



INSTRUCTION AND MAINTENANCE MANUAL:

FPR SERIES PUMP



Sanitary Centrifugal Pump

omd ■ 800-648-3326
oliver m. dean, inc. ■ www.omdean.com

DESCRIPTION

This manual contains installation, operation, assembly, disassembly and repair instructions for the Fristam FPR centrifugal pump.

The motors are standard NEMA totally enclosed fan cooled (TEFC) motors. They are C-face and have a locked front bearing. These motors do require feet. Replacements motors are easily available from local motor distributors.

CAUTION: BEGIN ALL PUMP MAINTENANCE OPERATIONS BY DISCONNECTING THE ENERGY SOURCE TO THE PUMP. OBSERVE ALL LOCK OUT/TAG OUT PROCEDURES AS OUTLINES BY ANSI Z244.1-1982 AND OSHA 1910.147 TO PREVENT ACCIDENTAL START-UP AND INJURY.

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TECHNICAL INFORMATION

SPECIFICATIONS

Maximum Inlet Pressure	150 PSI
Temperature Range	-40°F – 400°F
Noise Level	60 – 85 dB (A)

STANDARD MATERIALS OF CONSTRUCTION (NOTE: OTHER OPTIONS AVAILABLE)

Product Contact Components	AISI 316L Stainless Steel
Seal Components	
Single Rotating Seal	Chrome Oxide coated 316L Stainless Steel
Stationary Seal	Carbon
Double Rotating Seal (if installed)	Ceramic
Product Contact Surface Finish	32 in Ra
Flange Support.....	Cast Iron
Gaskets / O-rings.....	Viton
Cover O-ring.....	Buna
Motor	NEMA TEFC C-face (Painted Rolled Steel or Painted Cast Iron
.....	3 Phase, 60 Hz, 208-230/460 VAC, 1750/3500 RPM

FRONT PULL-OUT SEAL OPTIONS

Single Internal Mechanical	
Single Internal Mechanical with Cascade	
Single Internal Mechanical with Double External Mechanical	
Recommended Seal Flush Pressure	5 PSI Maximum
Recommended Seal Flush Flow	1 –2 Gallons per Hour

SEAL SIZES

757 – Used on Models: 700, 710, 720, 3520, 731, 3530, 740, 1740 & 3540	
Motor Frame Range: 140TC – 320TC	
Single Flange	
758 – Used on Models: 3450, 3550, 1051 & 1161	
Motor Frame Range: 180TC—360TC	
Double Flange	

RECOMMENDED TORQUE VALUES

Impeller Nut: Models 700-355	40 ft-lbs
Impeller Nut: Models 1050-4000	90 ft-lbs
757 Housing Clamp Bolt	55 ft-lbs
758 Housing Bolts.....	50 ft-lbs
Motor Bolts	
56C – 140TC	20 ft-lbs
180TC – 280TC.....	55 ft-lbs
320TC – 360TC.....	110 ft-lbs
Shaft Collar Screw(s)	
56C – 140TC	6 ft-lbs
180TC – 280TSC	15 ft-lbs
280TC – 360TC.....	40 ft-lbs

IMPELLER GAPS (TO HOUSING/TO COVER)

700, 710, 720, 731, 740, 1740	0.5 mm (0.020") / 0.5 mm (0.020")
3530, 3450, 3550, 3540, 3520, 1051	1 mm (0.040")/ 0.5 mm (0.020")
1161	1.5 mm (0.060")/ 2 mm (0.080")
4000.....	2.0 mm (0.80")/2 mm (0.80")

TOOLS FOR ASSEMBLY & DISASSEMBLY

9/16" socket.....	56C – 140TC motor bolts
3/4" socket.....	180TC – 280TC motor bolts, double flange housing bolts
.....	Single flange housing clamp bolt
15/16" socket.....	Impeller nut, 320TC – 360TC motor bolts
3/16" Allen wrench socket	56C – 180TC shaft collars
1/4" Allen wrench socket	210TC – 250TC shaft collars
5/16" Allen wrench socket	280TC – 360TSC shaft collars
3/4" wrench.....	Single flange clamp bolt
Ratchet	For loosening bolts
Torque wrench.....	For proper tightening
Adjustable pliers.....	For removing water pipes
Soft-faced hammer	For removing cover star nuts
3/8" diameter rod	For holding the shaft when tightening & loosening the impeller
Food grade lubricant.....	For lubricating o-rings and gaskets

RECOMMENDED PREVENTIVE MAINTENANCE

RECOMMENDED SEAL MAINTENANCE

Visually inspect mechanical seal daily for leakage.
 Replace mechanical seal annually under normal duty.
 Replace mechanical seal as often as required under heavy duty.

ELASTOMER INSPECTION

Inspect all elastomers when performing pump maintenance. We recommend replacing elastomers (o-rings and gaskets) during seal, pump shaft and/or motor replacement.

MOTOR LUBRICATION RECOMMENDATIONS

Use a high grade ball and roller bearing grease. Recommendations for standard service conditions include **Shell Dolium R** or **Chevron SRI**. (See Tables 1-3 for more details.)

NEMA/(IEC) Frame Size	Rated Speed - RPM		Table 1: Motor Lubrication Intervals for Standard Conditions
	3500	1750	
Up to 210 incl. (132 IEC)	5,500 hrs.	12,000 hrs.	
Over 210 to 280 incl. (180 IEC)	3,600 hrs.	9,500 hrs.	
Over 280 to 360 incl. (225 IEC)	2,200 hrs.	7,400 hrs.	

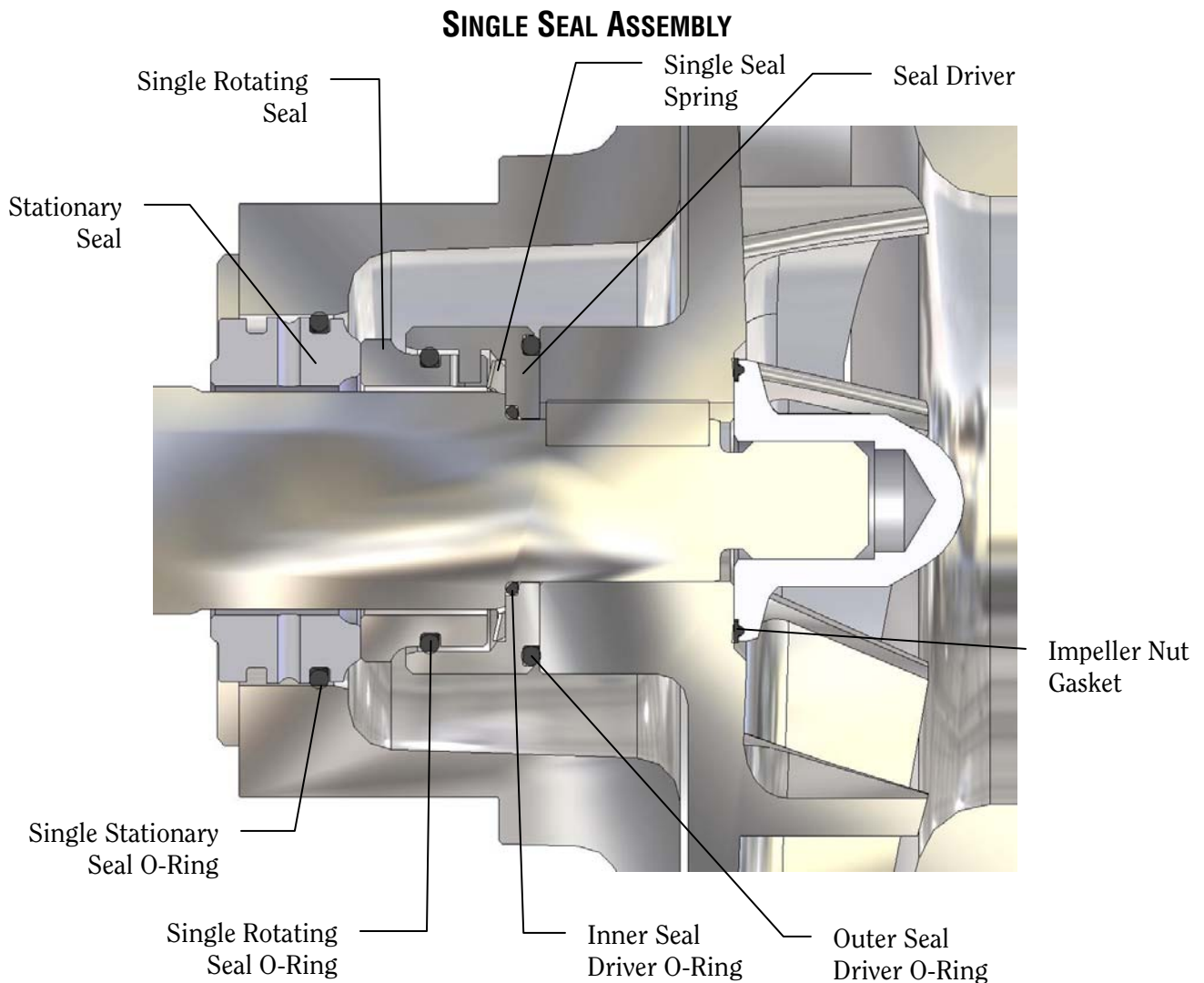
For severe service conditions, multiply interval hours by .5
 For extreme service conditions, multiply interval hours by .1

Table 2: Service Conditions Definitions

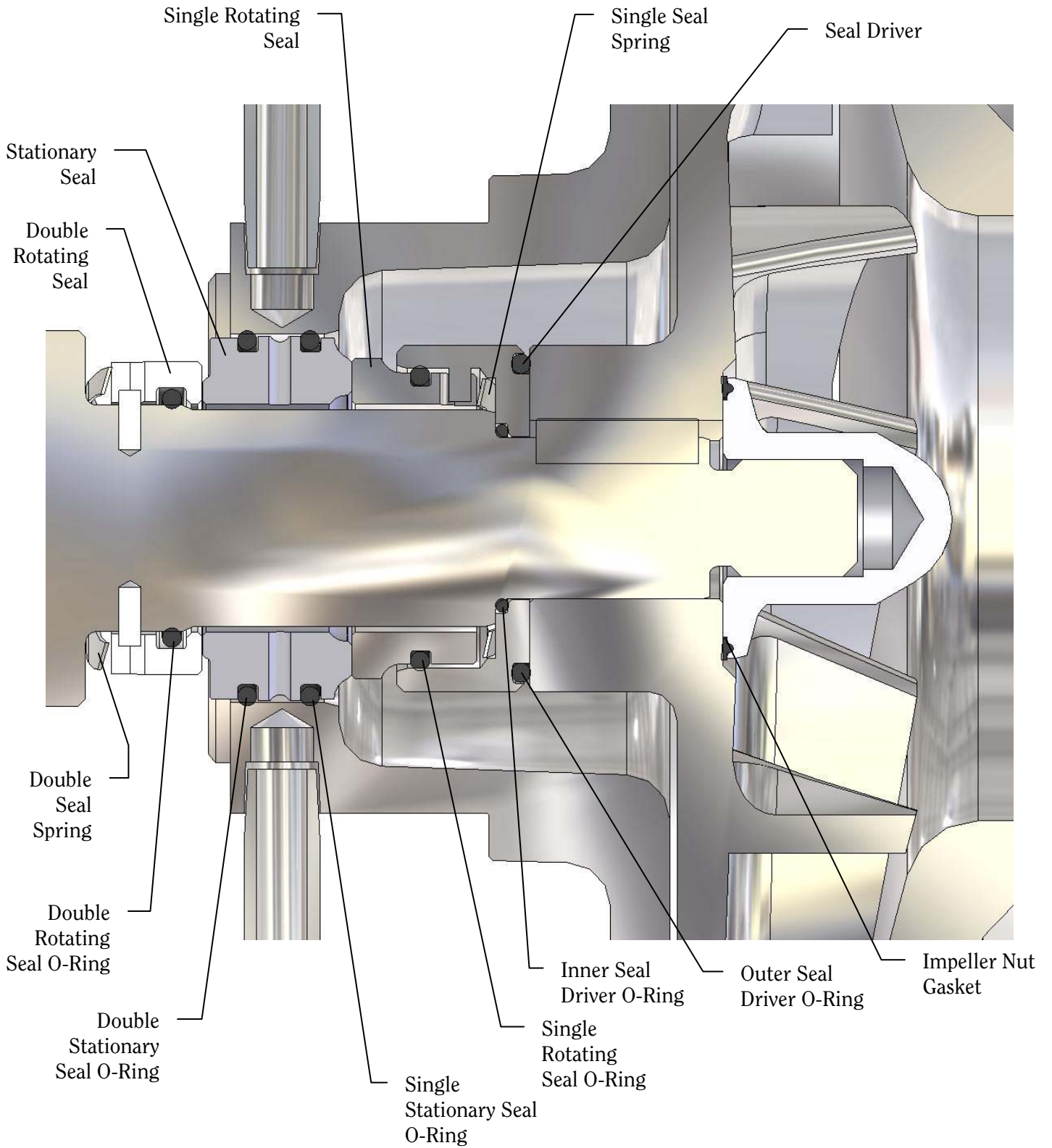
Service Conditions	Maximum Ambient Temperature	Atmospheric Contamination
Standard	104°F (40°C)	Clean, little corrosion
Severe	122°F (50°C)	Moderate dirt, corrosion
Extreme	>122°F (>50°C)	Severe, dirt abrasive dust, corrosion

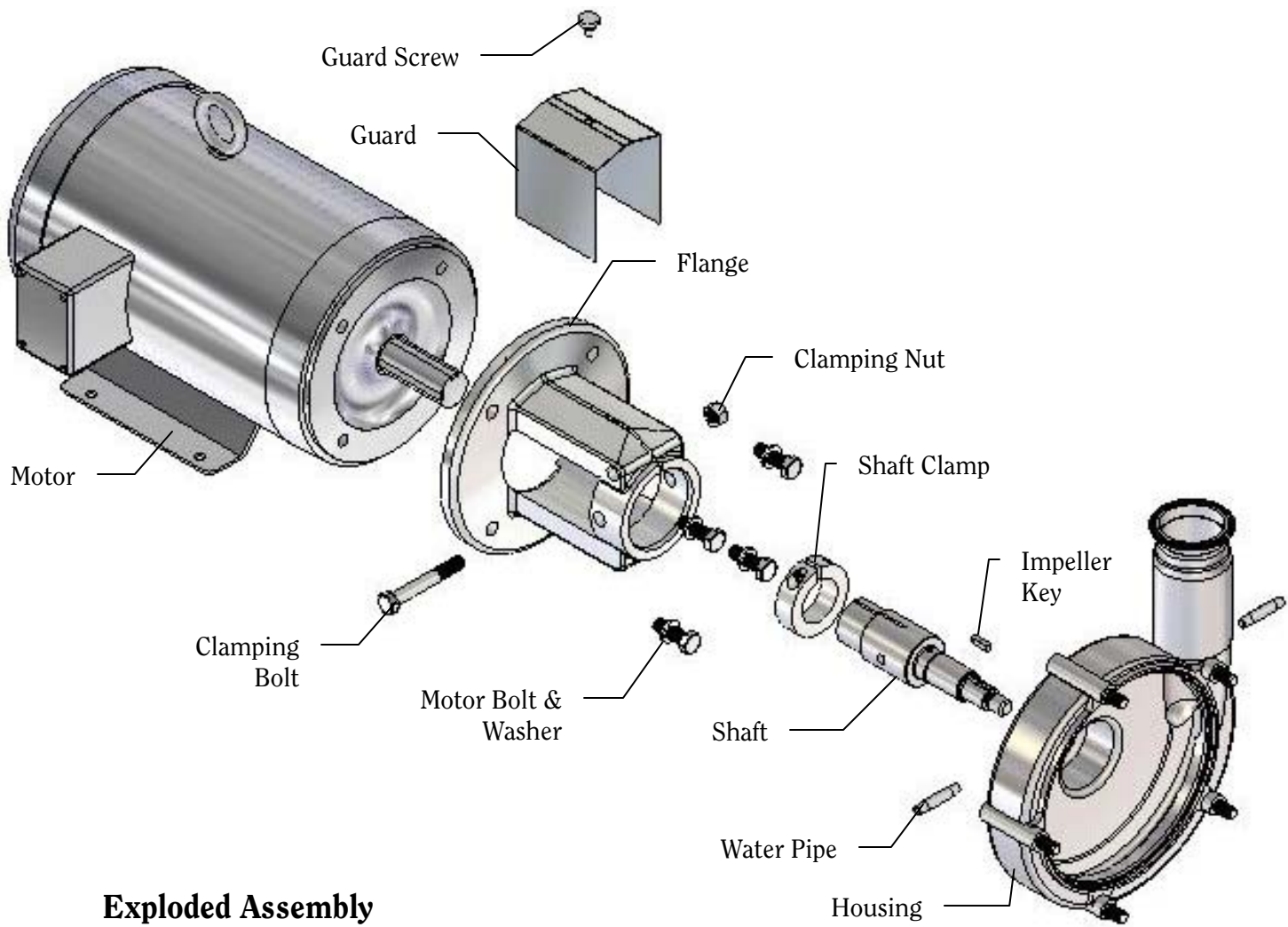
Table 3: Volume of Grease to be Added per Bearing

Frame Size NEMA/(IEC)	Grease IN. ³	Volume TSP
Up to 210 incl. (132 IEC)	0.6	2.0
Over 210 to 280 incl. (180 IEC)	1.2	3.9
Over 280 to 360 incl. (225 IEC)	1.5	5.2

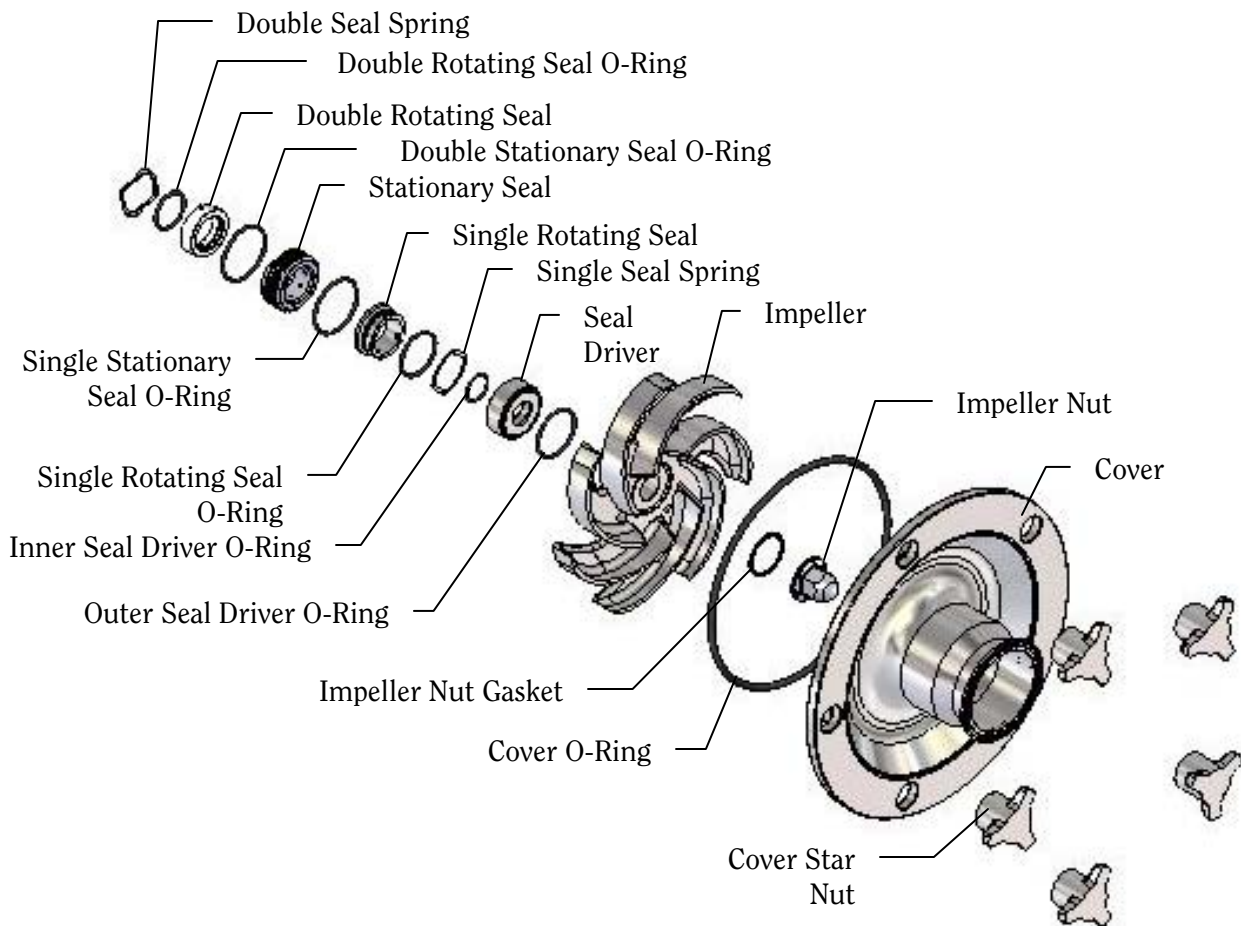


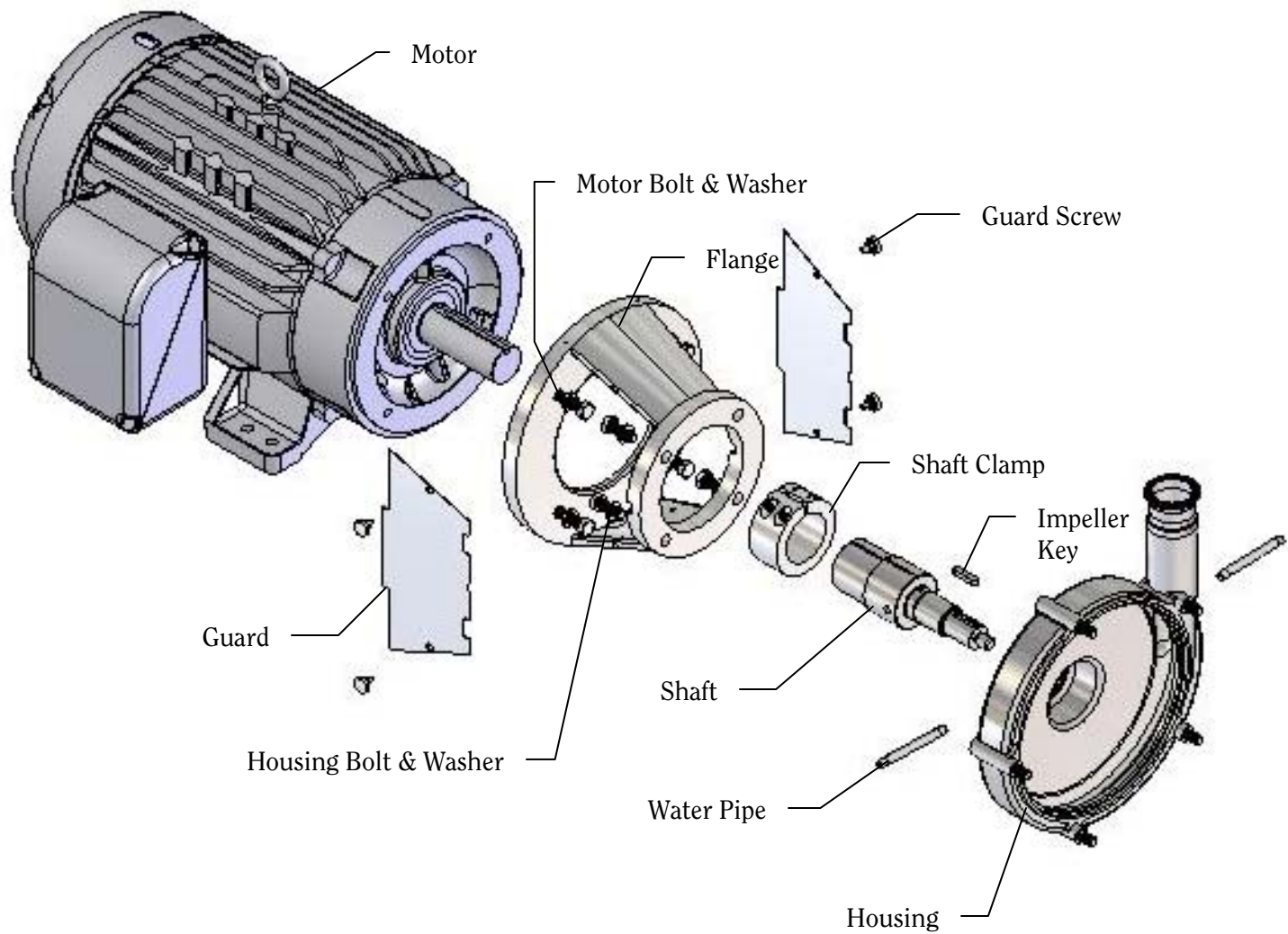
DOUBLE SEAL ASSEMBLY



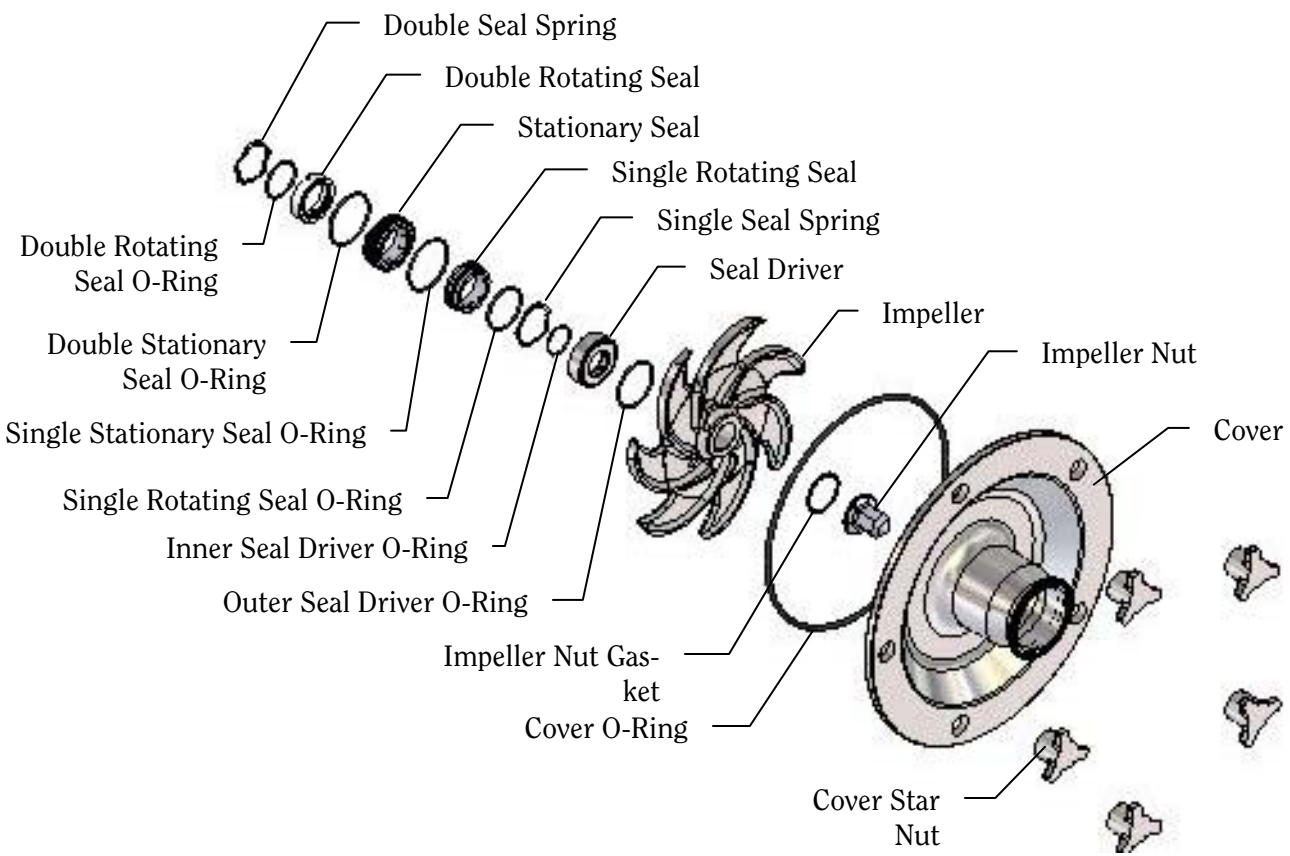


**Exploded Assembly
FPR 700-3540**





**Exploded Assembly
FPR 345, 355, 1050 & 1160**



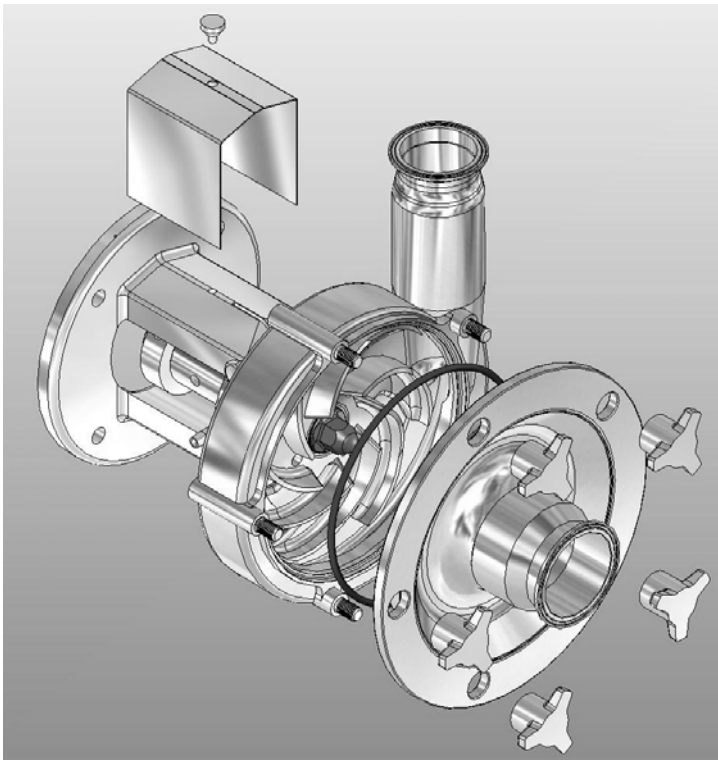
SEAL REPLACEMENT — DISASSEMBLY

FIGURE 1

Remove flange guard.

Remove cover star nuts with soft-faced hammer.

Remove cover and discard cover o-ring.

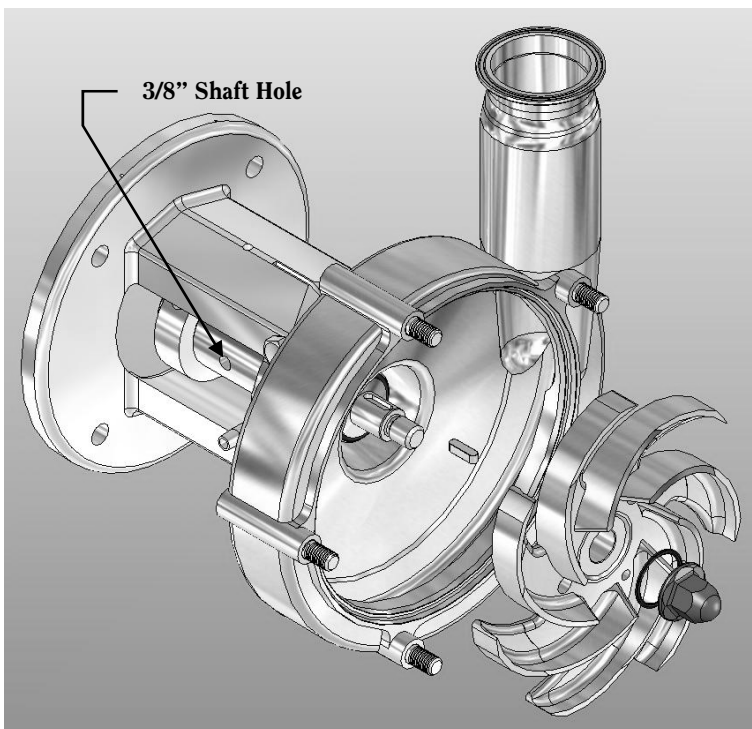


FIGURE 2

Place 3/8" rod or Phillips screwdriver in shaft hole. Use 15/16" socket with ratchet to remove impeller nut. Discard impeller nut gasket.

Remove impeller and discard impeller o-ring.

Remove key.

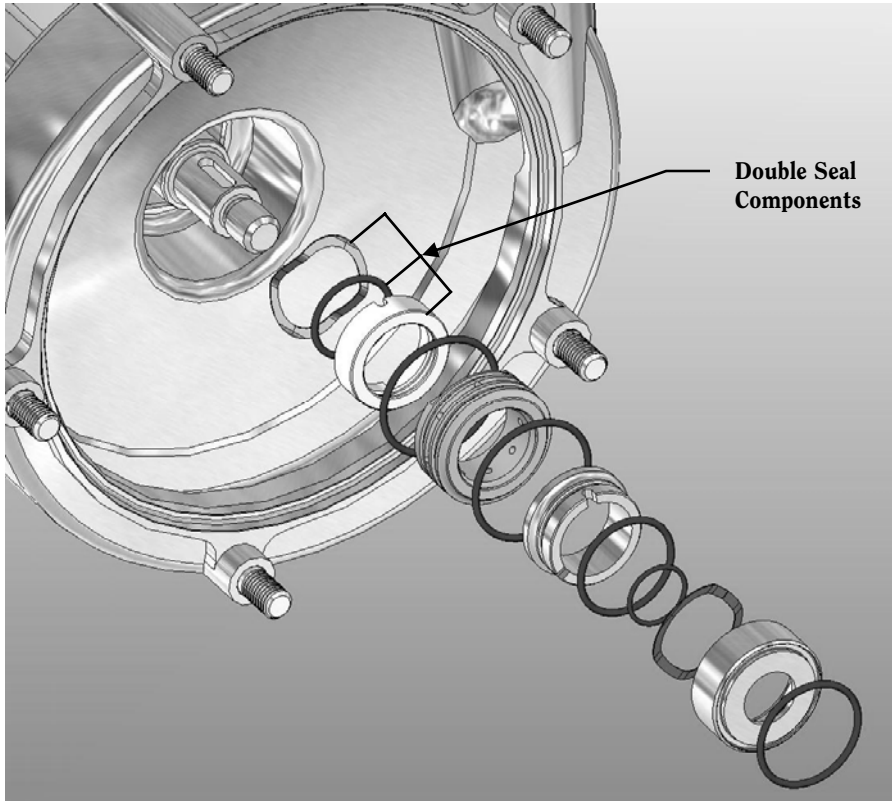


FIGURE 3

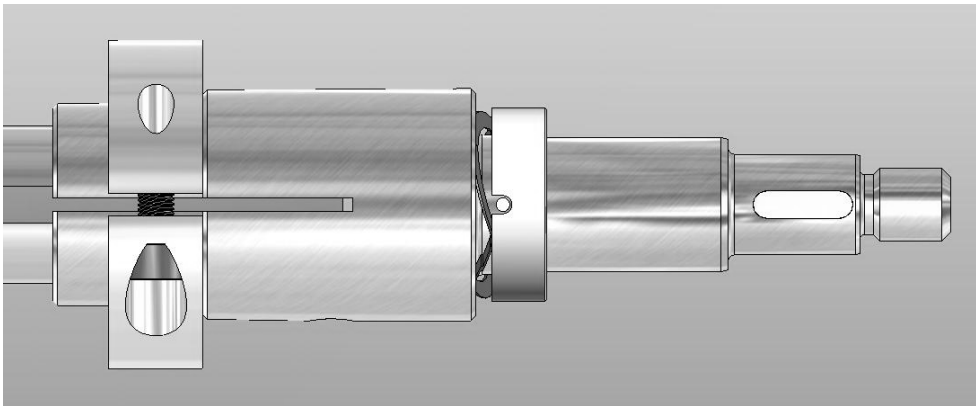
Remove seal driver/rotating seal assembly.

Discard rotating seal, o-rings and spring.

Remove stationary seal and discard.

Double Seal Only: Remove double rotating seal and double spring and discard.

ASSEMBLY



DOUBLE SEAL ONLY:

FIGURE 4

Install spring behind shaft pins. Place o-ring into double rotating seal and lubricate. Push seal onto shaft making sure slots align with pins.

(Note: housing and flange removed from picture for clarity)

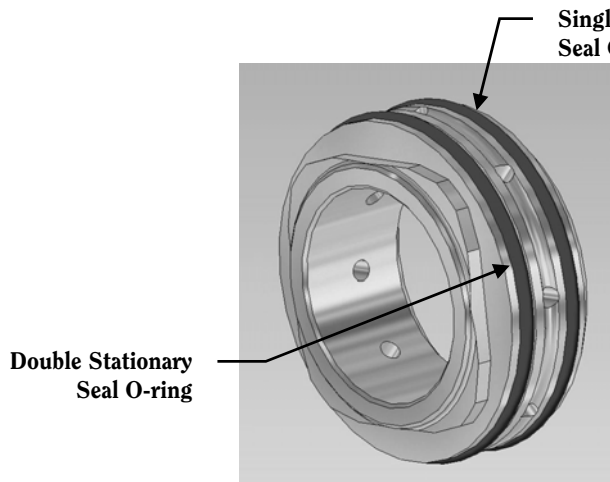


FIGURE 5

Single Seal:
Install single stationary seal o-ring and lubricate.

Double Seal:
Install single and double stationary seal o-rings and lubricate.

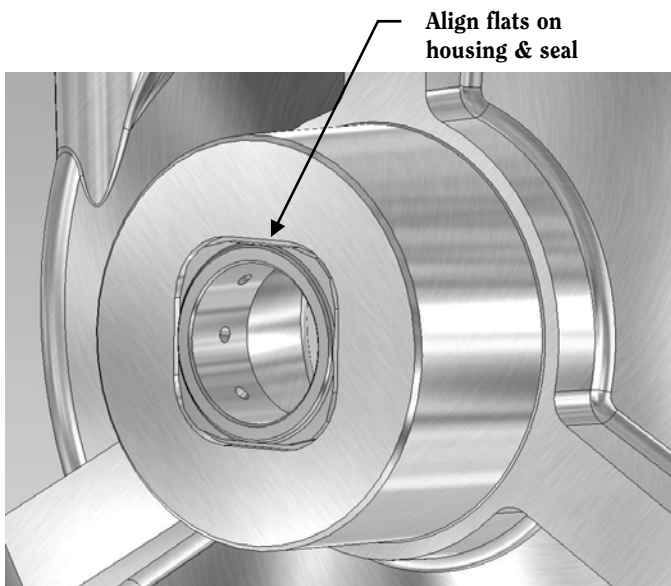


FIGURE 6

Install the stationary seal into housing making sure to align flats on the seal with the flats on the housing.

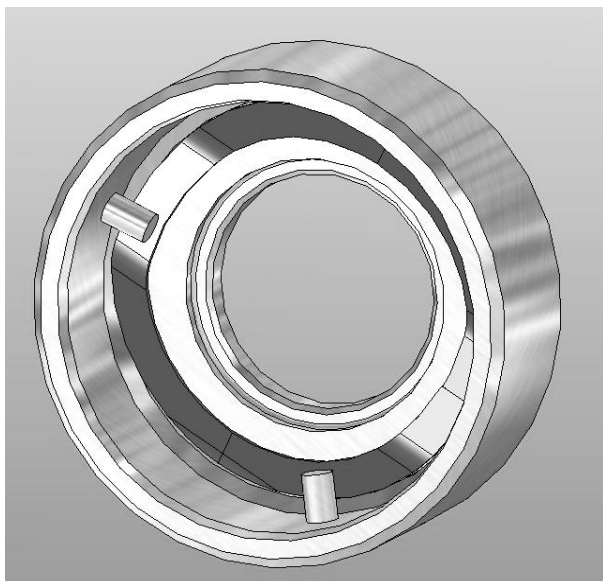


FIGURE 7

Install spring behind seal pins inside the seal driver.

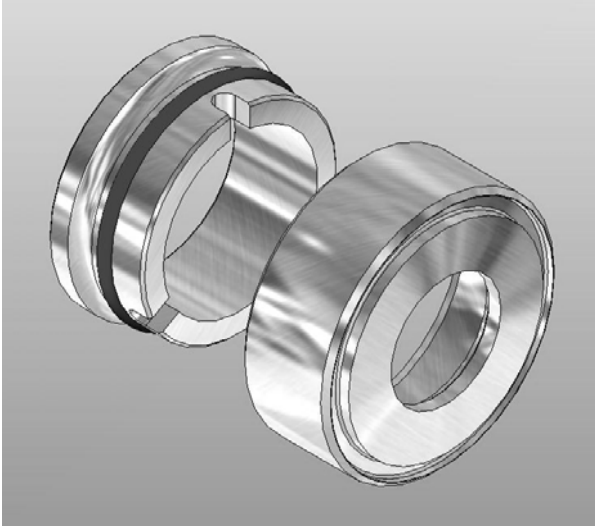


FIGURE 8

Install single rotating seal o-ring and lubricate. Slide seal driver onto rotating seal making sure to align pins inside the driver with the slots on the seal.

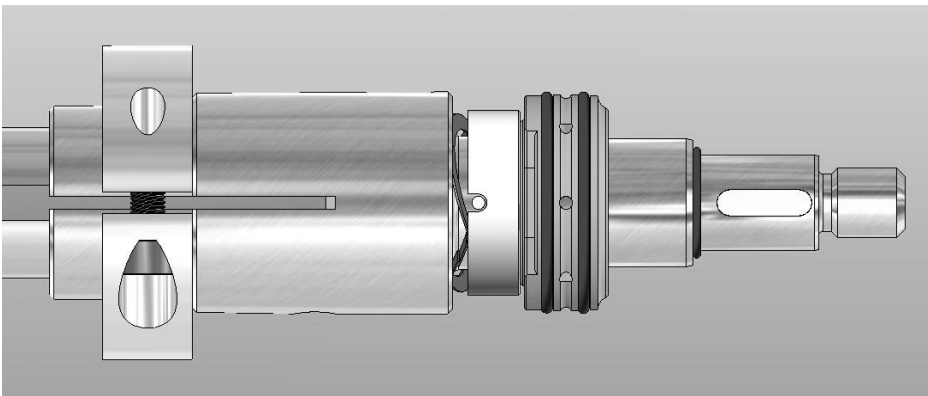


FIGURE 9

Slide small rotating seal o-ring onto the shaft and lubricate.

(Note: housing and flange removed from picture for clarity)

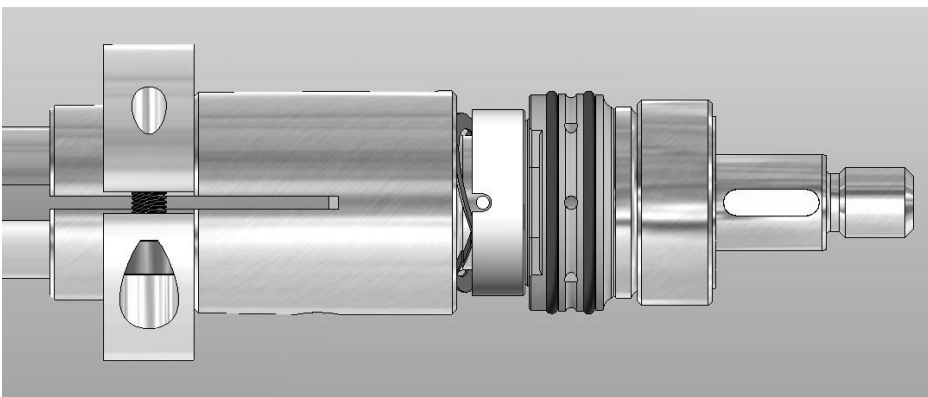


FIGURE 10

Slide seal driver assembly onto the shaft.

(Note: housing and flange removed from picture for clarity)



FIGURE 11

Install impeller key and outer seal driver o-ring. Lubricate o-ring.

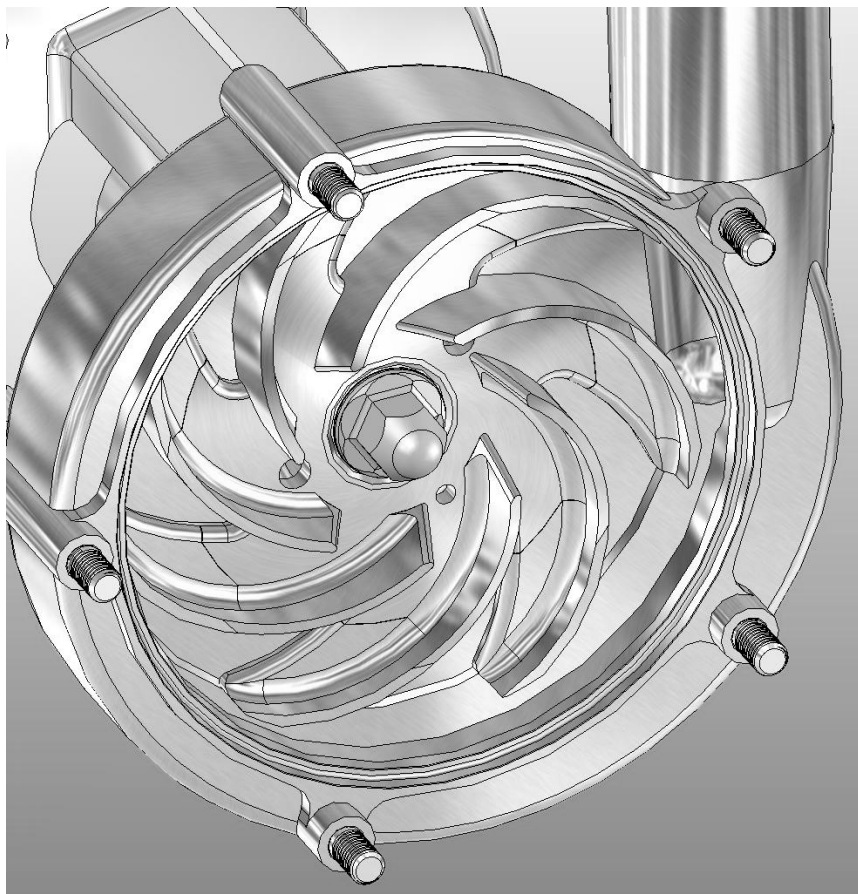


FIGURE 12

Slide impeller onto shaft making sure to align keyway in impeller with key in the shaft.

Lubricate impeller nut gasket and place it onto the impeller nut.

Thread impeller nut onto shaft. Place 3/8" rod or Phillips screwdriver in shaft hole. Use 15/16" socket with torque wrench and torque nut to 40 ft-lbs.

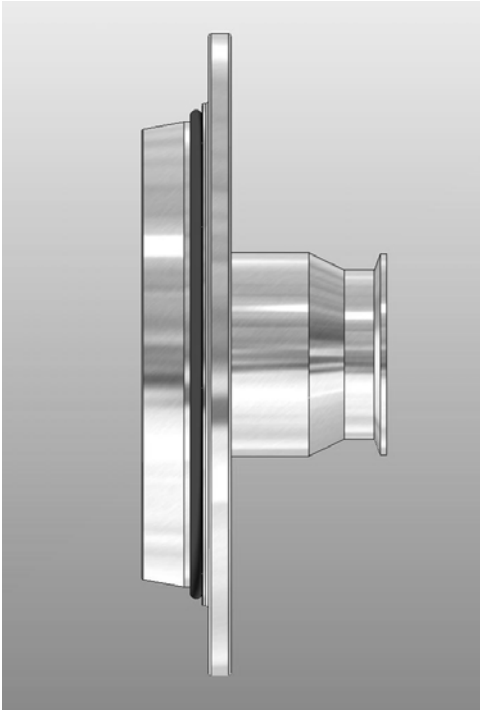


FIGURE 13

Install cover o-ring.

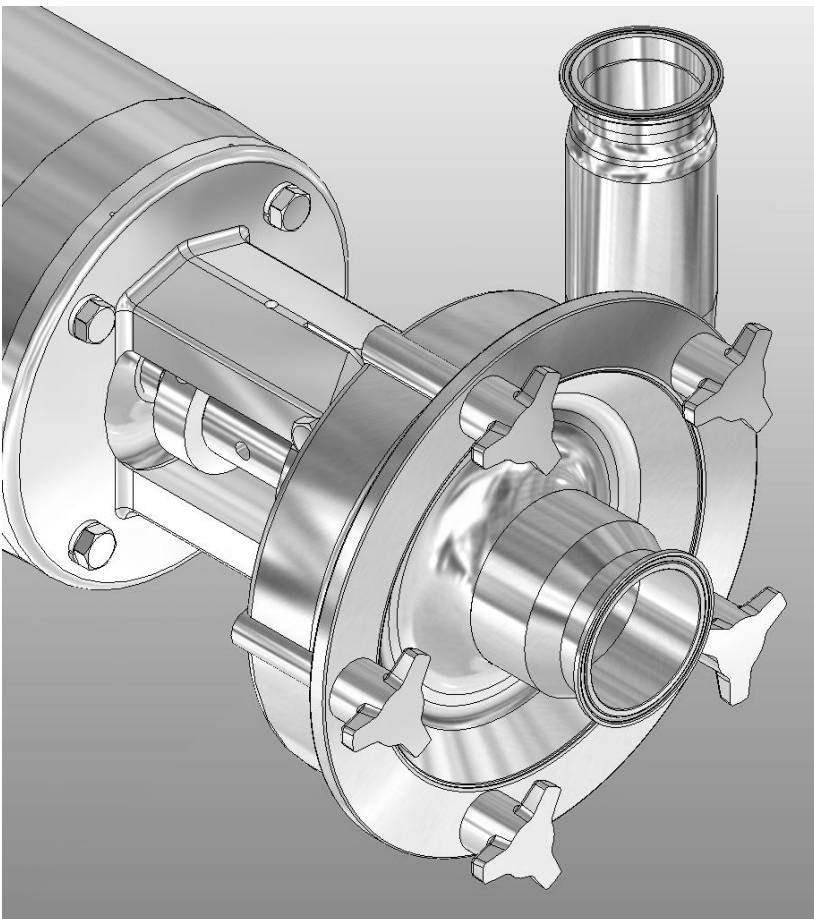


FIGURE 14

Install cover.

Install cover star nuts and tighten with a soft-faced hammer.

PUMP SHAFT REPLACEMENT

DISASSEMBLY

Disassemble pump as described in Figures 1-3

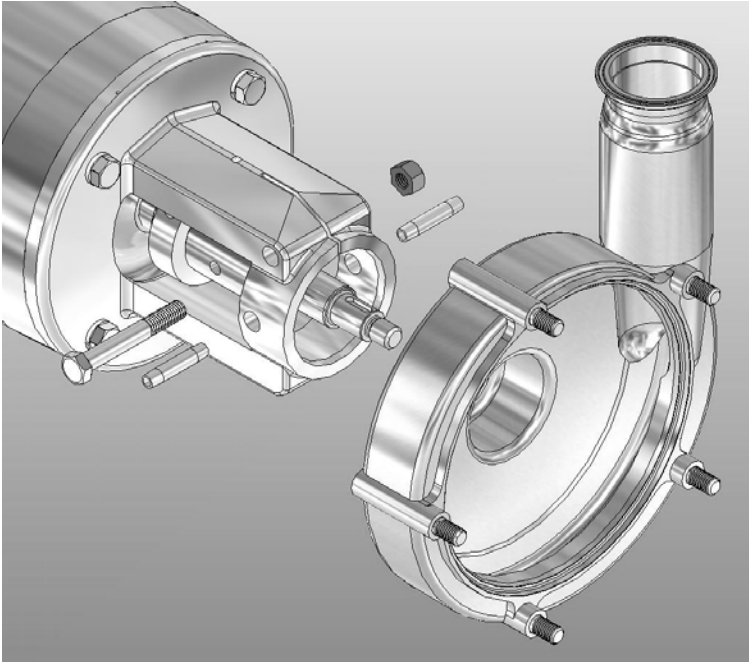


FIGURE 15 (700-354 MODEL PUMPS ONLY)

Double Seal and Water Cascade Only: Remove water pipe(s) using adjustable pliers.

Use two 3/4" wrenches to loosen the clamping bolt and nut. Remove the housing.

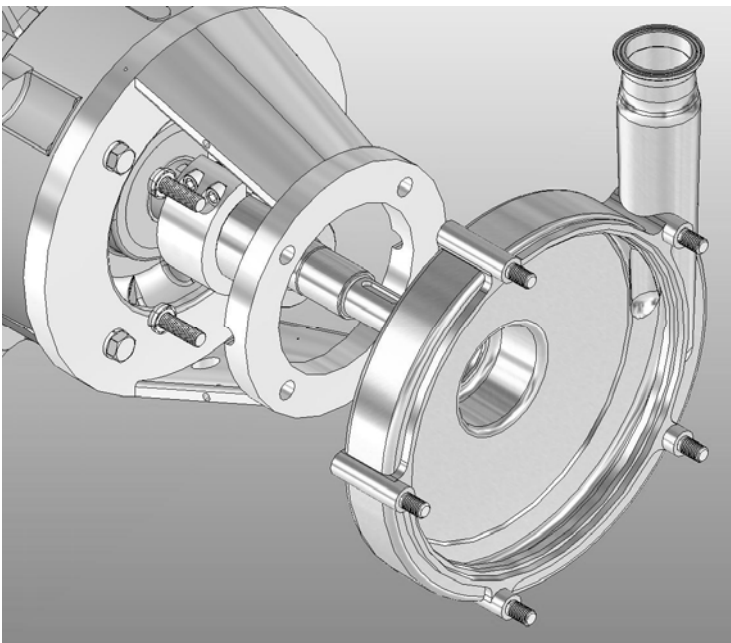


FIGURE 16 (345, 355, 1051 & 1161 MODEL PUMPS ONLY)

Double Seal and Water Cascade Only: Remove water pipe(s) using adjustable pliers.

Use a 3/4" socket to remove the housing bolts and washers. Remove the housing.

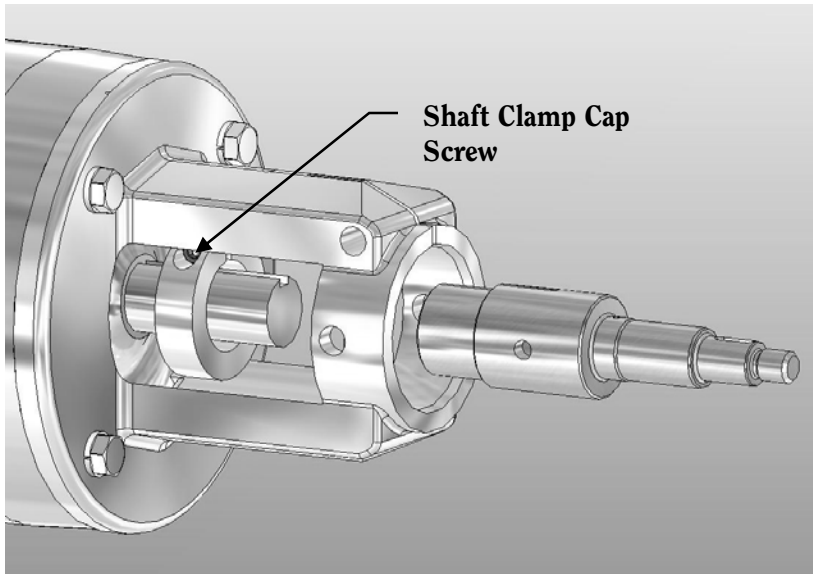


FIGURE 17

Use an Allen wrench to loosen the shaft clamp cap screw(s). Remove pump shaft.

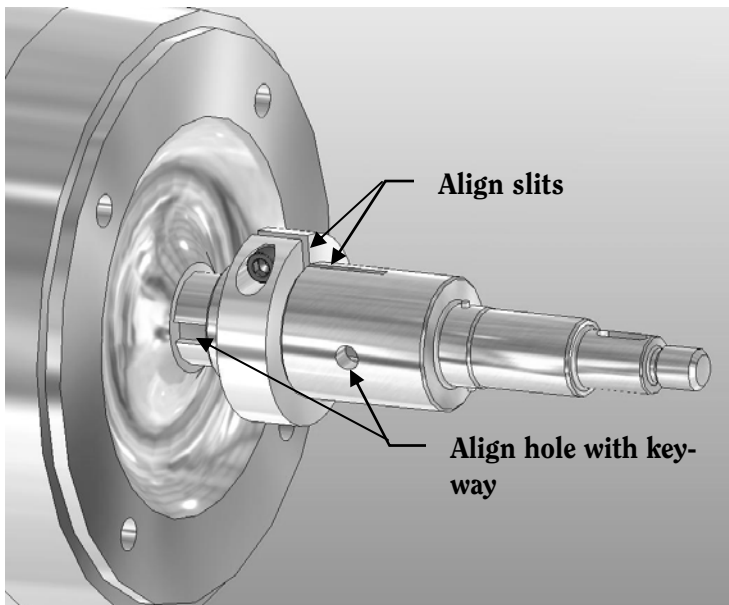
**ASSEMBLY**

FIGURE 18

Install new shaft making sure to align the slit in the shaft with the slit in the shaft clamp. Also align the keyway in the motor shaft with the hole in the pump shaft.

(Note: flange removed for clarity)

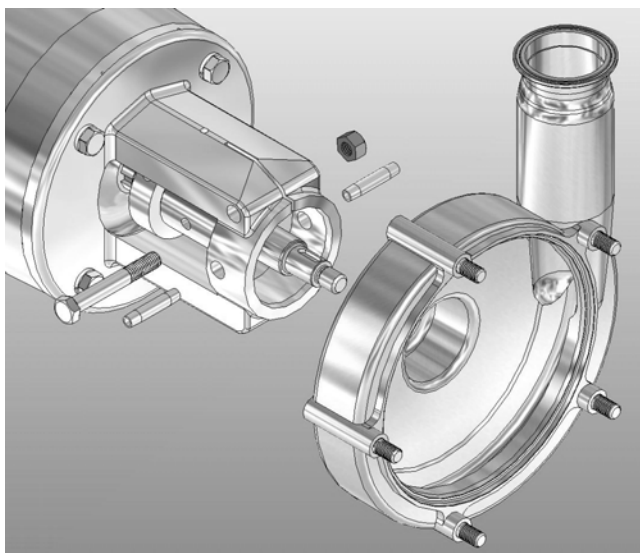


FIGURE 19 (700-354 MODEL PUMPS ONLY)

Install housing hub into the flange. Rotate the inlet to align it with the piping.

Use a 3/4" wrench and a 3/4" torque wrench to torque the clamping bolt to 55 ft-lbs.

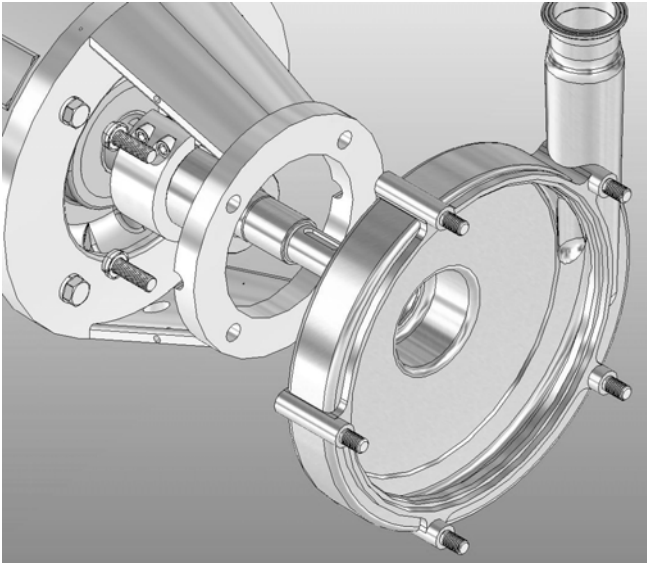


FIGURE 20 (345, 355, 1051 & 1161 MODEL PUMPS ONLY)

Install housing hub into the flange. Rotate the inlet to align it with the piping and align bolt holes.

Install the lockwashers and bolts. Use a 3/4" torque wrench to torque the bolts to 50 ft-lbs.

SETTING IMPELLER-TO-HOUSING GAP

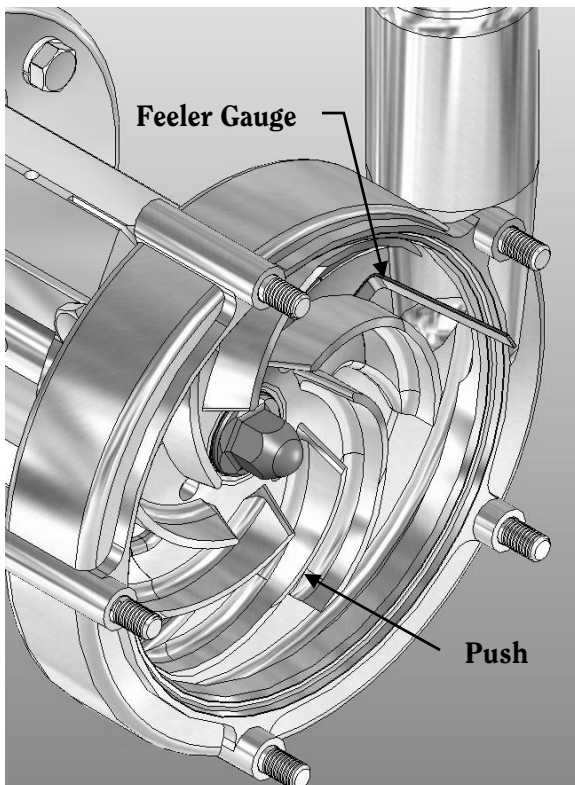


FIGURE 21

Assemble seal as described in figures 4-11.

Slide impeller onto shaft making sure to align keyway in impeller with key in the shaft.

Lubricate impeller nut gasket and place it onto the impeller nut. Thread impeller nut with gasket onto pump shaft. Use a torque wrench to torque the impeller nut to 40 ft-lbs.

Slide a feeler gauge between the impeller and housing. The thickness of feeler gauge is determined by the pump model. (Note: see page 3 for gauge thicknesses)

Set the impeller-to-housing gap (see figure 22) by pushing on the impeller. Once the feeler gauge fits snugly behind the impeller, tighten the shaft clamp bolt with an Allen wrench to the correct torque. (Note: see page 3 for torque values)

Remove feeler gauge.

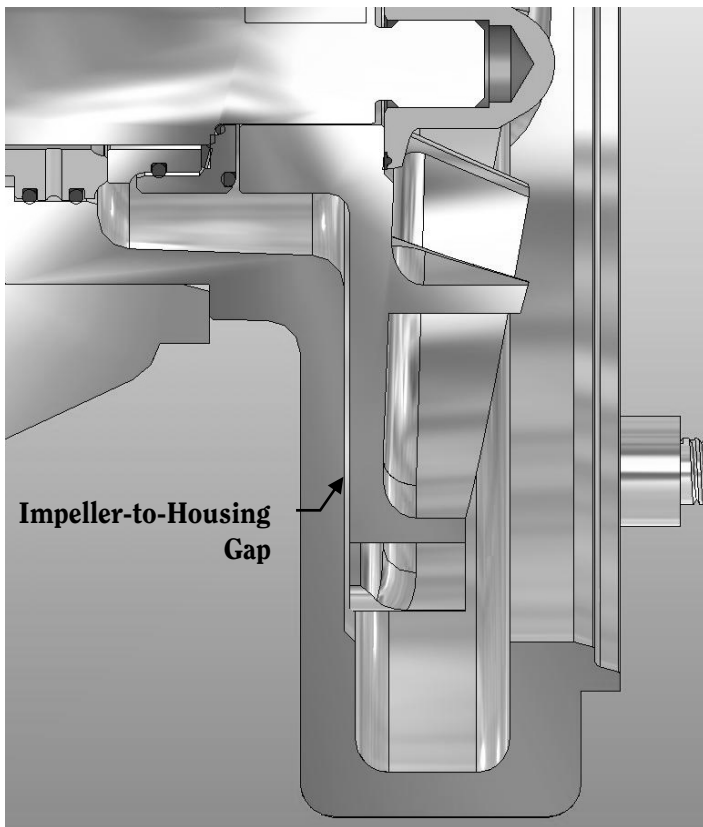


FIGURE 22

The impeller-to-housing gap is measured between the back of the impeller and the housing.

Install cover o-ring, cover and cover star nuts as described in figures 13-14.

MOTOR REPLACEMENT

DISASSEMBLY

Disassemble pump as described in figures 1-3.
Remove housing and shaft as described in figures 15-17.

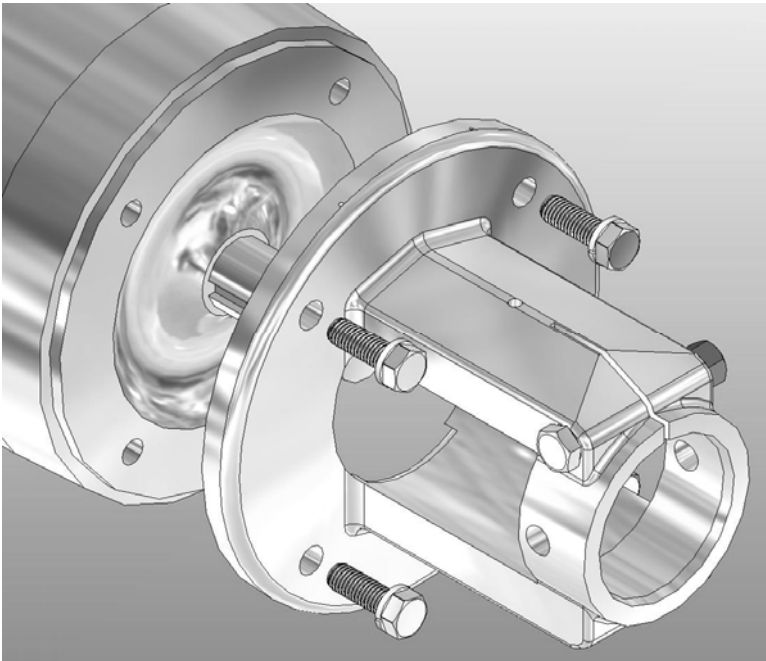


FIGURE 22

Use a socket to remove the motor bolts and washers. Remove the flange.

ASSEMBLY

Replace motor. Install flange onto motor. Replace bolts and washers. Use a torque wrench to tighten the bolts to the correct torque. (Note: see page 3 for torque values)

Install shaft and housing as described in figures 18-20.

Assemble seal as described in figures 4-11.

Set impeller-to-housing gap as described in figure 21.

Install cover o-ring, cover and cover star nuts as described in figures 13-14.

Replace guard(s) and water pipe(s) if necessary.

INSTALLATION

UNPACKING

Check the contents and all wrapping when unpacking the pump. Inspect the pump carefully for any damage that may have occurred during shipping. Immediately report any damage to the carrier. Remove the shaft guard and rotate the pump shaft by hand to make sure the impeller rotates freely. Keep the protective caps over the pump inlet and outlet in place until you are ready to install the pump.

INSTALLING

Prior to actually installing the pump, ensure that:

- The pump will be readily accessible for maintenance, inspection and cleaning.
- Adequate ventilation is provided for motor cooling.
- The drive and motor type is suitable for the environment where it is to be operated. Pumps intended for use in hazardous environments (i.e. explosive, corrosive, etc.) must use a motor and drive with the appropriate enclosure characteristics. Failure to use an appropriate motor type may result in serious damage and/or injury.

PIPING GUIDELINES

This section describes good piping practices to obtain maximum efficiency and service life from your pump.

Maximum performance and trouble-free operation require adherence to good piping practices.

- Ensuring proper piping support and alignment at both the suction inlet and discharge outlet can help prevent serious damage to the pump housing (**Figure 23**).
- Avoid abrupt transitions in the piping system (**Figure 24**).
- Avoid throttling valves in the suction piping.
- Keep suction lines as short and direct as possible.
- Ensure that the NPSH available in the system is greater than NPSH required by the pump.
- Avoid sump areas where sediments may collect (**Figure 25**).

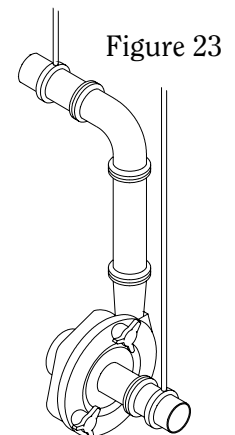


Figure 23

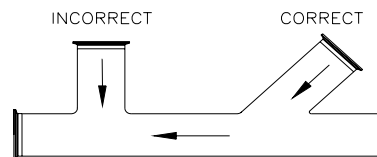


Figure 24

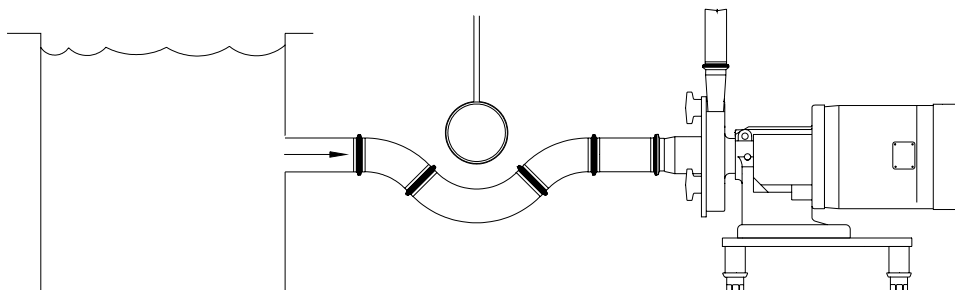
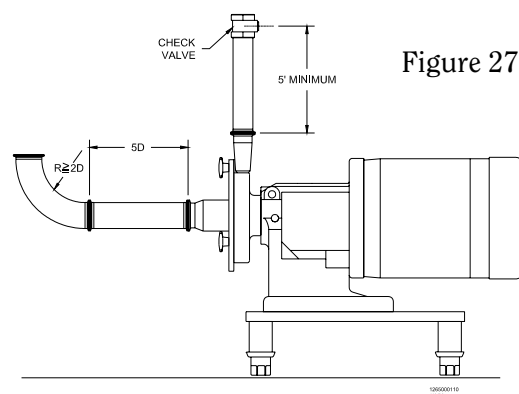
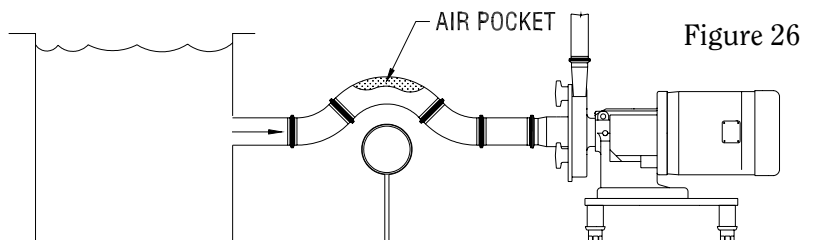


Figure 25

- Avoid the formation of air pockets in the piping (**Figure 26**).
- Avoid abrupt closure of shut-off valves, this may cause hydraulic shock which can cause severe damage to the pump and system.
- Avoid elbows in the suction line if possible. When necessary they should be located 5 pipe diameters away from the pump inlet, and have a bend radius greater than 2 pipe diameters (**Figure 27**).
- Check valves in discharge line should be a minimum of 5 ft. away from the pump outlet (**Figure 27**).



ELECTRICAL INSTALLATION

We use standard duty TEFC motors unless otherwise specified. Many motor options are available: washdown, flameproof, explosion proof, hostile duty or chemical duty.

The motor selected should meet the requirements of the specified operating conditions. A change in conditions (for example, higher viscosity, higher specific gravity, lower head losses) can overload the motor. When changing operating conditions or whenever there is any doubt, please contact Fristam Pumps, Inc., for technical assistance.

Have an electrician connect the motor using sound electrical practices. Provide adequate protection. Pumps fitted with mechanical seals must not run dry, not even momentarily. **Determine the direction of rotation by watching the motor fan, which must turn clockwise.**

PUMP OPERATIONS

START-UP INSTRUCTIONS

- Remove any foreign matter that may have entered the pump.
- Do not use the pump to flush the system!
- Check pump for proper rotation as indicated on the pump. **Proper motor direction is clockwise when looking at the fan end of the motor.** (NOTE: When checking the direction of rotation, the pump must be full of liquid.)
- Never run the pump dry, even momentarily. Seal damage can result.

SHUT-DOWN INSTRUCTIONS

- Shut off the power supply to the pump.
- Close the shut-off valves in the suction and discharge piping.
- Drain and clean the pump.
- Protect the pump against dust, heat, moisture and impact damage.

INSTALLATION OF WATER FLUSH FOR DOUBLE MECHANICAL SEAL

Set up the water flush for the double mechanical seal as shown (**Figure 28**). Use **only between 1-2 gallons per hour of water at a maximum pressure of 5 PSI**. Excessive flow of water through the seal increases the pressure inside the seal. **Note:** maximum pressure inside the seal is 5 PSI. **Excessive flow/pressure through the seal flush will cause excessive wear and shorten seal life.**

Pipe the exit side of the water flush with 2-5 feet physical height of tubing. This ensures that some water is always in the center seal and the seal never runs dry.

It is possible to inject steam through the center seal (within the pressure requirements). We do not recommend using steam alone for the cooling/lubricating of the seal.

It is desirable to have the flush water on the outlet side visible. This allows an easy check to see that the flush water is on and also if the seal is functioning properly. In a malfunctioning seal the flush water will disappear, become discolored, or show an unusual increase in flow. If these conditions exist, check the seal and replace if necessary.

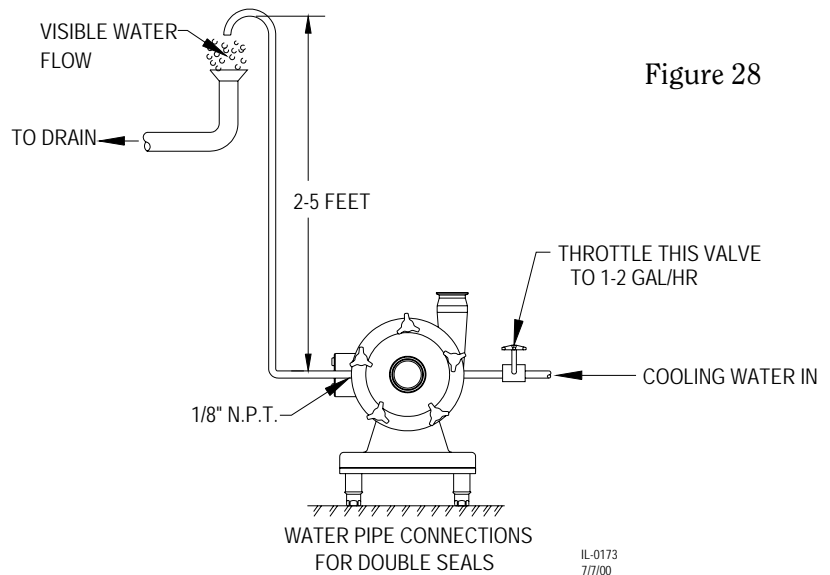


Figure 28

INSTALLATION OF WATER CASCADE

The water cascade (if supplied) is piped through the hub of the pump housing and into the stationary seal. Since there is no rear seal, the flush water will exit through the rear of the seal area (**Figure 29**).

Not all FPR pumps require a water cascade on the seal.

Use about 1-2 gallons per hour of water at a maximum pressure inside the seal of 5 psi.

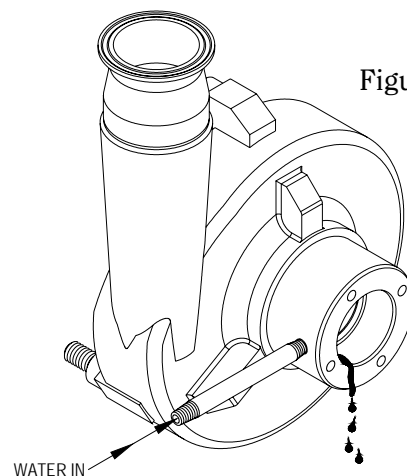


Figure 29

NOTICE OF TERMS, WARRANTY PROVISIONS INCLUDING DISCLAIMERS, CLAIMS AND LIMITATION OF LIABILITY

Prices and all terms and conditions of sale are established in current price sheets and are subject to change without notice. All orders are subject to acceptance by Fristam Pumps USA, Limited Partnership.

Each Fristam Pumps item is warranted to be free from manufacturing defects for a period of one (1) year from the date of shipment, providing it has been used as recommended and in accordance with recognized piping practice, and providing it has not been worn out due to severe service, such as encountered under extremely corrosive or abrasive conditions.

This warranty is expressly in lieu of any other warranties expressed or implied, including but not limited to, any implied warranty of merchantability or fitness for particular purpose. All other warranties whatsoever, expressed or implied by law or otherwise, are hereby excluded.

All claims must be in writing and must be mailed or delivered by purchaser within thirty (30) days after purchaser learns of the facts upon which such claim is based. Any claim not made in writing and within the time period specified above shall be deemed waived.

Purchaser's sole and exclusive remedy and Fristam Pumps maximum liability for claims arising hereunder or for negligence for any and all losses and damages resulting from any cause shall be either the repair or replacement of defective items or, at Fristam Pumps' option, the refund of the purchase price for such items. In no event, including in the case of a claim for negligence, shall Fristam Pumps be liable for incidental or consequential damages, including loss of profits.

No person, including any representative employee or agent of Fristam Pumps is authorized to assume on behalf of Fristam Pumps any liability or responsibility in addition to or different from that described in this provision. Any and all representations, promises, warranties or statements that are in addition to or different from the terms of this provision are of no force or effect.

If any provision of this Notice is held to be invalid, such provision shall be severed and the remaining provisions shall continue to be in force.



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Drawing # 1250000002 Updated 12/28/07
Part # 1050000040
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