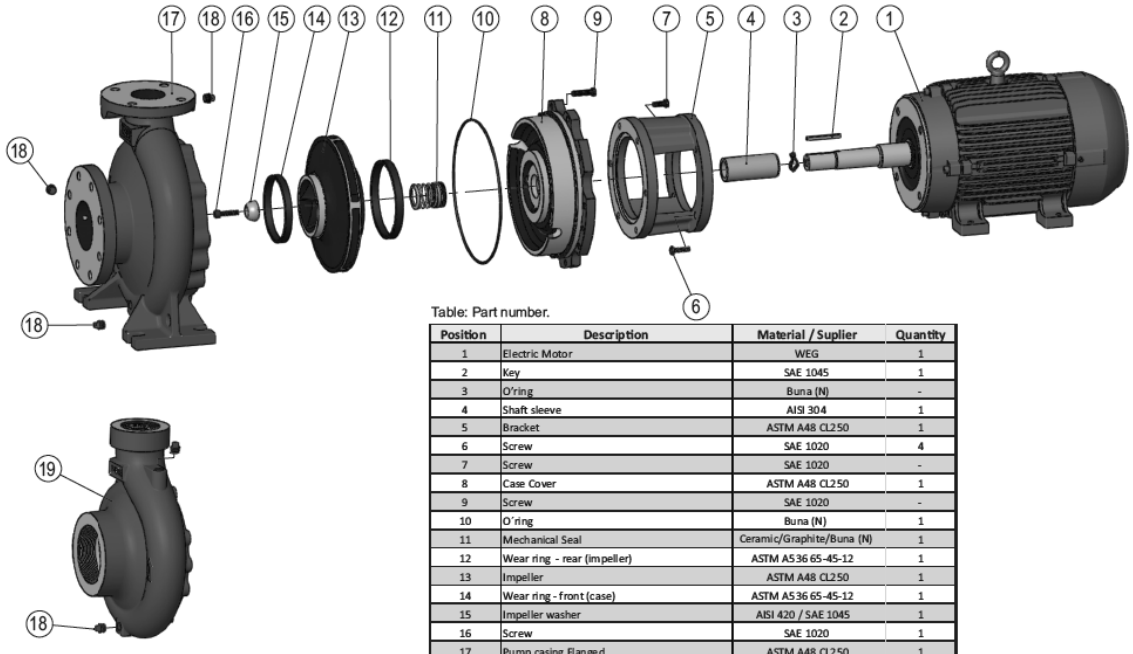


Table: Part number.

Position	Description	Material / Suplier	Quantity
1	Electric Motor	WEG	1
2	Key	SAE 1045	1
3	O'ring	Buna (N)	-
4	Shaft sleeve	AISI 304	1
5	Bracket	ASTM A48 CL250	1
6	Screw	SAE 1020	4
7	Screw	SAE 1020	-
8	Case Cover	ASTM A48 CL250	1
9	Screw	SAE 1020	-
10	O´ring	Buna (N)	1
11	Mechanical Seal	Ceramic/Graphite/Buna (N)	1
12	Wear ring - rear (impeller)	ASTM A536 65-45-12	1
13	Impeller	ASTM A48 CL250	1
14	Wear ring - front (case)	ASTM A536 65-45-12	1
15	Impeller washer	AISI 420 / SAE 1045	1
16	Screw	SAE 1020	1
17	Pump casing Flanged	ASTM A48 CL250	1
18	Plug	SAE 1020	3
19	*Pump casing Threaded (optional)	ASTM A48 CL250	1

* Only some models, up to size TH 65/200

Figure 14 - Close-coupled pump with mechanical seal

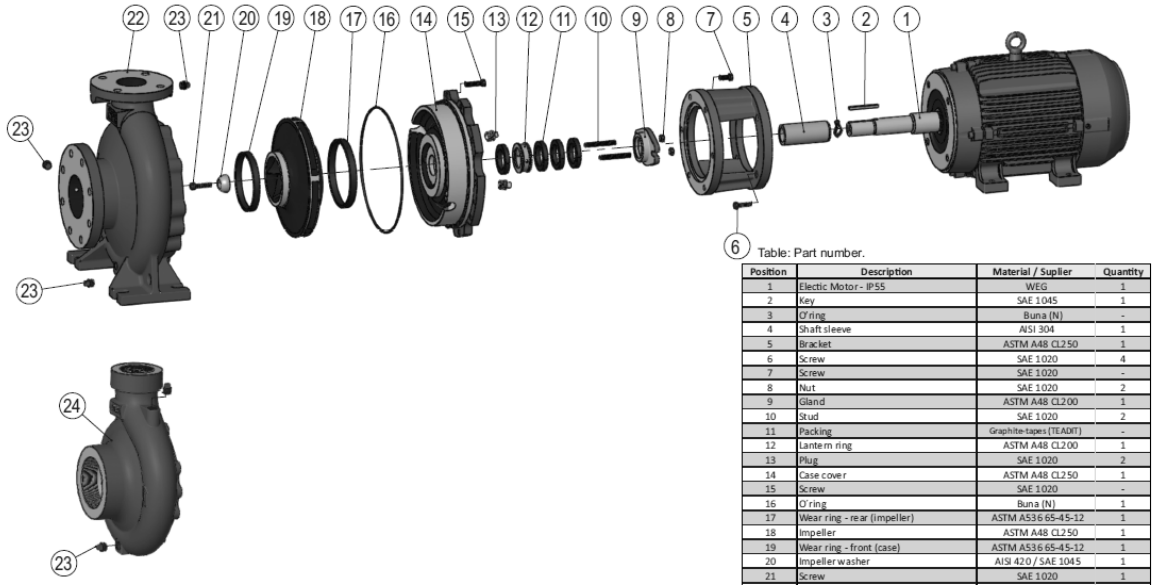


Table: Part number.

Position	Description	Material / Suplier	Quantity
1	Electic Motor - IP55	WEG	1
2	Key	SAE 1045	1
3	O'ring	Buna (N)	-
4	Shaft sleeve	AISI 304	1
5	Bracket	ASTM A48 CL250	1
6	Screw	SAE 1020	4
7	Screw	SAE 1020	-
8	Nut	SAE 1020	2
9	Gland	ASTM A48 CL200	1
10	Stud	SAE 1020	2
11	Packing	Graphite-tapes (TEADIT)	-
12	Lantern ring	ASTM A48 CL200	1
13	Plug	SAE 1020	2
14	Case cover	ASTM A48 CL250	1
15	Screw	SAE 1020	-
16	O'ring	Buna (N)	1
17	Wear ring - rear (impeller)	ASTM A536 65-45-12	1
18	Impeller	ASTM A48 CL250	1
19	Wear ring - front (case)	ASTM A536 65-45-12	1
20	Impeller washer	AISI 420 / SAE 1045	1
21	Screw	SAE 1020	1
22	Pump casing Flanged	ASTM A48 CL250	1
23	Plug	SAE 1020	3
24	*Pump casing Threaded (optional)	ASTM A48 CL250	1

* Only some models, up to size TH 65/200

Figure 15 - Close-coupled pump with packing

TROUBLESHOOTING TABLE

SYMPTOM	*CAUSE*	*REMEDY*
The pump is producing insufficient flow.	Counter-pressure is too high.	– Increase the speed. – Resize the impeller diameter – Resize the pump size.
	The pump is not primed.	– Prime the pump.
	The suction pipe or impeller are clogged.	– Clean the suction pipe. – Disassemble the pump and clean the impeller.
	The suction line has air pockets.	– Rearrange the piping in order to eliminate air pockets.
	The suction pressure is insufficient (positive suction).	– Check the liquid level of suction reservoir. – Check if pressure losses are not excessive. – Check if suction valve is completely open.
	The suction lift is too high (negative suction).	– Clean the foot valve and suction pipe. Eventually increase suction piping diameter. – Check if foot valve is working accordingly. – Check NPSH available of installation and compare to NPSH required. If necessary, decrease suction lift.
	The suction line has air leak.	– Repair the leak.
	The stuffing box has air leak.	– Adjust gland cover until pumped liquid flow. Replace the packing, if necessary. – Check auxiliary pipelines and lantern ring position.
	Undersized foot valve.	– Check if the foot valve is not clogged. – Free passage area of foot valve should be 1.5 times the cross sectional area of the suction pipeline. Using strainer, the free passage area should be 3 to 4 times.

SYMPTOM	*CAUSE*	*REMEDY*
The pump is producing insufficient flow.	Suction piping has insufficient submergence.	– Increase the submergence or use a baffle in order to eliminate vortices.
	The speed is too low.	– Check if electric motor is correctly connected. Check electric voltage. – Increase the speed.
	Internal parts are too worn.	– Open the pump and check clearances subject to wear (wear rings and impeller). – Eventually, replace new parts.
The pump is producing excessive pressure.	The speed is too high.	– Check the speed. If it is not possible reduce the speed, diameter impeller should be trimmed. Consult EBARA.
The pump is producing insufficient pressure.	The speed is too low.	– Check if electric motor is correctly connected. Check electric voltage. – Increase the speed.
	The shaft is rotating in the wrong direction.	– Invert the connection of two phases of electric motor.
	The wear rings are worn.	– Replace the wear rings and check the condition of impeller.
	The impeller is damaged.	– Repair e replace the impeller. Identify the cause of damage and correct it.
	Leakage between casing and casing cover.	– Replace the O-ring.
The pump loses prime after starting.	The suction lift is too high	– Check pressure losses in the suction piping. – Check NPSH available of installation and compare to NPSH required. If necessary, decrease suction lift.
	The suction line has air pockets.	– Rearrange the piping in order to eliminate air pockets.
	The suction line has air leak.	– Repair the leak.

SYMPTOM	*CAUSE*	*REMEDY*
The pump loses prime after starting.	The stuffing box has air leak.	– Adjust gland cover until pumped liquid flow. Replace the packing, if necessary. – Check auxiliary pipelines and lantern ring position.
	Suction piping has insufficient submergence.	– Increase the submergence or use a baffle in order to eliminate vortices.
The driver is overloaded	The speed is too high.	– Check the speed. If it is not possible reduce the speed, diameter impeller should be trimmed. Consult EBARA.
	System head is less than pump head.	– Impeller diameter should be trimmed. – Adjust flow using the discharge valve.
	Liquid specific gravity is higher than of that stated when the pump was supplied.	– The motor should be replaced according new system curve.
	Liquid viscosity is higher than of that stated when the pump was supplied.	– The motor should be replaced according new system curve.
	The impeller is clogged.	– Disassemble the pump and clean the impeller.
	The pump-motor assembly is misaligned.	– Check and realign the assembly.
	The shaft is bent.	– Replace the shaft as necessary.
	Impeller is rubbing the casing.	– The casing should be deformed due incorrect supported piping. – Check the impeller. – Correct the causes and replace the damaged parts.
	The wear rings are worn.	– Replace the wear rings and check the condition of impeller.

SYMPTOM	*CAUSE*	*REMEDY*
The driver is overloaded	Packing installation is incorrect.	– Check the condition of packing. – Reinstall packing rings and lantern ring accordingly.
	Gland cover is too tight and packing lubrication is stopped.	– Adjust gland cover to provide lubrication for packing.
The packing is leaking excessively.	Pressure in the stuffing box is excessive.	– Check pressure in the stuffing box.
	Lantern ring is not correctly positioned in the stuffing box.	– Position the lantern ring correctly.
	Pipeline that provides liquid to packing is not delivering liquid	– Check and clean the auxiliary pipeline and regulate its valve.
	The shaft is bent.	– Replace the shaft as necessary.

PRODUCT WARRANTY

EBARA undertakes to remedy product defects in materials and workmanship for a period of 18 months from the date of production.

Coverage:

I. The products are covered by warranty due to material and manufacturing defects, except normal wear.

II. Parts covered by this warranty shall be replaced only if EBARA authorized personnel observe defects. It is necessary to present the invoice.

III. The warranty is limited for repairing or replacement of defective parts made by EBARA.

Warranty claims will be rejected in the following situations:

I. Defects caused by normal wear and tear.

II. Faults caused by improper usage or accidents.

III. Failure to observe the operating instructions.

IV. Improper installation or subject to excessive oscillations.

V. Incompatibility between pumped liquid and pump material.

VI. Modifications or repair work to the product by non-authorized personnel.

VII. Improper transportation or storage.

VIII. Invoice or product nameplate contains erasures.

IX. Other reasons beyond EBARA´s control.

EBARA shall not be liable for service, labor or transportation charges or for damages for delay caused by defective material or workmanship or for personal injuries or damage to property caused directly or indirectly by any EBARA product or by its use.

The above terms are in line of all other warranties expressed or implied. No representative or other person is authorized or permitted to make any warranty or assume for us any liability not strictly in accordance with the foregoing.

In the case of components purchased by EBARA, such as starters, controls, mechanicals seals, drivers, couplings, etc., the warranty of that manufacturer will be extend to the purchaser in lieu of any warranty by us.

Note: It is indispensable to present the invoice to meet the warranty. The buyer/user is responsible for transportation charges and subsequent reinstallation of equipment, as well as transportation risks for technical assistance shops.

In case of failure of this product, contact EBARA.

Contacts:

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