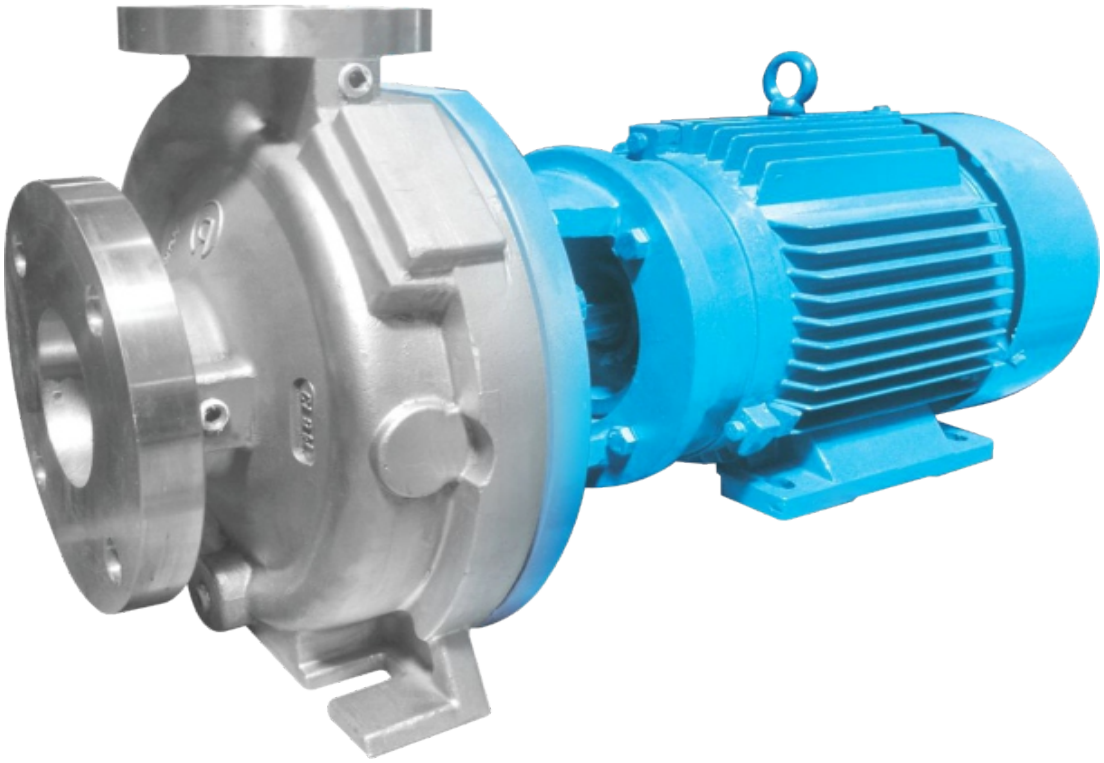
ROTECH
Pumps & Systems Inc

"A Trusted Partner in Pump Solutions"

INSTALLATION, OPERATION & MAINTENANCE MANUAL



ANSI 1296 Pump

WARRANTY CLAUSE | LIMITED LIABILITY

Rotech Pumps

Pumps manufactured & assembled by Rotech covered by warranty for free of manufacturing defects for a period not exceed - ing twelve months from the date of shipment from our Plant/warehouse. This warranty will be limited and subject to Rotech authorisation /approval.

1. Rotech will make good by repair or its option the replacement of faulty parts under warranty, providing always that:

   (a) The equipment was correctly installed and properly used in accordance with Rotech Installation & Operating instruction manual and accepted codes of good engineering practice.

   (b) The claims for goods under warranty arise solely from faulty design, material or workmanship. Rotech products don't offer warranty or guarantee for any pump application. The customer can't blame Rotech for selection of Material of constructions and other specifications. The customer can consult consulting engineers before purchase of pumps.

   (c) The repair is carried on in the Rotech service department or by an authorized agent or distributor appointed by Rotech authorized repair agent must obtain written approval (WRA#) from Rotech before Completing repair under warranty.

   (d) Authorized repair agents will be refunded with the amount of equivalent to a similar repair work in the Rotech service department.

   (e) All freight costs to and from the service department or repair agents to be paid by the purchaser.

2. In the case of equipment or components which are not manufactured by Rotech, but supplied by Rotech.

   For Example: Electric motors, engines, trade accessories etc. The warranty is limited of such equipment & subject to respective manufacturers.

3. Rotech Pumps warranty doesn't cover any of the following:

   (a) Claims for third party liability, labor cost, transportation cost or damage caused by failure of any of the company's products.

   (b) Damage caused by abnormal operating conditions, war, violence, storm, cataclysm or any other force.

   (c) Damage caused by the equipment being used for an application for which it is not recommended.

   (d) Damage caused by sand or abrasive materials, corrosion due to acid waters, electrolytic action, liquid temperature beyond the recommended range, cavitation, improper supply voltage or insufficient liquid to enable the pump to specification.

4. The decision of Rotech in relation to any claims or disputes over warranty is final.

5. This warranty is in lieu of all other warranties and conditions expressed or limited written or oral, statutory to the extent allowable by law or otherwise, which are hereby negated and excluded.

Limited Liability

Rotech shall not be liable for any damage, delays or personal injury caused by following improper or proper procedure of installation and maintenance of equipment being supplied by Rotech.

The pump and other equipment supplied by Rotech based on customer specification. Rotech can't be liable the installation of pump and equipment in any hazardous environment. Customer has to consult engineers before purchasing for proper pump application.

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INTRODUCTION OF PUMP

Rotech's 1296 SERIES ANSI chemical process centrifugal pumps are designed for pumping various types of chemicals, hydrocarbon, slurries and other liquid. This pump has back pull out design enable to pull out from operation without disturbing piping.

Pump Safety Tools & Procedure

Always wear SAFETY APPAREL

- Insulated work gloves when handling hot bearings or using bearing heater.
- Heavy work gloves when handling parts that have sharp edges, especially impellers
- Safety glasses (with side shields) to protect eyes, especially in machine shop areas.
- Steel-toed shoes to protect feet when handling parts heavy tools, etc.
- Any other equipment needed to protect against fluids.

FLANGED CONNECTIONS

- Do not try to adjust or match piping by applying force to make connection with a pump
- Use only fasteners of proper size & material
- Ensure there are no missing fasteners
- Beware of corroded or loose fasteners

Normal OPERATION

- Do not operate below minimum rated flow, or with suction / discharge valves closed
- Do not open vent or drain valves, or remove plugs while the system is pressurized

Be careful WHILE MAINTENANCE

Always Lockout Power

- Ensure pump is isolated from the system & pressure is relived before disassembling pump, removing plugs, or disconnecting piping.
- Use proper lifting & supporting equipment to prevent serious injury
- Observe proper decontamination procedures
- Know & follow company safety regulations

FOREWORD

Rotech ANSI pumps are designed and manufactured for optimum performance and long, trouble-free service. Preventive maintenance is a key factor for long life and safe operation of pump.. This manual is provided as a guideline for proper installation, operation and maintenance. THIS MANUAL MUST BE READ AND UNDERSTOOD BEFORE INSTALLING AND OPERATING ANY Rotech 1296 SERIES ANSI chemical process pumps.

Rotech pumps & systems Inc SHALL NOT BE LIABLE FOR PHYSICAL INJURY, DAMAGE OR DELAYS CAUSED BY A FAILURE TO OBSERVE THE INSTRUCTIONS FOR INSTALLATION, OPERATION, AND MAINTENANCE CONTAINED IN THIS MANUAL.

PRECAUTIONS

NEVER apply heat to remove impeller. It may explode due to trapped liquid.

NEVER use heat to disassemble pump. Explosion could occur due to trapped liquid.

NEVER operate pump beyond the rated conditions to which the pump was sold.

NEVER start pump without proper prime (sufficient liquid in pump casing).

NEVER operate pump below recommended minimum flow or when dry.

ALWAYS lock out power to the motor before performing pump maintenance.

NEVER operate pump without safety devices installed.

NEVER operate pump with discharge valve closed.

NEVER operate pump with suction valve closed.

DO NOT change conditions of service without approval of an authorized Rotech representative.

! WARNING !

Rotech is not responsible for the Personal injury will result if procedures outlined in this manual are followed or not followed.

RECEIPT AND STORAGE

RECEIPT OF PUMP & EQUIPMENT

Receiving of Pump

Immediately after receipt of pump, please check following:
1. Check Name plate details on pump.
2. Please check name plate details on which Pump Model number, Size of pump, Flow , Head, Serial number, HP of Motor, RPM and compared with Purchase order just to make sure you have received right pump against order to avoid / any issue.
3. Check pump crate and pump & other equipment is in good condition and did not damage in transportation. If there is any damage, immediately report to shipper Rotech Distributor or your supplier.
4. Use proper procedure unloading pump and equipment from truck.

STORAGE OF PUMP AND EQUIPMENT

Store pump in a cool and dry area free from heat, dirt .Do not remove packing if not necessary. Rotate pump shaft at least once a week to maintain protective film of oil or grease on bearings.
If you intend to store for long term, use proper storage treatment for safeguard of pumps.

INSTALLATION

PREPARATION

When preparing your pump for installation, Please make sure the discharge and suction connections must be clean and free of anything that might prohibit a tight connection. This is especially important on the suction, air leaks can cause a pump to operate poorly or to lose prime completely.

If your pump has just been taken out of storage all of the grease or preservative must be removed from the ball bearing housing. The ball bearing housing must then be thoroughly cleaned with kerosene or carbon tetrachloride & re-lubricated. On packed pumps, it will be necessary to clean the shaft sleeve & stuffing box with kerosene or carbon tetrachloride & then repack.

FOUNDATION

Whenever possible locate pump near the source of supply as possible. Allow enough space for inspection & maintenance of pump. Baseplate mounted pumps are usually grouted on a concrete foundation that has been poured on a solid footing. The foundation should be of heavy construction to reduce vibration and must be rigid enough to resist the torque it may be subjected to. The foundation should be 2" to 6" larger than the base, depending on the size of the base. A space of approximately 2" should be left between the foundation and the bottom of the base for grouting. Use a pipe sleeved bolt as shown in Fig. 2 to within 1/2" of the base for a foundation bolt.

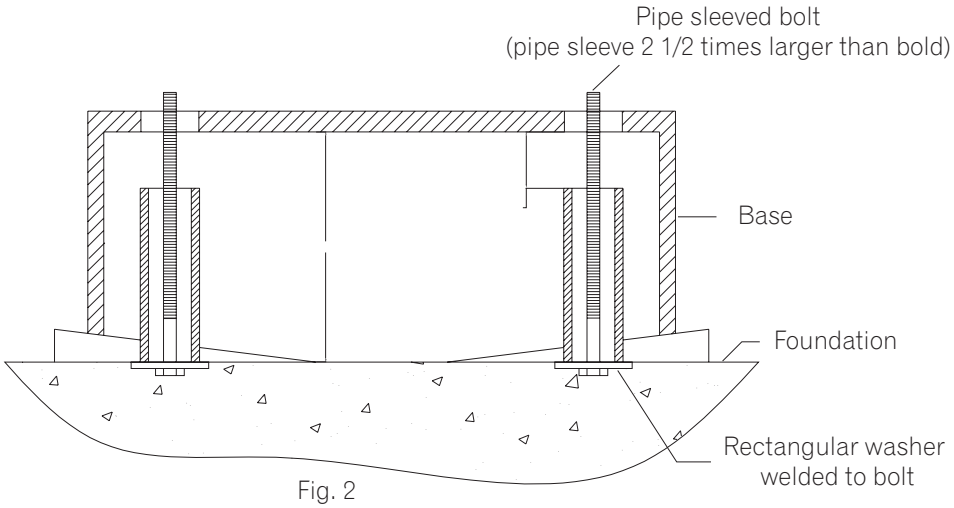


Fig. 2

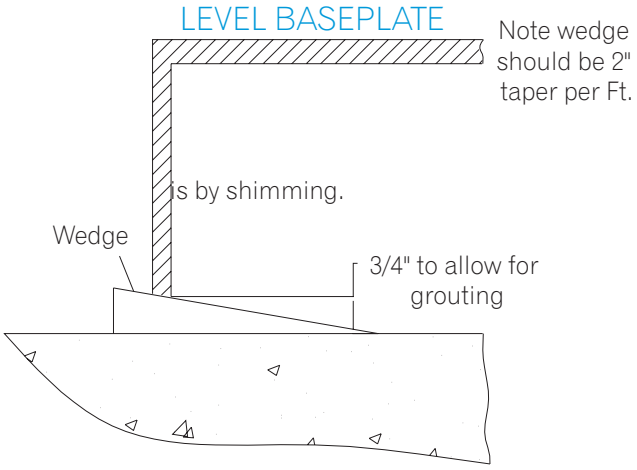


Fig. 3

Pump alignment is very important and special care should be taken . Once the pump is set the only means of adjusting

1. Place 12 wedges on the foundation, one wedge on each side of every mounting bolt. Place wedges so that baseplate is 3/4" above foundation to allow for adequate grouting (Fig. 3).

2. Carefully lower the baseplate onto mounting bolts.

3. Level baseplate to within 1/8" over the length and to within .088 in over the width by adjusting the wedges.

4. Hand tighten bolts.

1. Apply Anti-seizing compound on jack screw to allow for easy removal after the grout has cured.

2. Cut 6 or 8 round plates from barstock to set the jack screws on. Chamfering the edges of the plate is recommended to reduce stress concentrations.

3. Set the baseplate on the foundation, then raise it 3/4" to 1 1/2" using the four corner jack screws. At this time, the two center jack screws should not be touching the foundation.

4. Place one machinist level lengthwise on a single motor pad, & another across the ends of both motor pads. (It is important that the surface being leveled is free of all contaminants, such as dust, to ensure that your reading is accurate.)

5. Adjust the four jack screws in order to level the motor pads to zero in both directions.

6. Turn down the center jack screws until they are resting on their metal plates.

7. Move the two levels to the pump pads. Place one level lengthwise on a single pad, and the other across the middle of both pump pads.

8. Adjust the jack screws to level the pump pads in both directions.

9. Install the anchor bolts until they are hand tight.

10. Recheck the motor pads for level measurements.

11. Continue adjusting the jackscrews & anchor bolts until all level measurements are within the requirement of 0.002 on in / ft.

! WARNING!

Before starting any alignment procedure, ensure that the motor power is locked out. Failure to do this will result in serious physical injury.

ALIGNMENT CHECKS

Initial Alignment (Cold Alignment)

- Before grouting baseplate to make certain alignment can be obtained
- After grouting baseplate to make sure no changes have occurred.
- After connecting piping to ensure that alignment hasn't been altered by pipe strain. If alignment has changed alter piping to remove strain.

Final Alignment (Hot Alignment)

- After first run to obtain correct alignment when equipment is at operating temperature.

ALIGNMENT CRITERIA

Good alignment is achieved when the differences between the readings is .010 or less when the pump is at operating temperature. However, during the installation phase it is necessary to set the parallel alignment in the vertical direction to a different criteria. This is due to the differences in the expansion rates of the pump and the motor. The recommended cold settings for electric motor driven pumps is shown in Table 1.0

ALIGNMENT TROUBLESHOOTING

Problem	Probable	Cause Solution
Cannot obtain horizontal alignment, angular of parallel	The bolts holding the driver feet are bound.	Loosen pump hold down bolts & slide pump & driver until horizontal alignment is achieved.
	Baseplate not leveled properly, probably twisted.	Determine which corner(s) of baseplate are high or low & adjust properly, then realign.

GROUT BASEPLATE

1. Clean the areas on the baseplate that will contact grout. Do not use oil-based cleaners because the grout will not bond to it.
2. Build a form around the base as illustrated in Fig. 4 Then thoroughly wet the foundation.
3. Pour grout into form being sure that it flows under the base. Fill to within 3/4" to 1" from the bottom of the base.
4. Allow grout to set for 48 hours.
5. Recheck coupling alignment, make any adjustments that may be necessary and tighten foundation bolts securely.

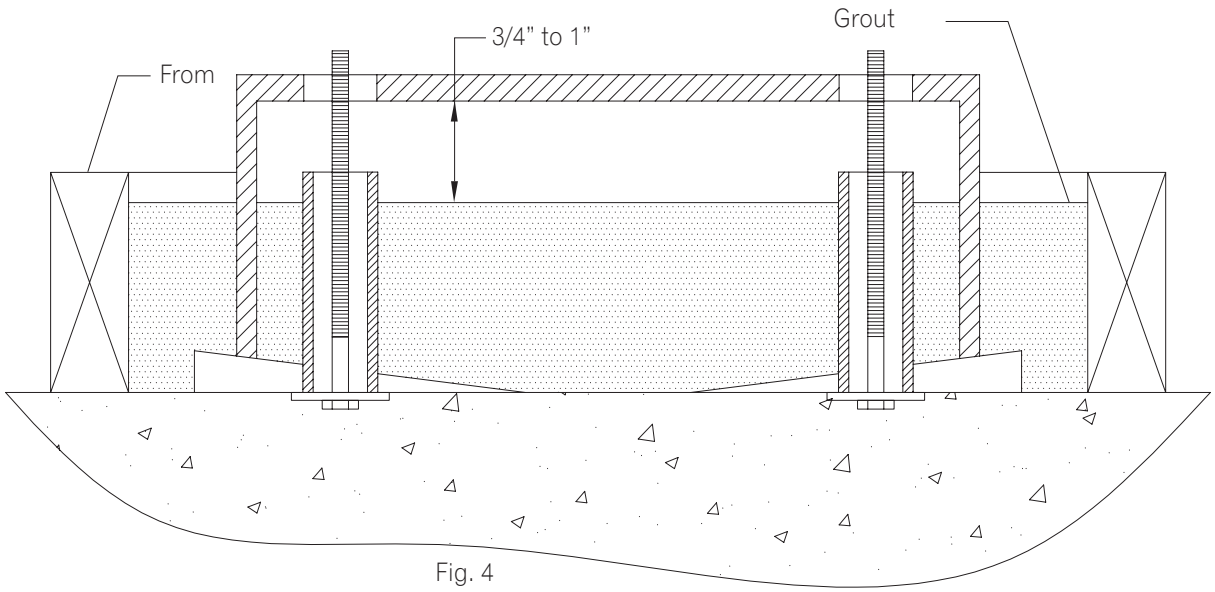


Fig. 4

PIPING

Guidelines for piping follow given in the "Hydraulic Institute Standards" and must be reviewed before installing pump.

! WARNING !

Never force piping into position by pulling it in place with the pump suction & discharge flange bolts. This will cause misalignment between pump & driver which will adversely effect the operation of the unit resulting in physical injury and damage to the equipment.

1. All piping must be supported independently of the pump.
2. Before connecting the piping to the pump, ensure that grout has hardened and the foundation bolts have been tightened.
3. When handling liquids at high temperatures, it is recommended that expansion loops or joints be properly installed in suction and/or discharge lines so that linear expansion of piping will not draw pump out of alignment.
4. On pumps handling corrosive liquids, the piping should be arranged to allow for flushing prior to removal.
5. Clean all pipe parts prior to installation.

SUCTION PIPING:

1. Properly installed suction piping is necessary for trouble-free pump operation. Flush suction piping before connection to the pump.
2. Never place a pipe line elbow in the horizontal plane directly at the pump suction. Use a straight pipe 4 to 6 pipe diameters long between the elbow & the pump suction.
3. Use suction pipe one or two sizes larger than the pump suction, with an eccentric reducer, sloping side down, at the suction flange (Fig. 7). Suction piping should never be smaller than the pump suction.
4. Never throttle pump on the suction side, always control flow by throttling on the discharge side of the pump. When using a strainer on the suction, install it as close to the pump as possible & select a strainer with a net area of at least four times that of the suction pipe.
5. Whenever possible the end of the suction should be a minimum of 3' below the liquid level (Fig 5). The liquid near the pump suction should be free from agitation to prevent air entering the suction line.
6. Liquid coming back into the reservoir should not enter near the pump suction pipe, & the liquid should not drop from a high level (Fig. 6).
7. If a foot valve is not used in the suction line, it is good practice to bell out the suction pipe to lower the entrance velocities at the inlet (Fig. 5).

! WARNING !

NPSHA must always exceed NPSHR as shown on performance curves. Reference Hydraulic Institute for NPSH and pipe friction values needed to evaluate suction piping.

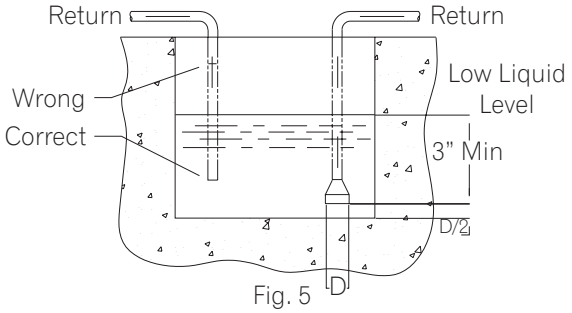


Fig. 5

SUCTION LIFT CONDITIONS

1. Pipe must be free from air pockets.
2. Pipe must slope upwards to pump.
3. All connections must be air tight.
4. Whenever possible avoid dynamic suction lifts of more than 12'.
5. A means of priming the pump must be provided.

SUCTION HEAD/SUCTION CONDITIONS

1. An isolation valve should be installed in the suction pipe at least four diameters from the suction to allow closing of the line for pump inspection and maintenance.
2. Pipe must be free from air pockets.
3. Piping should be level or slope gradually downward from the source.
4. No part of the piping should extend below pump suction flange.
5. The size of the entrance from the supply should be one or two sizes larger than the pipe.
6. To prevent vortices and air entrainment at the supply, the entrance from the supply must be adequately submerged below the liquid surface.

DISCHARGE PIPING

1. A gate valve & check valve should be installed in the discharge line. The check valve should be installed between the gate valve and the pump (Fig. 6) this will allow for inspection of the check valve. The gate valve is required for priming, flow regulation, & for maintenance of the pump. The check valve is required to prevent pump or seal damage from reverse flow through the pump when the motor is turned off.
2. Discharge pipe increasers should be connected between the pump & the check valve (Fig.7).
3. If quick closing valves are installed in the system, cush - ioning devices should also be installed to protect the pump from surges & water hammer.

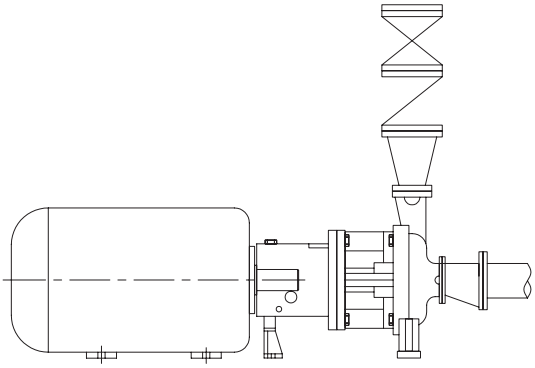


Fig. 6

FINAL PIPING CHECK

After all piping connections have been made to the pump:

1. Rotate the shaft by hand to ensure that there is no binding and all parts are free.
2. Recheck pump alignment to detect any pipe strain, if pipe strain exists correct piping.

OPERATION

PREPARATION FOR START-UP

Check Rotation

1. Please check wiring of motor as per motor manufacture's specifications & according to local regulations.
2. Lock out power to driver
3. Disconnect motor/pump shaft coupling to prevent dry operation of the pump and reverse rotation.
4. Make sure everyone is clear. Jog motor starter, pump must rotate clockwise when viewing from the driving end looking over the motor. Direction arrows are cast in impeller housings.

Check Impeller Clearance

Before starting pump the impeller clearance must be checked. The pump efficiency is maintained when the proper impeller clearance is set. When pumping liquids under 200°F (93°C), the impeller front clearance for the STR & MTR is between .010" and .015". If the impeller front clearance is not set between the above values significant performance degradation will result. When pumping liquids above 200°F (93°C) the front impeller clearance when cold must be set per Table 2. This is necessary to allow for differential expansion due to the higher operating temperature. See the Maintenance section for correct impeller adjustment procedure.

! WARNING !

Operating pump dry will cause damage to mechanical seal and may cause rotating parts to seize.

TABLE 2: IMPELLER CLEARANCES

Cold Temperature Clearances For	
Service Temperature	Clearance
Up to 200°F (93°C)	.010" - .015"
200°F to 250°F (121°C)	.012" - .017"
250°F to 300°F (149°C)	.014" - .019"
300°F to 350°F (177°C)	.016" - .021"
350°F to 400°F (204°C)	.018" - .023"

Priming Of Pump

Centrifugal pump will require to prime to operate satisfactorily. Do not try to prime pump when operating and DO NOT under any circumstances operate the pump without being completely primed. Some of the most common methods of priming are flooded suction, foot valve in suction line, ejector (steam, water, or air operated), and vacuum pump.

With Flooded Suction:

1. Slowly open the gate valve in the suction line.
2. Remove the air vent in the top of the pump casing to release entrained air.
3. Close the air vent once liquid starts to flow out of it.

With Foot Valve In Suction Line:

1. Open air vent on pump casing.
2. The pump and suction line must be filled with the liquid being pumped. It is recommended to fill the discharge pipe several feet above the pump discharge.
3. After filling pipe and pump close air vent.
4. The pump will remain primed unless the foot valve leaks or if the liquid is contaminated & does not allow foot valve to close tight.

With an Ejector:

1. Mount ejector at the highest point in the impeller housing to ensure removal of all the air in the casing & suction pipe.
2. Operate ejector with gate valve in discharge line closed.
3. Operate until ejector discharges a full steady flow of liquid.
4. On pumps using packing it may be necessary to tighten packing gland to prevent pulling of air through shaft clearances. After pump is primed properly loosen gland to achieve a slight trickle of liquid through stuffing box.

With a Vacuum Pump:

1. Mount vacuum pump at the highest point in the impeller housing to ensure removal of all the air in the casing and suction pipe.
2. Gate valve in discharge line must be closed.
3. After pump is primed, valves between vacuum pump & Rotech pump must be closed.
4. On pumps using packing it may be necessary to tighten packing gland to prevent pulling of air through shaft clearances. After pump is primed properly loosen gland to achieve a slight trickle of liquid through stuffing box.

Storage, Assembly & Disassembly of Mechanical Seal:

Read, understand & follow the manufacture's installation, operation and maintenance instructions.

Type 1: Installation of Mechanical Seal:

1. MTR Slide the stuffing box cover over the shaft/sleeve. Bolt the cover (184) to the frame adapt-er(108). STR Slide the 6" or 8" stuffing box cover (184) with adapter ring (108) over shaft and bolt to bearing.
2. Mark / scribe the shaft at the face of the stuffing box.
3. Unbolt and remove the stuffing box cover.
4. Locate the installation reference dimension on the seal installation drawing. Normally this is the dimension from the face of the stuffing box to the rear of the seal.
5. Mark the shaft with a felt marker or marking tool at the dimension (i.e. 1/32").
6. Lubricate the shaft with silicon grease or soapy water. Slide the seal onto the shaft. Line up the face of the seal with your mark and secure with set screw.
7. Reassemble the pump.

IMPELLER CLEARANCE

! WARNING !

Lock out motor power to prevent accidental startup and physical injury.

Over time a change in pump performance may be noticed. Performance can usually be renewed by resetting the impeller clearance.

Impeller Clearance Setting

A gradual loss in head &/or capacity can occur. You may restore performance by adjusting the impeller clearance, which is the measurement between the impeller vanes and the surface of the casing.

Pumpage Temperature	STR	MTR
-20 to 150° F (-29-66° C)	0.005 (.13)	.008 (.20)
Up to 175° F (80° C)	0.005 (.13)	.008 (.20)
Up to 200° F (93° C)	0.005 (.13)	.008 (.20)
Up to 225° F (107° C)	0.006 (.16)	.099 (.23)
Up to 250° F (121° C)	0.007 (.18)	.010 (.26)
Up to 275° F (135° C)	0.008 (.21)	.011 (.28)
Up to 300° F (149° C)	0.009 (.23)	.012 (.30)
Up to 350° F (177° C)	0.011 (.28)	.014 (.36)
Up to 400° F (204° C)	0.013 (.33)	.016 (.41)

INITIAL STARTING

1. The gate valve in the discharge line should be closed & gradually opened as the motor reaches full speed (approximately 5 to 10 seconds). After the pump has been in operation & the suction & discharge lines are filled with liquid, it is not necessary to close the gate valve when starting.
2. Start motor & immediately observe pressure gauges. If discharge pressure is not quickly attained stop pump, reprime, & attempt to restart.
3. If your pump is packed, loosen packing gland screws to allow free leakage. Then tighten screws uniformly on packing gland until leakage is reduced to approximately 30 drops per minute. Never tighten packing enough to stop all leakage, a slight leakage is required to lubricate packing and prevent scoring of shaft sleeve.
4. Check pump for vibration levels, bearing temperature, & excessive noise. If normal levels are exceeded, shut down & investigate.

OPERATION

Always vary the capacity with gate valve in the discharge line. Never restrict intake flow.

If the specific gravity of liquid being pumped is greater than originally assumed or if the rated flow is exceeded, the motor may overload.

To prevent damage from cavitation or recirculation, always operate pump at or near the rated conditions.

! WARNING!

DO NOT operate pump below minimum rated flows or with suction or discharge valves closed. These conditions could create an explosive hazard due to vaporization or pumpage & can quickly lead to pump failure and physical injury.

Drain all liquid from inside pump if it will be exposed to freezing conditions while idle. The conditions could cause liquid to freeze and damage the pump. Liquid inside cooling coils, if supplied, should also be drained.

STUFFING BOX

Packed Box

Braided packing is supplied as standard equipment on all pumps. Install gland bolt nuts finger-tight only. Adjust the gland bolt nuts during start-up to achieve 40-65 drops of leakage per minute. Specific packing type is dependent on pH, temperature, etc. of the liquid being pumped.

Pump Model				
	STR	MTR	LTR	XLR
Packing Size	5/16"	3/8"	3/8"	7/16"

Clean and cool pumpage may be used to lubricate the packing. If the pumpage is not suitable, you must supply an external source of lubrication.

CAUTION

Do not allow packing to run dry. It must be lubricated. See ANSI/ASME B73.1 M-1984 for proper seal flush plans.

CARTRIDGE MECHANICAL SEAL

! WARNING!

Determine the effects that a failure of the mechanical seal might have on the environment and personnel and correct conditions to prevent personal injury.

! WARNING!

Only work on seal when the pump is locked out and the seal is depressurized.

Refer to the manufacture's installation, operating, and maintenance instructions. Failure to do so can result in environmental damage, personal injury, and seal malfunction and / or seal failure.

Start Up

Read, understand and follow the manufacture's installation, operation, and maintenance instructions.

Priming

Prior to starting a centrifugal pump, it is imperative that you prime the pump by flooding the suction piping and casing with fluid. Priming will occur when you open the suction isolation valve and the packing sealing liquid valve.

CAUTION

Do not operate the pump without liquid in the casing.

Start Up

1. Rotate the pump by hand; making sure that the rotating element is spinning freely.

2. Be sure the suction valve is open.

3. Partially close the discharge valve.

CAUTION

Do not operate the pump with the discharge valve closed for an extended period of time.

4. Unlock power to the pump driver.

5. Slowly open the discharge valve as soon as the motor reaches operating speed.

6. Check stuffing box leakage and adjust, if necessary, to achieve leakage of 40-65 drops per minute.

7. Adjust the discharge valve as needed while checking piping for leaks.

8. Check mechanical operation of the pump and motor.

! WARNING !

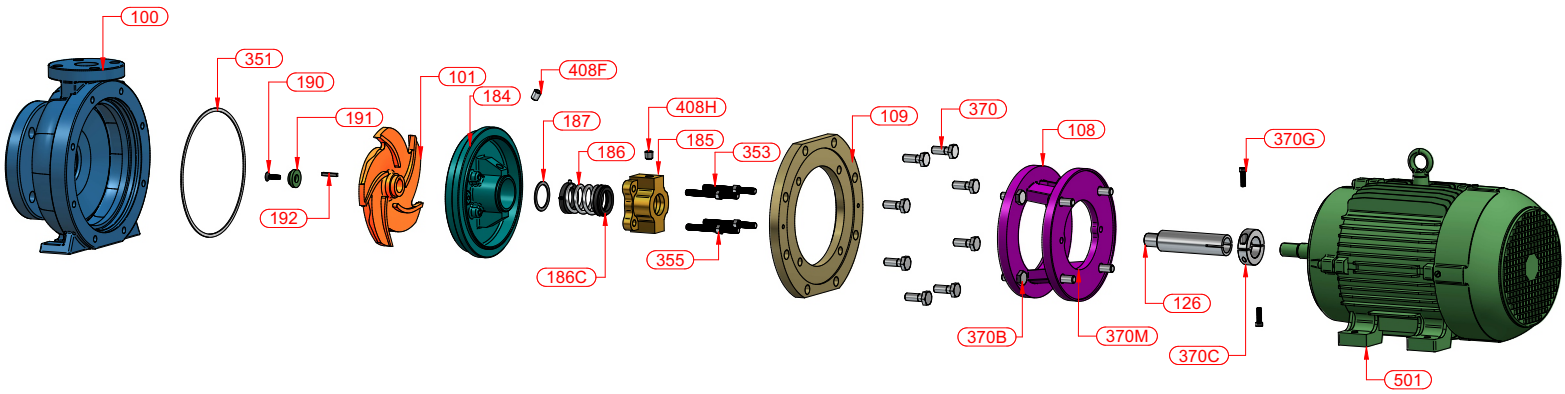
Do not operate the pump without the proper guard. See ANSI/ASME B15.1-1996.

Shut Down

1. Gradually close the discharge valve and turn off the power to the motor.

2. Lock out power to the pump driver.

Exploded View & Parts List



PART #	PART DESCRIPTION	MATERIAL OF CONSTRUCTION					
100	Casing	WCB/ Carbon Steel	SS304	SS316	CD4MCu	Alloy20	Hastelloy B&C
101	Impeller	WCB/ Carbon Steel	SS304	SS316	CD4MCu	Alloy20	Hastelloy B&C
105	Lantern Ring (Optional)	Glass-Filled TEFLON*					
106	Stuffing Box Packing (Optional)	TEFLON* Impregnated Fiber					
107	Adapter Plate (for 8'' STR Pump)	Cast Iron/Ductile iron					
108	Adapter	Cast Iron/Ductile iron					
127A	Stub Shaft (for SB)	SS316		SS316		Alloy20	Hastelloy
127B	Stub Shaft (for LB)	SS316		SS316		Alloy20	Hastelloy
184A	Stuffing Box Cover (SB)	WCB/ Carbon Steel	SS304	SS316	CD4MCu	Alloy20	Hastelloy
184B	Stuffing Box Cover (LB for STR only)	WCB/ Carbon Steel	SS304	SS316	CD4MCu	Alloy20	Hastelloy
185A	Seal Chamber/Gland (SB)	WCB/ Carbon Steel	SS316	SS316	CD4MCu	Alloy20	Hastelloy
185B	Seal Chamber/Gland (LB for STR only)	WCB/ Carbon Steel	SS316	SS316	CD4MCu	Alloy20	Hastelloy
186	Mechanical Seal	Various - depending on applications					
186C	Spring Lock Cover	Various - depending on applications					
187A	SBC Gasket (SB)	TEFLON* /Non-Asbestos					
187B	SBC Gasket (LB for STR only)	TEFLON* /Non-Asbestos					
190	CSK Screw	Steel					
191A	Conical Washer	SS316		SS316		Alloy20	Hastelloy
191B	Conical Washer	SS316		SS316		Alloy20	Hastelloy
192	Shaft Key	Steel					
250	Packing Gland (Optional)	Various					
351	Casing Gasket	Aramid Fiber with EPDM Rubber or PTFE					
353	Stud Seal Chamber to SBC	Steel					
355	Nut	Steel					
370	Cap Screw, Adapter-to-Casing	Steel					
370B	Bolt, Adapter to Casing	Steel	SS304				
370G	Socket Allen Head Screw	SS304					
370M	Bolt, Adapter to Motor	Steel/SS304					
371A	Stub Shaft Collar	SS316		SS316		Alloy20	Hastelloy
371B	Stub Shaft Collar	SS316		SS316		Alloy20	Hastelloy
408F	Plug Flush Port SBC	Steel					
408H	Plug Seal Chamber	Steel					
501	Motor	Various					
502	Motor Block	Mild Steel					
502A	Bolt, Motor to Motor Block	Steel					
502D	Washer	Steel					
502E	Nut	Steel					

Installation of Shaft Seals

SHAFT SEALS

Packed Pumps

DO NOT STOP LEAKAGE! Packed glands drawn up too tight increases power consumption, increases wear on shaft, and shortens life of packing. When leakage can no longer be controlled by drawing up on the packing gland add another ring of packing to the stuffing box. After further operation and leakage again can no longer be controlled replace the packing by using the following procedure:

1. Remove all old packing from the stuffing box. Clean box and shaft sleeve thoroughly and examine for wear. Replace shaft sleeve if wear is excessive. Check bearing by lifting shaft up and down; do not expect packing to act as a bearing.

2. Use the right cross section of packing, Rotech uses Non-Asbestos packing as our standard for general purpose applications. Packing for special applications available, consult factory.

3. When using coil or spiral packing always cut the packing into separate rings. Never wind a coil of packing into a stuffing box. Rings can either be cut with butt (square) joint or diagonal joints. (Fig. 9) The best way to cut packing is on a mandrel the same diameter as the shaft sleeve. Hold the coil packing tightly and firmly on the mandrel but do not stretch excessively. Cut the ring and try it in the stuffing box to make certain it fills the packing space properly with no gap in the joint at the O.D. of the ring. It is necessary that the rings be cut to the correct size, otherwise service life is reduced.

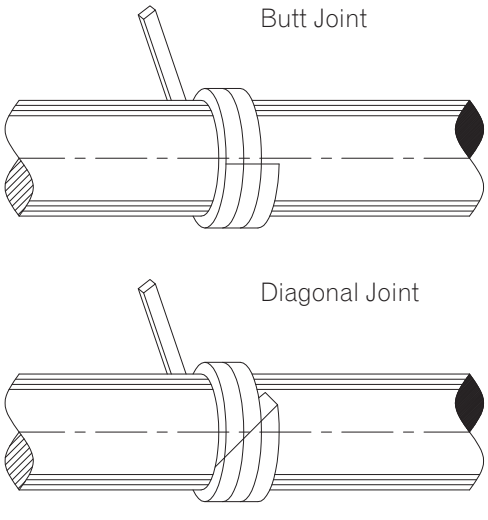


Fig. 9

4. Install one ring at a time. Make sure it is clean and has not picked up any dirt in handling. If clean oil is available, lubricate the shaft and inside of the stuffing box. Seat rings firmly. (Except for TFE filament and graphite 19 yarn packing which should be snugged up very gently. Then wrench in gradually.. .after the pump is back in opera -tion.) Joints of successive rings should be staggered and kept at least 90° apart. Each individual ring should be firmly seated with a tamping tool. When enough rings have been individually seated so the nose of the gland will reach them, individual tamping should be supplemented by the gland. Never depend entirely on the gland to seat a set of rings properly-this practice will jam the last rings installed, but leave the bottom rings loose in the box.

5. After the last ring is installed, take up bolts finger tight or very slightly snugged up. Do not jam the packing into place by excessive gland loading. Start pump, and take up bolts until leakage is decreased to a minimum. Make sure gland bolts are taken up evenly, stopping leakage entirely at this point will cause packing to burn up.

6. Allow packing to leak freely when starting up a newly packed pump. Excessive leakage during the first hour of operation will result in a better packing job over a longer period of time. Final adjustment should allow approximately 30 drops per minute to leak from the packing.

7. When specified, Rotech can provide means of lubricating the shaft and packing through a lantern ring by supplying water, oil, grease, or liquid handled in the pump.

8. If the stuffing box has a lantern ring, make sure the lantern ring, as installed, is slightly behind the fluid inlet as gland pressure is applied. (Fig 10)

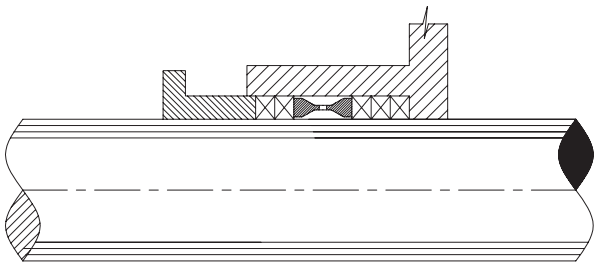


Fig. 10

9. Replace packing when leakage cannot be controlled by further take up on the gland.

Some of the most common reasons for packing failure are:

- Improper installation
- Uneven gland adjustment
- Shaft misalignment and shaft whip
- Improper selection of packing for liquid
- Improper selection for pressure and temperature
- Contaminated liquid (dirt, abrasives, etc.)
- Operation without fluid

MECHANICAL SEALS

1. Blue the shaft sleeve Scribe a mark at the face of stem plate to use as reference for installation of mechanical seal.

2. Remove the impeller, shaft sleeve, and stem plate.

3. Install stationary seat of mechanical seal into seal gland per seal manufacturer's instructions.

4. Slide seal gland with stationary seat and seal gland gasket onto shaft.

5. Install mechanical seal and locking collar onto shaft sleeve per seal manufacturer's instructions.

6. Install shaft sleeve with mechanical seal onto shaft.

7. Then mount stem plate to stem.

8. Reinstall impeller following same method previously used.

9. Mount seal gland to stem plate.

Some of the most common reasons for seal failure are:

- Improper installation
- Shaft misalignment and shaft whip
- Wrong selection for liquid pumped
- Dirt or grit between faces
- Seal gland tightened unevenly so stationary seat is not perpendicular to shaft
- Operation without fluid

! WARNING !

Pump and components are heavy. Serious physical injury or damage to equipment could occur from failure to properly lift and support pump. Steel-toed shoes must be worn at all times.

APPENDIX

APPENDIX 1

Centrifugal pump troubleshooting

The following table provides possible solutions for symptoms that you may encounter with your centrifugal pump.

! WARNING !

Before attempting to service the pump:
1. Follow the shut down procedures.
2. Lock out the power source.
3. Allow the pump to cool.
4. Close the suction and discharge valves.
5. Drain the pump.

TABLE 5: CENTRIFUGAL PUMP TROUBLESHOOTING

Symptom	Cause	Solution
Pump not delivering liquid	• Pump not primed • Suction lift too high • Wrong direction of rotation • Impeller clogged • Suction line plugged	• Re-prime pump • Install shorter suction pipe • Change motor wiring • Back-flush pump • Remove debris
Low flow and low head	• Air leak in stuffing box • Worn suction side plate • Impeller worn or damaged • Air leak in suction line • Impeller clogged • Wrong direction of rotation	• Replace or adjust packing • Replace defective part • Inspect and replace impeller, if needed • Replace gasket • Back-flush pump • Change motor wiring
Pump loses prime	• Pump not primed correctly • Air leak in suction line • Lantern ring in wrong location	• Re-prime pump • Replace gasket or pipe plug • Repack moving lantern ring to correctly align with flush hole
Motor requires excessive amperage	• Stuffing box gland is too tight • Total dynamic head is too low • Rotary part rubbing stationary part • Liquid is heavier than specified	• Readjust or replace packing • Install throttle or reduce impeller diameter • Adjust part or replace parts • Check specific gravity of liquid

MAINTENANCE AND REPAIR

! WARNING !

WEAR EYE PROTECTION
Failure to do so can result in serious personal injury.

Dis-assembly Procedures

1. Lock out power supply at the motor starter.
2. Close off discharge, suction, sealing fluid, and cooling fluid.
3. Drain casing and flush, if needed.

! WARNING !

Pump parts are heavy. Use proper lifting methods to avoid personal injury.

4. Place lifting sling through frame to ensure safe handling during disassembly / assembly.
5. Remove bolts (370) holding the frame adapter (108) to casing (100).
6. Pull the frame adapter back from casing by tightening jack bolts.
7. Take the frame assembly to bench and secure for further work.

! WARNING !

Never use heat to remove impeller. Heat combined with trapped fluid could cause an explosion, which can result in personal injury.

8. Remove the impeller (101) from the shaft (127A/127B).

FOR A PACKED PUMP:

a. Remove the packing gland nuts (353A).

b. Slide gland toward frame (228).

c. Remove seal chamber nuts (423B).

d. Slide off stuffing box cover (184).

e. Remove packing (106) and lantern ring (105).

FOR A MECHANICAL SEAL:

a. Remove seal gland nuts (353A).

b. Slide gland toward frame (228), exercising care so as to not drop stationary set from gland.

c. Remove seal chamber nuts (423B).

d. Slide off stuffing box cover (184).

e. Remove mechanical seal rotating element (383) and sleeve (128) from pump shaft.

f. Loosen set screws if present. Refer to cartridge seal manufacturer's instructions.

g. Slide off seal gland with stationary seal and o-ring gasket.

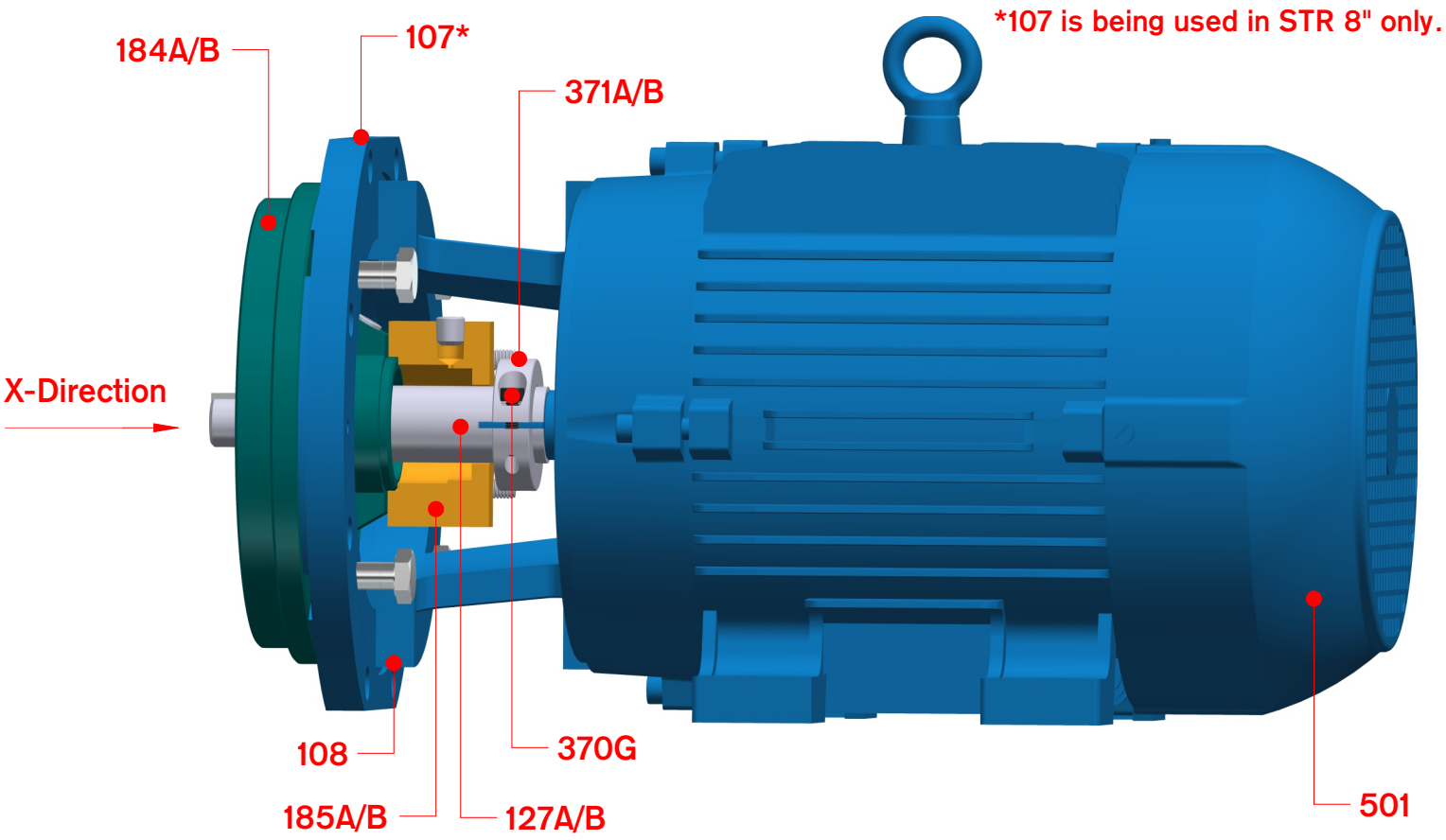
NOTE: Do not use a hammer, which may cause damage to the shaft.

18. Inspect all parts for cracks, erosion, pitting, rusting, damaged threads, corrosion, and groove worn shaft/sleeve. Replace casing if grooves and pits are greater than 1/8" deep. Replace impeller if grooves are greater than 1/16" or even wear exceeds

1/32". Inspect stub shaft if grooved or pitted. Shaft run out is cause for replacement.

ASSEMBLY PROCEDURES

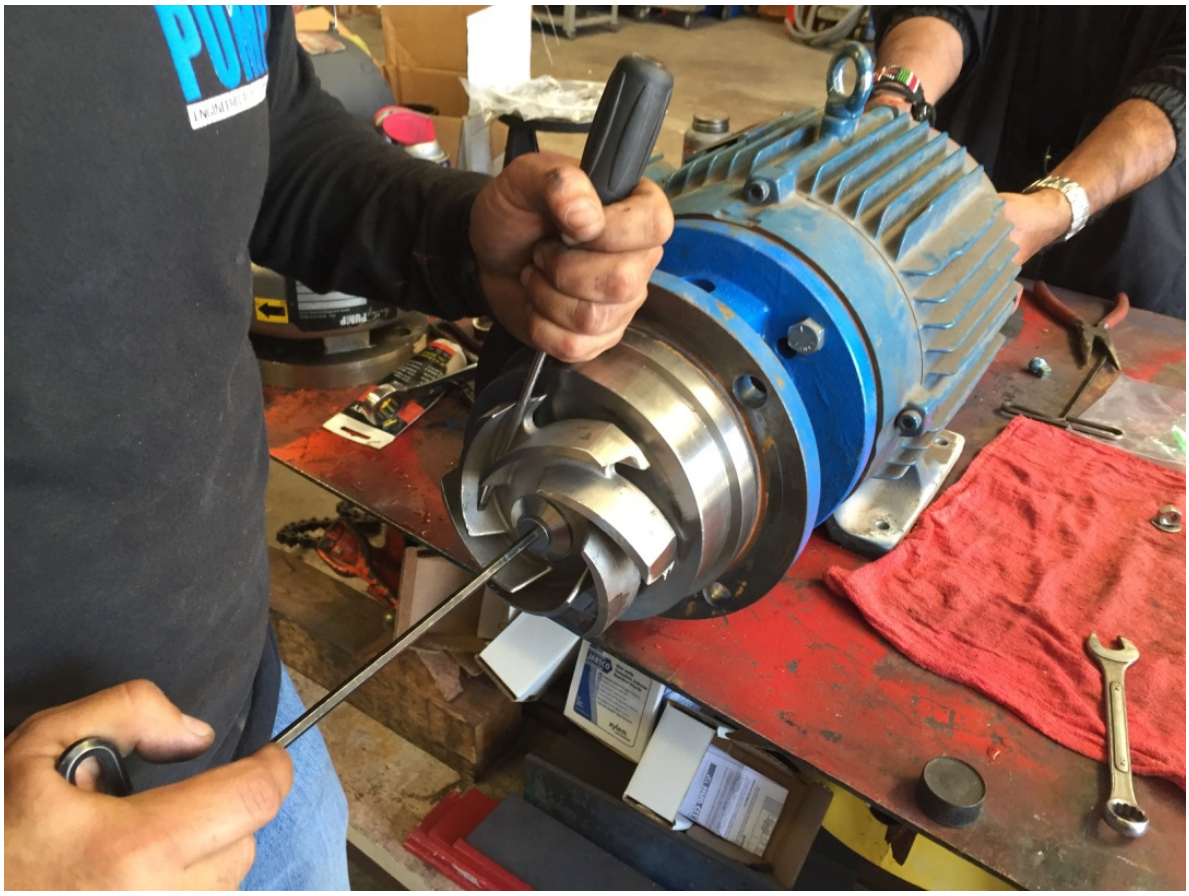
Refer to Bolt Torque Values when assembling pump.



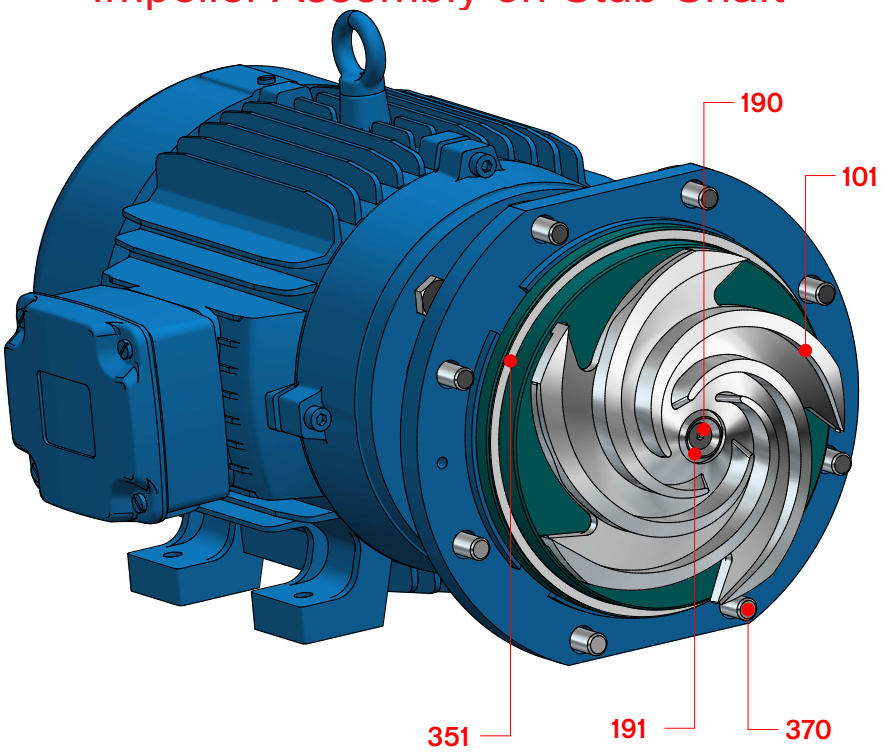
1 . Install Seal chamber (185 A /B) or mechanical seal on Stuffing Box Cover (184A/B) by following seal installation guide.
2. Install Stuffing Box Assembly on Adapter (108)
3. Align (127A/B) Shaft with the motor shaft and push sub assembly on to the motor (in x-direction)
4. Fasten Adapter - Motor bolts but do not tighten them.
5. Push Stub Shaft (127A/B) to the end stop against the motor shaft (in X-direction).
6. Install Stub Shaft Collar (371A/B) onto Stub Shaft (127 A/B) by using Allen Head Cap Screw (370G).

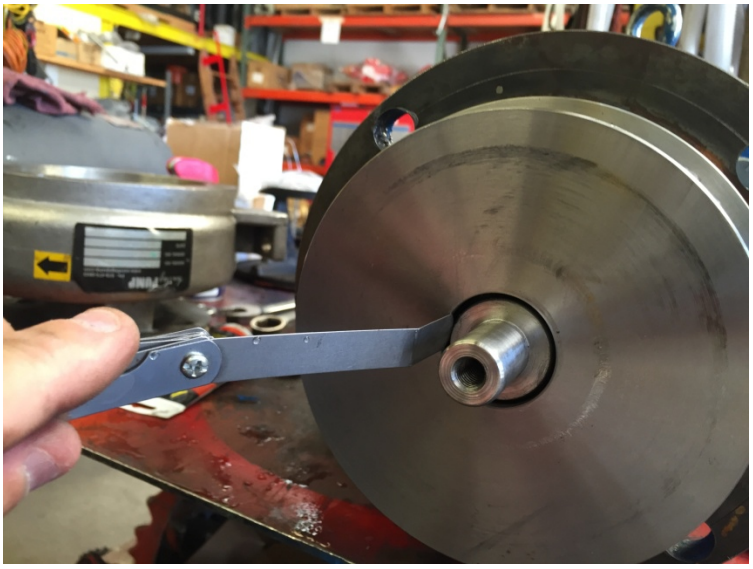
NOTE

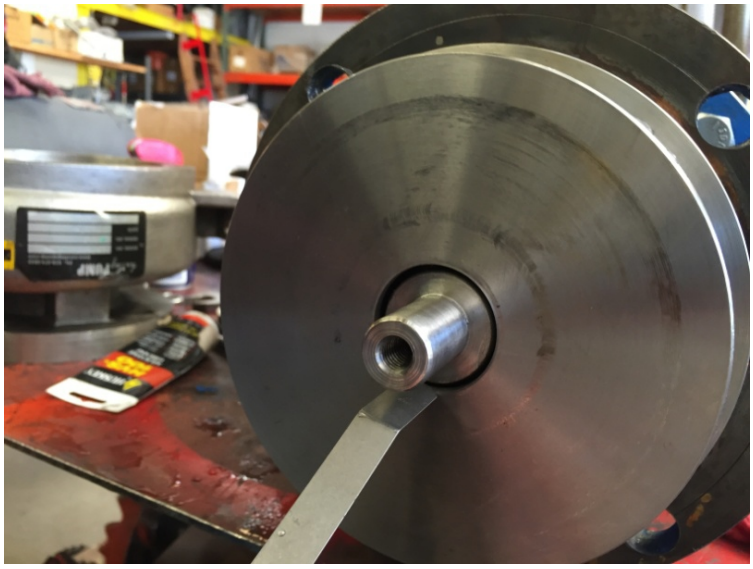
If the Stub Shaft (127A/B) falls out ask Rotech for a component by component procedure to continue to install to avoid damage to the single mechanical seal.



Impeller Assembly on Stub Shaft







Consistent Gap

Inconsistent Gap

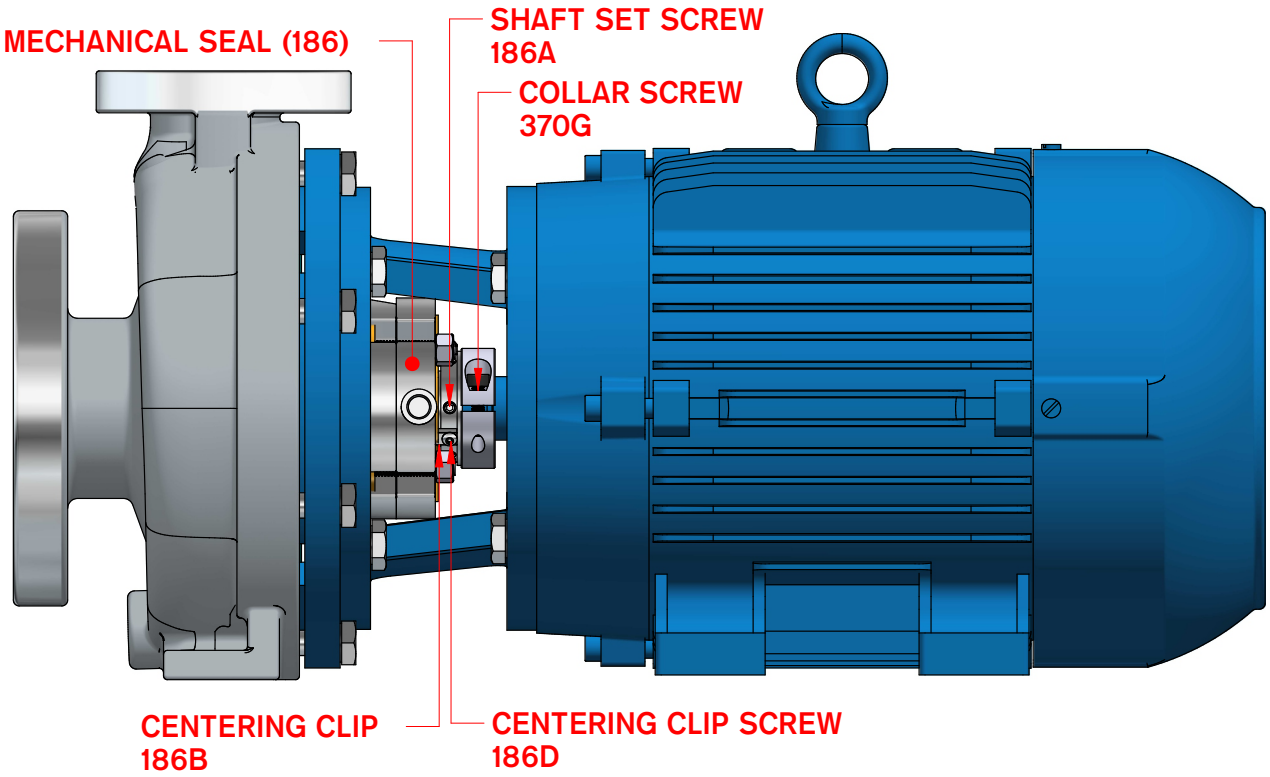
7. Align shaft to the stuffing box cover move the sub assembly up/left/right as needed to align the stuffing box cover to the shaft (consistent gap) and tighten motor bolts.
• Check with feeler gauge on all four sides until shaft to housing is in alignment.
8. Install the (192) shaft key onto the shaft (127A/B).
Install impeller (101) onto the shaft Place Conical Washer (191) on the shaft and tighten with impeller bolt (191) while keeping the impeller from turning.

9. Install the (351) Pump Casing Gasket.
10. Slide the (100) Pump Casing onto the Stuffing box cover (184).
11. Fasten the sub assembly to the (100) Pump Casing.
12. Tighten the Set Screws of the mechanical seal gradually until hand tight.
13. Remove Clip screw (186D) and Centering Clip (186B) and safe keep them.
14. The pump feet can now be mounted to the base and hooked to the suction and discharge piping.
15. Open valve and fill suction line with water.
16. Turn the pump in manual.
17. Verify the motor rotation.

18. Install Clip screw (186D) and Centering Clips (186B) Loosen the Set Screws of the mechanical seal gradually until loose.

NOTE

Centering Clip (186D) need to be installed before moving shaft back and forth to adjust impeller spacing.



Bolt Torque Values, Ft-Lbs (N-m)			
Description	Frame	Model 1296	
		Lube	Dry
Bolt, Casing to adaptor	STR 6"	30 (40)	45 (60)
	STR 8"	20 (27)	30 (40)
	MTR	30 (40)	45 (60)

*Values are in inch-lbs (N-m)