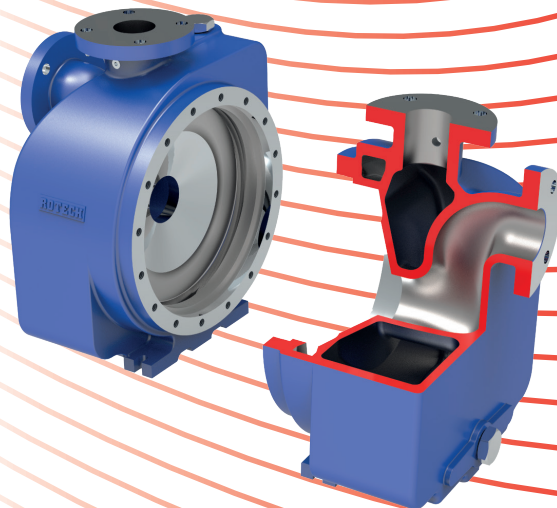
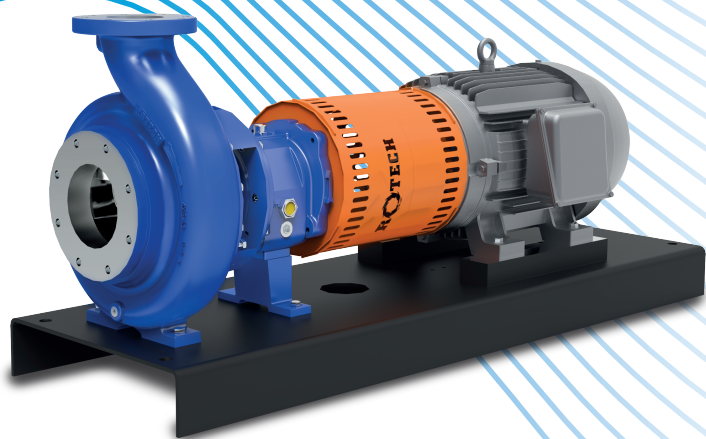
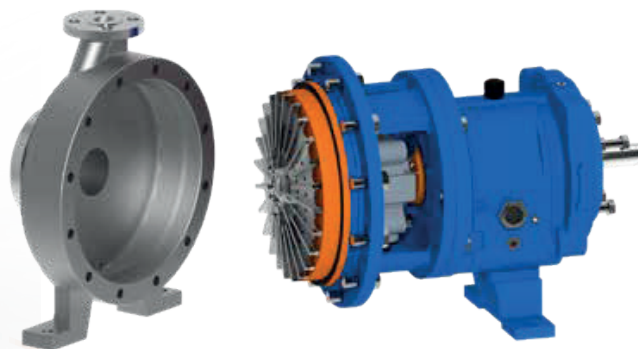
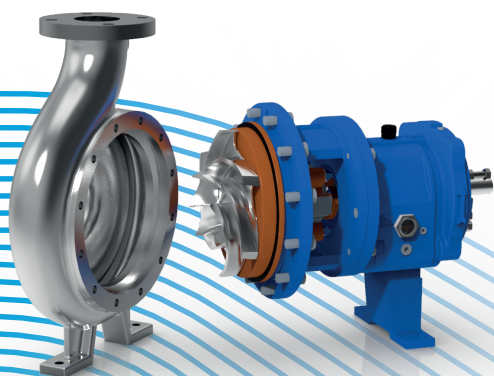


## Rotech Pumps

### ANSI 1196 Series

#### Installation, Operation, and Maintenance Manual



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# 1. Warranty and Limited Liability

Rotech provides a warranty for equipment and its component parts that are manufactured by Rotech. This warranty covers defects in materials and workmanship under normal use and service for a duration of 12 (twelve) months from the date of shipment. Please note that this warranty does not extend to accessories or components that are not produced by Rotech. However, Rotech agrees, whenever possible, to transfer to the Buyer the rights under the original manufacturer's warranty, without any involvement of Rotech.

To make a claim under this warranty, the Buyer must notify Rotech in writing of any alleged defects covered by this warranty, providing all relevant details, including the serial number, equipment type, and purchase date, within thirty (30) days of discovering such defects during the warranty period. Claims made more than 30 days after the warranty period expires will not be valid.

If Rotech requests, the Buyer must promptly return the equipment or its component parts to Rotech before any repair attempts or send them to an authorized service station designated by Rotech. In such cases, the Buyer is responsible for prepaying all shipping expenses. Rotech will not be held liable for any loss or damage to goods during transit, and no warranty claim will be considered valid unless the returned goods arrive intact and undamaged due to shipment. Repaired or replaced materials returned to the customer will be shipped F.O.B. (Free On Board) from Rotech's factory. Rotech will not provide credit for parts or equipment returned to them and will not accept the delivery of such items unless the Buyer has obtained written approval from Rotech.

Performance guarantees and warranties are contingent upon the use of original equipment manufacturer (OEM) replacement parts. Rotech Pumps & Systems assumes no responsibility or liability if any alterations, unauthorized design modifications, or non-OEM replacement parts are incorporated.

Additionally, the warranty for repaired or replaced parts of Rotech's manufacture is valid for ninety (90) days or for the remaining duration of the original warranty applicable to the equipment or parts being repaired or replaced, whichever is longer. This warranty exclusively applies to the repaired or replaced part and does not extend to the overall product or any other component of the product undergoing repair.

For repair parts manufactured by Rotech and sold after the expiration of the original warranty period, there is a one (1) year warranty from the shipment date against defects in materials and workmanship under normal use and service. Again, this warranty solely covers the replacement part and does not extend to the product itself or any component of the product being repaired.

Rotech reserves the right to substitute new equipment or improved parts for any defective equipment without incurring any further liability. Any repairs or services performed by Rotech, which are not covered by this warranty, will be charged in accordance with Rotech's prevailing standard prices.

Rotech shall not be responsible for:

- Consequential, incidental, special, or punitive damages.
- Equipment conditions resulting from normal wear and tear, abnormal use, accidents, neglect, or misuse.
- Costs and damages incurred due to repairs or alterations made by anyone other than Rotech.



- Damage caused by abrasive materials, chemicals, scale deposits, corrosion, lightning, improper voltage, mishandling, or similar conditions.
- Loss, damage, or expenses related to or resulting from the installation, removal, or reinstallation of equipment.
- Labor costs or charges incurred in repairing or replacing defective equipment parts, including the cost of reinstalling parts repaired or replaced by Rotech.
- Shipment expenses for equipment or repaired/replacement parts.
- Any other losses, damages, or expenses of any kind.

**Performance:** Equipment performance is not guaranteed or warranted unless explicitly agreed upon by Rotech in accordance with its guarantee policy. Performance curves and other information provided to the Buyer are approximate, and no warranty or guarantee shall be inferred from such information. All testing shall adhere to Rotech's standard policy.

**Limitation of Liability:** Under no circumstances shall Rotech be liable under the Order or otherwise for liquidated damages, collateral, consequential, or special damages, or for loss of profits, actual production losses, or construction progress, regardless of the cause of such damages or losses. In any event, Rotech's total aggregate liability under the Order or otherwise shall not exceed the contract price. The Buyer agrees to indemnify and hold Rotech harmless from all third-party claims in excess of these limitations.

**Compliance with Law:** Since compliance with various Federal, State, and Local laws and regulations pertaining to occupational health, safety, and pollution are influenced by the use, installation, and operation of the equipment, matters beyond Rotech's control, Rotech assumes no responsibility for compliance with these laws and regulations. This includes any indemnity, warranty, or other obligations related to such compliance.

## 2. Introduction of Pump

Rotech's 1196 1196LF 1796 SERIES ANSI chemical process centrifugal pumps are designed for pumping various types of chemicals, hydrocarbons, slurries, and other liquids. This pump features a back pull-out design that enables removal from operation without disturbing the piping.

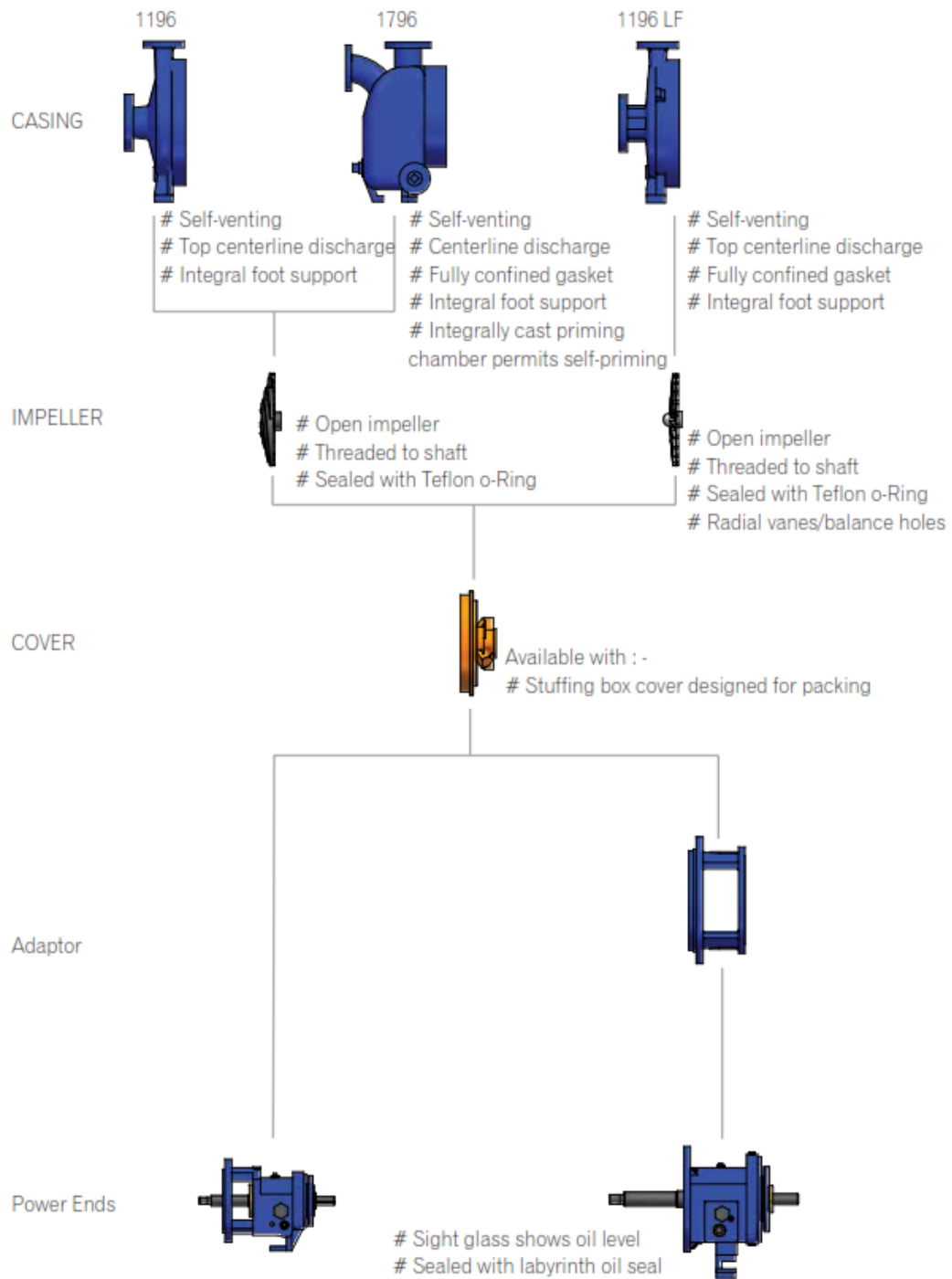
Rotech ANSI pumps are designed and manufactured for optimum performance and long, trouble-free service. Preventive maintenance is a key factor for long life and safe operation of the pump.

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 1196 SERIES ANSI  
PROCESS PUMPS.**

**ROTECH PUMPS 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.**

## 2.1 Model Relationship



### **3. Pump Safety Tools and Procedure**

#### **Always wear SAFETY APPAREL**

- Insulated work gloves when handling hot bearings or using bearing heaters.
- 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 heavy parts and tools.
- Any other equipment needed to protect against fluids.

#### **COUPLING GUARDS**

- Make sure OSHA-type coupling guard is installed before operating a pump.

#### **FLANGED CONNECTIONS**

- Do not try to adjust or match piping by applying force to make a connection with a pump.
- Use only fasteners of proper size and 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 during Maintenance**

##### **Always Lockout Power**

- Ensure pump is isolated from the system and pressure is relieved before disassembling pump, removing plugs, or disconnecting piping.
- Use proper lifting and supporting equipment to prevent serious injury.
- Observe proper decontamination procedures.
- Know and follow company safety regulations.
- Make sure drive end and driver end are not connected when pump is not meant to be in operation.

### 3.1 Precautions

<b>NEVER</b> apply heat to remove impeller. It may explode due to trapped liquid.	<b>NEVER</b> use heat to disassemble pump. Explosion could occur due to trapped liquid.
<b>NEVER</b> operate pump without coupling guard correctly installed.	<b>NEVER</b> operate pump beyond the rated conditions to which the pump was sold.
<b>NEVER</b> start pump without proper prime (sufficient liquid in pump casing).	<b>NEVER</b> operate pump below recommended minimum flow or when dry.
<b>ALWAYS</b> lock out power to the motor before performing pump maintenance.	<b>NEVER</b> operate pump without safety devices installed.
<b>NEVER</b> operate pump with discharge valve closed.	<b>NEVER</b> operate pump with suction valve closed.
<b>DO NOT</b> change conditions of service without approval of an authorized Rotech representative.	

Table 1: Pump Operation Safety Precautions

#### ! WARNING !

Rotech is not responsible for personal injury that may result if procedures outlined in this manual are not followed.

## 4. Receipt and Storage

### 4.1 Receiving the Pump

#### WARNING

Pump and assemblies are heavy; improper handling could result in serious injury.

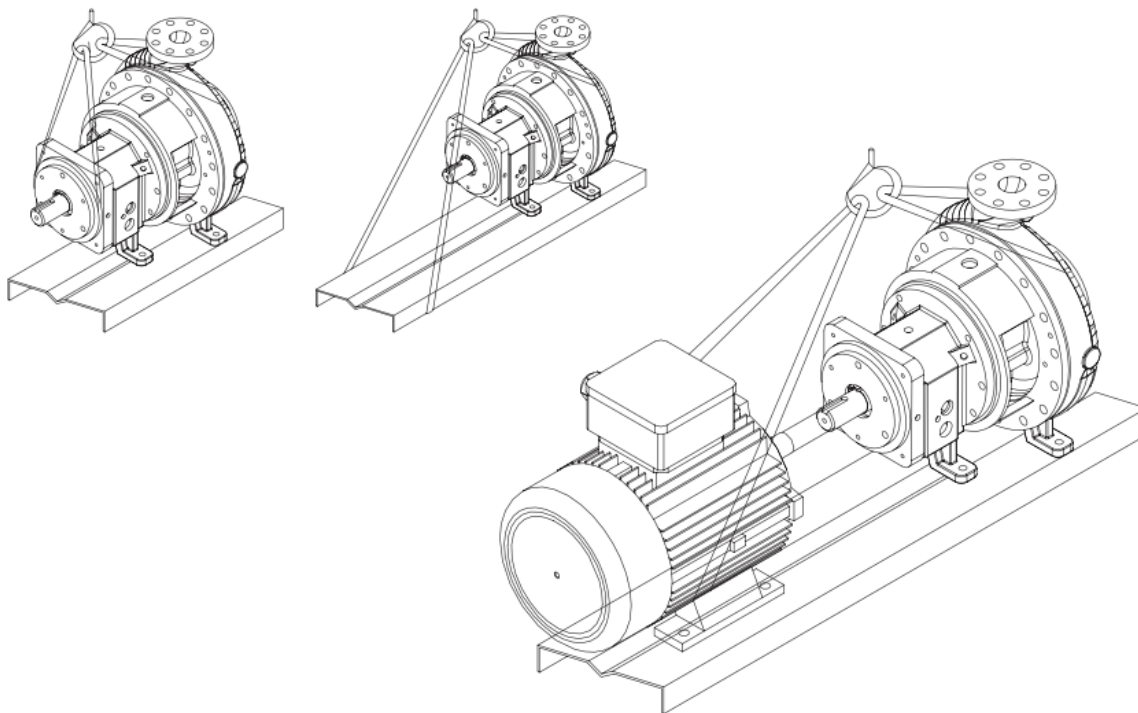


Figure 1: Please follow proper handling procedure

Immediately upon arrival, carefully inspect the pump for any evidence of damage during transit. Immediately report any damage to your Rotech Pumps & Systems Inc. representative.

## 4.2 Storing the Pump

Store the pump in a clean, dry location. **Do not remove piping connection covers.** Rotate the pump shaft by hand at least **once per week** to maintain a protective film of oil or grease on the bearings. If long-term storage is anticipated, special storage preparation and treatment procedures are available from Rotech Pumps & Systems Inc.

## 5. Installation

The pump should be installed in a clean, well-ventilated, and properly drained location that allows adequate room for maintenance and inspection.

Reliable and trouble-free operation of the pump begins with proper installation, with particular attention paid to the baseplate and piping connections. A secure baseplate enables accurate alignment to be achieved and maintained. Misaligned or improperly supported piping will impose flange loads, making alignment difficult and potentially causing premature failures.

### 5.1 Baseplates and Anchors

The recommended mounting for a baseplate is on a concrete pad with proper grouting. Despite the robust design of the baseplate, there is always some degree of flexibility. Insufficient support under the baseplate can lead to distortion, causing misalignment and

increased vibration levels, which may be amplified through resonances in the pump base or piping system. A properly grouted baseplate will resist distortion and provide sufficient mass to dampen vibrations.

#### Note

*When pumps and motors are assembled on a baseplate at the factory, a preliminary alignment is performed to ensure that the pump and motor are aligned at the time of installation.*

*This preliminary alignment is not to be considered final. Factory alignment may shift during shipment and installation. Several alignments will typically be necessary during final commissioning, as will be discussed in subsequent sections.*

Anchor (foundation) bolts are used to secure the baseplate to the foundation or support structure. For concrete pad installations, the anchor bolts should be embedded as illustrated in the figure below. It is recommended to use a wooden template during concrete pouring to correctly position the anchor bolts according to the pump unit assembly drawings.

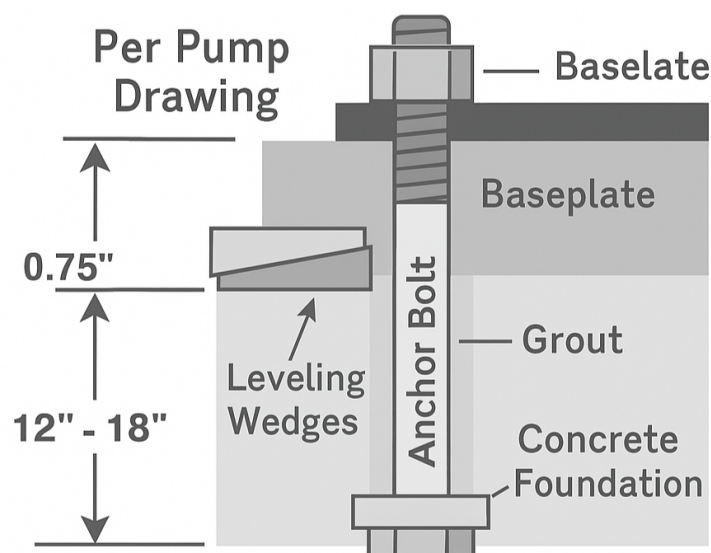


Figure 2: Typical Anchor Bolt Arrangement (Sleeve Type)

- Anchor bolts are typically sized 2 sizes smaller than the hole size in the baseplate. Refer to assembly drawings for specific sizing.
- The inside diameter (ID) of the sleeve should be two bolt sizes larger than the anchor bolt diameter.
- Allow approximately 0.75" to 1.5" space between the bottom of the baseplate and the foundation grout surface.
- A "sleeve" type anchor bolt is shown. Alternative styles like hook or J-type anchor bolts may also be used.

- Pack the sleeve between the anchor bolt and concrete form with mortar to prevent grout intrusion during foundation pouring.

## 5.2 Coupling Alignment Procedure

For trouble-free operation of the pump, proper alignment must be ensured. Proper alignment is the responsibility of the installer and user of the pump. While a preliminary alignment is performed at the factory, it is necessary for the installer to realign the pump at the installation site.

### ! WARNING !

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

## Alignment Checks

### Initial Alignment (Cold Alignment)

- Before grouting the baseplate to confirm that alignment can be achieved.
- After grouting the baseplate to verify no shifting has occurred.
- After connecting piping to ensure that no misalignment has been introduced by pipe strain. If misalignment is detected, re-align to remove pipe strain.

### Final Alignment (Hot Alignment)

- After initial run, verify and correct alignment when the pump is at operating temperature.

## Alignment Criteria

Good alignment is achieved when the total indicator reading (TIR) is **0.010” or less** at operating temperature. However, during installation, cold setting values must be used to compensate for thermal growth differences between the pump and the motor. Recommended cold settings for electric motor-driven pumps are shown in Table 2.

Pumpage Temperature	Set Driver Shaft
50°F (10°C)	0.002 in. Low
150°F (65°C)	0.001 in. High
250°F (120°C)	0.005 in. High
350°F (175°C)	0.009 in. High
450°F (218°C)	0.013 in. High
550°F (228°C)	0.017 in. High
650°F (343°C)	0.021 in. High

Table 2: Recommended Cold Setting of Parallel Vertical Alignment



## Angular Alignment

Angular alignment must be checked with a micrometer or caliper. Measurements should be taken from the outside of one flange to the outside of the other flange at multiple positions around the periphery of the coupling **without rotating** the coupling. The difference between the maximum and minimum readings must not exceed **0.010"** for XLR pumps and **0.0050"** for STR/MTR/LTR configurations.

## Parallel Alignment

Parallel alignment is checked by placing a straightedge across the two coupling flanges and measuring the offset at various points around the circumference. Again, **DO NOT rotate** the coupling. The offset must not exceed **0.010"**.

If correction is made to either angular or parallel alignment, the other must be rechecked to confirm proper final alignment.

## Leveling Procedure for Baseplate Installation

1. Ensure the pump pads are set to zero level in both directions.
2. Turn down the center jack screws until they rest on their metal plates.
3. Place two levels on the pump pads — one longitudinally and one transversely across the pads.
4. Adjust the jack screws to level the pump pads in both directions.
5. Install anchor bolts and tighten to a snug fit (hand tight).
6. Recheck the level on the motor pads.
7. Continue adjusting jack screws and anchor bolts until all measurements are within **0.002 in/ft.**

## 5.3 Piping

Guidelines for piping should follow the standards set by the *Hydraulic Institute Standards* and must be reviewed prior to installing the pump.

### **! WARNING !**

Never force piping into position by pulling it in place with the pump suction and discharge flange bolts. This can cause misalignment between the pump and driver, potentially resulting in physical injury and damage to equipment.

1. All piping must be supported independently of the pump.
2. Ensure the grout has hardened and the foundation bolts are tightened before connecting piping to the pump.
3. When handling liquids at high temperatures, install expansion loops or joints in the suction and/or discharge lines to accommodate thermal expansion without pulling the pump out of alignment.

4. For pumps handling corrosive liquids, arrange piping to allow for flushing prior to disassembly.
5. Clean all pipe parts prior to installation.

*It is recommended that a pressure gauge be installed at both the suction and discharge connections to monitor pump performance.*

## Bearing Frame and Flushing

Bearing cooling is required for applications with pumpage temperature above 350 F or if bearings operate above approx . 180 F . Bearing cooling is accomplished with a finned-tube cooler,

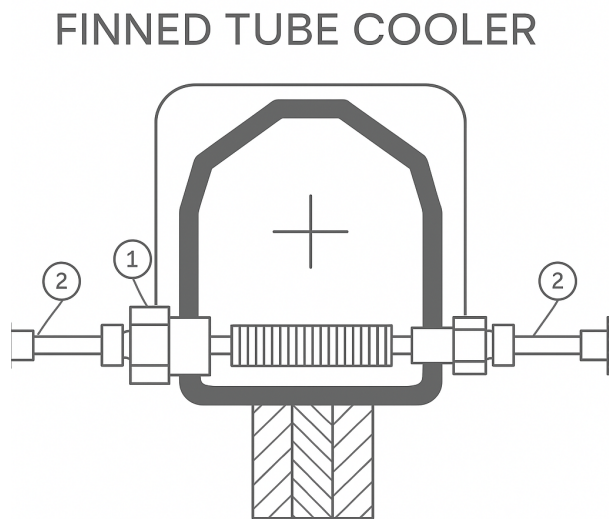


Figure 3: Item 1 and 2 Show Compression 1/2" NPT fittings

Flushing is typically related to shaft sealing and varies by application. Mechanical seals are flushed to prevent localized heating at the seal faces, using either a bypass line from the pump discharge or suction, or an external clean liquid source if the pumpage contains solids or contaminants.

For packed pumps requiring flushing, clean water is injected into the lantern ring via the stuffing box cover to protect the packing and sleeve from solids. It's recommended to install a pressure gauge, needle valve, and flow indicator on the flush line to monitor flow.

In suction lift applications, where stuffing box pressure may be below atmospheric, pressurized water must be supplied to the lantern ring to maintain a water seal. For clean liquids, a bypass from the discharge may suffice; for solids, external water injection is needed.

Before startup, ensure all cooling and flushing lines are properly installed and operational.

## 6. Suction Piping

Properly installed suction piping is critical for reliable pump operation. Always flush the suction piping before connecting it to the pump.

1. Always use a straight run of pipe, 4 to 6 pipe diameters in length, between the elbow and the pump suction.
2. Use suction pipe one or two sizes larger than the pump suction nozzle with an eccentric reducer, sloping side down at the suction flange.
3. Suction piping should never be smaller than the pump suction.
4. Never throttle the pump on the suction side; always control flow on the discharge side.
5. When using a strainer, position it as close to the pump as possible and select a strainer with a net free area at least four times that of the suction pipe.
6. The suction pipe should terminate at least three feet below the liquid level in the supply tank to avoid vortex formation and air entrainment.
7. If a foot valve is used, bolt it to the suction pipe to lower inlet velocities.

### **! WARNING !**

NPSHA must always exceed NPSHR as indicated on performance curves. Consult the Hydraulic Institute Standards for NPSH and pipe friction calculations.

## Suction Head/Suction Conditions

1. Install an isolation valve at least four pipe diameters upstream of the suction flange.
2. Ensure piping is free from air pockets.
3. Piping must be level or slope gradually downward to the suction flange.
4. No piping should extend below the suction flange.
5. Slope the entrance piping from the supply side one or two sizes larger than the pump nozzle.
6. Prevent air entrainment; ensure submerged piping is adequately below the liquid surface.
7. For systems with multiple pumps, ensure even liquid distribution.

## **Suction Lift Conditions**

1. Ensure that the suction is as close to the suction as possible to avoid priming issues.
2. Ensure the suction piping is free of air pockets.
3. Pipes must slope upwards to the pump.
4. All pipe connections must be tight.
5. Use a foot valve if suction lift is greater than 12 feet.
6. Prime the pump before starting.

## **Discharge Piping**

1. A gate valve and check valve must be installed in the discharge piping, with the check valve placed between the gate valve and the pump.
2. Discharge piping increases should be installed between the pump and the check valve.
3. Install cushioning devices such as surge suppressors if quick closing valves are used.
4. Discharge piping should be larger than the pump discharge nozzle. If using an expansion joint, place it between the pump and the check valve.

## **Final Piping**

After all piping connections have been completed:

1. Rotate the pump shaft by hand to ensure no binding and confirm all parts are free.
2. Recheck the alignment to detect any pipe strain. If pipe strain is detected, correct it before startup.

## 7. Operation

### 7.1 Preparation for Start-Up

#### Check Rotation

1. Verify the motor rotation as per the motor manufacturer's specifications and applicable local regulations.
2. Lock out power to the driver.
3. Disconnect the motor/pump shaft coupling to prevent dry operation of the pump and ensure correct rotation.
4. Make sure the motor is clear of obstructions. Jog the motor starter — the pump must rotate clockwise when viewed from the driving end of the motor. Directional arrows are provided on the impeller housings. Damage to the pump may occur if the rotation is incorrect.
5. Ensure the suction line is fully open.
6. Lock out power to the motor to prevent accidental rotation and physical injury.
7. Install and lubricate the coupling as per the manufacturer's instructions.
8. Install the coupling guard (see Appendix 3: Coupling Guard Installation Instructions).

#### **! WARNING !**

Pump damage can occur if driven in the reverse direction. Swapping leads in a 3-phase motor can reverse rotation.

#### Check Impeller Clearance

Before start-up, the impeller clearance must be verified. Proper impeller clearance ensures optimal pump efficiency: Please review the impeller clearance in the earlier section to refer where the impeller clearance needs to be set. Failure to maintain correct impeller clearance will result in reduced performance and potential damage. Refer to the maintenance section for detailed adjustment procedures.

#### **! WARNING !**

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

#### **! WARNING !**

Pumps are not filled with oil or grease from the factory. This must be done before operation; failure to do so will cause premature failure.

## 7.2 Stuffing Box Cover

### Packing

Braided packing is optional on all pumps. Install gland bolt nuts finger-tight only. Adjust the gland bolt nuts during start-up to achieve a leakage rate of 40–65 drops per minute. Specific packing type selection depends on the pH, temperature, and properties of the liquid being pumped.

	Pump Model				
	STR	MTR	LTR	XLR	XLR-17
Lantern Ring Width	7/16"	5/8"	5/8"	5/8"	5/8"
Packing Size	5/16"	3/8"	3/8"	7/16"	7/16"
Number of Rings	5				

Table 3: Packing Details

Clean, cool pumped liquid may be used to lubricate the packing. If the pumped liquid is not suitable, an external source of lubrication must be supplied.

#### NOTICE

Packing must be lubricated. Refer to ANSI/ASME B73.1 M-2016.

### Cartridge Mechanical Seal

#### WARNING

Failure of the mechanical seal could result in serious injury and environmental damage.

#### DANGER

Lock out driver power and ensure the seal is depressurized before beginning any work.

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

### Type 1 Mechanical Seal

#### 7.2.1 Installing Type 1 Mechanical Seal

1. For **MTR**, **LTR**, **XLR** models: Slide the stuffing box cover over the shaft or sleeve and bolt the cover to the frame adapter.
2. For **STR** models: Slide the 6" or 8" stuffing box cover with the adapter ring (108) over the shaft and bolt to the bearing housing.
3. Mark or scribe the shaft at the face of the stuffing box.

4. Unbolt and remove the stuffing box cover.
5. Locate the installation reference dimension on the seal installation drawing (this is usually the distance from the stuffing box face to the rear of the seal).
6. Mark the shaft with a felt marker or scribe at this dimension (tolerance  $\pm 1/32''$ ).
7. Lubricate the shaft with silicon grease or soapy water, slide the seal onto the shaft, align the seal face to the mark, and secure with the set screw.
8. Reassemble the pump.

### **7.3 Priming of Pump**

Centrifugal pumps must be properly primed to operate correctly. **DO NOT** attempt to start the pump without fully priming.

#### **With Flooded Suction**

1. Slowly open the gate valve in the suction line.
2. Remove air from the pump by opening the air vent.
3. Close the air vent once water starts to flow steadily.

#### **With Foot Valve in Suction Line**

1. Open the air vent on the pump casing.
2. Fill the pump and suction line with liquid by elevating the discharge pipe above the pump discharge.
3. Close the air vent once the pump and suction line are filled.
4. The pump will stay primed unless leaks occur or the liquid is contaminated.

#### **With an Ejector**

1. Mount the ejector at the highest point in the suction line to remove air.
2. Operate the ejector with the gate valve in the discharge closed.
3. Operate the ejector until there is a full, steady flow of liquid.
4. For packed pumps, tighten the packing gland properly to avoid shaft clearances and air suction through the stuffing box.

#### **With a Vacuum Pump (Suction Lift)**

1. Mount a vacuum pump at the highest point to remove all air.
2. Keep the gate valve in the discharge closed during priming.
3. Once primed, switch over from vacuum pump to normal pump operation.
4. Adjust packing if necessary to prevent air leakage through the stuffing box.

## 8. Lubrication

### CAUTION

Oil lubricated pumps are shipped with **NO oil** in the bearing frame.

### NOTICE

Grease lubricated pumps are intended to use grease only. Do not add oil to the bearing housing.

Ball bearings are sensitive to both over-lubrication and under-lubrication, either of which can negatively affect bearing performance. Use a thermometer to monitor bearing temperature. Overheating will shorten bearing life.

The relationship between bearing temperature and pumped liquid temperature is an important indicator of performance. Table 4 shows this relationship.

Pumping Liquid Temperature	60°F	200°F	300°F
Approximate Normal Line Bearing Temperature	115°F	140°F	160°F

Table 4: Liquid to Bearing Temperatures

The values above are based on a room temperature of 70°F. The maximum recommended bearing operating temperature is 175°F. When pumping liquids over 250°F, it is necessary to flush through the stuffing box gland or seal cage.

### 8.1 Oil Lubrication

Use high-quality turbine oil with rust and oxidation inhibitors. Oil viscosity depends on service temperatures (see Table 5).

Bearing Temperature	ISO Grade	Viscosity at 100°F (SSU)
Up to 100°F	46	215
100°F to 350°F	68	300
Above 350°F	100	470

Table 5: Oil Viscosities per Temperature

### 8.2 Adding Oil

Fill the bearing frame with oil until the center of the sight glass is reached.

- Chevron – GTS Oil 68
- Exxon – TERRESTIC 68 or NUTO H68
- Mobil – DTE Heavy-Medium
- Philips – Mangus 315



- Shell – Tellus Oil 68
- Sunoco – Sunvis 968
- Amoco – Amoco Industrial #68
- Royal Purple – SYNFILM ISO VG68

### 8.3 Grease Lubrication

Regrease grease-lubricated bearings every three months using NLGI No. 2 consistency grease rated for temperatures -60°F to 350°F.

Acceptable Greases	Product
Citgo	Mystic EP2
Keystone	81EP2
Mobil	Mobil Grease XHP222
Mobil Synthetic	SCH 100

Table 6: Acceptable Bearing Greases

#### Regrease Bearings

1. Wipe fittings clean.
2. Remove grease relief plugs.
3. Fill grease until it purges from relief plugs.
4. Reinstall grease relief plugs.

## 9. Starting the Pump

### WARNING

*DO NOT operate the pump below minimum rated flow or with the suction and/or discharge valve closed. These conditions may cause vaporization of the pumped liquid, leading to an explosive hazard and serious pump damage or personal injury.*

1. Re-check the motor to ensure all connections are correct. Verify that thermal overload relays are properly sized and set.
2. Confirm that the coupling guard and all safety-related devices and instrumentation are properly installed and functional.
3. Verify that the suction isolation valve is completely open. **Never** use the suction valve to control flow — doing so will "starve" the pump, causing cavitation, vibration, and pump damage.

4. For liquids above 200°F (93°C), gradually warm the pump until its temperature is within 100°F (38°C) of the intended operating temperature. Heating rate should not exceed 2.5°F (1.4°C) per minute.
5. Confirm that all flushing and cooling lines are attached, operational, and ready.
6. Crack open the discharge valve slightly to allow initial system filling.
7. Start the pump. As the driver reaches full speed, gradually open the discharge valve to allow the system to fill and stabilize at the required operating capacity and head.
8. Listen for unusual noise, vibration, or indications of binding. If any are present, immediately stop the pump, investigate the cause, and correct it before restarting.
9. Check the shaft seal:
  - If equipped with a mechanical seal, there should be no visible leakage.
  - If equipped with packing, a steady leakage stream should be visible. Adjust packing **gradually**, tightening the gland nuts  $\frac{1}{4}$  turn at a time until 40–60 drops per minute are achieved. This adjustment may require several hours.

**Final Alignment Check:** Once the pump and motor have reached operating temperature and stabilized:

1. Stop the pump.
2. Lock out and secure the power source.
3. Remove the coupling guard and coupling.
4. Recheck alignment following procedures outlined in the *Installation and Alignment* section.
5. Make necessary alignment corrections.
6. Reinstall coupling and coupling guard.

## 10. Disassembly and Reassembly Warnings

Prior to working on the pump, follow these safety precautions:

Warnings and Precautions	
Lock out power supply.	Close suction and discharge valves.
<b>Pump components are heavy.</b> Use proper lifting techniques.	<b>Wear steel-toe shoes, safety glasses, gloves, and protective clothing.</b>
If pump contains toxic fluids, wear PPE.	Dispose hazardous materials per regulations.
Do not apply heat to remove parts.	Allow system to cool before handling.

## 10.1 Removing Pump from Service

1. Lock out power.
2. Close suction and discharge valves.
3. Drain casing and flush if required. If hazardous, wear appropriate PPE.
4. Remove coupling guard and spacer.
5. If oil-lubricated, drain oil.
6. Disconnect cooling/flush lines.
7. Remove frame foot bolts.
8. Remove entire back pull-out assembly from casing using jacking bolts.
9. Inspect internal components.
10. Transport pull-out assembly to workbench.

### 10.1.1 Impeller Removal

1. Secure pump assembly to bench.
2. Mark shaft at coupling hub.
3. Remove impeller using impeller wrench. **Do not apply heat.** Use spanner for larger frames.
4. Turn impeller clockwise to loosen. Impact counterclockwise to remove.
5. Discard O-ring and wear gloves.

### 10.1.2 Removing Stuffing Box Cover

Component Seal	Cartridge Seal	Packed Box
Remove seal gland nuts and slide gland away from isolator.	Remove positioning clips and loosen set screws.	Remove packing gland nuts.
Remove seal chamber nuts.	Remove seal gland nuts.	Remove stuffing box cover nuts.
Remove seal chamber from shaft.	Slide cartridge seal back toward isolator.	Slide stuffing box cover off shaft.
Remove rotary and stationary seal parts.	Remove seal chamber nuts.	Remove packing rings and lantern ring.
	Remove seal chamber and cartridge seal.	

Table 7: Stuffing Box Cover Removal – Seal Type Procedures

### 10.1.3 Removal of Frame Adapter

1. Remove dowel pins and bolts securing frame to adapter.
2. Separate frame from adapter and discard gasket.
3. Leave labyrinth or isolator seal in place unless damaged.

### 10.1.4 Power End Disassembly

1. Remove cap screws and loosen jam nuts.
2. Tighten jack bolts to move housing out of frame.
3. Slide shaft and bearing housing assembly out.
4. Remove jackscrews and nuts.
5. Discard bearing housing O-ring.
6. Remove bearing retaining ring.
7. Tap shaft through housing with mallet; do not remove oil seal.
8. Remove bearing locknut and washer.
9. Use arbor press to remove inboard and outboard bearings.
10. Complete frame disassembly as needed; remove oil plugs, sight glass, and seals.

### 10.1.5 Parts Inspection

**Inspect all components before reassembly. Replace worn parts. Tolerances must meet manufacturer specifications.**

- **Bearing Frame & Foot:** Check for cracks, rust, pitting, or erosion.
- **Frame:** Clean threads, lubrication passages, and inboard bore.
- **Shaft & Sleeve:** Check for grooves, wear, and runout; replace if tolerance exceeds 0.002".
- **Casing:** Inspect for wear or corrosion. Replace if wear exceeds 1/8" deep.
- **Impeller:** Check vanes for corrosion, erosion, or wear  $\geq 1/8$ ".
- **Frame Adapter:** Inspect for cracks or damage.
- **Bearing Housing:** Look for pits, cracks, or wear.
- **Stuffing Box Cover:** Check face and bore for scoring or wear  $\geq 1/8$ ".
- **Shaft:** Check for straightness and corrosion. Max TIR 0.002".

## 11. Pump Assembly

1. Clean frame and chase threads.
2. Install oil fill plug, sight glass, and lubrication plugs.
3. Attach frame foot with bolts.
4. Install oil ring and bearing cover where applicable.
5. Install outboard bearing.
6. *If grease-lubricated:* Install bearing shield away from impeller end.
7. Heat bearing with induction heater. Wear gloves.
8. Install bearing lock washer and locknut. Tighten nut; bend lock tang into place.
9. Lubricate and install bearing housing.
10. Insert new O-ring.
11. Lubricate bearing housing and install into frame.
12. Tighten bolts and jam nuts evenly.
13. Attach frame to adapter, align dowel pins and gasket. Tighten in crisscross pattern.
14. *Note:* Some steps do not apply to 6" STR models.
15. Install labyrinth seal in adapter. Face down oil drain slots.
16. Apply anti-seize to shaft and install sleeve if required.
17. Align anti-rotation pin with notch.
18. Install stuffing box cover.
19. Install impeller with new O-ring.
20. Tighten impeller using wrench or strap wrench.
21. **Packed pumps:**
  - Insert packing rings.
  - Insert lantern ring, align with flush connection.
  - Install gland halves and hand-tighten nuts.
22. **Mechanical seal pumps:** Follow seal manufacturer instructions.
23. Install casing gasket.
24. Reinsert into casing or store for later use.
25. Slide assembly into casing.

26. Install casing bolts and tighten.
27. Rotate shaft to ensure no rubbing.
28. Adjust impeller clearance.
29. Align drive coupling.
30. Check rotation if motor was replaced.
31. Reinstall coupling guard.

## 12. Maintenance

### 12.1 Recommended Spare Parts

Table 8: *Spare Parts – Recommended Items*

– Shaft Kit	– Outboard Bearing	– Impeller O-Ring	– Inboard Labyrinth Seal
– Maintenance Kit	– Inboard Bearing	– Bearing Housing O-Ring	– Bearing Locknut
– Impeller	– Casing Gasket		
– Shaft	– Frame-to-Adapter Gasket	– Outboard Labyrinth Seal	– Bearing Housing Retaining Ring
– Shaft Sleeve			

### 12.2 Bearings

#### 12.2.1 Routine Inspection (Daily)

Check the oil level daily. Add or remove oil if the level is not at the center of the sight glass. Replace oil if contaminated.

### 12.3 Changing Oil

Change oil every three months or every 2000 hours, whichever comes first. Change oil more frequently if the pump operates in a harsh environment. See installation section to see acceptable oils.

## Bearing Frame Oil Capacity

Frame	Pints
S	1.0
M	2.6
L	3.0
XL	7.4

Table 9: Bearing Frame Oil Capacity by Frame Size

### NOTICE

Underfilling or overfilling the bearing frame can cause damage.

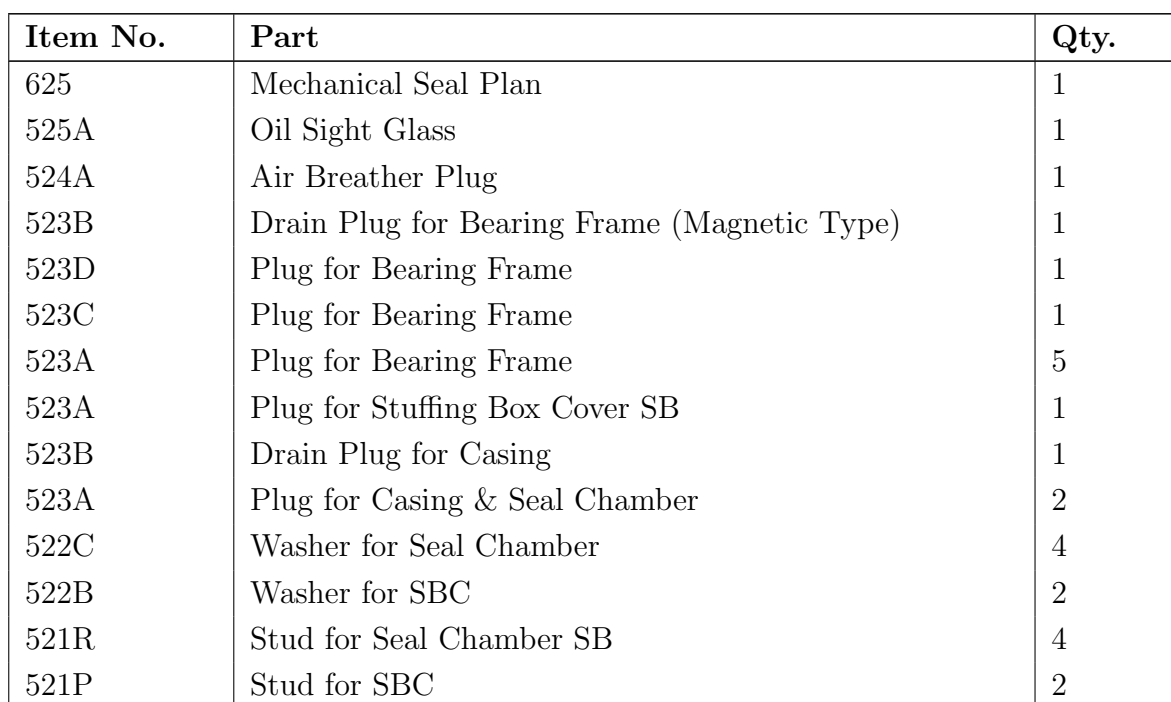
## 13. Troubleshooting

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 align with flush hole.
Bearings are running hot	Misalignment. Low or insufficient lubricant.	Realign drive coupling. Check oil level and/or grease.
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.
Stuffing box is leaking excessively	Stuffing box is incorrectly packed. Shaft sleeve is scored or worn. Wrong type of packing. Shaft is bent. Worn mechanical seal parts.	Repack stuffing box. Replace shaft sleeve as required. Install correct packing. Replace shaft. Rebuild seal; replace parts.

Table 10: Centrifugal Pump Troubleshooting



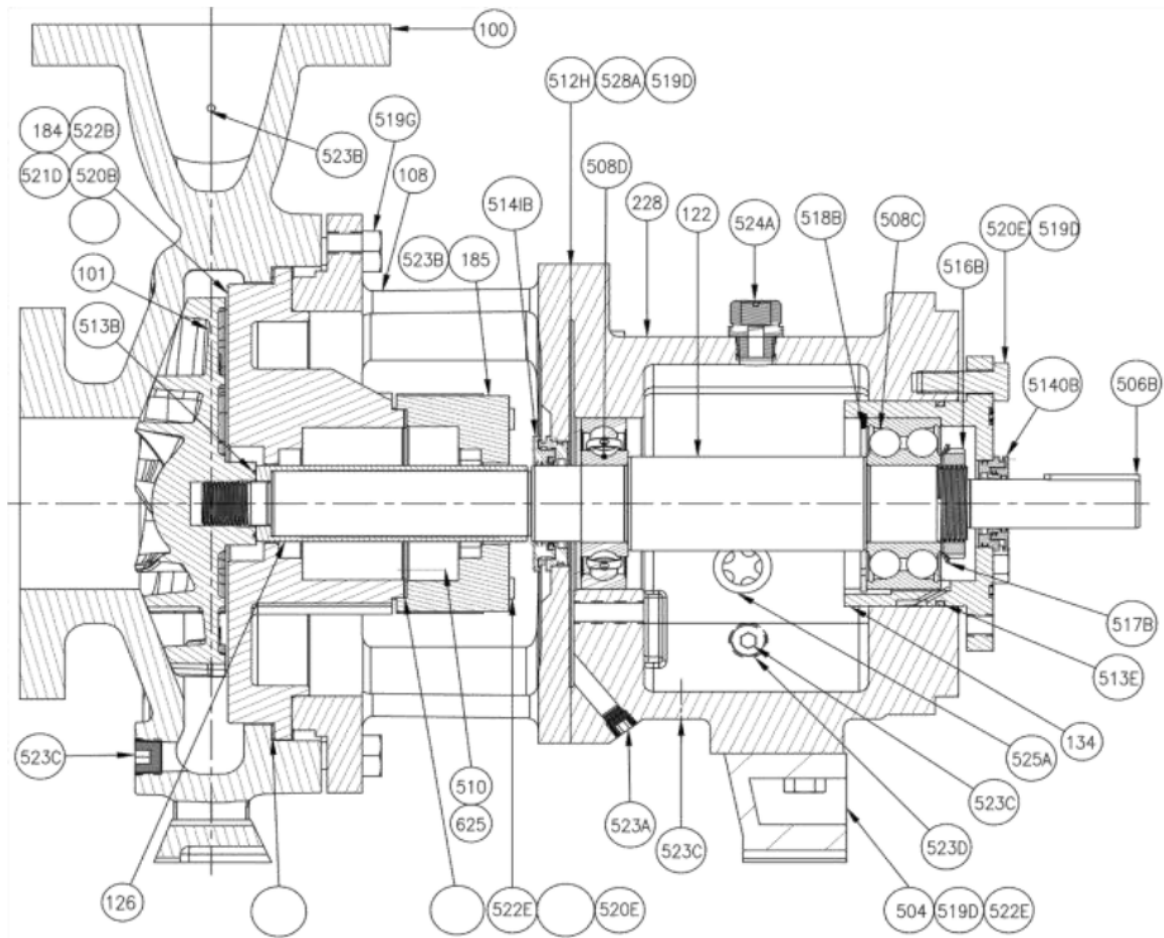
## 14.1 STR PARTS LIST



COTD.....

Item No.	Part	Qty.
520C	Nut for Housing Jacking	3
520C	Nut for Seal Chamber	4
520B	Nut for SBC Locking	2
519B	Bolt for BRG Housing Locking & Jacking	6
519F	Bolt for Back Plate	4
519D	Bolt for Casing	8
518A	Circlip	1
517A	Bearing Lock Washer	1
516A	Bearing Lock Nut	1
514IB	Isolator Inboard	1
514OB	Isolator Outboard	1
513D	O-Ring BRG Housing	1
513A	O-Ring Impeller	1
512D	Seal Chamber Gasket	1
512B	SBC Gasket	1
510	Mechanical Seal	1 Set
508B	Single Row Deep Groove Ball Bearing	1
508A	Double Row Deep Groove Angular Contact Ball Bearing	1
506A	Coupling Key	1
503	Adaptor Back Plate	1
228	Bearing Frame	1
185	Seal Chamber SB	1
184	Stuffing Box Cover SB	1
134	Bearing Housing	1
126	Shaft Sleeve	1
122	Shaft	1
101	Impeller	1
100	Casing	1

## 14.2 MTR PARTS LIST

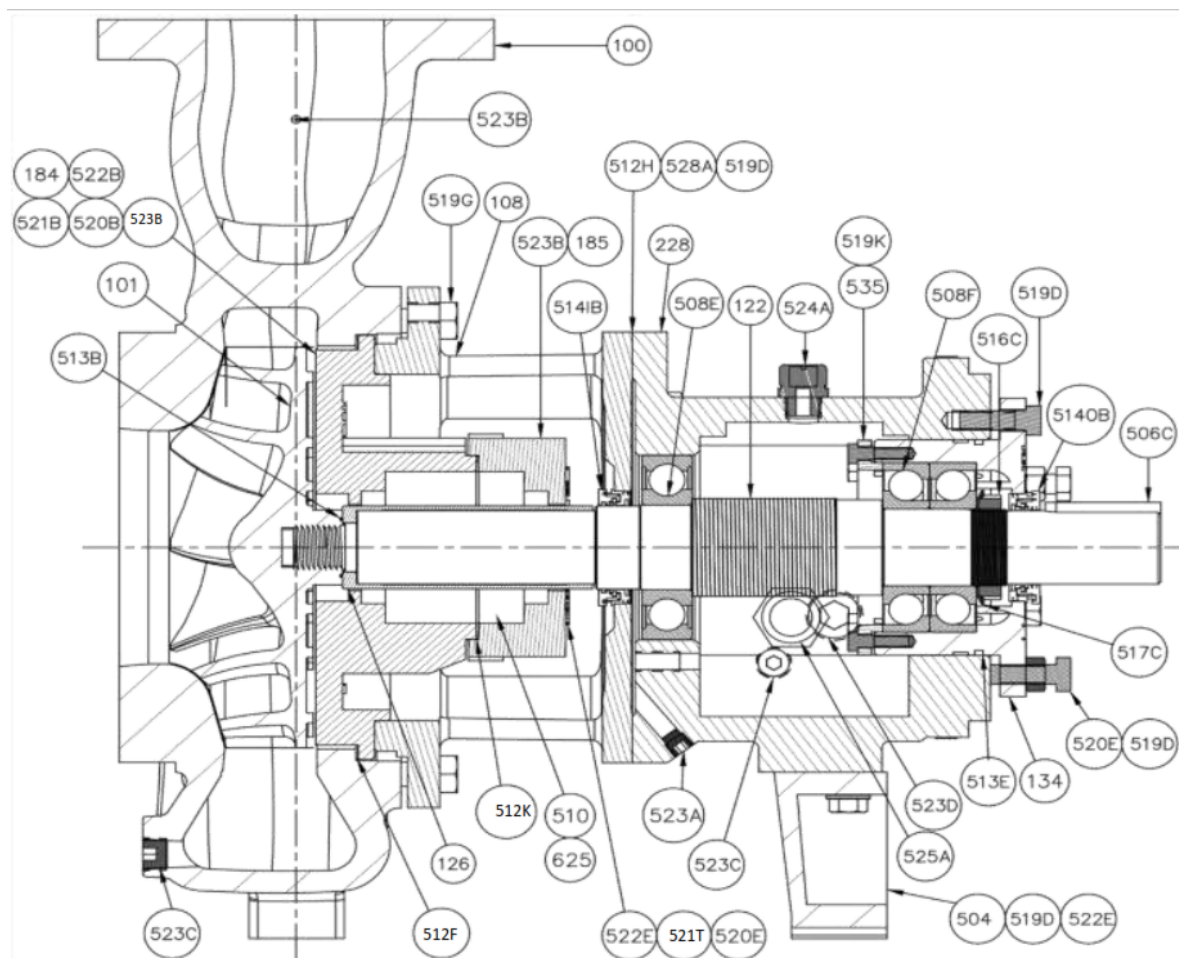


Item No.	Part	Qty.
625	Mechanical Seal Plan	1
523E	Dowel Pin for BRG Frame	1
525A	Oil Sight Glass	1
524A	Air Breather Plug	1
523B	Drain Plug for BRG Frame (Magnetic)	1
523D	Plug for Bearing Frame	1
523C	Plug for Bearing Frame	1
523A	Plug for Bearing Frame	5
523A	Plug for Stuffing Box	1
523B	Drain Plug for Casing	1
523A	Plug for Casing & Seal Chamber	2
522C	Washer for SBC	2

COTD....

Item No.	Part	Qty.
522B	Washer for Seal Chamber	4
521R	Stud for Seal Chamber	4
521P	Stud for SBC	2
520C	Nut for Housing Jacking	3
520C	Nut for Seal Chamber	4
520B	Nut for SBC Locking	2
519B	Bolt for BRG Housing	6
519F	Bolt for Back Plate	4
519D	Bolt for Casing	8
506A	Coupling Key	1
518A	Circlip	1
517A	Bearing Lock Washer	1
516A	Bearing Lock Nut	1
514IB	Isolator Inboard	1
514OB	Isolator Outboard	1
513D	O-Ring BRG Housing	1
513A	O-Ring Impeller	1
512D	Seal Chamber Gasket	1
512B	SBC Gasket	1
510	Mechanical Seal	1 Set
508D	Single Row Deep Groove	1
508C	Double Row Deep Groove	1
503	Adaptor Back Plate	1
228	BRG Frame	1
185	Seal Chamber SB	1
184	Stuffing Box Cover SB	1
134	Bearing Housing	1
126	Shaft Sleeve	1
122	Shaft	1
101	Impeller	1
100	Casing	1

## 14.3 LTR PARTS LIST



article longtable

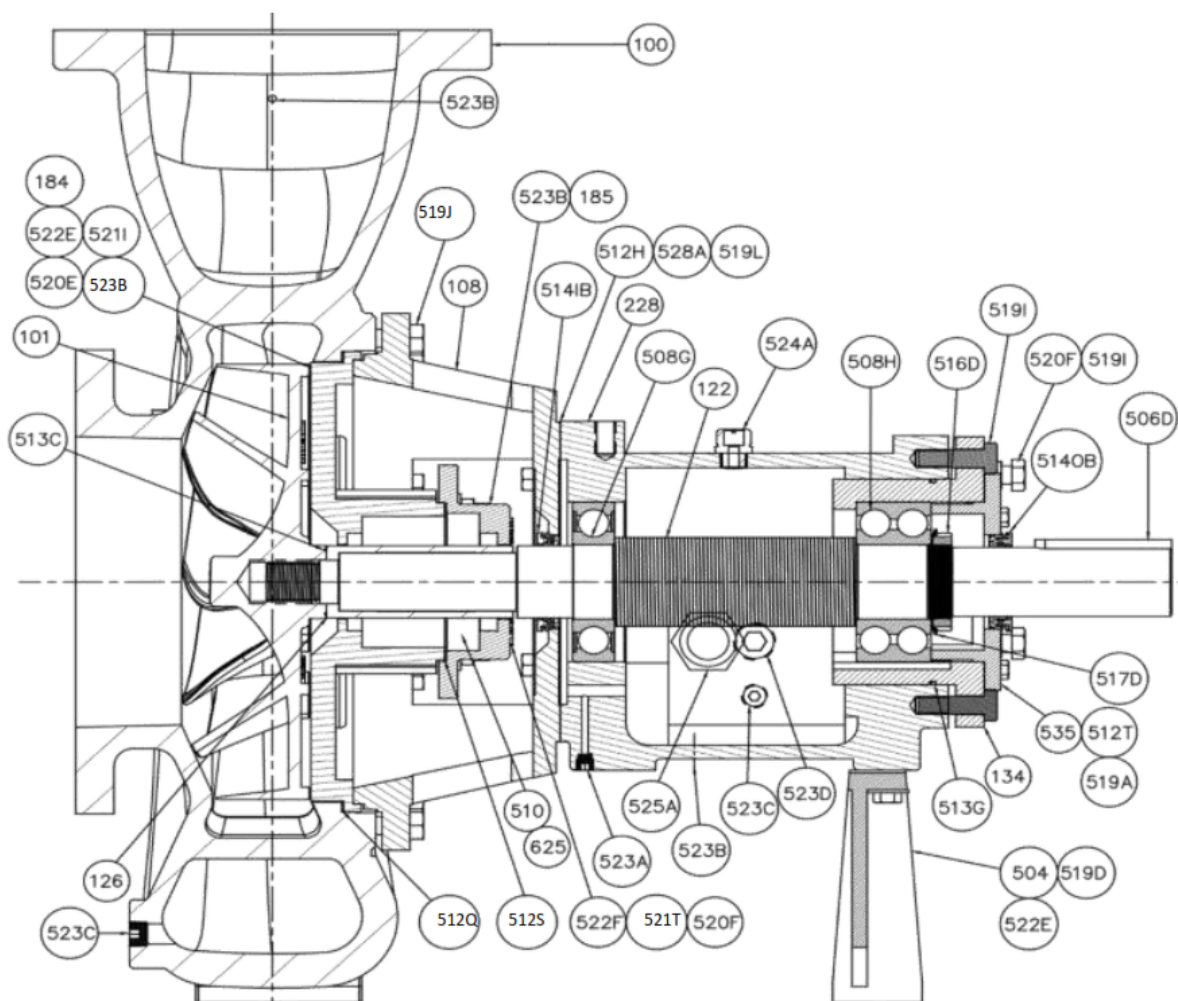
Item	Part	Qty
625	Mechanical Seal Plan	1
535	Bearing Lock Ring	1
523E	Dowel Pin for BRG Frame	2
525A	Oil Sight Glass	1
524A	Air Breather Plug	1
523B	Drain Plug for Bearing Frame (Magnetic Type)	1
523D	Plug for Bearing Frame	2
523C	Plug for Bearing Frame	1
523A	Plug for Bearing Frame	2
523A	Plug for Stuffing Box Cover LB	1
523C	Drain Plug for Casing	1
523B	Plug for Casing & Seal Chamber	2
522E	Washer for LEG	2

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COTD....

Item No.	Part	Qty.
522C	Washer for Seal Chamber	4
522B	Washer for SBC	2
521T	Stud for Seal Chamber LB	4
521B	Stud for SBC	2
520E	Nut for Housing Jacking	3
520C	Nut for Seal Chamber	4
520B	Nut for SBC Locking	2
519K	Bolt for Bearing Lock Ring	1
519D	Bolt for LEG	2
519C	Bolt for BRG Housing Locking & Jacking	6
519B	Bolt for Adaptor	4
519G	Bolt for Casing	10
517C	Bearing Lock Washer	1
516C	Bearing Lock Nut	1
514IB	Isolator Inboard	1
514OB	Isolator Outboard	1
513D	O-Ring Bearing Housing	1
513A	O-Ring Impeller	1
512X	Adaptor Gasket	1
512K	Seal Chamber Gasket	1
512F	SBC Gasket	1
510	Mechanical Seal	1 Set
508E	Single Row Deep Groove Ball Bearing	1
508F	Single Row Deep Groove Angular Contact Ball Brg.	2
506C	Coupling Key	1
504	LEG for Bearing Frame	1
228	Bearing Frame	1
185	Seal Chamber LB	1
184	Stuffing Box Cover LB	1
134	Bearing Housing	1
535	Bearing Lock Cover	1
126	Shaft Sleeve	1
122	Shaft	1
103	Adaptor	1
101	Impeller	1
100	Casing	1

## 14.4 XLR PARTS LIST



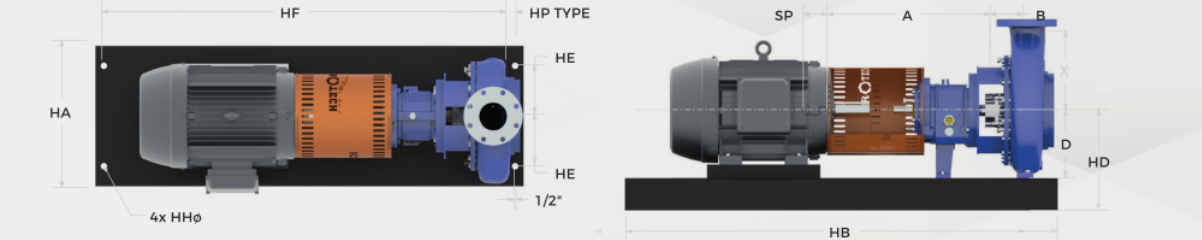
Item	Part	Qty
625	Mechanical Seal Plan	1
535	Bearing Cover	1
523A	Dowel Pin for BRG. Frame	2
525A	Oil Sight Glass	1
524A	Air Breather Plug	1
523B	Drain Plug for Bearing Frame (Magnetic Type)	1
523D	Plug for Bearing Frame	2
523C	Plug for Bearing Frame	1
523A	Plug for Bearing Frame	1
523A	Plug for Stuffing Box Cover SB	1
523B	Bearing Housing Plug (1/8")	4
523C	Drain Plug for Casing	1

COTD....

Item No.	Part	Qty.
523B	Plug for Casing & Seal Chamber	2
522E	Washer for LEG	2
522F	Washer for Seal Chamber	4
522E	Washer for SBC	2
521T	Stud for Seal Chamber SB	4
521I	Stud for SBC	2
520F	Nut for Housing Jacking	3
520E	Nut for Seal Chamber	4
520C	Nut for SBC Locking	2
519A	Bolt for Bearing Cover	6
519D	Bolt for LEG	2
519C	Bolt for BRG. Housing Locking & Jacking	6
519I	Bolt for Adaptor	4
519G	Bolt for Casing	8
517D	Bearing Lock Washer	1
516G	Bearing Lock Nut	1
514IB	Isolator Inboard	1
514OB	Isolator Outboard	1
513C	O-Ring Bearing Housing	1
513G	O-Ring Impeller	1
512H	Bearing Cover Gasket	1
512X	Adaptor Gasket	1
512D	Seal Chamber Gasket	1
512B	SBC Gasket	1
510	Mechanical Seal	1 Set
508E	Single Row Deep Groove Ball Bearing	1
508H	Double Row Deep Groove Angular Contact Ball BRG.	1
506G	Coupling Key	1
504	LEG for Bearing Frame	1
228	Bearing Frame	1
185	Seal Chamber SB	1
184	Stuffing Box Cover SB	1
134	Bearing Housing	1
126	Shaft Sleeve	1
122	Shaft	1
103	Adaptor	1
101	Impeller	1
100	Casing	1

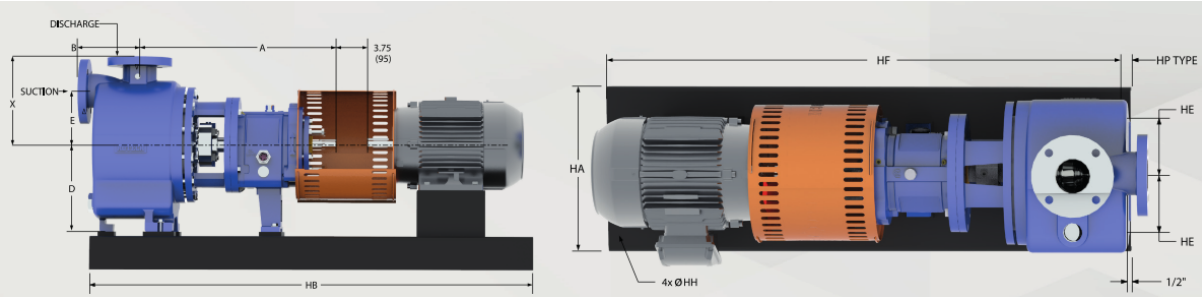


## 14.5 DIMENSIONAL DRAWINGS



FRAME	SIZE	ANSI DESIGNATION	DISCHARGE SIZE	SUCTION SIZE	X	A	B	D	SP	WEIGHT BARE PUMP lb (kg)
STR	1x1.5-6	AA	1	1.5						110 (50)
	1.5x3-6	AB	1.5	3						120 (55)
	2x3-6	AC	2	3	6.5 (165)					125 (57)
	1x1.5-8	AA	1	1.5		13.5 (343)	4.0 (102)	5.25 (133)	3.75 (95)	130 (59)
	1.5x3-8	AB	1.5	3						135 (61)
MTR/LTR	3x4-7	A70	3	4	11 (280)					270 (122)
	2x3-8	A60	2	3	9.5 (242)					265 (120)
	3x4-8	A70	3	4	11 (280)					270 (122)
	3x4-8G	A70	3	4	11 (280)					270 (122)
	1x2-10	A05	1	2	8.5 (216)	19.5 (496)	4.0 (102)	8.25 (210)		280 (127)
	1.5x3-10	A50	1.5	3						285 (129)
	2x3-10	A60	2	3	9.5 (242)					275 (125)
	3x4-10	A70	3	4	11 (280)				3.75 (95)	290 (132)
	3x4-10H	A40	3	4	12.5 (318)					305 (138)
	4x6-10G	A80	4	6	13.5 (343)					385 (175)
	4x6-10H	A80	4	6	13.5 (343)					385 (175)
	1.5x3-13	A20	1.5	3	10.5 (267)	19.5 (496)	4.0 (102)	10 (254)		350 (159)
	2x3-13	A30	2	3	11.5 (292)					355 (161)
	3x4-13	A40	3	4	12.5 (318)					370 (168)
	4x6-13	A80	4	6	13.5 (343)					440 (200)
XLR	6x8-13	A90	6	8	16 (406)					620 (281)
	8x10-13	A100	8	10	18 (457)					740 (336)
	6x8-15	A110	6	8	18 (457)					700 (318)
	8x10-15	A120	8	10	19 (483)					800 (363)
	8x10-15 G	A120	8	10	19 (483)	27.875 (708)	6 (152)	14.5 (368)	5.25 (133)	775 (352)
	8x10-16 H	A120	8	10	19 (483)					1030 (467)
	3x4-17	A115	3	4	16					700 (318)
	4x6-17	A105	4	6	16 (406)					720 (327)
	6x8-17	A110	6	8	18 (457)					815 (370)
	8x10-17	A120	8	10	19 (483)					885 (401)

\*\*1196LF DIMENSIONS MATCH THE SAME DIMENSIONS AS 1196 BUT OFFER RAISED FACE AS STANDARD OFFERING LOW FLOW SIZES: 1X1.5-8 STR, 1X2-10 MTR, 1.5X3-13 LTR \*\*\*NOTE 1.5X3-13 LF ARE LTR FRAME BY STANDARD



### PUMP DIMENSIONS AND WEIGHTS

PUMP FRAME	PUMP SIZE	DISCHARGE SIZE	SUCTION SIZE	X	A	B	D	E	SP	RARE PUMP WEIGHT LBS (KG)
STR	1x1.5-6	1	1.5	7.25(184)	15.5(394)	5(127)	7.5(191)	4(102)		85(38)
	1.5x1.5-8	1.5	1.5	7.875(200)						170(77)
MTR/LTR	2x2-10	2	2		21.75(552)	6.5(165)				270(123)
	3x3-10	3	3	10(254)	22.625(575)	6.75(171)				315(143)
	4x4-10	4	4		23.375(594)	9.18(233)	10(254)	6(152)	3.75(95)	370(168)
	3x3-13	3	3		22.625(575)	6.75(171)				400(182)
	4x4-13	4	4	11.5(292)	23.375(594)	9.18(233)				470(214)
	6x6-13	6	6	15(381)	23.375(594)	10(254)	12(304.8)	8(203)		690(314)

\*Construction Details

Component	STR	MTR	LTR	XLR
<b>Shaft</b>				
Diameter at Impeller	.75 (19)	1 (25)	1.25 (32)	1.5 (38)
Diameter in Stuffing Box/Seal Chamber	1.375 (35) / 1.125 (29)	1.75 (45) / 1.5 (38)	2.125 (54) / 1.875 (48)	2.5 (64) / 2 (51)*
Diameter Between Bearings	1.5 (38)	2.125 (54)	2.5 (64)	3.125 (79)
Diameter at Coupling	.875 (22)	1.125 (29)	1.875 (48)	2.375 (60)
Overhang	6.125 (156)	8.375 (213)	8.375 (213)	9.969 (253)
Maximum Shaft Deflection	0.002 (0.05)			
Shaft Deflection Index ( $L^3/D$ ) With Sleeve	143	116	48	62
Shaft Deflection Index ( $L^3/D$ ) Less Sleeve	64	63	29	25
<b>Sleeve</b>				
O.D. thru Stuffing Box/Seal Chamber	1.375 (35)	1.75 (45)	2.125 (54)	2.5 (64)*
<b>Bearings</b>				
Radial	6207	6309	6311	6313
Thrust	3306	3309	7310	3313
Bearing Span	4.125 (105)	6.75 (171)	6.875 (164)	9.25 (235)
<b>STD Stuffing Box</b>				
Bore	2 (51)	2.5 (64)	2.875 (73)	3.375 (86)*
<b>Power Limits</b>				
HP (kW) per 100 RPM	1.1 (0.82)	3.4 (2.6)	5.6 (4.2)	14 (10.5)**
<b>Temperature</b>				
Max Liquid Temp (Oil/Grease no cooling)	—	—	—	350°F (177°C)
Max Liquid Temp (Oil/High Temp Opt.)	—	—	—	700°F (370°C)
<b>Casing</b>				
Corrosion Allowance	0.125 (3)			

\* 17 inch sizes have  $2\frac{1}{4}$  inch (57) shaft diameters in stuffing box/seal chamber with sleeve. Shaft sleeve O.D. is  $2\frac{3}{4}$  inches (70) for packing and  $2\frac{1}{2}$  inches (64) for mechanical seals.

\* 17 inch sizes power limit per 100 RPM is 20 HP (15 kW).

## 15. Appendix

### 15.1 Impeller Clearance

#### Feeler Gauge Method

#### Feeler Gauge Method

1. Lock out power to the motor.
2. Remove coupling guard and spacer.
3. Loosen jack bolts and jam nuts.
4. Tighten bearing housing bolts evenly while slowly rotating the shaft until impeller begins to rub casing.
5. Insert feeler gauge between bolt heads and housing to desired clearance.
6. Tighten jack bolts until they contact housing bolts.
7. Tighten jam nuts. Rotate shaft to confirm smooth rotation.
8. Reinstall spacer and guard.

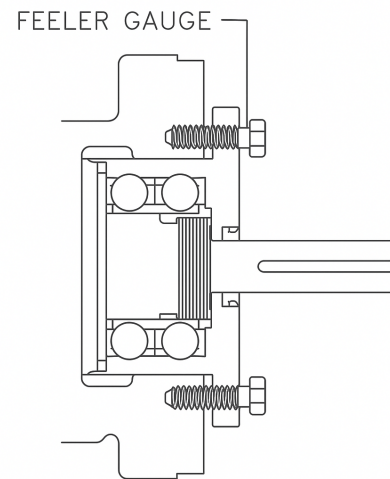


Figure 4: Feeler Gauge Method

### Dial Indicator Method

**WARNING:** *Ensure drive power is locked out to prevent accidental start-up.*

1. Lock out power to the motor.
2. Remove coupling guard and spacer.
3. Mount dial indicator on the baseplate, with the tip touching the pump shaft face. Set to zero.
4. Loosen jack bolts and jam nuts.
5. Tighten bearing housing bolts evenly while slowly rotating the shaft until the impeller contacts the casing.
6. Tighten jack bolts evenly to move the housing away from the frame. Stop when the dial indicator shows proper clearance.
7. Confirm dial reading is correct. Tighten jam nuts.
8. Reinstall spacer and guard.

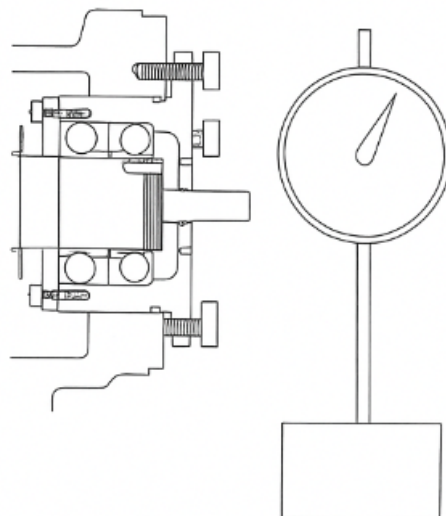


Figure 5: Dial Indicator Method

## 15.2 Construction Details

Table 20: Bearing Fits and Tolerances – S and M Frames (ABEC 1 Standard)

Location	Fit Type	S Frame	M Frame
Radial Bearing (Inboard)	Shaft OD	1.3785 / 1.3781	1.7722 / 1.7718
	Bearing ID	1.3780 / 1.3775	1.7717 / 1.7712
	Frame/Adapter ID	2.8346 / 2.8353	3.9370 / 3.9379
	Bearing OD	2.8341 / 2.8341	3.9364 / 3.9364
Thrust Bearing (Outboard)	Shaft OD	1.1815 / 1.1812	1.7722 / 1.7718
	Bearing ID	1.1811 / 1.1807	1.7717 / 1.7712
	Bearing Housing ID	2.8346 / 2.8353	3.9370 / 3.9379
	Bearing OD	2.8341 / 2.8341	3.9364 / 3.9364

Table 21: Bearing Fits and Tolerances – L and XL Frames (ABEC 1 Standard)

Location	Fit Type	L Frame	XL Frame
Radial Bearing (Inboard)	Shaft OD	2.1660 / 2.1655	2.5597 / 2.5592
	Bearing ID	2.1654 / 2.1648	2.5591 / 2.5585
	Frame/Adapter ID	4.7244 / 4.7253	5.5118 / 5.5128
	Bearing OD	4.7238 / 4.7238	5.5111 / 5.5111
Thrust Bearing (Outboard)	Shaft OD	1.9690 / 1.9686	2.5597 / 2.5592
	Bearing ID	1.9685 / 1.9680	2.5591 / 2.5585
	Bearing Housing ID	4.3307 / 4.3316	5.5118 / 5.5128
	Bearing OD	4.3301 / 4.3301	5.5111 / 5.5111

## 15.3 Coupling Guard

### 12.1 Installation Instructions for Coupling Guards (ANSI B15.1)

#### **DANGER**

Lock out/Tag out driver power before performing any work on pump.

#### **DANGER**

Replace all guards before re-energizing the driver.

#### **WARNING**

Before assembling or disassembling the coupling guard, de-energize the motor, lock out the motor controller/starter, and place a caution tag at the starter indicating that it is disconnected. Before resuming normal pump operation, replace the coupling guard.

#### **NOTICE**

Summit Pump assumes no liability when these procedures are avoided.

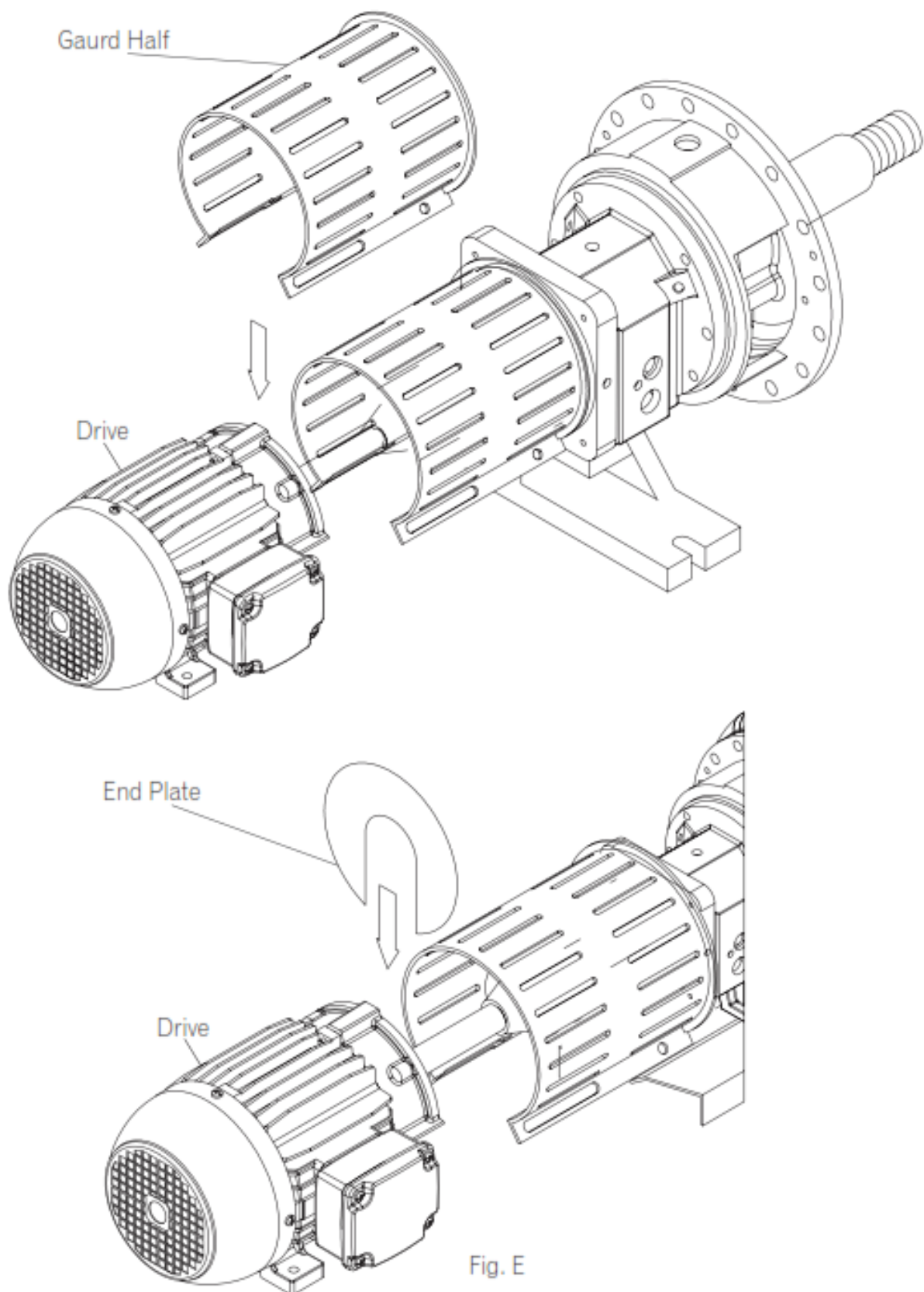
### 12.1.1 Assembly Procedures

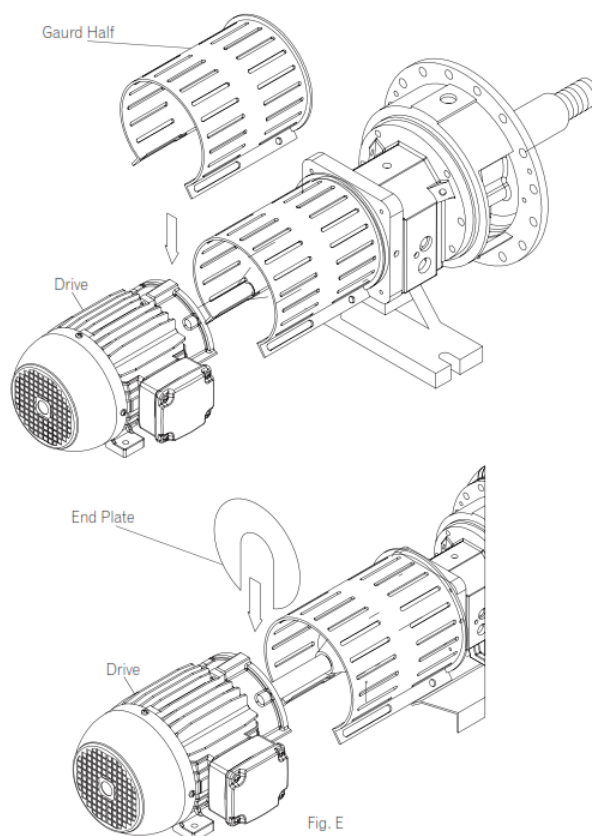
#### **NOTICE**

If the end plate (pump end) was previously installed, make any necessary adjustments to the coupling and skip to step 2.

1. On the STR, MTR, and LTR, align the end plate (pump end) to the bearing frame. (Impeller adjustment is not required.) On the XLR, align the end plate to the pump bearing housing using the slots provided and secure it using the jam nuts.
2. Slightly spread the bottom of the coupling guard half (pump end) and place it over the pump end plate. The annular groove in the guard half should locate around the end plate.
3. Secure the guard half with a bolt, nut, and two washers through the round hole on the front end of the guard. Tighten securely.
4. Slightly spread the driver end coupling guard half and place it over the pump end guard half. The annular groove should face the motor.

5. Place the driver end plate over the motor shaft and secure it with a bolt, nut, and two washers through the rear slot of the guard. Finger-tighten.
6. Adjust the length of the coupling guard to fully cover the shafts and coupling. Slide the driver end guard toward the motor and secure it with a bolt, nut, and two washers through the center slotted holes. Tighten all fasteners.





#### NOTICE

Complete the coupling adjustments before proceeding with the coupling guard assembly.

### 12.1.2 Disassembly Procedures

It is necessary to remove the coupling guard for pump maintenance or adjustments. Replace the coupling guard after completing all work.

#### NOTICE

Refer to the assembly instructions in reverse order for disassembly.

1. Remove the center bolt, nut, and washers. Slide the motor end guard half toward the pump.
2. Remove the bolt, nut, and washers from the driver end and remove the end plate.
3. Slightly spread and lift off the driver end guard half.
4. Remove the remaining bolt, nut, and washers and lift off the pump end guard half.

#### NOTICE

It is unnecessary to remove the end plate (pump end) from the bearing housing. The bearing housing tap bolts are accessible without removing the plate.



Bolt Torque, Ft.-Lbs. (except where noted)				
Frame	DI Casing		Alloy Casing	
	Dry	Lubed	Dry	Lubed
<b>Casing Bolt (370)</b>				
8" STR	30	20	54	35
6" STR				
MTR	59	39	107	71
LTR				
XLR				
XLR-17	170	113	212	141
<b>Frame Adapter (370B)</b>	All — Dry: 30, Lubed: 20			
<b>Bearing Clamp Ring (236A)</b>	L — Dry: 83 in.-lbs., Lubed: 55 in.-lbs.			
<b>Bearing End Cover (370G)</b>	XLR / XLR-17 — Dry: 12, Lubed: 9			

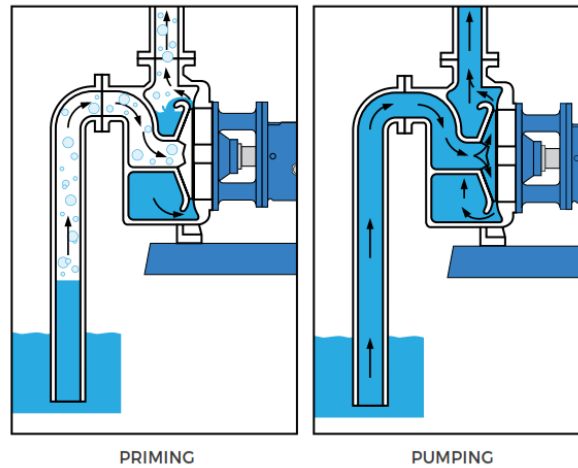
## Bolt Torque Values

Maximum Bearing Locknut Torque, Ft.-Lbs.			
Frame	Bearing Size	Locknut Size	Maximum Torque
S	5306A/C3	N-06	20
M	5309A/C3	N-09	50
L	7310BECBM	N-10	70
XL	5313A/C3	N-13	140

## Self-Priming 1796

### Steps to Prime the Rotech 1796 Series Pump

1. Re-check motor to ensure that connections are correct. Check that thermal overload relays are properly sized and set for operation.
2. Verify that the coupling guard and all other safety-related devices and instrumentation are in place and in working order.
3. Initially fill the pump with enough liquid to fill the priming chamber (see Table 22).
4. Check that any suction isolation valves are completely open. **Never use the suction valve to control flow** as this can lead to pump starvation, cavitation, and vibration—resulting in pump damage.
5. Ensure that all flushing and cooling lines, as applicable, are attached and operational.
6. Open vent or bypass line valve (if applicable).
7. Depending on the system design, either crack open or keep the discharge valve fully closed during priming.
8. Start the driver.
9. Listen for unexpected noise, significant vibration, or indications of binding. If any of these are observed, stop the pump immediately, inspect the installation, and correct all issues before restarting.



10. Depending on suction lift height and system air volume, priming may take several minutes. Contact Rotech Pumps or your authorized Rotech representative for assistance in estimating suction priming time.
11. Monitor pressure gauges. Once full prime is achieved, gradually open the discharge valve to fill the system and stabilize at the pump's rated operating point.

Table 22: Initial Charge Volume – Rotech 1796 Series

Model	Initial Charge Volume (in <sup>3</sup> )
1796 1.5x1-6	310
1796 1.5x1.5-8	390
1796 2x2-10	1100
1796 3x3-10	1160
1796 4x4-10	1550
1796 3x3-13	1330
1796 4x4-13	1410
1796 6x6-13	2980



## PUMP INFORMATION

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Purchase Date:

Purchase Order#:

Serial Number:

Equipment Number:

Distributed By:

[www.ROTECHPUMPS.com](http://www.ROTECHPUMPS.com)  
[Info@Rotechpumps.com](mailto:Info@Rotechpumps.com)

Rev. 1/2025