



Installation, Operation and Maintenance Instructions

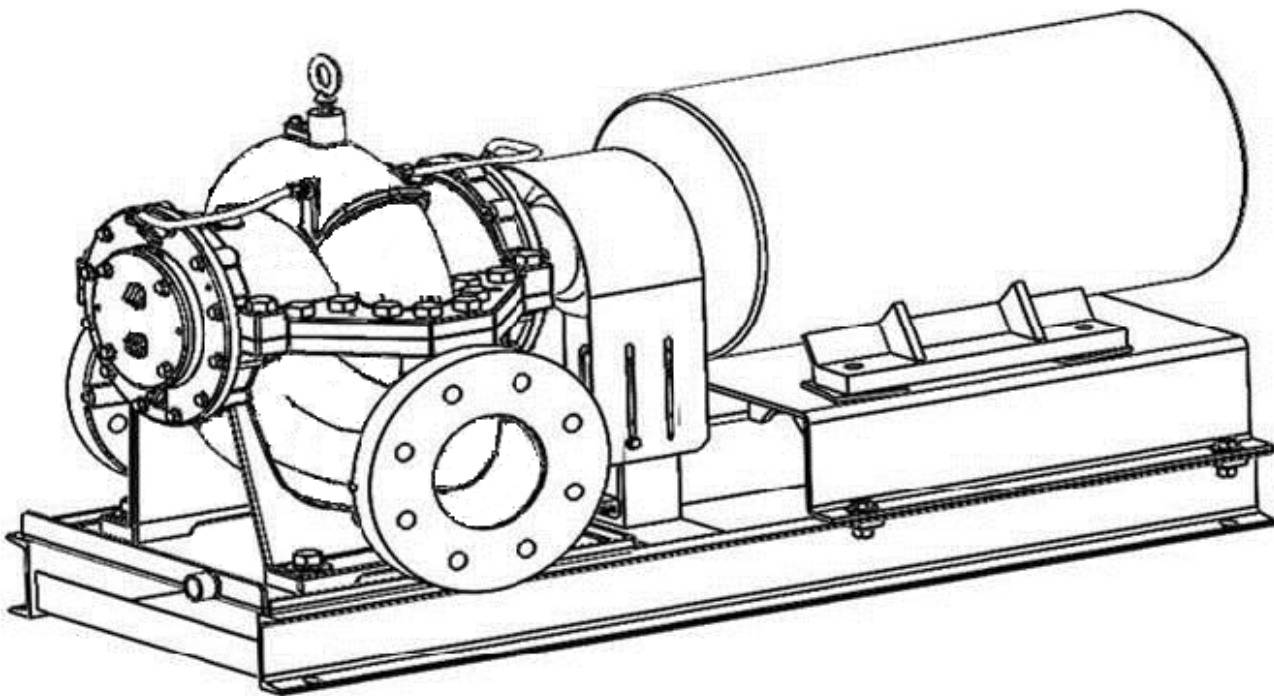
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HS Base Mounted Pumps

The pump must be installed and operated in full compliance with these instructions. The pump may not be operated outside the limits specified on the nameplate and within this manual. The pump should only be operated by skilled trained personnel. The manufacturer will not accept liability if these instructions are not followed. This manual does not take into account any specific local regulations or bylaws that may be applicable, and it is the responsibility of the installer to ensure compliance with such regulations.



**FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT
IN PERSONAL INJURY OR PROPERTY DAMAGE**

INTRODUCTION

All Taco pumps are designated by model number, size and type. This information is stamped on an identification nameplate which is mounted on the pump. This nameplate must never be removed. The pumps covered by these instructions, when correctly installed and maintained will provide many years of trouble free service. These instructions are to be carefully studied and followed at all stages of the pump installation and operating life. All work should be performed by qualified personnel.

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1 INSTALLATION

1.1 Receiving Pump

Upon receipt a visual check should be made to determine if any damage has occurred during transit or handling. What to look for?

- (a) Broken or cracked components, including base, motor or pump feet and flanges.
- (b) Bent pump or motor shaft.
- (c) Broken motor end bells or damaged conduit boxes on motor.
- (d) Missing parts, damaged coupler guard.

Parts or accessories are sometimes wrapped individually or fastened to the equipment. If any damage or losses have been incurred, promptly notify your Taco representative and the transit company who delivered the product. When unloading pump units, lift equally as shown in figures 1 & 2.

CAUTION: When using a forklift, particular care should be taken to properly balance the load. The electric motor may be significantly heavier or lighter than the pump. If possible, use the original pallet or skid provided.

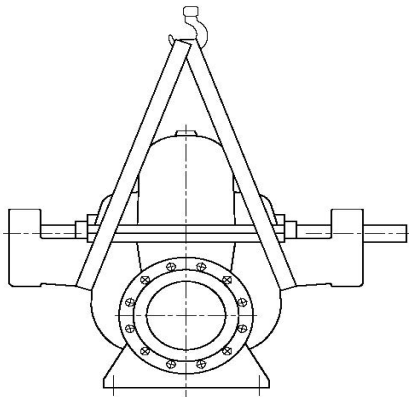


Figure 1: Attaching a Sling to the Pumpset

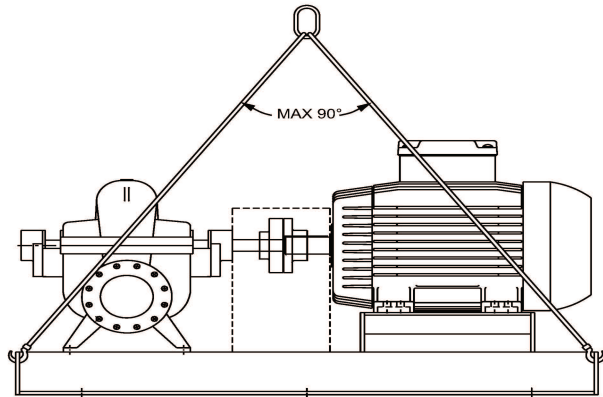


Figure 2: Lifting the Complete Pumpset

1.2 Temporary Storage

If the pump is not to be installed and operated soon after arrival, store it in a clean, dry place, having slow, moderate changes in ambient temperature. Steps should be taken to protect the pump from moisture, dust, dirt and foreign bodies. It is recommended that the following procedure is taken: —

- (a) Ensure that the bearings are packed with the recommended grease, to prevent moisture from entering around the shaft.
- (b) Ensure that suction and discharge branches of the pump and all other openings are covered with cardboard, wood or masking tape to prevent foreign objects from entering the pump.
- (c) If the pump is to be stored where there is no protective covering, it is advisable to cover the unit with a tarpaulin or other suitable covering.

1.3 Preparation

Before installing the pump, clean the suction and discharge flanges thoroughly.

1.4 Location

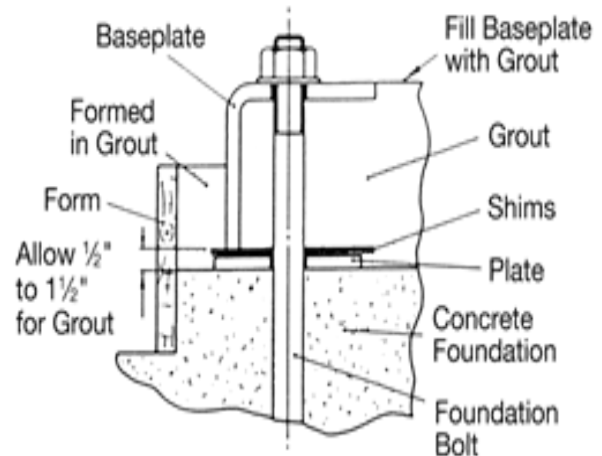
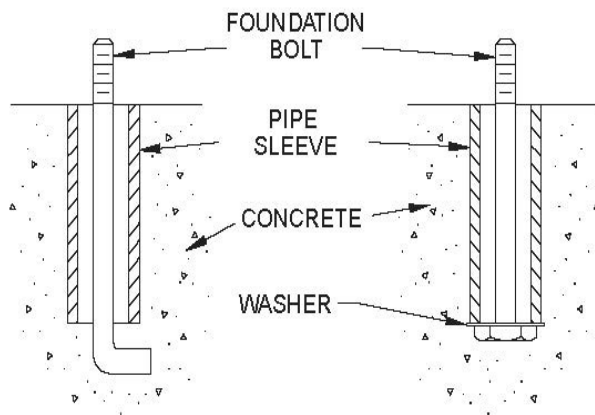
The pump should be installed as near the liquid source as possible with the shortest and most direct suction pipe practical.

The pump should be installed with sufficient accessibility for inspection and maintenance. Ample space and headroom should be allowed for the use of an over head crane or hoist sufficiently strong to lift the unit.

Make sure there is a suitable power source available for the pump driver. If motor driven, electrical characteristics should be identical to those shown on motor data plate.

1.5 Foundation (See Fig. 3)

FIG.3



1.6 Baseplate Setting (See Fig. 3)

The foundation should be poured without interruptions. The top surface of the foundation should be well scored and grooved before the concrete sets: this provides a bonding surface for the grout. Foundation bolts should be set in the concrete. Lower base plate on pad through the anchor holes on the base plate. Snug up the flange nuts and washer. Allow enough length for grout, and shims. Use blocks and shims under base for support at foundation bolts and mid way between bolts, to position base approximately 1" above the concrete foundation with the studs extending through holes in the baseplate. By adding or removing shims under the base, level the pump shaft and flanges. The baseplate must be level. The concrete should be allowed to cure for 48 hrs. Draw foundation bolt nuts tight against baseplate and observe pump and motor shafts or coupling hubs for alignment.

Check to make sure the piping can be aligned to the pump flanges without placing pipe strain on either flange.

Grout baseplate completely and allow grout to dry thoroughly before attaching piping to pump (24 hours is sufficient time with approved grouting procedure).

1.7 Grouting Procedure (See Fig.3) Visit www.taco-hvac.com for "How To" video presentation. Grout compensates for uneven foundation, distributes weight of unit and prevents shifting. Use an approved, non-shrinking grout as follows, after setting and levelling unit: -

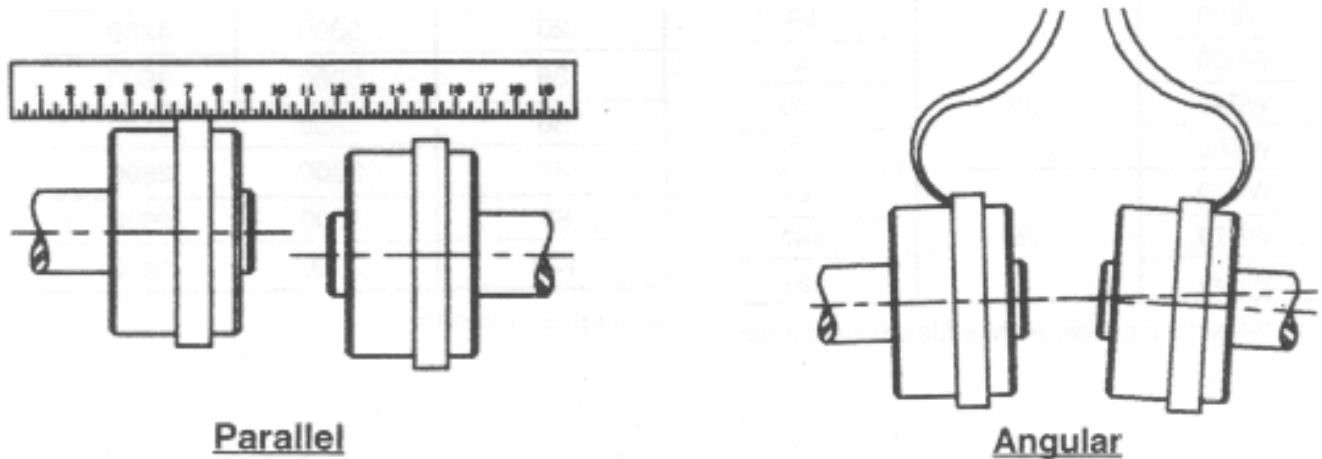
- (a) Build strong form around foundation to contain grout.
- (b) Soak top of concrete foundation thoroughly, then remove surface water.
- (c) Baseplate should be completely filled with grout and, if necessary remove trapped air.
- (d) After the grout has thoroughly hardened, check the foundation bolts and tighten if necessary.
- (e) Check the alignment after the foundation bolts are tightened.

1.8 Alignment Procedure (See Fig. 4)

The pump driver, if supplied, is correctly aligned on its baseplate at the factory. A certain amount of misalignment is possible during transit and it is therefore essential to check alignment, prior to final grouting.

A flexible coupling will only compensate for a small amount of misalignment and should not be used to compensate for excessive misalignment of the pump and driver shafts. Inaccurate alignment results in vibration and excessive wear on the bearings, and seals. Parallel alignment may be checked by placing a straight edge across the two hubs and measuring the maximum offset at various points around the periphery of the hubs. Do not rotate shafts. Reposition equipment until offset is as small as possible.

FIG. 4



1.9 Forms of misalignment:- Figure 4

(a) Angular – shafts with concentric axes but not parallel.

(b) Parallel - shafts with axes parallel but not concentric.

To check for angular alignment, insert a pair of inside callipers or taper gauge at four points at 90 degree intervals around the coupling. Angular alignment is achieved when the measurements at all points around the coupling faces are within 0.005" of each other.

To check for parallel alignment, place a straight edge across both coupling rims at the bottom, and at both sides. Parallel alignment is achieved when all points around the OD of the coupler is within 0.005". Alignment adjustments can be made by shimming under the driver mounting feet. After each adjustment it is necessary to recheck all features of alignment.

Alignment should be performed after the baseplate has been properly set and grout has dried thoroughly according to instructions. Final alignment should be made by shimming driver only.

NOTE: Final alignment should be made at operating temperatures.

1.10 Suction and Discharge Piping (See Fig. 5 & 6)

Piping should always be run to the pump. Do not move pump to pipe.

This could make final alignment impossible. Both suction and discharge piping should be supported independently and close to pump so that no strain is transmitted to the pump when the flange bolts are tightened. Use pipe hangers or other supports at necessary intervals to provide support. When expansion joints are used in the piping system, they must be installed beyond the piping supports closest to the pump. It is advisable to increase the size of both suction and discharge pipes at the pump connection to minimize frictional losses.

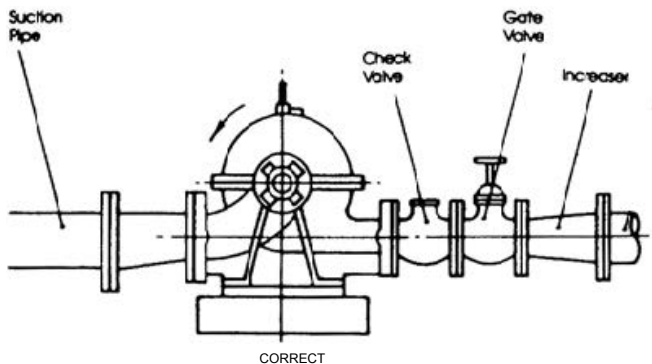


FIG.5

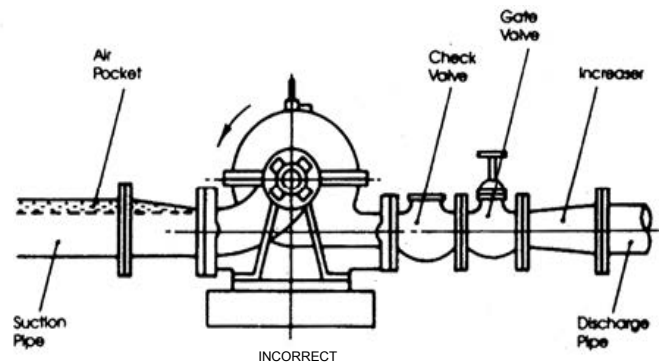


FIG.6

A suction diffuser or minimum of 5 pipe diameters of straight pipe of same size is acceptable. It is not recommended running the suction line parallel with the pump shaft with an elbow or suction diffuser leading directly to the pump. Install piping as straight as possible, avoiding unnecessary bends. Where necessary, use long radius elbows or a Taco suction diffuser at right angles to the pump shaft.

Make sure that all piping joints are air tight. Provide pipe expansions when hot fluids are to be pumped. Where reducers are used, eccentric reducers are to be fitted in suction lines and straight taper reducers in discharge and vertical lines. Undulations in the pipe runs are also to be avoided. This or misuse of reducers may cause the formation of air pockets in the pipe, and thus preventing the correct operation of the pump.

The suction pipe should be as short and direct as possible. Where suction lift is not very high, it is advisable to use a foot valve. Horizontal suction line must have a gradual rise to the pump.

The discharge pipe is usually preceded by a non-return valve or check valve and a discharge gate valve. The check valve is to protect the pump from excessive back pressure and reverse rotation of the unit and to prevent back flow into the pump in case of stoppage or failure of the driver. The discharge gate valve is used in priming, starting and when shutting down the pump.

NOTE: Strainers should be installed on the discharge side of the pump to minimize suction pressure losses.

2 OPERATION

2.1 Check Points Before Start


Before initial starting of the pump, make the following inspection:

- (a) Pump is primed. Never run the unit dry. The liquid in the pump serves as a lubricant for close fit parts within the pump. The pump can be damaged if operated dry. The pump can be primed by using an ejector exhaustless vacuum pump. If a foot valve is used in the suction line the pump can be primed by venting and filling the casing with liquid.
- (b) Check alignment between pump and motor.
- (c) Motor is correctly wired to starting device, check voltage, phase and frequency on motor nameplate with the line circuit. Confirm correct direction of rotation prior to coupling to pump. Check by starting motor and switching off immediately, confirm rotation is the same as the arrow direction on the pump casing.
- (d) Bearing lubrication is provided (see lubrication section), also check driver lubrication.
- (e) Mechanical seal has been fitted or stuffing box has been packed. The packing is allowed to leak.
- (f) All rotating components are found to be free when turned by hand.
- (g) The pump base plate is grouted and bolted to the foundation pad.

IMPORTANT! These instructions should be read completely prior to installation of the equipment. A copy of these instructions should be retained on file for future reference. This pump is intended for the circulation of water or other suitable HVAC media. It is not intended for hazardous, corrosive, or flammable liquids. Refer to motor instructions to determine proper terminal connections in order to obtain correct pump rotation. Pump should be installed according to local electrical and safety codes using appropriate size wire and suitable over current protection. Use a lockable isolator or circuit breaker conforming to EN60947-3. It is recommended that the pump be fitted with a suitable "EMRGENCY STOP".

SAFETY REQUIREMENTS

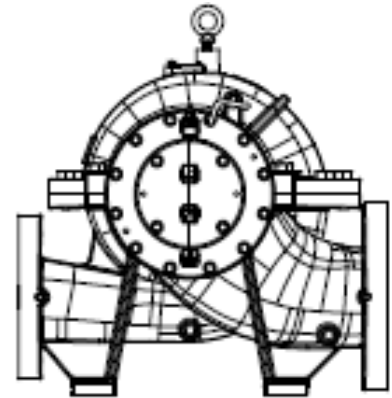
Pump must not be operated without guards in place.

 **Caution:** Always disconnect the pump from the electrical power source before handling. If the system fails to operate properly, carefully read instructions and perform maintenance recommendations.

2.2 Starting

Before the pump is started for the first time, it is important to check the following points.:

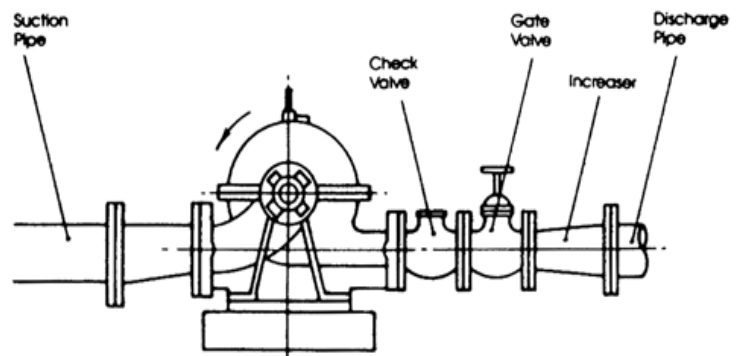
- (a) Check that the pump rotates freely by hand..
- (b) Open the air valve on top of pump casing to evacuate any air that may be trapped, close vent when all air is removed.
- (c) Jog the driver to check for proper rotation.
- (d) Start the pump driver.
- (e) When the pump reaches operating speed, open the discharge valve slowly. The pressure will gradually drop as the flow increases.



Do not operate pump for prolonged periods with closed discharge valve, so as to avoid overheating.

The pump should be shut down at once if the pump is running at its rated speed and found to have any of the following problems: —

- (a) No liquid delivered.
- (b) Not enough liquid delivered.
- (c) Not enough pressure.
- (d) Loss of liquid after starting.
- (e) Excess vibration.
- (f) Motor runs hot.
- (g) Pump bearing overheating



2.3 Running

While the pump is running, inspect and record the following as baseline data:

- (a) Stuffing box (soft packed pumps only). Ensure there is sufficient leakage to lubricate the packing.
- (b) Check the bearings for temperature, when pump reaches operating speed and temperature.
- (c) With mechanical seal fitted pumps, check that there is no leakage from the seal area.
- (d) Suction and discharge gauge pressure readings (if fitted)
- (e) Measure and record vibration readings.

2.4 Minimum Flow Rate

Taco pumps should not be continually operated at a flowrate below 30% of the best efficiency point unless otherwise specifically agreed by the manufacturer. If the application is such that zero flow or less than 30% of original design flow will occur, a return/by-pass line must be fitted to dissipate heat.

2.5 Stopping

- (a) Slowly close the discharge valve as the pump slows to a stop.
- (b) Shut off external sealing liquid supply if supplied, to release stuffing box pressure.
- (c) Successful operation of the pump depends on the accuracy of the alignment. It is recommended to recheck the alignment after preliminary run.

3 PROBLEM ANALYSIS



Caution: Always disconnect the pump from the electrical power source before handling. If the pump and driver fails to operate properly, carefully read instructions and perform checks noted below.

TROUBLESHOOTING		
SYMPTOM	POSSIBLE CAUSE(S)	CHECK
No Discharge	The pump is not primed. Speed is too low. System head is higher than calculated. Suction lift is higher than pump designed. Impeller may be completely clogged.	If the case was vented and if suction and discharge valves are open. VFD settings. The head calculations. The NPSH required. Correct lift if NPSHR is higher than NPSHA. The impeller visually, by dismantling the wet end.
	Incorrect direction of rotation.	The motor wiring. VFD settings.
	Air leak in the suction line.	All pipe fittings. All threaded & flanged connections.
Insufficient Discharge Pressure	Incorrect direction of rotation. Speed is too low.	The motor wiring. VFD settings.
	System head is less than anticipated. Air in the system.	Design parameters All fittings for leaks. All air vents for leaks.
	Mechanical defects: Worn wear rings. Impeller is damaged. Impeller diameter is too small.	All major components by dismantling the wet end.
Loss of Suction	Leak in the suction line. Suction lift is too high. Insufficient NPSHA. Air in the system. Clogged suction strainer.	NPSHA calculations. For air in suction line. The suction strainer.
Vibration	Air leak in suction line Air or gas in liquid Impeller partially plugged	All pipe threads and flanged connections and fittings.
	Mechanical defects:	Bearing worn, Rotor out of balance, Bent shaft or base not rigid.
Pump bearings overheat	Lubricant contaminated Driver misalignment No lubricant	Quality of lubricant Coupling alignment Amount of lubricant
Motor runs hot	Speed is too high. Specific gravity of the liquid is too high. Unbalanced voltage	VFD settings. The calculations for viscosity correction. The motor wiring. Amp load VFD settings.
	Mechanical defects: Shaft is binding Driver misalignment	Coupling alignment All major components by dismantling the wet end & bearing frame.
Excessive Power Consumption	System head is lower than calculated.	The head calculations.
	Specific gravity of the liquid is too high.	The calculations for viscosity correction.
	Mechanical defects: Bent Shaft Shaft is binding. Impeller diameter is too small.	All major components by dismantling the wet end & bearing frame.

4 MAINTENANCE

4.1 Routine Maintenance

(a) General

Routine maintenance is a sound insurance against a forced shutdown, because of failure at a most inconvenient time. A high degree of cleanliness of the equipment and surrounding area should be maintained during all maintenance procedures.

(b) Frequency of Inspections

Inspections should be carried out in accordance with routine maintenance chart. Depending on operation and environmental conditions together with a comparison of previous inspections, the frequency of inspections may be altered to maintain satisfactory operation of the pump to suit established operating procedures.

ROUTINE MAINTENANCE CHART

Every Week	Visually check for leaks. Check for lubrication. Monitor bearing temperature for temperature rise. Check and record pressure gage readings
Every Month	Check bearing temperature.
Every 6 Months	Check the seal for leakage and replace if necessary. Check alignment of pump and motor. Check holding down bolts for tightness. Check coupling for wear.
Every Year	Check rotating element for wear. Check wear ring clearances. Measure total dynamic suction and discharge head.

4.2 Lubrication

Bearings are initially lubricated during manufacture. The regreasing interval depends upon the running speed of the unit: –

PUMP RUNNING SPEED	REGREASING INTERVAL
1750 RPM	4250 HOURS
3450 RPM	2000 HOURS

To recharge the bearings with fresh grease, use a grease gun through the two lubricating ports provided.

DO NOT APPLY LUBRICANT WHEN PUMP IS RUNNING.

Every 10,000 hours or 2 years, remove bearings from pump, degrease and repack or replace in accordance with reassembly instructions.

Recommended greases:	MAKE	GRADE
	Exxon	Polyrex EM
	Citgo Connoco	Polyurea 2
	Phillips	Polyurea 2

4.3 Bearings

These instructions do not supersede any information issued by the bearing manufacturers.

Care and maintenance of bearings is a matter of ensuring that they are: –

- (a) Correctly lubricated at intervals as laid down in routine maintenance chart.
- (b) Removed, cleaned and refitted with care.
- (c) Tools used and work areas should be clean.

To remove a bearing, use correctly suited withdrawal equipment. Inspect the bearing for wear, fractures, cracks, and corrosion which will necessitate a bearing replacement.

CAUTION: Damage can be caused by exerting force against the outer race of a ball bearing.

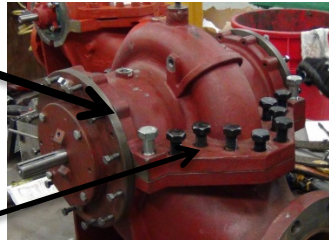


CAUTION: Danger of electrocution. Electric supply must be isolated before working on the pump set.

4.4 Dismantling Pump

4.4.1 Drains the pump by removing drain plugs and removing copper flush lines.

4.4.2 Remove all 12 bearing cap bolts.



Casing Cover Removal

4.4.3 Remove all 20 casing cover bolts.

4.4.4 Attach eye ring on top of casing cover and use overhead hoist to lift casing cover off of casing base.

4.4.5 Remove rotating element from casing using an overhead hoist.



Rotating Element in Casing

4.4.6 Remove four bolts holding on bearing cover to housing.



Bearing Cover

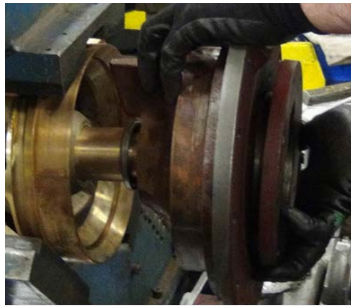
4.4.7 Bend lock washer teeth out the groove in the lock nut.

4.4.8 Loosen bearing retainer nut using lock nut socket tool and large socket wrench.



Bearing Retainer Nut and Lock Washer

- 4.4.9 Remove bearing retainer nut and lock washer from non-drive end of the shaft.
- 4.4.10 Using a bearing or gear puller remove bearing from shaft.
- 4.4.11 Remove bearing housing and cap from shaft.



Removal of Bearing House and Bearing Cap

- 4.4.12 Remove bearing spacer from bearing housing cap.



Removing bearing Spacer

- 4.4.13 Remove mechanical seal assemble.



Removal of Mechanical Seal

- 4.4.14 Slide impeller wear rings from impeller.
- 4.4.15 Repeat steps 4.4.6 through 4.4.13 for the drive end of the rotating assemble.

4.5 Pump Assembly

Note: For clockwise rotating pumps position the rotating element assembly over the bottom half of the casing with the suction end positioned to the right. Make sure the vanes curve away from the section end. Pushing and not scooping the fluid as shown in Figure 1 above.

Note: For Counter-clockwise rotating pumps position the rotating element assembly over the bottom half of the casing with the suction end positioned to the left. Make sure the vanes curve away from the section end. Pushing and not scooping the fluid as shown in Figure 2 above.

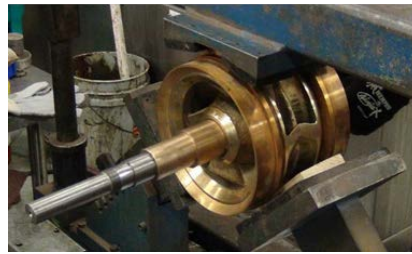
- 4.5.1 Load impeller in hydraulic vice fixture with the key shaft on bottom and impeller vanes going to the left (When facing impeller from the front). Make sure to smooth any rough edges.
- 4.5.2 Apply a light coat of silicone to surfaces of impeller bore.
- 4.5.3 Install wear rings on both sides of impeller, with their shoulders facing the impeller.
- 4.5.4 Take impeller shaft and insert keys into the impeller shafts key slots.



- 4.5.5 Slide impeller shaft through impeller making sure to line up key in the impeller shaft with the key slot in the impeller (The impeller shaft drive end should be facing you).
- 4.5.6 Take the two sleeves and two small O-rings. Coat the rings with silicone and place an O-ring in the groove at one end of each sleeve.
- 4.5.7 Slide a sleeve, O-ring side first, onto the impeller shaft all the way to the impeller. Make sure the key slot inside the sleeve lines with the key. When done correctly the impeller hub will completely conceal the O-ring. Repeat for the other end of the impeller shaft.



Sleeve Key Slot



Sleeves on Impeller Shafts with Concealed O-rings

- 4.5.8 Apply silicone to the sleeve, and install the mechanical seal assembly over the sleeve spring side first. Slide seal until it reaches the shoulder of the sleeve. Remove excess silicone and repeat for the other side of the shaft.



Mechanical Seal Assembly on Sleeve

- 4.5.9 Apply silicone to bearing spacer and slide v-ring onto bearing spacer. The broader and thicker end will slide onto the narrower end of the spacer. Slide the v-ring until its surface mates with the lip of the bearing spacer. Repeat for second bearing spacer and v-ring.



Bearing Spacer with v-ring

- 4.5.10 Take the drive end bearing housing, marked DE along the edge, and insert the bearing spacer into the DE bearing house narrow end first. The bearing spacer goes from the outside surface (concave) to the inside surface. Place gaskets around narrow end of the bearing spacer sticking out of the inside surface of the bearing housing. Gasket should be flush against inside surface. Repeat for non-drive end bearing housing.



Drive End Bearing Housing



Non-Drive End Bearing Housing



Inserting Bearing Spacer



Gasket around Bearing Spacer

- 4.5.11 Take bearing housing caps. Put silicone in the groove on the inside surface of the bearing housing cap. Insert large O-ring into same groove. Repeat process for second bearing housing cap.



Bearing Housing Cap with O-ring

- 4.5.12 Place bearing housing cap onto the drive end of the impeller shaft, place the drive end bearing housing onto the housing cap, and push to compress seal spring. Repeat for second bearing cap and non-drive end housing on other end of impeller.



Bearing Housing and Cap Placed on Impeller Shaft

- 4.5.13 Load bearings on an induction heater crossbar.

- 4.5.14 Set temperature to:

- A. Small and Medium Size Bearings: 249°F
- B. Large Size Bearings: 215°F

- 4.5.15 Once the bearings are heated remove using insulated gloves and slide over impeller shaft. It should fit right up against the bearing spacer. If needed use a rubber mallet to hammer bearing into position.



Slide Bearing onto Impeller Shaft

- 4.5.16 Add lock washer and check to see if its anti-twist hub fits into the groove at the end of the shaft. If it does not use de-burring tool to reduce its size.
- 4.5.17 Position lock washer against the bearing with anti-twist hub in shaft groove and teeth facing out.



Lock Washer against Bearing on Impeller Shaft

- 4.5.18 Screw bearing retainer nut onto the end of the shaft by hand and then finish tightening by inserting the tip of a flat head screwdriver into the slots of the retainer nut and tapping the top of the screwdriver. Continue tightening nut until it stops.



Bearing Retainer Nut against Lock Washer

- 4.5.19 Finish tightening bearing retainer nut by using lock nut socket tool and large socket wrench. Then bend one of the lock washer teeth into one of the grooves in the lock nut.
- 4.5.20 Repeat steps 4.5.13 through 4.5.19 for the second bearing.
- 4.5.21 Get the cover and attach to drive end bearing housing. Attach bolts using an impact wrench. Making sure to keep the grease holes orientated vertically. Make sure the fins on the inside of the bearing caps are on top of rotating assembly.



Cover Attached to Bearing Housing with Correct Grease Hole Orientation

- 4.5.22 Inspect and clean inner surfaces of the pump cover and base. De-burr edges and clean out debris.
- 4.5.23 Place gasket casing on casing base, trim any casting overhangs.
- 4.5.24 Dab Loctite along the inner edge, and on either side where the wear rings touches the casing.

4.5.25 Place gasket on casing base and line up holes in gasket.

4.5.26 Line up pins in casing base with holes in gasket.

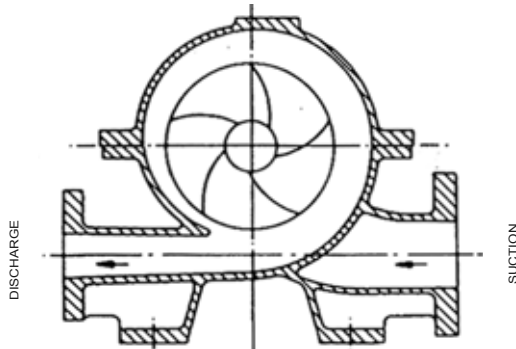


Figure 1: CLOCKWISE ROTATION
VIEWED FROM COUPLING END

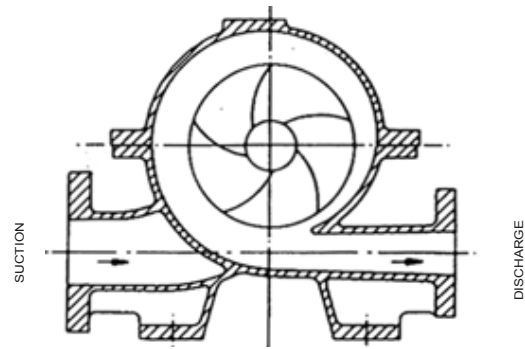


Figure 2: COUNTERCLOCKWISE ROTATION
VIEWED FROM COUPLING END

- 4.5.27 Lift rotating element and position over the bottom half of the casing. Use overhead hoist and lifting straps in necessary. Turn wear rings to align guide holes with the locating pin in the casing. The wear rings have guide holes 180 degrees from another to aid in aligning guide holes and pins. Check impeller for correct rotation using Figures 1 and 2 above.



Rotating Element in Casing Base

- 4.5.28 Insure impeller turns freely by rotating impeller. If binding occurs, check wear ring fit.
4.5.29 Dab Loctite on gasket on the same places as on the casing base.
4.5.30 Use overhead hoist to lift casing cover and place on top of casing base making sure the bolt holes line up.
4.5.31 Insert the 16 shorter bolts through the casing cover and into the base and loosely tight by hands. The 4 longer bolts go into the 2 bolt holes at either end of casing.
4.5.32 Insert the 12 bolts through bearing housing cap and into bolt holes on the end of casing, both top and base and loosely tighten by hand.

Note: Loosely tighten all the bolts in sections 4.5.31 and 4.5.32 by hand in order to make adjustments to better align the casing and bearing housing caps.



Casing Cover Reattached to Casing bas with all Bolts

- 4.5.33 Tighten the bolts from section 4.5.31 and 4.5.32 using an impact wrench in a crisscross pattern. For casting bolts tighten starting at impeller center line moving out.

5 Part Replacment

5.1 Bearing Replacements

5.1.1 Remove the 4 bolts holding on the bearing cover.



5.1.2 Using a lock nut socket and large socket wrench remove the retainer nut. Make sure to bend back the locking washer from the nut and then remove the retaining nut.

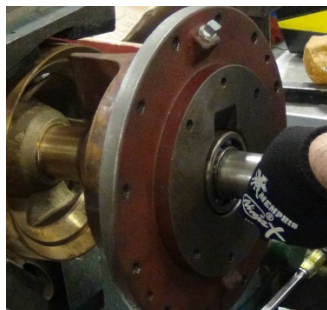


5.1.3 Then remove the lock washer.



5.1.4 Using a bearing or gear puller remove the bearing from the shaft. Heat may need to be applied to loosen up the bearing.

5.1.5 Using insulated gloves remove the new bearing from heated cross bar and slide it over impeller shaft, it should fit right against bearing spacer. If necessary use a rubber mallet to hammer bearing into position.



- 5.1.6 Get lock washer, check to see if its anti-twist hub fits into the groove at end of the shaft. If not use a de-burring tool to reduce its size.
- 5.1.7 Position lock washer against the bearing with anti-twist hub in the shaft groove and with the teeth of the lock washer facing out.



- 5.1.8 Screw bearing retainer nut on end of the shaft by hand and then use large flat head screwdriver and mallet to tighten the nut against the lock washer. Tightening the nut is accomplished by inserting tip of the flat head screwdriver in slots of the nut and tapping the top of screwdriver with the mallet. Continue tightening nut until it stops.

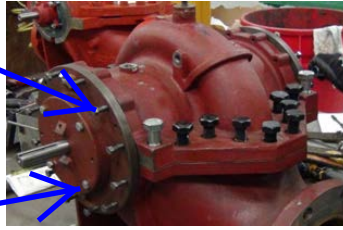


- 5.1.9 Finish tightening bearing retaining nut using lock nut socket tool and large socket wrench. Bend one of the lock washer teeth into one of the grooves in the lock nut.
- 5.1.10 Get a cover and attach to bearing housing. Attach using 4 bolts and impact wrench. The grease holes in the cover located on the 2 bulges of the cover should be oriented vertically. To ensure the grease holes are in the correct orientation the fins on the inside of the bearing cap should be on top of the rotating assembly.



5.2 Mechanical Seal Replacements

- 5.2.1 Remove the 12 bolts on the bearing housing cover.



- 5.2.2 Remove the 4 bolts on the bearing cap.

- 5.2.3 Using a lock nut socket and large socket wrench remove the retainer nut. Make sure to bend back the locking washer from the nut.



- 5.2.4 Then Remove the locking washer.



- 5.2.5 Using a bearing or gear puller remove the bearing from the . Shaft. Heat may need to be applied to loosen up the bearing.

- 5.2.6 Remove the bearing housing and cap to gain access to mechanical seal.

- 5.2.7 Remove old mechanical seal assembly from the sleeve.

- 5.2.8 Apply a small amount of silicone to the sleeve

- 5.2.9 Install mechanical seal assembly over the sleeve, Spring side first. Slide seal assembly over sleeve until it reaches the shoulder of the sleeve.



- 5.2.10 Remove the excess silicone.
- 5.2.11 Using insulated glove remove bearings from heated cross bar and slide over impeller shaft, it should fit right up against the bearing spacer. If necessary use a rubber mallet to hammer bearing into position.
- 5.2.12 Get lock washer, check to see if its anti-twist hub fits into the groove at the end of the shaft. If not use a de-burring tool to reduce it size.
- 5.2.13 Position lock washer against the bearing with anti-twist hub in shaft groove and with the teeth facing out.



- 5.2.14 Screw bearing retainer nut onto the end of the shaft by hand and then finish tightening by inserting the tip of a flat head screwdriver into the slots of the retainer nut and tapping the top of the screwdriver. Continue tightening nut until it stops.



- 5.2.15 Finish tightening bearing retainer nut using a lock nut socket and large socket wrench. Bend over one of the lock washer teeth into one of the grooves in the lock nut.
- 5.2.16 Get the cover and attach to bearing housing. Attach bolts using an impact wrench. Making sure to keep the grease holes orientated vertically. Make sure the fins on the inside of the bearing caps are on top of rotating assembly.



6 LONG-TERM STORAGE

Here are some general suggestions for long term storage. The applicability of all, or some of these suggestions depend on several factors such as type of equipment, length of storage, and condition of the environment in which they are stored in:

1. Drain the casing completely and dry it thoroughly, including its bearing housing and stuffing box, or seal chamber. Apply a coat of soluble rust preventive solution both internally and externally.
2. Cover all openings. Flanged openings (such as suction and discharge nozzles) should be covered with blind flanges with elastomer gasket. Threaded openings should be covered with steel plugs or caps.
3. Remove the shaft coupling; it may cause the shaft to develop a permanent sag during prolonged storage.
4. Wrap the exposed shaft and key with corrosion inhibitor waterproof paper or waxed cloth.
5. Protect the bearing housing from moisture by placing bags of vapor phase inhibitor crystals around the housing.
6. Cover the equipment with industrial strength plastic, preferably transparent to allow its visual inspection, including its nameplate, without uncovering the unit.
7. Store the unit in its normal position in a dry, temperature controlled environment.
8. Inspect the unit periodically and turn the shaft a few times plus 1/4 turn at least once a week. Turning the shaft prevents pitting of finished surfaces. The extra 1/4 turn is to displace the sag and prevent the shaft from developing a permanent bow.

NOTES

GPM _____

IMPELLER DIAMETER _____

MOTOR RPM _____

HEAD _____

MOTOR HP _____

MOTOR VOLTAGE _____



Commercial Pump Warranty Terms

(Models FI, CI, FE, CE, KV, KS, TA, TC, TS, GT)

Taco, Inc. will repair or replace without charge (at the Company's option) any commercial pump product or part which is proven defective under normal use within one year from date of start-up or one year and six months from date of shipment (whichever occurs first).

In order to obtain service under warranty, it is the responsibility of the purchaser to promptly notify the Company in writing and promptly deliver the item in question, delivery prepaid to the

factory. For complete details on warranty returns, the purchaser should contact a local Taco stocking distributor or the Company. If the product or part in question contains no defect as covered in this warranty, the purchaser will be billed for parts and labor charges in effect at time of factory examination or repair.

Motors provided on commercial pumps are not covered by this warranty, and are warranted by the motor manufacturer. For complete details on motor warranty returns, the purchaser should contact the motor manufacturer's local service repair center or contact the motor manufacturer directly.

Seals provided on commercial pumps are not covered by this warranty.

Any Taco product or part not installed or operated in conformity with Taco instructions or which

has been subjected to misuse, misapplication, the presence of certain chemicals (such as solvents, acids, etc.) or other abuse will not be covered by this warranty. For complete information on chemical and application restrictions, the purchaser should contact the company.

Taco, Inc. reserves the right to make changes in details of design, construction, or arrangement of materials of its products without notification.

Taco, Incorporated offers this warranty in lieu of all other express or implied warranties. No warranties are made for merchantability or fitness for use and there are no warranties which extend beyond the description contained herein. Taco, Inc. will not be liable for any special, incidental, or consequential damages.

