

# Ampco Pumps

## LF & LM Series Pump

### Instruction & Maintenance Manual



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## TECHNICAL DATA

### **SPECIFICATIONS**

MAXIMUM INLET PRESSURE.....	150 PSI / 10.3 BAR
TEMPERATURE RANGE.....	-40° F → 400° F/ -40° C → 204° C

### **MATERIALS OF CONSTRUCTION**

Casing.....	AISI 316L Stainless Steel
Cover .....	AISI 316L Stainless Steel
Impeller .....	AISI 316L Stainless Steel
Seal Driver.....	AISI 316L Stainless Steel
Adapter.....	AISI 304 Stainless Steel
PRODUCT CONTACT SURFACE FINISH.....	32Ra (standard)
Optional Finishes.....	25Ra, 20Ra, 15Ra, Electro Polish
O-RINGS & GASKETS.....	Viton (standard)
Optional Materials.....	EPDM, Buna (others per request)

### **SEAL**

Type.....	Internal Single Mechanical
Optional.....	Internal Single Mechanical Cascade
Optional.....	External Double Mechanical
Pressure (flush for double seal).....	4-5 PSI / 0.27-0.34 BAR
Water Consumption (flush for double seal).....	4-8 GPH /15-19 LPH
Stationary Seal Material.....	Silicon Carbide
Rotating Seal Material.....	Carbon
Optional Material.....	Silicon Carbide

### **MOTOR**

**refer to the motor's owners manual**

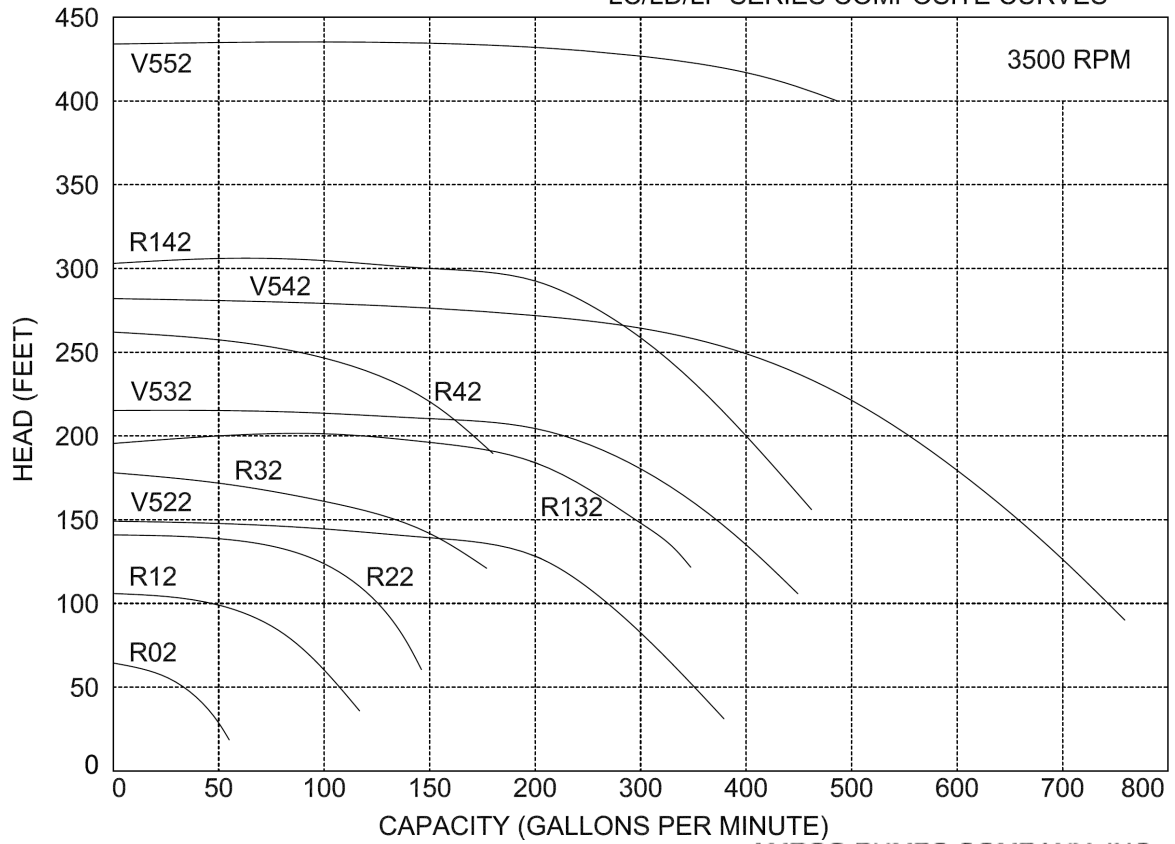
### **RECOMMENDED TORQUE VALUES**

Impeller nut LFX-pumps.....	90ft-lbs / 122N-m
Impeller nut LF/LM-pumps.....	40ft-lbs / 54N-m
Adapter Clamping bolt.....	55ft-lbs / 75N-m
Adapter Cap Screws	
NEMA 56C-140TC/ IEC 80-112.....	20ft-lbs / 27N-m
NEMA 180TC-280TC/ IEC 132-200.....	50ft-lbs / 68N-m
NEMA 320TC-360TC.....	110ft-lbs / 149N-m
Shaft Collar Socket Head Cap Screws	
NEMA 56C-140TC/ IEC 80-112.....	6ft-lbs / 8N-m
NEMA 180TC-280TC/ IEC 132-200.....	15ft-lbs / 20.5N-m
NEMA 320TC-360TC.....	40ft-lbs / 54N-m

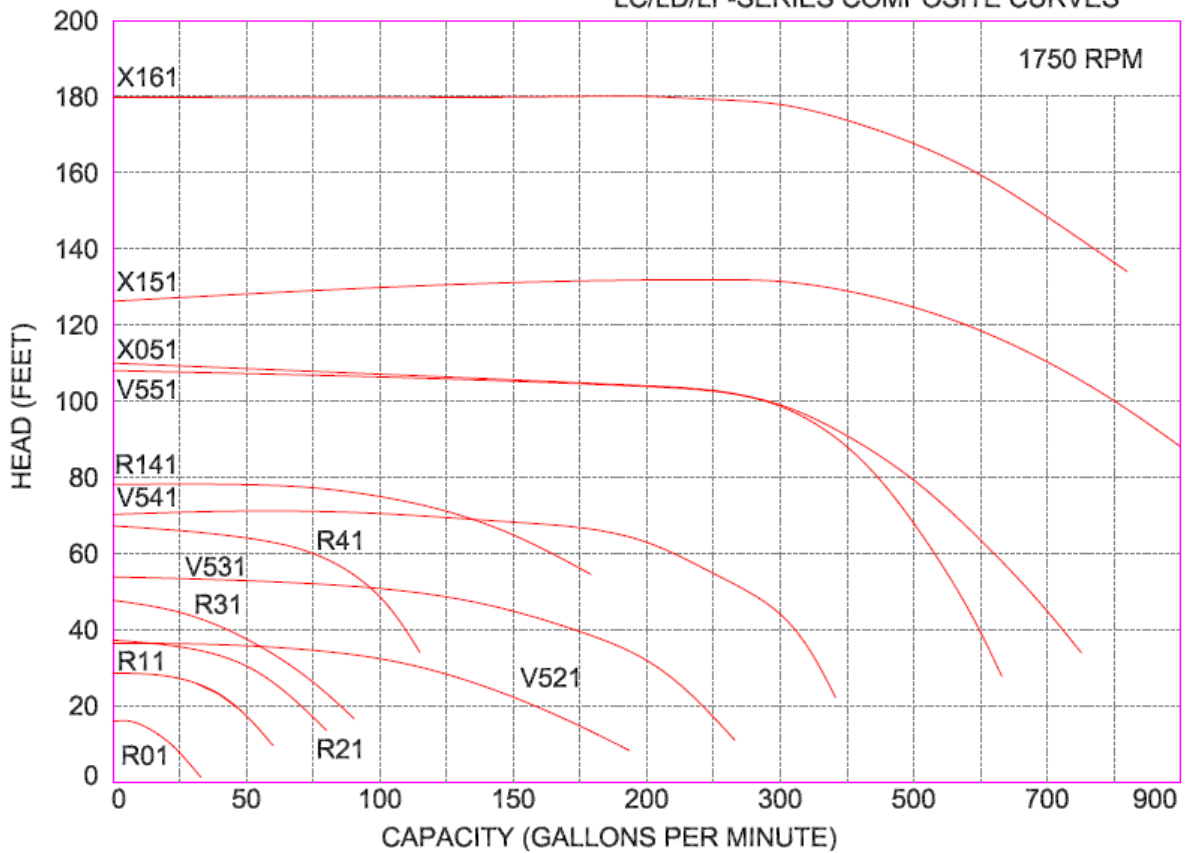
### **IMPELLER GAP**

<b>R (round internal cavity) LF and LM pumps.....</b>	<b>0.02" / 0.5mm</b>
<b>V (volute) LF and LM pumps.....</b>	<b>0.04" / 1.0mm</b>
<b>X pumps.....</b>	<b>0.06" / 1.5mm</b>
<b>401 Pump.....</b>	<b>0.08" / 2.0mm</b>

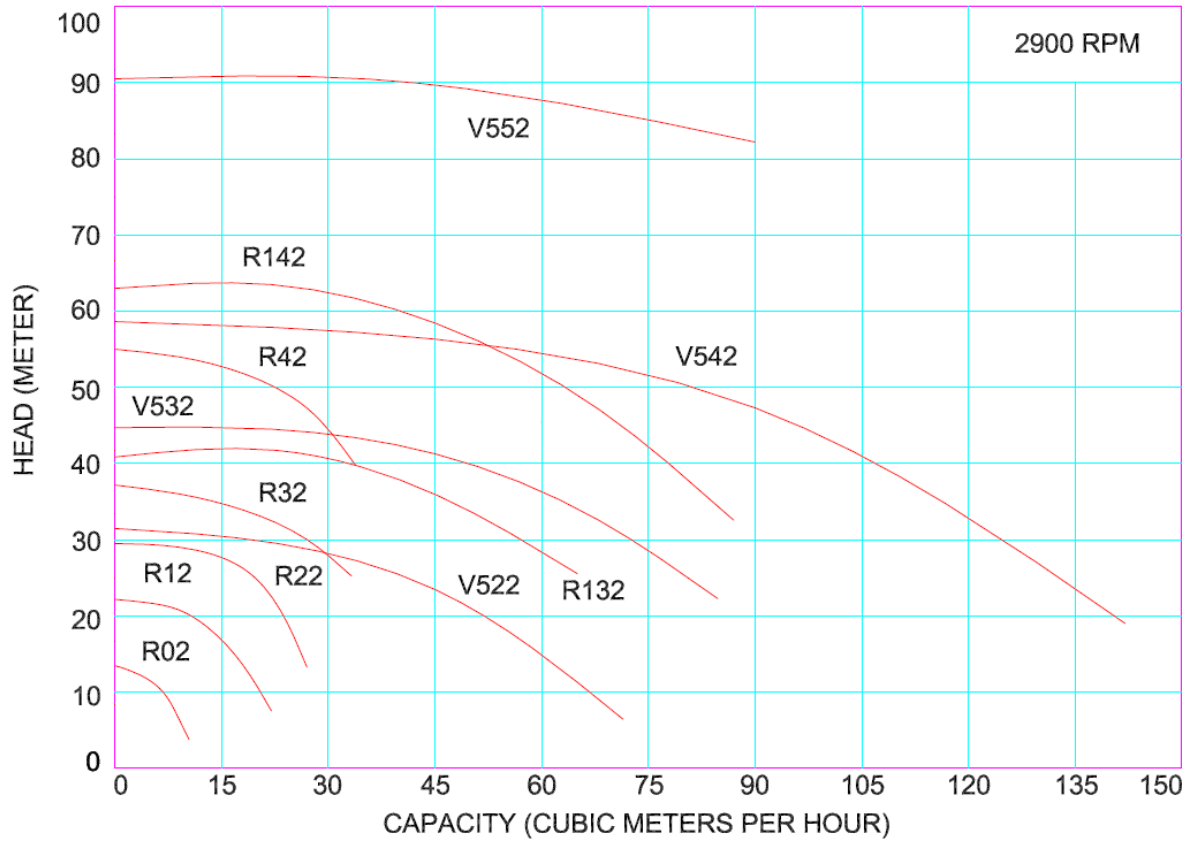
AMPCO PUMPS COMPANY, INC.  
LC/LD/LF-SERIES COMPOSITE CURVES



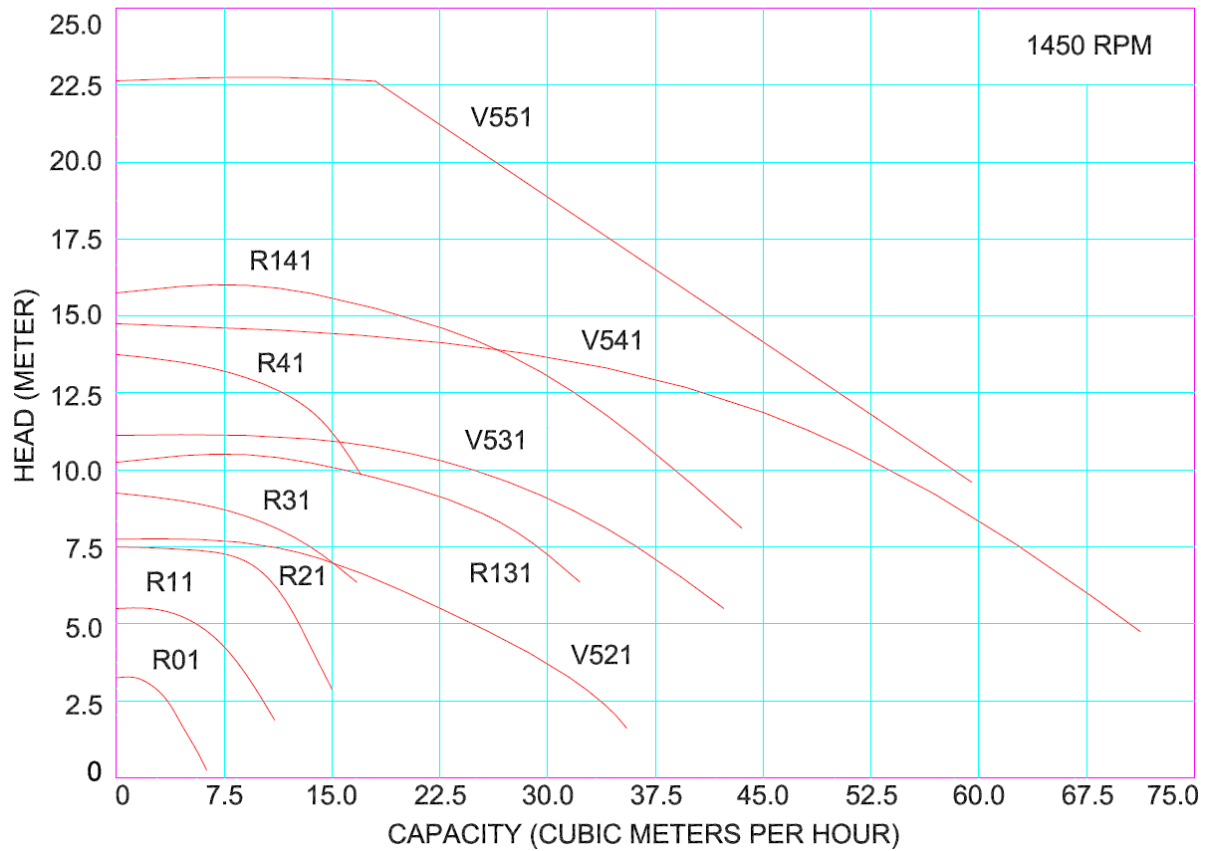
AMPCO PUMPS COMPANY, INC.  
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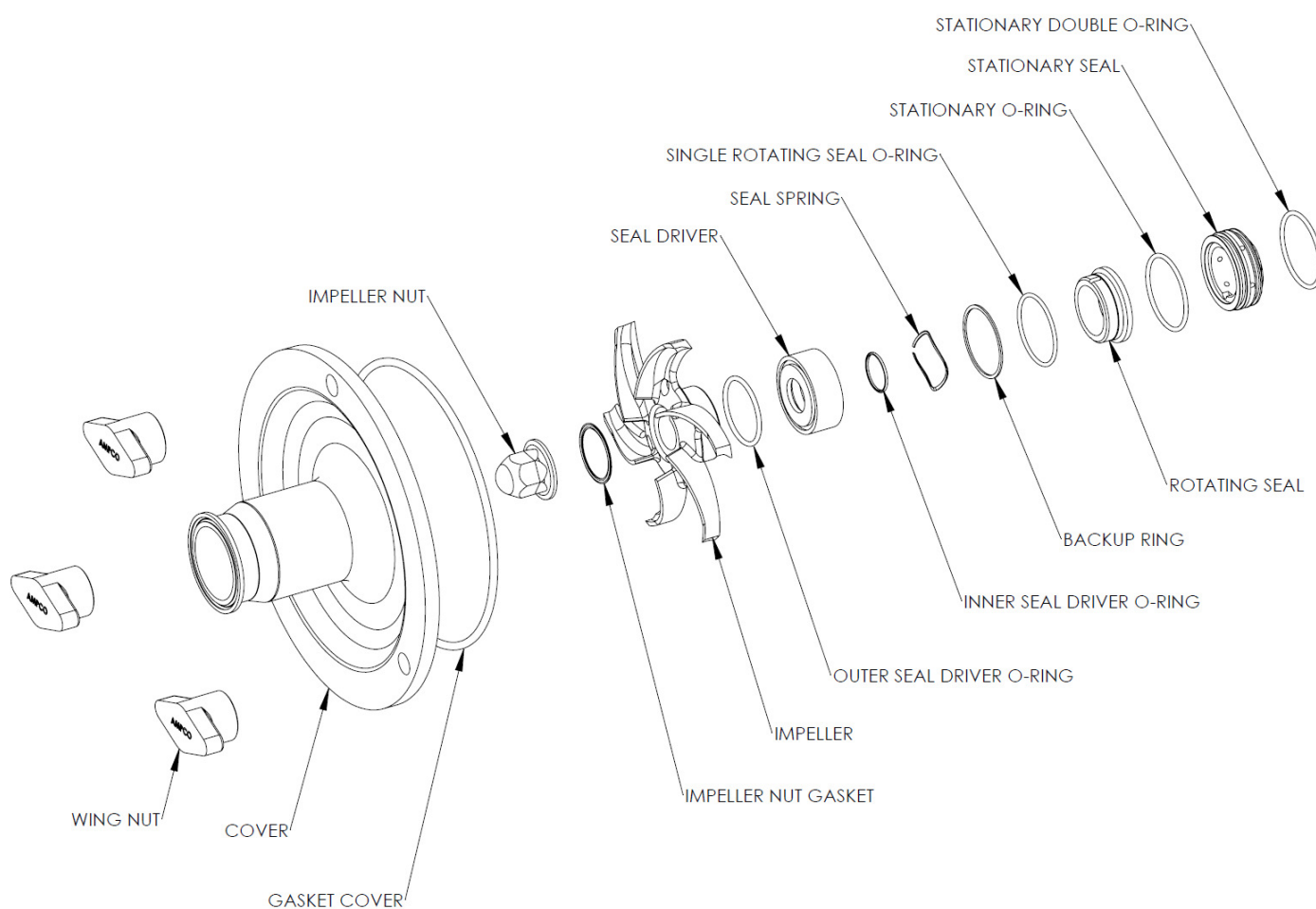
AMPCO PUMPS COMPANY, INC.  
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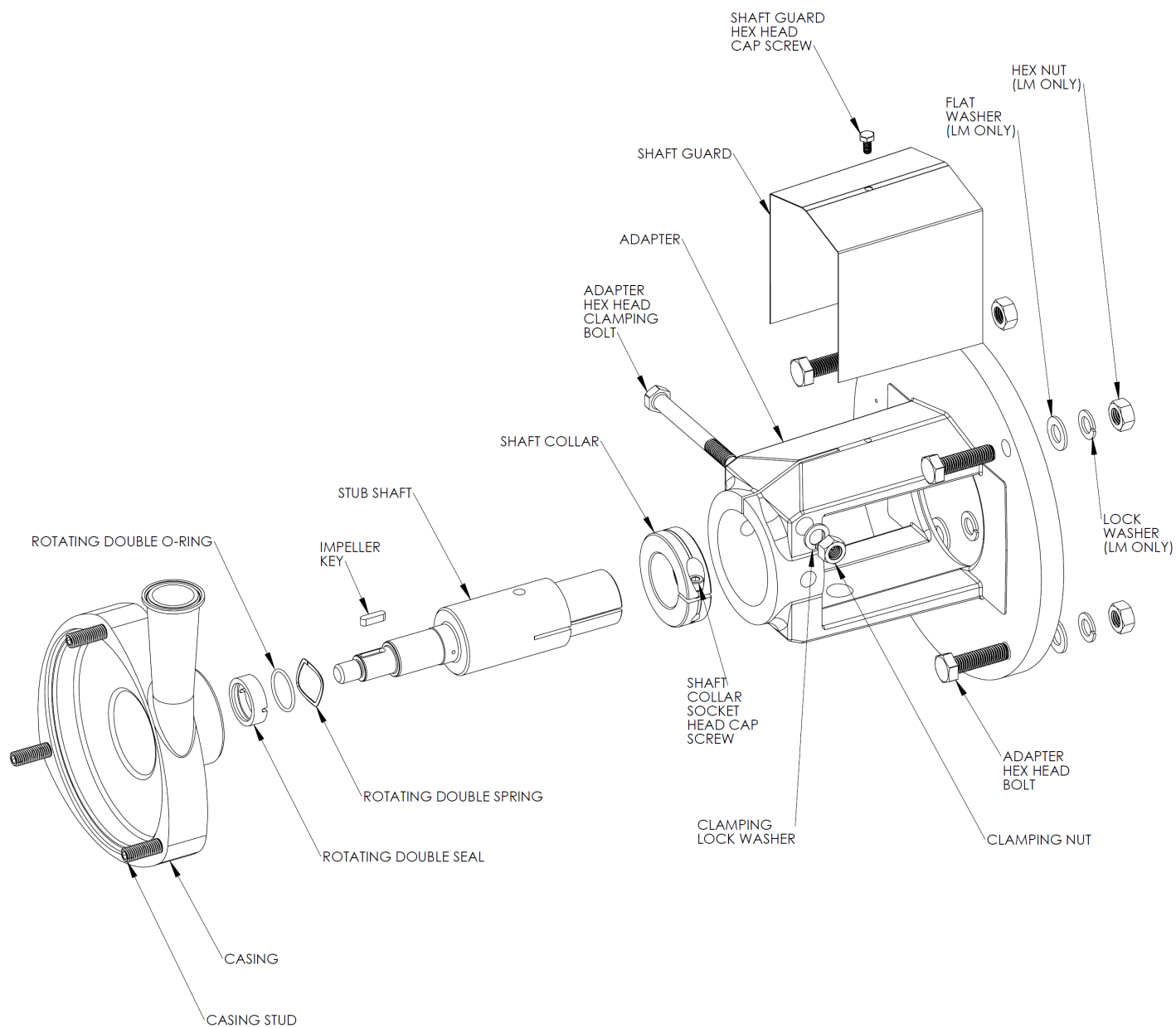


AMPCO PUMPS COMPANY, INC.  
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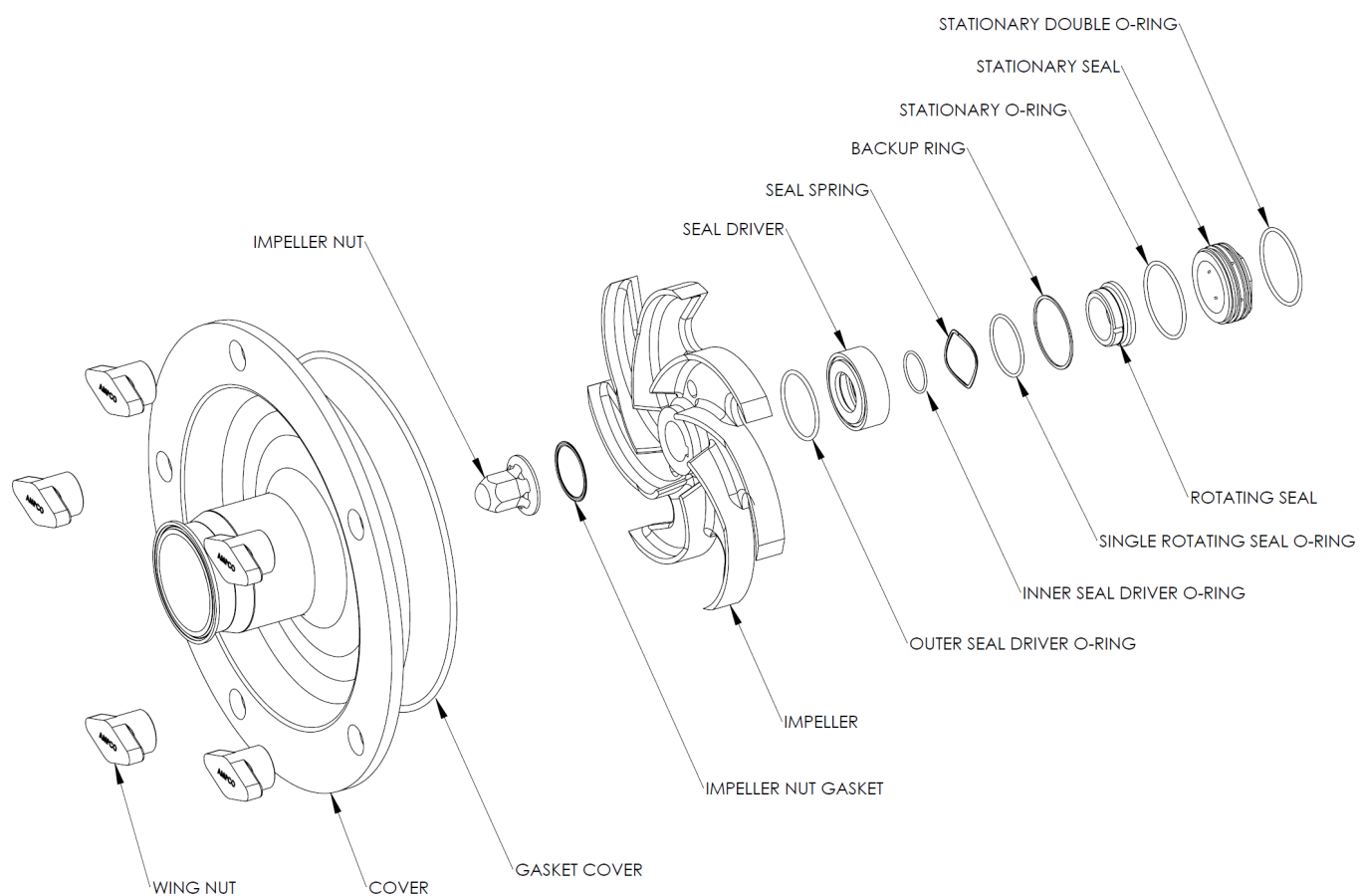


## EXPLODED ASSEMBLY LF/LM PUMPS: R00, R10, R20, R30, R40, R130, V520, V530 AND V540 WITH THE 757 SEAL

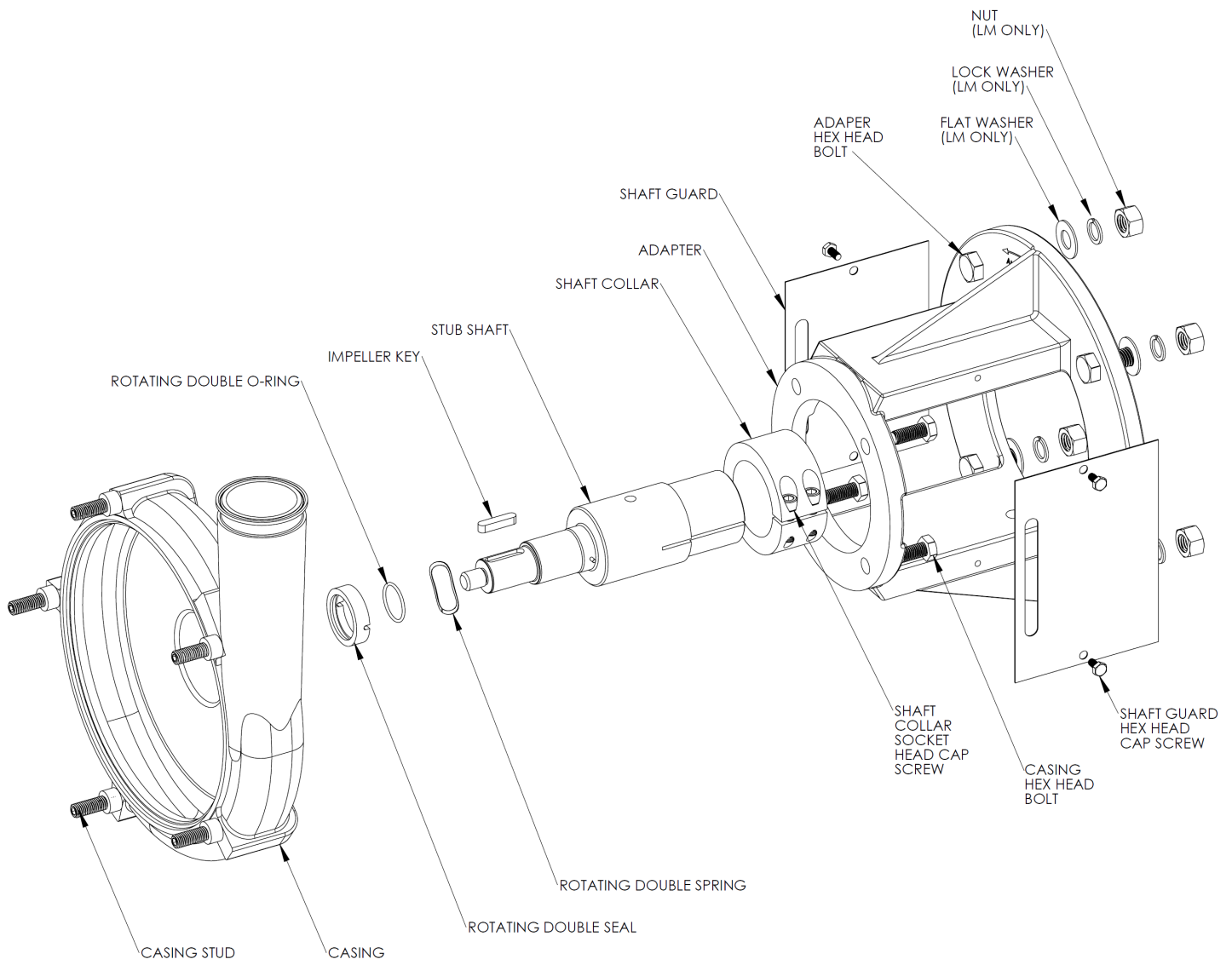




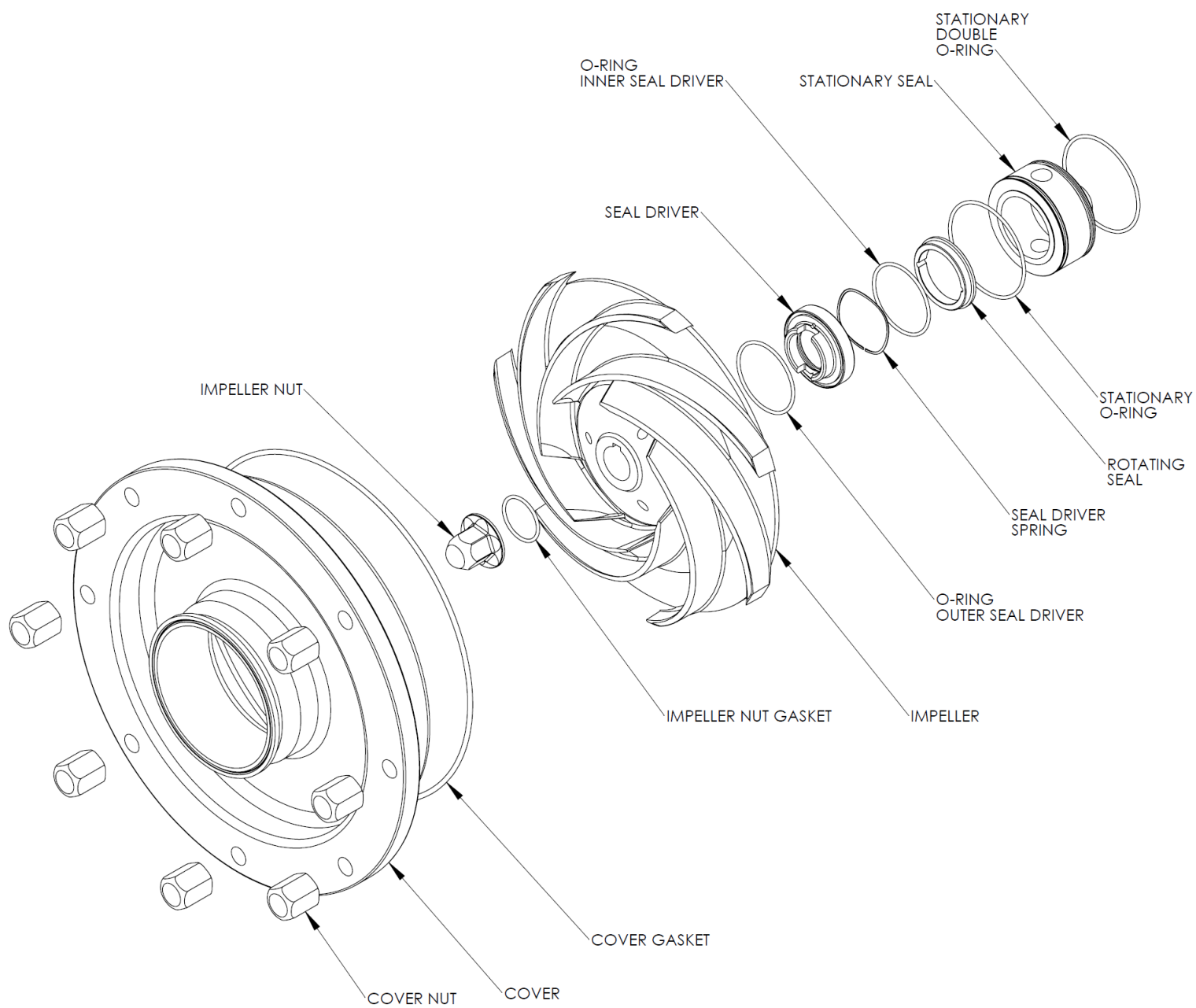
# EXPLODED ASSEMBLY LF PUMPS: V550, X051, X151, X161 WITH THE 758 SEAL

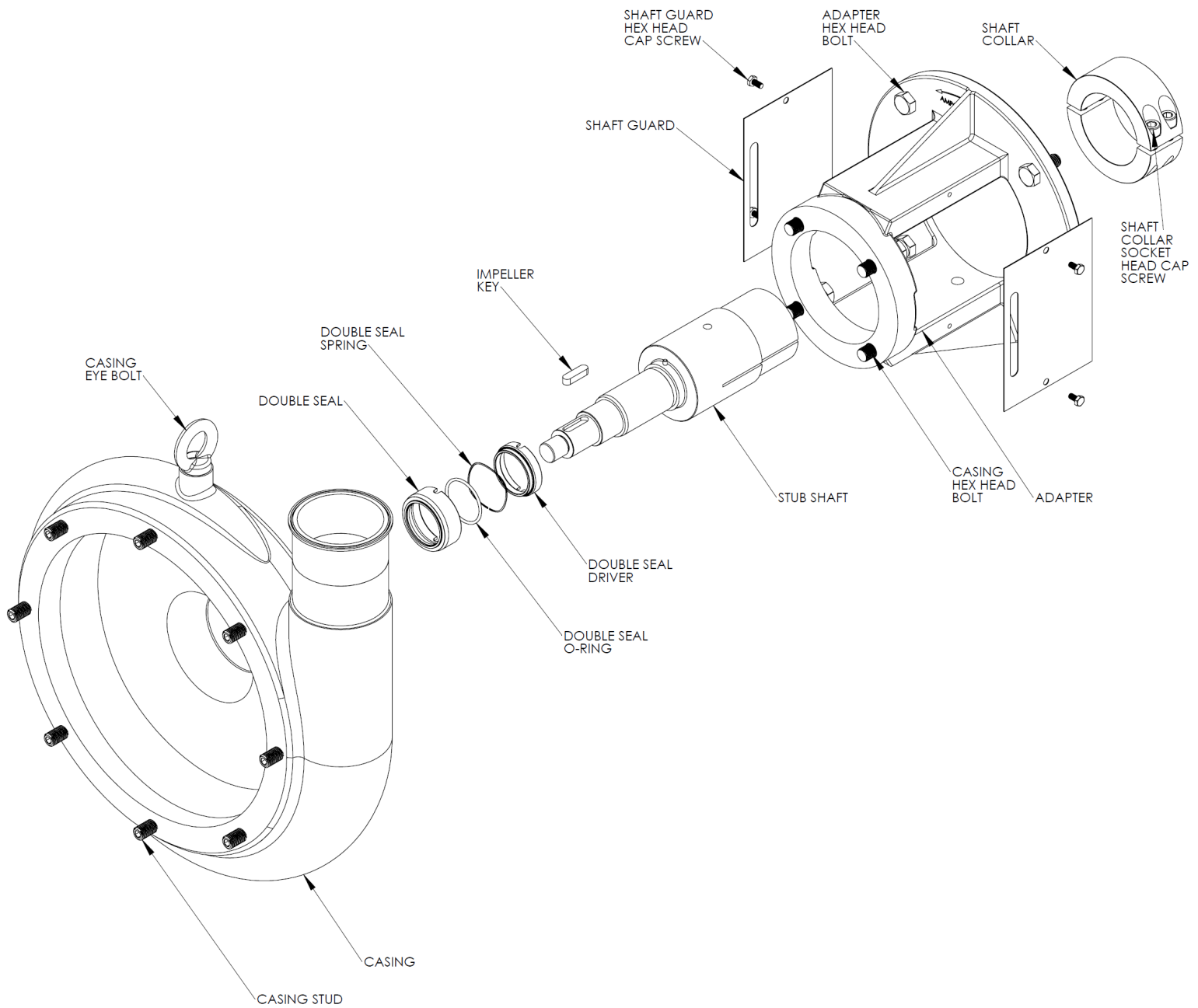




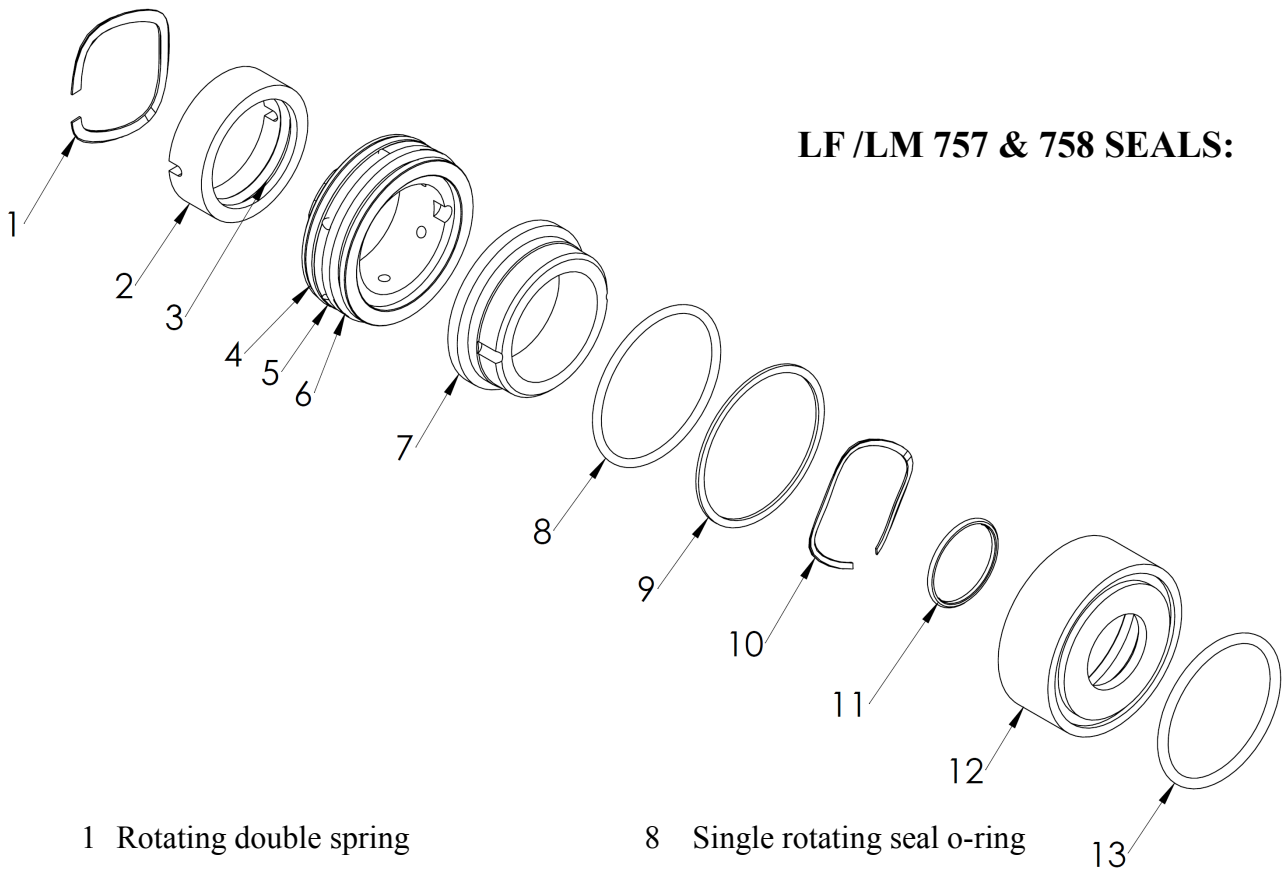


## EXPLODED ASSEMBLY LF 401 PUMPS:





## LF /LM 757 & 758 SEALS:



1 Rotating double spring

2 Rotating double seal

3 Rotating double o-ring

4 Stationary double o-ring

5 Stationary seal

6 Stationary seal single o-ring

7 Single rotating seal

8 Single rotating seal o-ring

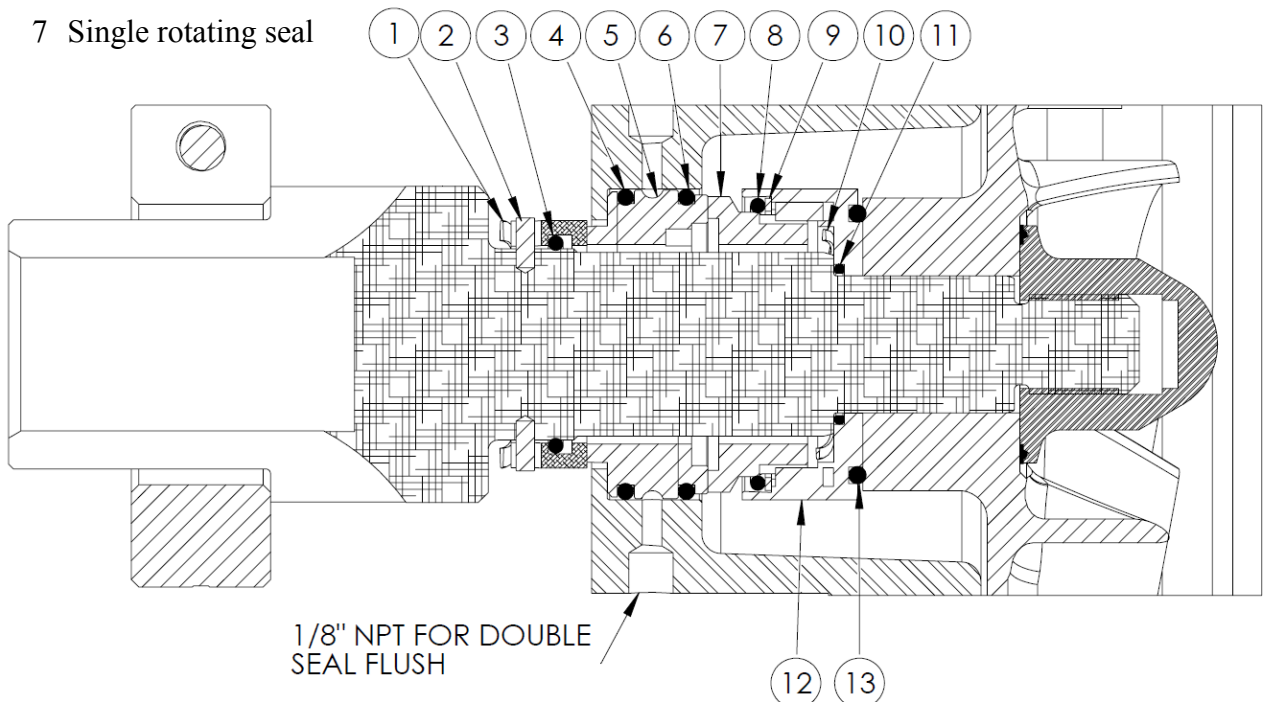
9 Backup ring

10 Seal spring

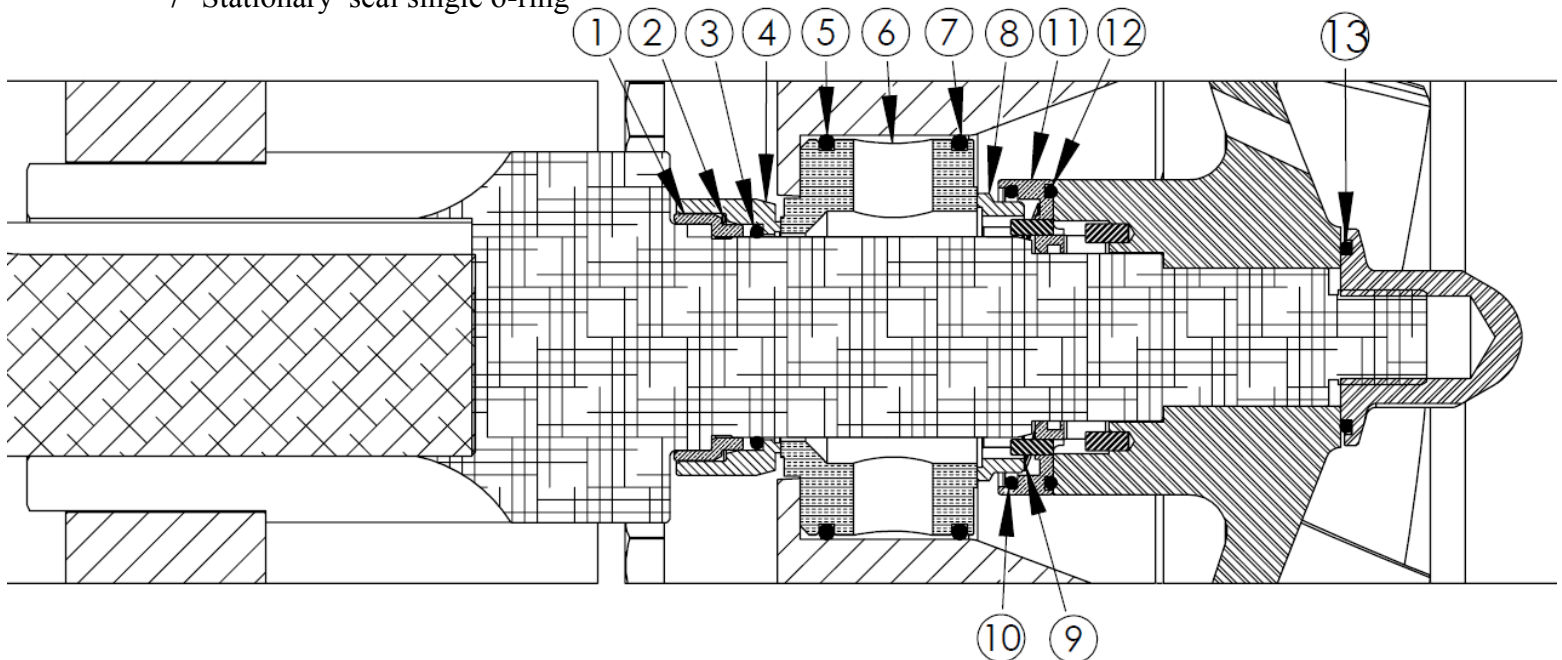
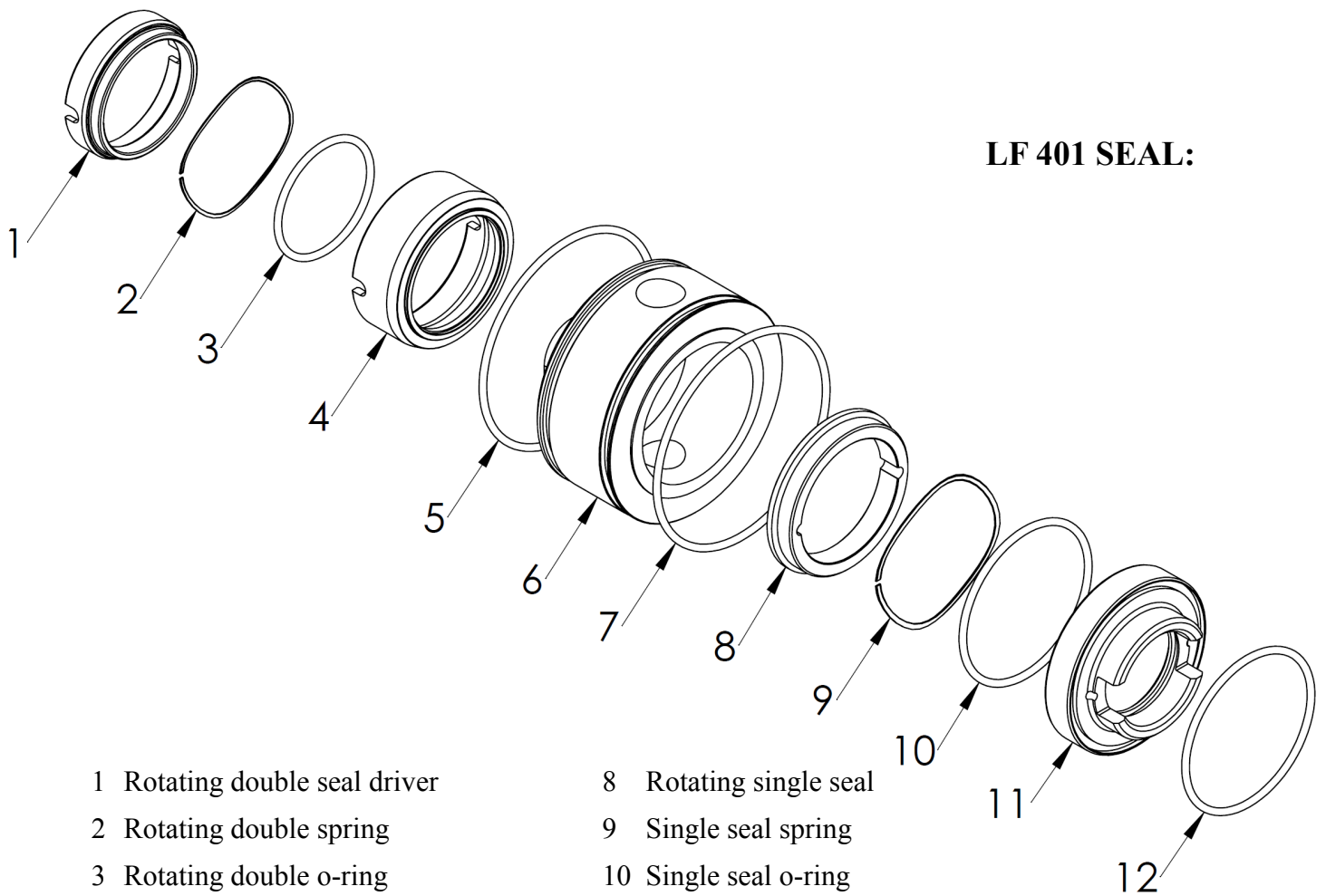
11 Seal driver inner o-ring

12 Seal driver

13 Seal driver outer o-ring



## LF 401 SEAL:



## **SERVICE MAINTENANCE AND SCHEDULING**

### **DAILY PUMP MAINTENANCE CHECKS**

1. Pump leakage (seal or otherwise)
2. Pressure reading and flow indication
3. Change in operating sound
4. Change in bearing temperature
5. Flow through lip seal lines

Motor lubrication schedule:

Every 2200Hrs of standard service.

Every 1100Hrs of severe service.

Every 220Hrs of extreme service.

Standard service is 8-16 hours of service and up to 104°F/40°C in a clean/little corrosion atmospheric contamination.

Severe service is 16+ hours of service per day up to 120°F/50°C in a moderate dirt/corrosion atmospheric contamination.

Extreme service is 8-16 hours of service per day over 120°F/50°C in a severe dirt, abrasive dust, corrosive heavy shock or vibration environment.

### **SEMI-ANNUAL PUMP MAINTENANCE CHECKS**

1. Mechanical seal assembly
2. Motor bearing lubrication

### **ANNUAL PUMP MAINTENANCE CHECKS-INCLUDES SEMI-ANNUAL MAINTENANCE CHECKS PLUS:**

3. Remove seal for inspection
4. Bearing check
5. Check of axis/running clearance of impeller

### **CONTINGENCY PLAN**

FOR INSPECTION FINDINGS AND BREAKDOWNS, AN ADEQUATE SUPPLY OF PROBABLE REPLACEMENT PARTS SHOULD BE KEPT ON HAND.

THE MINIMUM SPARE PARTS ARE AS FOLLOWS:

1. Single mechanical seal kit
2. Cover gasket
3. Impeller key

IN ADDITION AMPCO RECOMMENDS

4. Impeller
5. Cover
6. Impeller nut

Where service cannot be interrupted, a complete stand-by pump unit fully assembled (in a by-pass line) is recommended.



## PUMP INSTALLATION

### Receiving pumps:

Visually inspect shipping crate(s)/pallet(s) for damage. Ampco pumps will be shipped in boxes labeled Ampco Pumps or in crates. If there is any damage it is imperative to notify the driver at the time of delivery. Failure to do so will make it difficult, if not impossible, to file a damage claim and Ampco Pumps will not be held accountable. Please contact Ampco Pumps shipping department with damage details ASAP.

Once unpacked, carefully inspect the pump for any damage that may have occurred during shipping. Using a 15/16" socket, an extension drive and ratchet turn the impeller nut to make sure the impeller turns freely. There should be a little noise from the seal which is normal. If there is metal to metal contact when the impeller is turned shipping damage is likely. Leave the protective covers on the inlet and discharge connections until the pump is installed and is ready to be connected to piping.

### Pump location:

Install pump in an optimal location. Be sure that there is room around the pump so it can be accessed readily for maintenance. Ensure that the motor has adequate ventilation. Make sure the motor type is suitable for the environment in which it is installed.

### Electrical installation:

Have a qualified electrician connect the motor using sound electrical practices. Do not test run the motor with the pump dry. Mechanical seals can be damaged running dry even momentarily. The pump must be flooded and the flush must be connected with flushing water flowing before starting the pump. The pump and motor has been selected for a specific environment and system application. Changing the environment or system conditions (i.e. change of fluid, change in head losses, change in NPSHr) can overload the motor. When changing system conditions or when in doubt, contact Ampco Pumps Company for technical assistance and someone will be ready to assist.

### Double seal flush:

Install flush piping as shown in figure 23. The regulating valve must be on the inlet end of the flush. The flush requires 4-8 gallons per hour at 1 BAR or 14.5 PSI. The tubing on the exit side of the flush has a least 2 ft / 0.6m of height so once the flush has ran there will be a small amount of water on the seal and it will not run dry. Direction of flow should always be from a lower elevation inlet to a higher elevation outlet to evacuate air if there is a difference in elevation.

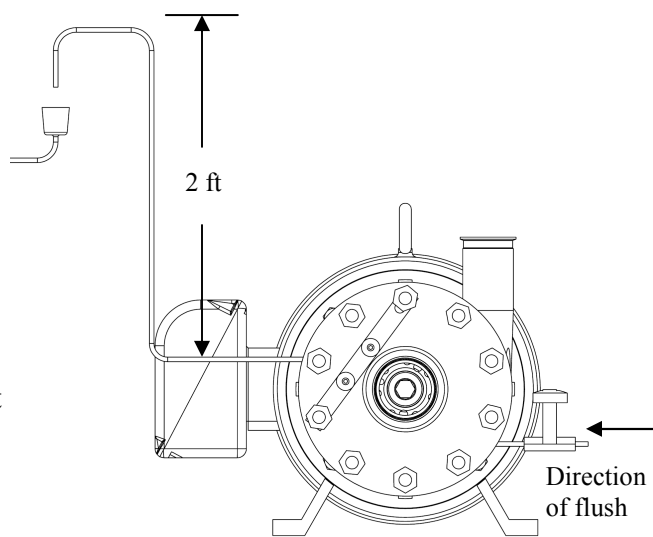
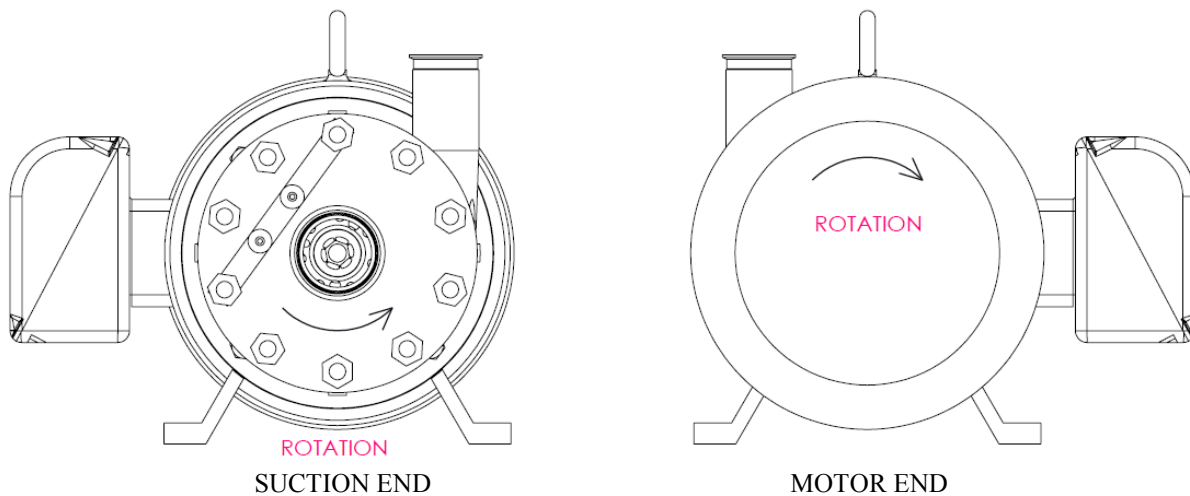


Figure 23

### Pump operation:

Make sure the pump is clean and free of any foreign matter.

Once the motor, flush and piping all have been properly connected, the flush is turned on and is visibly flowing (if the pump has a flush option) and the pump has been flooded, the pump can be momentarily turned on to check the motor rotation. The correct rotation is counter-clock wise while looking at the pump from the suction end clock wise if looking at the pump from the motor end.



When the rotation of the motor has been verified to be correct the pump is ready to run continuously for service.

### Shut down instructions:

Turn off power supply to the pump.  
Close shut-off valves.  
Drain and clean pump.



## PUMP DISMANTLING & SEAL REMOVAL

**ATTENTION!** BEFORE ATTEMPTING ANY SERVICE ON ANY PUMP OR MOTOR, DISCONNECT OR LOCKOUT ELECTRICAL POWER TO THE PUMP MOTOR. IF THE PUMP AND MOTOR ARE TO BE REMOVED AS A UNIT, NOTE THE WIRING AND CONFIGURATION. USE COLORED OR NUMBERED TAPE TO MARK THE WIRE CONNECTIONS OF THE PUMP MOTOR AND POWER SOURCE, FOR RE-CONNECTION.

### TOOLS REQUIRED TO DISMANTLE PUMP AND REMOVE SEAL:

Socket wrench for the impeller nut

Torque wrench

3/8" round bar

90° o-ring pick

Dead blow hammer (soft face)

7/16" wrench

1. Disconnect electrical power to the pump motor and follow any lockout / tag-out procedures in place at your facility.
2. Disconnect pump from the suction piping. Drain all fluids from the pump.

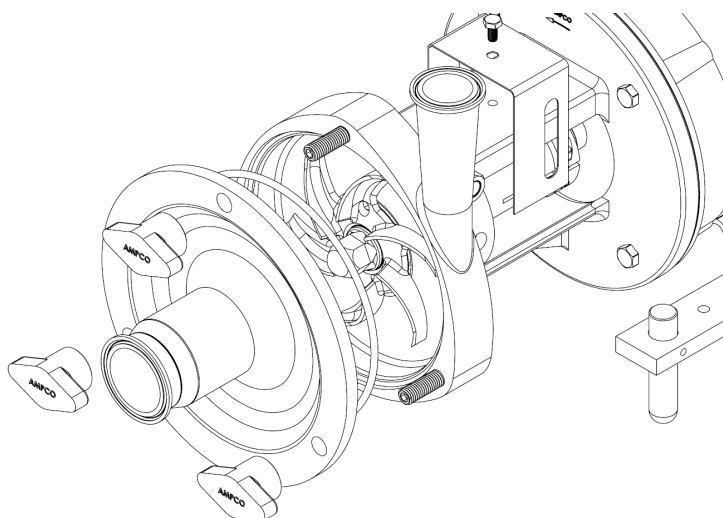


Figure 1

3. Loosen and remove cover wing nuts, cover, cover gasket and shaft guard. See figure 1.

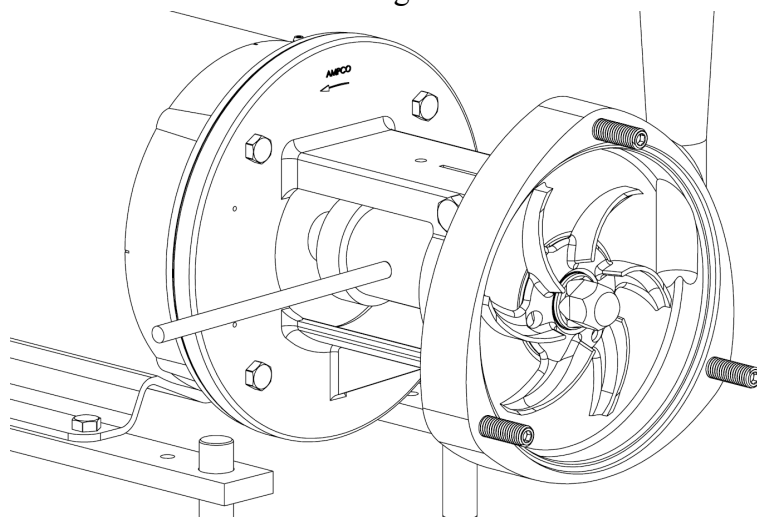


Figure 2

4. Insert a 3/8" bar in the hole in the stub shaft. See figure 2. Turn the impeller nut with a socket wrench counterclockwise to remove the impeller nut.

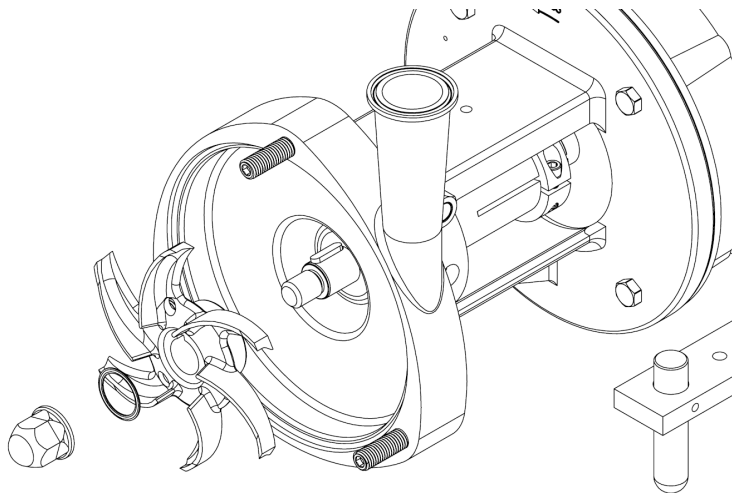


Figure 3

5. Remove the impeller nut, the impeller nut gasket, impeller, then the key. This process can be seen in Figure 3. The seal driver may be pushing against the key. With one hand push the seal driver into the casing with index and middle finger on opposite sides of the shaft. Then with your free hand remove the key.

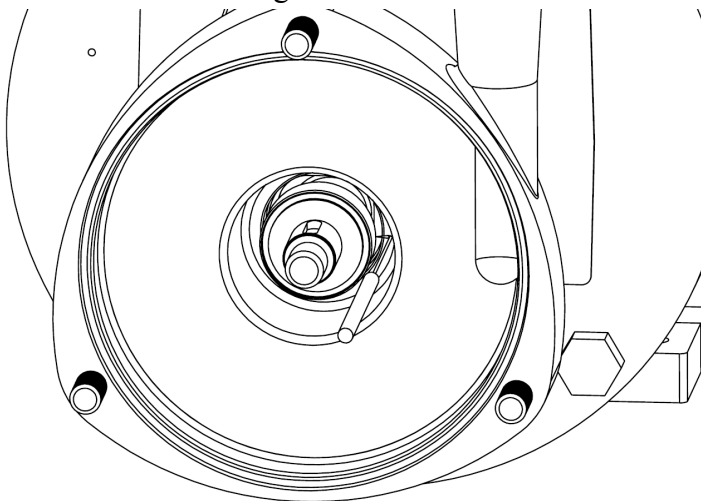


Figure 4

6. Pull out the seal driver. You may have to use a pick to separate the rotating seal from the stationary seal, figure 4.

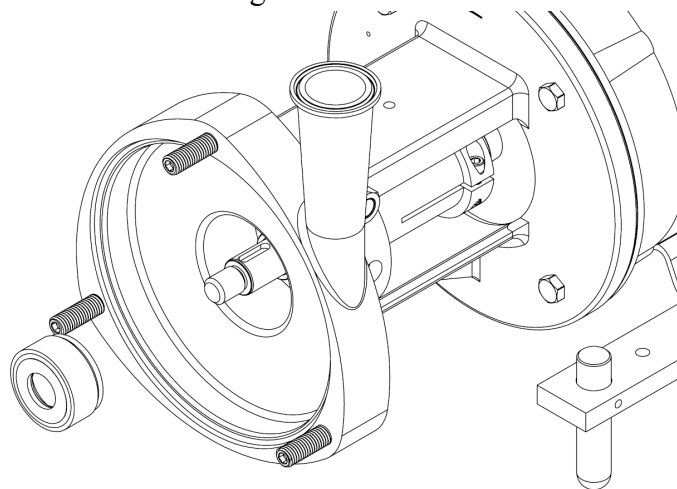


Figure 5

7. The rotating seal, o-ring and spring will come out at as a single component, figure 5.

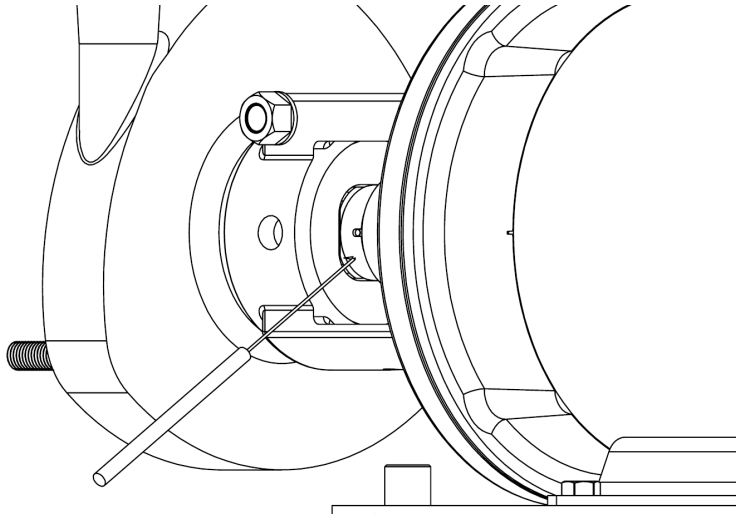


Figure 6

8. Push the stationary seal out from the back of the pump using an o-ring pick or your fingers or both. Pushing on opposite sides of the shaft with constant light pressure the best. Make sure to push outside of the rear seal face. See figure 6.

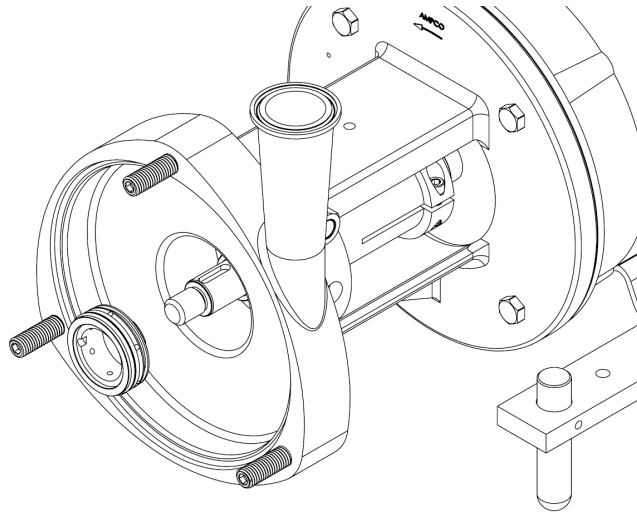


Figure 7

9. Remove stationary seal once pushed out of its' bore. See figure 7.

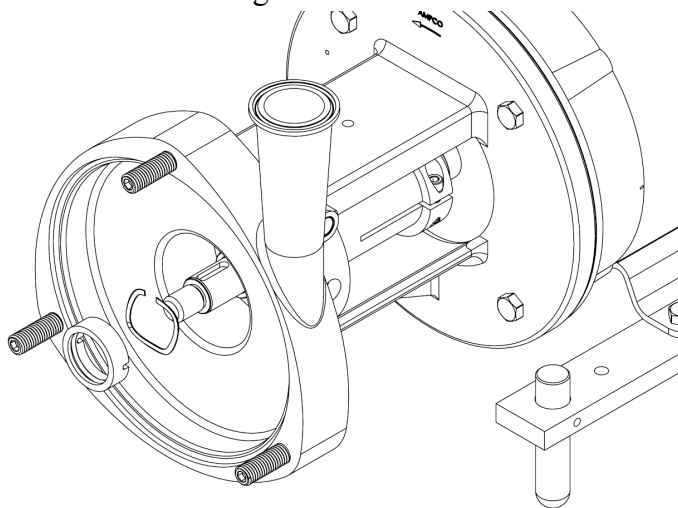


Figure 8

10. Remove the double rotating seal assembly and spring if the pump has the double seal option. Check the condition of the casing, rotating seal, stationary seal and double seal. Clean and remove any foreign matter before reinstalling the seal.

## PUMP ASSEMBLY AND SEAL INSTALLATION

When replacing the seal assembly lubricate all o-rings with food grade lubricant to ease assembly. Once the pump is fully assembled turn the stub shaft a few revolutions by hand making sure it turn relatively freely and nothing is rubbing inside the pump. Running the pump with foreign objects in the pump or having the impeller making contact with either the cover or the casing will result in serious damage if not completely destroying the pump. For assembling pumps with single seals, start at step number 4.

### TOOLS REQUIRED FOR ASSEMBLY AND SEAL INSTALLATION:

1-1/4" socket wrench

3/8" round bar

Torque wrench

7/16" wrench

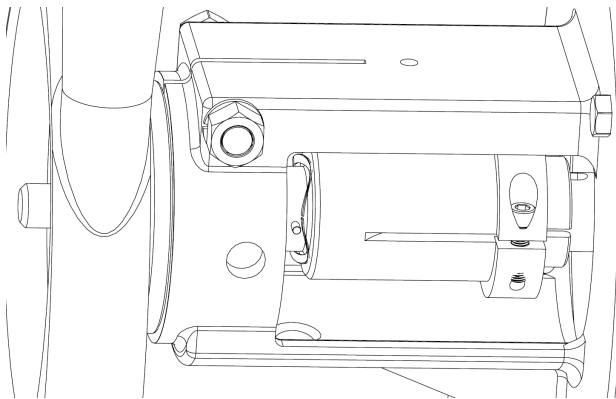


Figure 9

1. Slide the rotating double spring onto the stub shaft and use the slot to maneuver the spring behind both rotating drive pins. There are two seal springs in the double seal kit. The rotating double seal spring is the heavier spring.

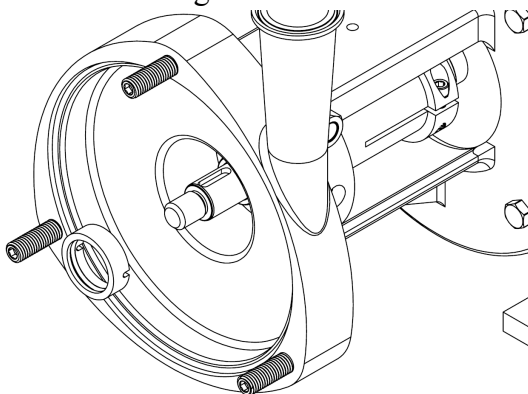


Figure 10

2. Slide the rotating seal over the shaft through the casing.

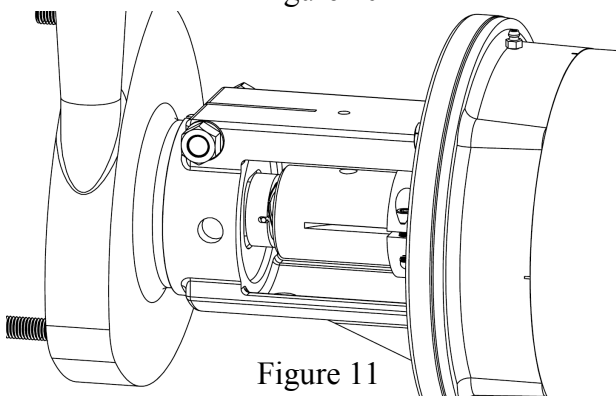


Figure 11

3. Set the slots in the rotating seal over the drive pins figure 11.

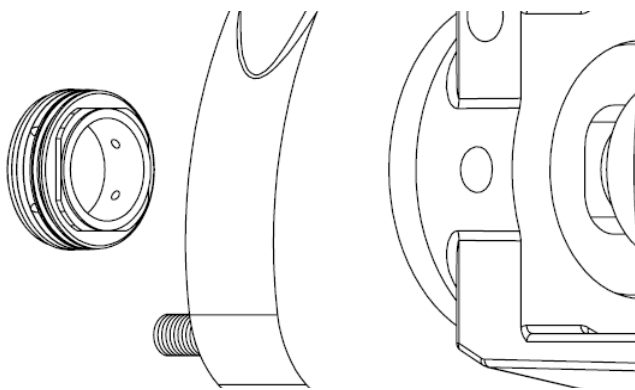


Figure 12

4. Note the square end of the stationary seal. Insert this end in first and slide the stationary seal over the shaft and into the casing, figure 12.

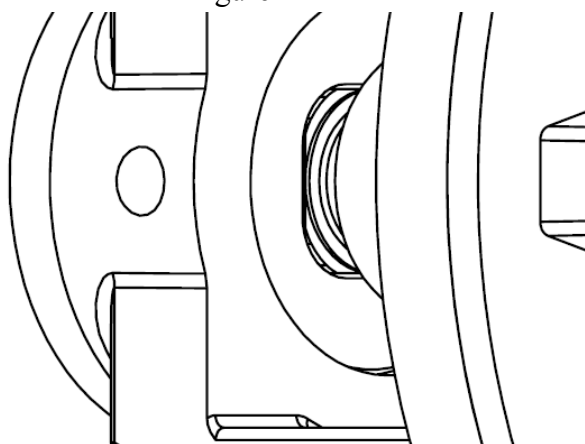


Figure 13

5. Line up a flat on the stationary seal to the a flat of the window of the casing and gently press the stationary seal into the casing bore. See figure 13.

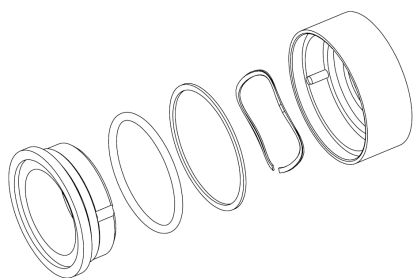


Figure 14

6. Assemble the rotating half of the seal. The order of assembly can be seen in figure 14. Insert the single seal spring into the seal driver. The single seal spring is smaller than the rotating double spring. Next insert the backup ring. The backup ring may need to be pushed in. Insert the single rotating seal o-ring then insert the single rotating seal. Be sure to line up the slots in the rotating seal with the pins in the seal driver.

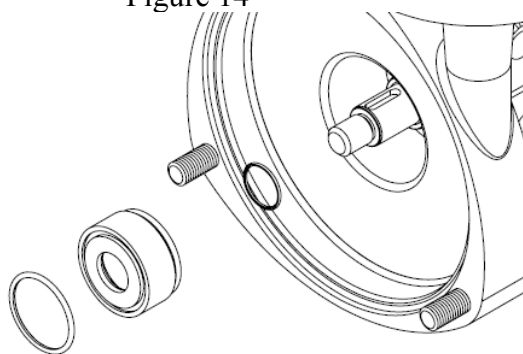
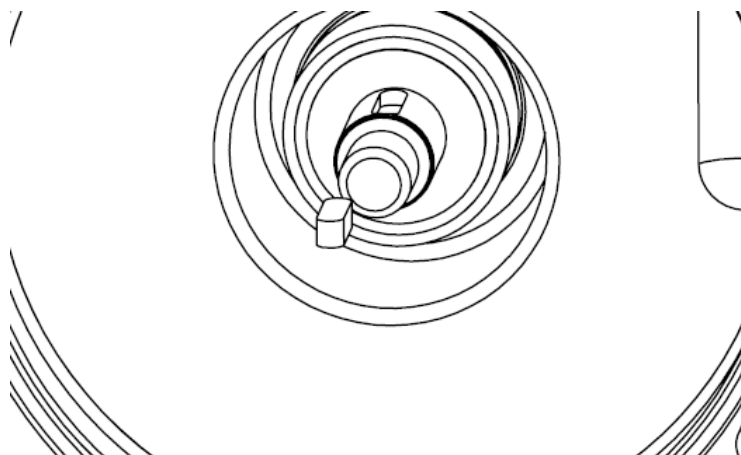


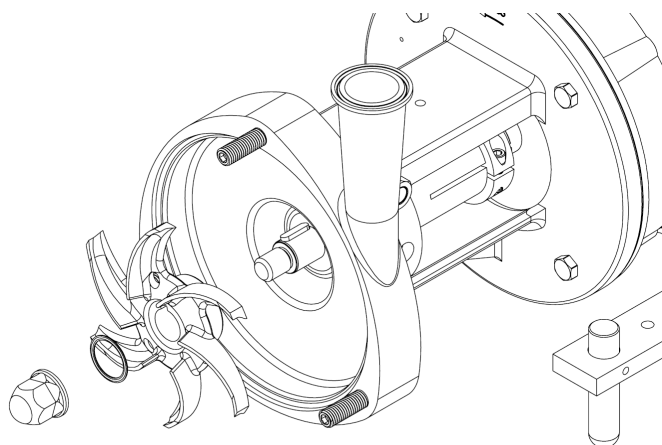
Figure 15

7. Install inner seal driver o-ring, then slide the rotating seal assembly onto the stub shaft, as seen in figure 15, against the stationary seal. Be sure the outer seal driver o-ring is in the o-ring groove of the seal driver.



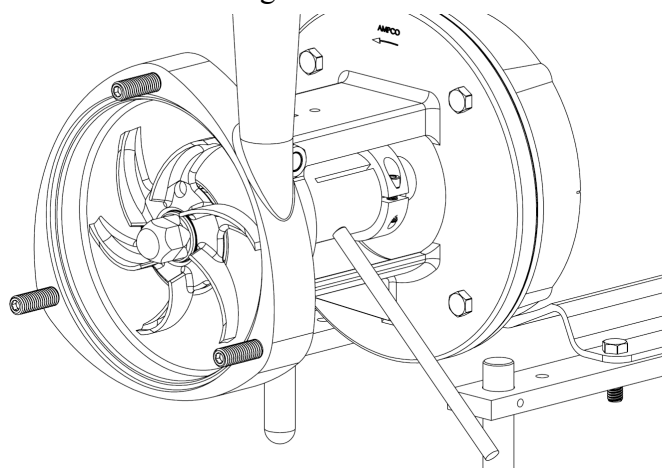
8. Insert key into the keyway in the stub shaft, figure 16.

Figure 16



9. Replace the impeller, impeller nut and gasket, figure 17.

Figure 17



10. Insert the 3/8" bar into the stub shaft, figure 18, and torque the impeller nut to 90 ft-lbs for LF X-pumps and to 40 ft-lbs for all other LF pumps.

Figure 18

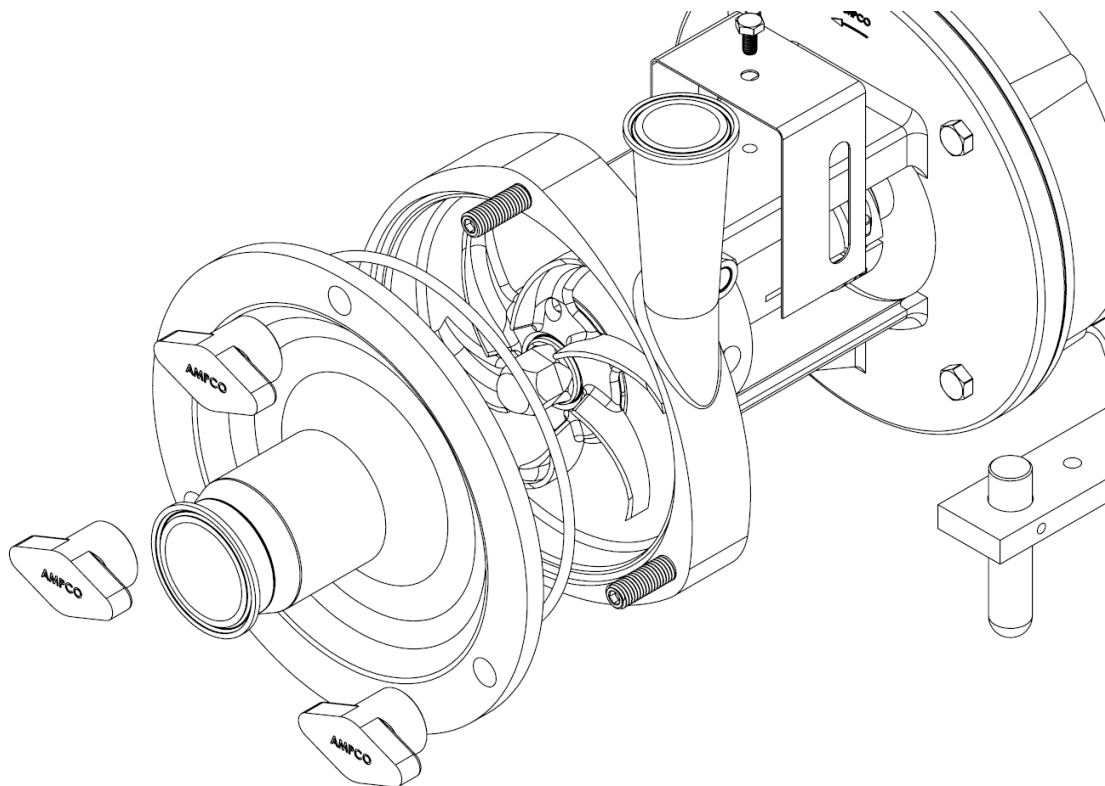


Figure 19

11. Replace the cover, cover gasket and wing nuts. Once the wing nuts are tightened turn the stub shaft by hand a few revolutions making sure nothing is rubbing inside the pump. Running the pump with foreign objects in the pump or having the impeller making contact with either the cover or the casing will result in serious damage if not completely destroying the pump. If the shaft turns freely and the impeller is not rubbing either the casing or the cover replace the shaft guard and the pump is ready to be reconnected to the piping system.

**Note:** Always turn the stub shaft by hand before start up making sure nothing is rubbing inside the motor, such as foreign objects or the impeller touching either the back inside of the casing or the cover. Also never run this pump dry. Seals will heat up instantly at operating RPMs, score and may no longer seal when damaged.

**WARNING:** Mechanical seal must never run dry. Seal damage will result.

## 401 PUMP DISMANTLING & SEAL REMOVAL

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### TOOLS REQUIRED TO DISMANTLE PUMP AND REMOVE SEAL:

1-1/4" socket wrench

Torque wrench

3/8" round bar

90° o-ring pick

7/16" wrench

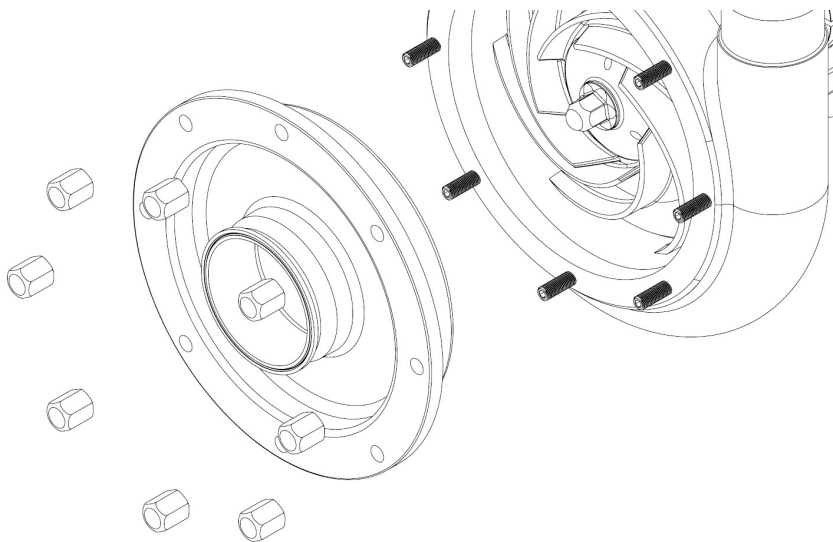


Figure 20

1. Disconnect electrical power to the pump motor and follow any lockout / tag-out procedures in place at your facility.
2. Disconnect pump from the suction piping. Drain all fluids from the pump.

3. Loosen and remove cover wing nuts, cover, cover gasket and shaft guard. See figure 20.

4. Insert a 3/8" bar in the hole in the stub shaft. See figure 21. Turn the impeller nut with a socket wrench counterclockwise to remove the impeller nut.

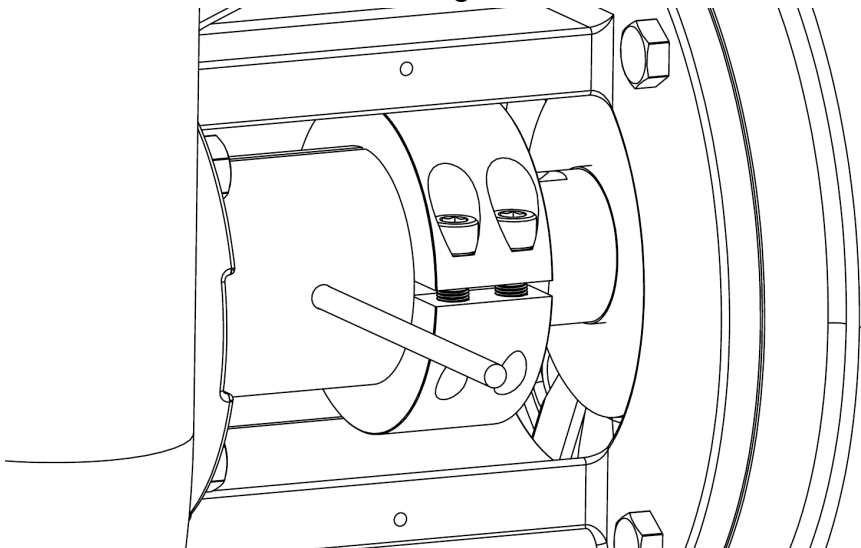


Figure 21



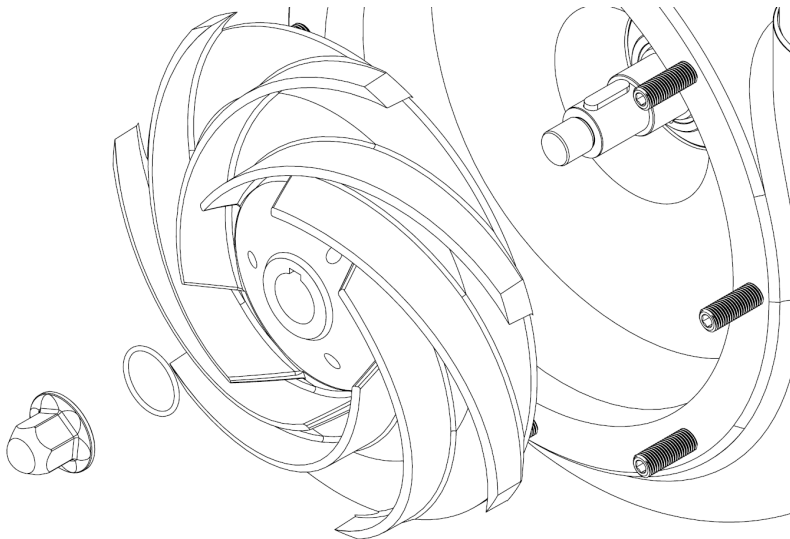


Figure 22

5. Remove the impeller nut gasket, impeller, and the impeller key. This process can be seen in Figure 22.

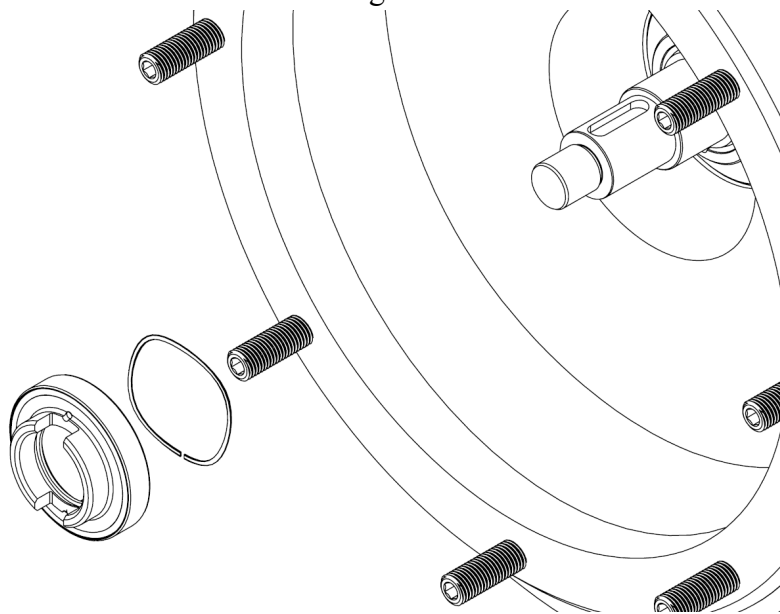


Figure 23

6. Pull out the seal driver if it did not already come out with the impeller and the single seal spring. Removal of the impeller key is not necessary, keep track of it if you do remove it.

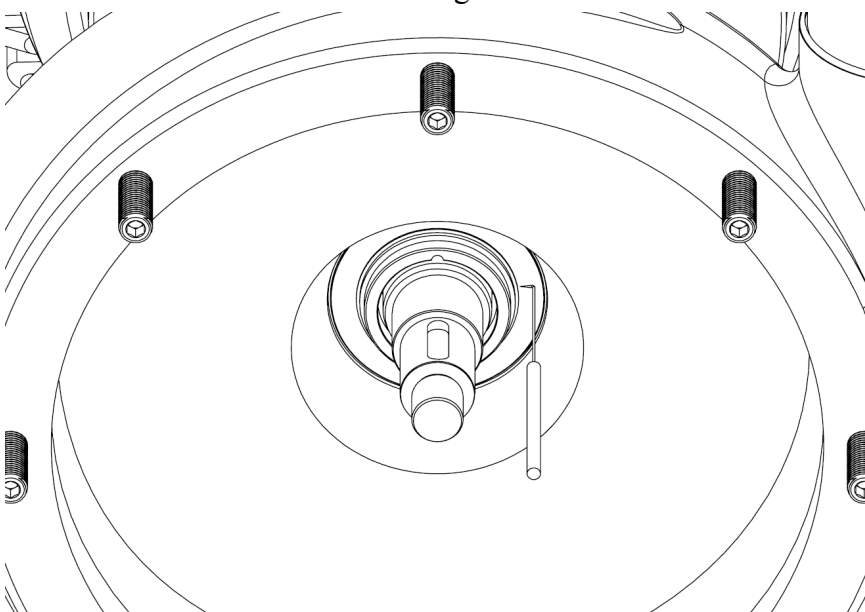


Figure 24

7. Pull out the rotating seal. You may have to use a pick to separate the rotating seal from the stationary seal while taking care not to scratch or damage the sealing surfaces, figure 24.

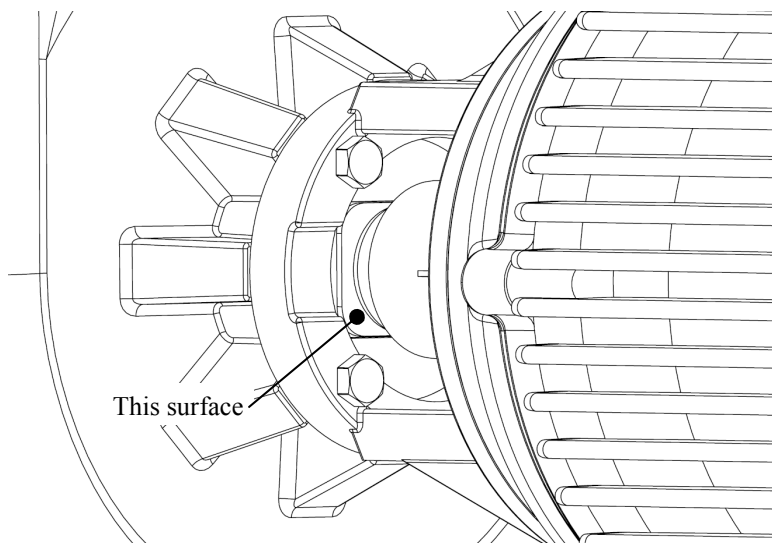


Figure 25

8. Push the stationary seal out from the back of the pump using an o-ring pick or your fingers or both again make sure to push outside of the rear seal face so the seal surfaces are not damaged. Pushing on opposite sides of the shaft with constant light pressure the best. See figure 25.

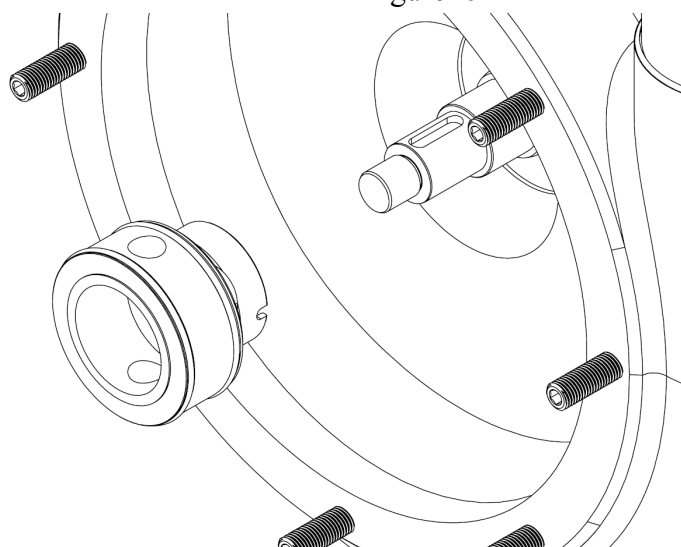


Figure 26

9. Remove the stationary seal once pushed out of its' bore. The double seal may also come out with the stationary seal if the pump has this option. See figure 26.

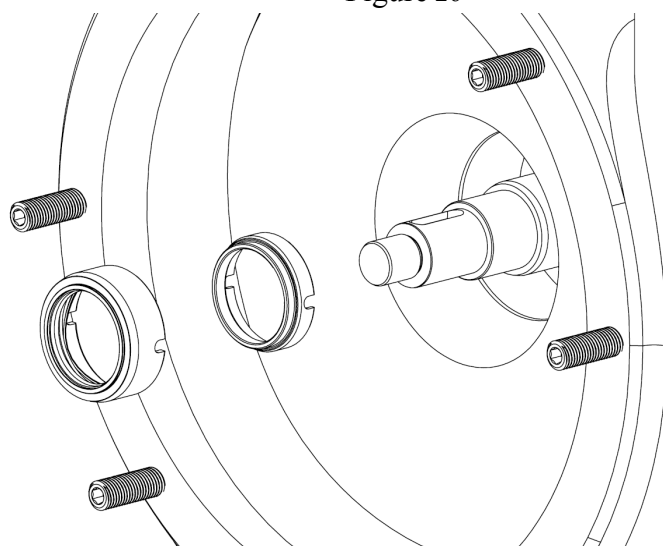


Figure 27

10. Remove the double rotating seal assembly which includes the double seal driver, double spring, double o-ring and the double seal. Check the condition of the casing, impeller, rotating seal, stationary seal and double seal assemblies. Clean and remove any foreign matter before reinstalling the seal and assembling the pump.

## LF 401 PUMP ASSEMBLY AND SEAL INSTALLATION

When replacing the seal assembly lubricate all o-rings with food grade lubricant to ease assembly. Once the pump is fully assembled turn the stub shaft a few revolutions by hand making sure it turns relatively freely and nothing is rubbing inside the pump. Running the pump with foreign objects in the pump or having the impeller making contact with either the cover or the casing will result in serious damage if not completely destroying the pump. For assembling pumps with single seals, start at step number #.

### TOOLS REQUIRED FOR ASSEMBLY AND SEAL INSTALLATION:

1-1/4" socket wrench  
3/8" round bar

Torque wrench  
7/16" wrench

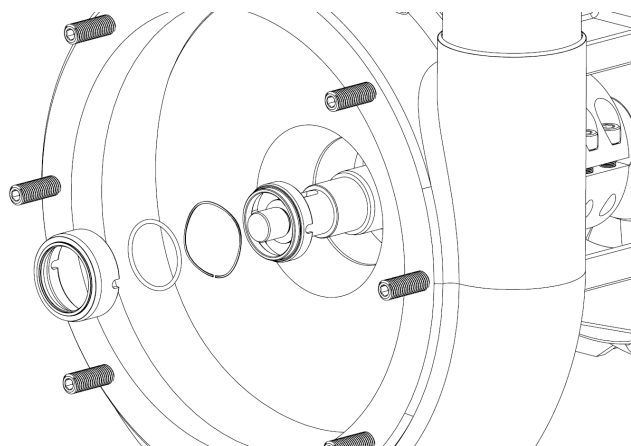


Figure 28

1. Slide the rotating double driver onto the stub shaft, the rotating double spring, the rotating double o-ring and then the rotating double seal in this order one component at a time figure 28.

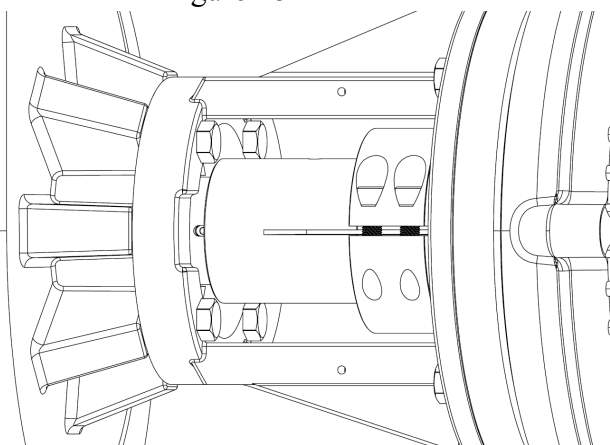


Figure 29

2. Slots in the double seal driver and rotating double seal fit over the driving pins on the stub shaft. See figure 29.

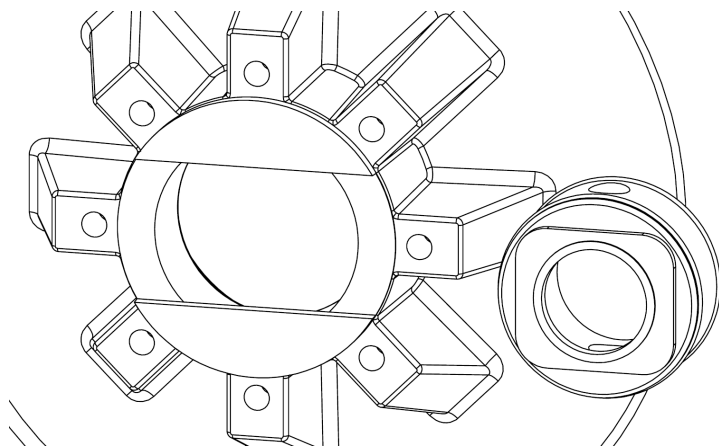


Figure 30

3. The o-rings on the stationary seal must be lubricated well or it will be very difficult to push the stationary seal into the its' bore. Line up the flats on the stationary seal with the rectangular hole in the hub of the casing. See figure 30.

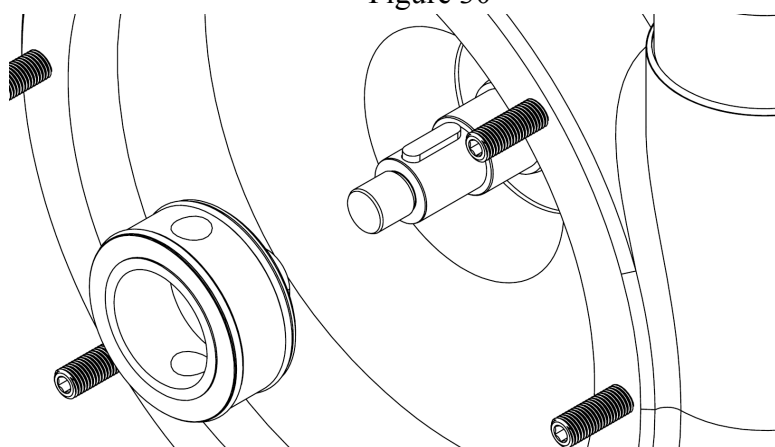


Figure 31

4. Install the stationary seal pushing the stationary seal into the casing bore.

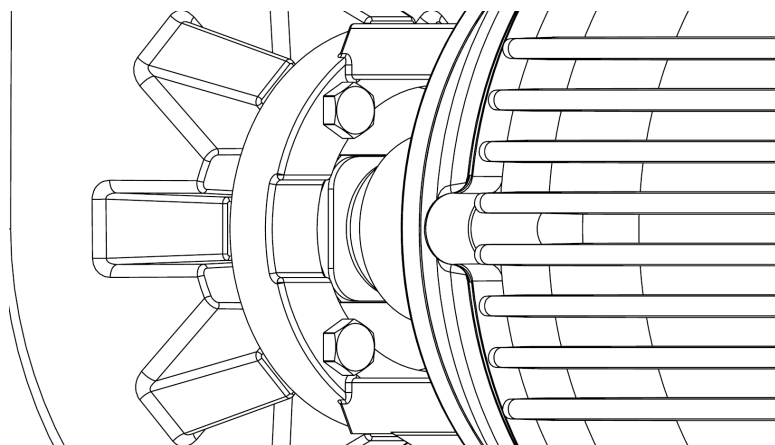


Figure 32

5. Make sure the stationary seal seats against the back face of the bore.

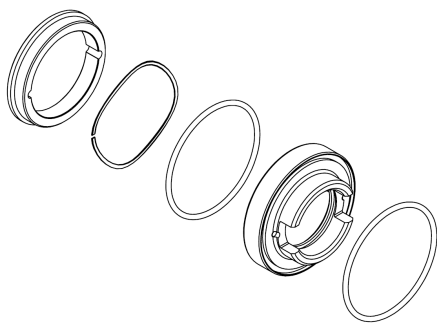


Figure 33

4. Assemble single seal and driver assembly. Insert the seal driver o-ring and the single seal o-ring into the seal driver. Insert the single seal spring into the seal driver. Then press the rotating single seal into the seal driver while noting that the notches in the rotating single seal line up with the seal driver pins, figure 33.

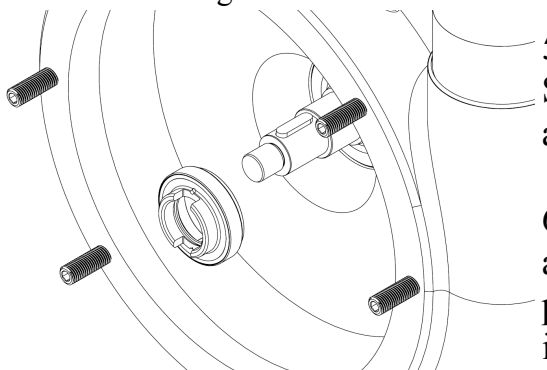


Figure 34

5. Install the single seal and driver assembly. Slide single seal assembly over the stub shaft and against the stationary seal.

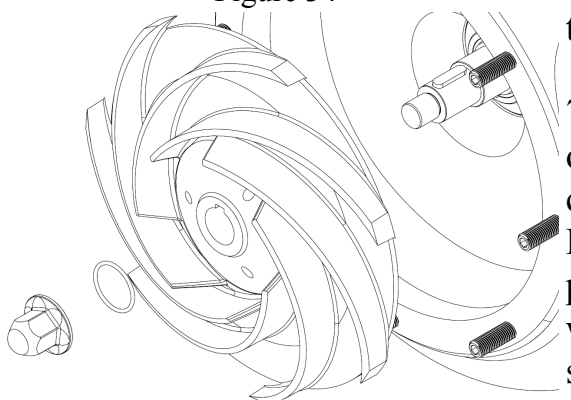


Figure 35

6. Install impeller and impeller key, if it is not already in the stub shaft figure 35. Note driving pins in impeller hub will go into the large slots in the front of the single seal driver. Replace the impeller nut gasket and impeller nut and torque to the correct value.

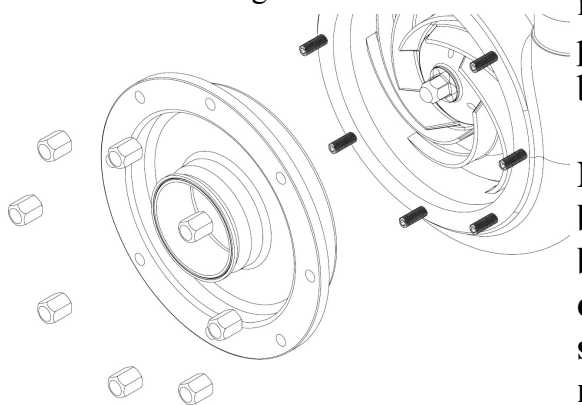


Figure 36

7. Replace the cover and check that the cover o-ring is in place and not damaged. Replace the cover nuts and torque to the proper values. Running the pump with foreign objects in the pump or having the impeller making contact with either the cover or the casing will result in serious damage if not completely destroying the pump. If the shaft turns freely and the impeller is not rubbing either the casing or the cover, replace the shaft guard and the pump is ready to be reconnected to the piping system.

**Note: Always turn the stub shaft by hand before start up making sure nothing is rubbing inside the motor, such as foreign objects or the impeller touching either the back inside of the casing or the cover. Also never run this pump dry. Seals will heat up instantly at operating RPMs, score and may no longer seal when damaged.**

## SETTING THE IMPELLER CLEARANCE

Assemble the pump as described in the Pump Assembly and Seal Installation section of this manual. For double seals perform steps 1-10 and for single seals perform steps 4-10 of the Pump Assembly and Seal Installation instructions. Take note that the shaft collar screw must be torqued to the proper torque value as determined by the frame size of the motor. Using a torque value less than the prescribed value may allow the shaft to move toward the cover and cause damage to the pump.

- 0.02" (0.5mm) Shim for LF R Pumps
- 0.04" (1.0mm) Shim for LF V Pumps
- 0.06" (1.5mm) Shim for LF X Pumps
- 0.08" (2.0mm) Shim for LF 401 Pumps

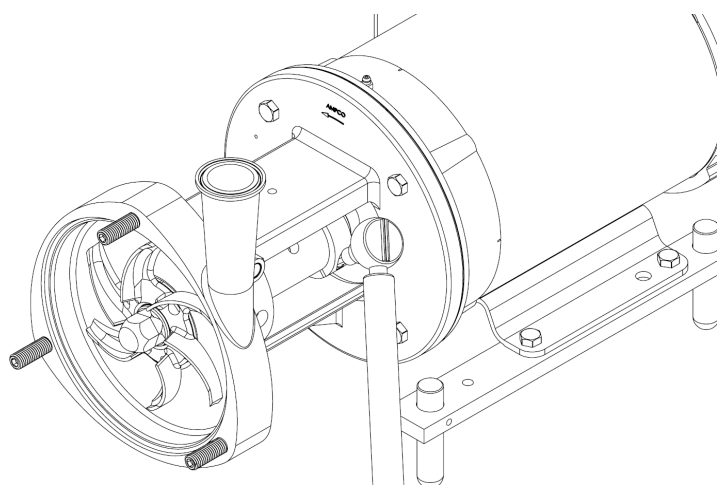


Figure 37

1. Loosen the socket head cap screw in the shaft collar and re-tighten it just enough so the shaft is still able move along the motors axis.

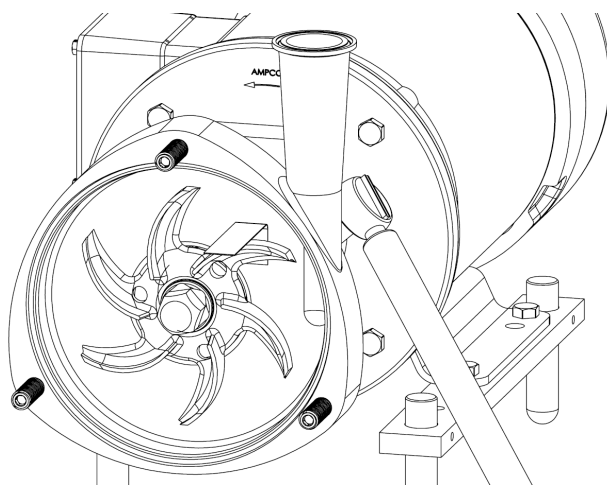


Figure 38

2. Once the shaft collar is able to slide on the motor shaft, insert an appropriate thickness shim between the back side of the impeller vane and the back of the casing's bore as shown in figure 38. Check all vanes and set the clearance with the vane that has the smallest clearance.

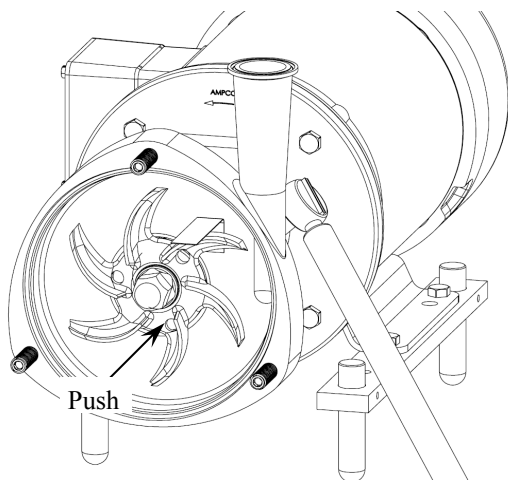


Figure 39

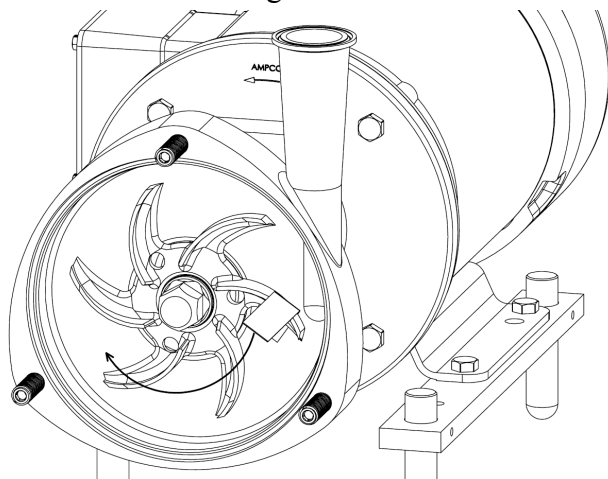


Figure 40

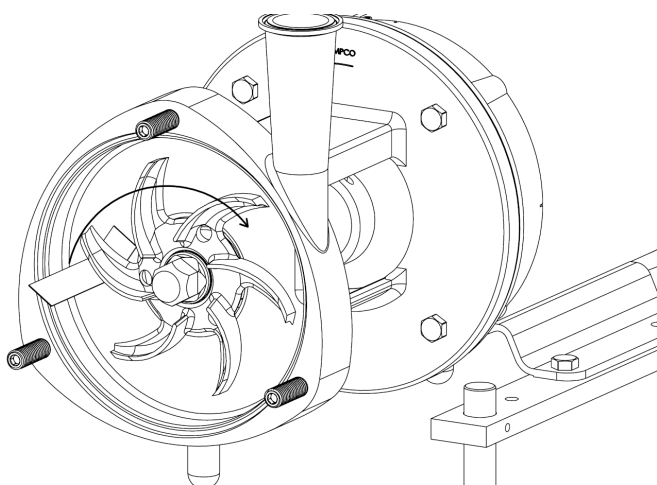


Figure 41

3. While pushing the impeller nut, impeller, and shaft collar towards the motor slightly pinching the shim, tighten the socket head cap screw in the shaft collar. Torque the socket cap screw to the right torque value that correlates to the frame size of the motor. When the shaft collar screw is not torqued to the correct value the shaft may move during pump operation although the shaft cannot be moved by hand along the motors axis. Torquing the shaft collar screw more than the recommended value may break the screw.

4. Check the clearance between the rest of the impeller vanes. With the gage behind each vane rotate the impeller a full revolution to ensure there is a minimum clearance as in figure 23 and 24. The gage should easily slip behind each vane.

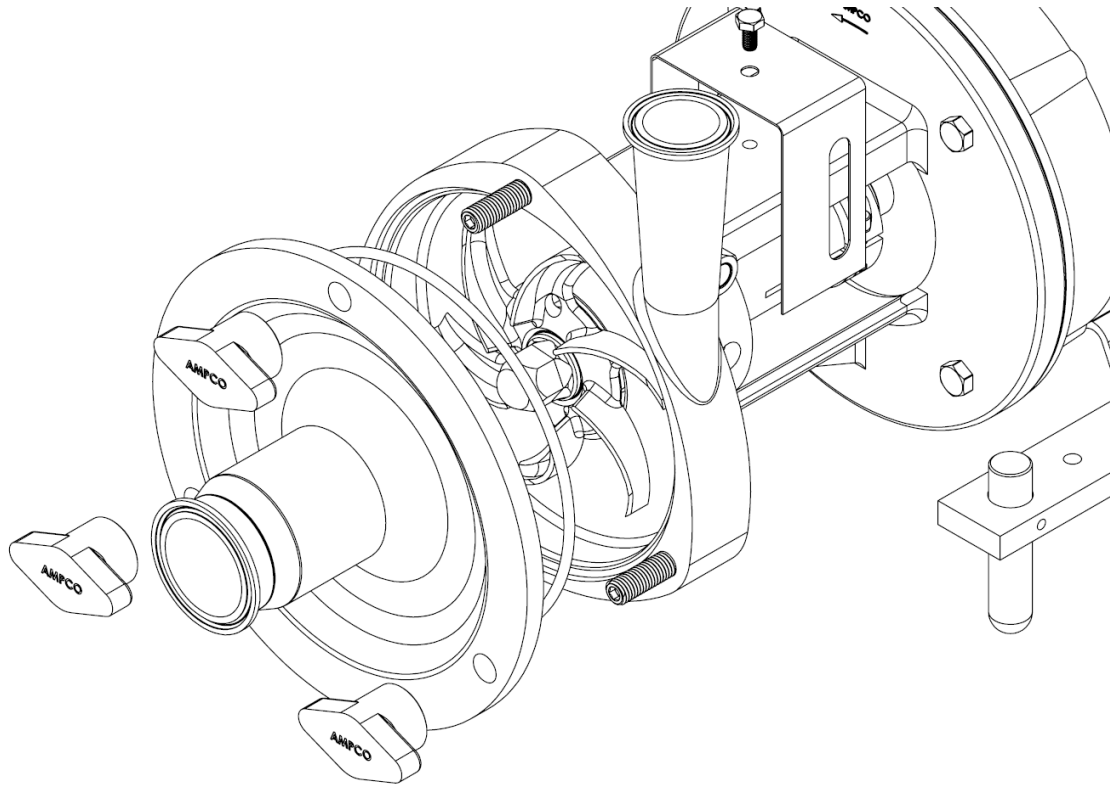


Figure 42

5. Replace the cover, cover gasket and cover nuts. Once the cover nuts are tightened turn the stub shaft by hand a few revolutions making sure nothing is rubbing inside the pump. Running the pump with foreign objects in the pump or having the impeller making contact with either the cover or the casing will result in serious damage if not completely destroying the pump. If the shaft turns freely and the impeller is not rubbing either the casing or the cover replace the shaft guard and the pump is ready to be reconnected to the piping system.

**Note:** Always turn the stub shaft by hand before start up making sure nothing is rubbing inside the motor, such as foreign objects or the impeller touching either the back inside of the casing or the cover. Also never run this pump dry. Seals will heat up instantly at operating RPMs, score and may no longer seal when damaged.

**WARNING:** Mechanical seal must never run dry. Seal damage will result.



## Sound piping practices

Suction and discharge piping must be properly supported and aligned with the pumps suction and discharge ports.

Avoid throttling valves in the suction line of the system.

Check valves must be at a minimum of 5 pipe diameters from the pump's discharge. Figure 43.

Keep the suction piping short and direct as possible. Avoid elbows in the suction line of the system. If this is unavoidable, locate the elbow as least 5 pipe diameters away from the pumps inlet and elbows should not have a radii less than twice the diameter of pipe. Figure 43.

Make sure that the NPSH available is always greater than the system's NPSH required.

Avoid bending piping over obstacles as this will cause the formation of an air pocket in the suction line. Figure 44. Route piping under any obstructions whenever possible. Figure 45.

When using a reducer on the suction end the reduced centerline should not be below the suction centerline as in figure 46. The centerline of the small diameter end of the reducer should be above the centerline of the suction line as in figure 47.

Injection line angles should be 45° or less. Figure 48.

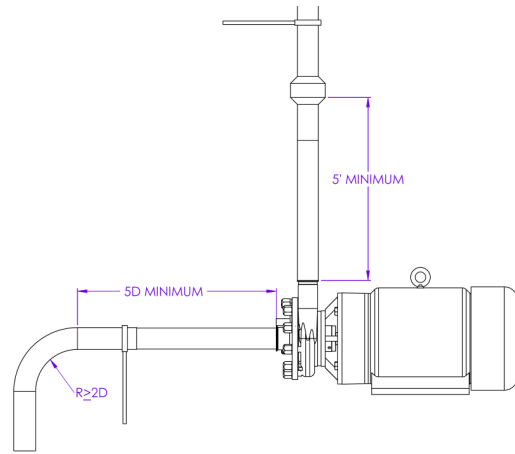


Figure 43

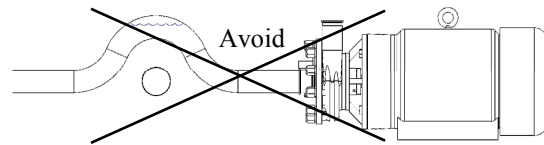


Figure 44

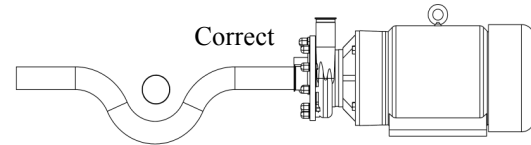


Figure 45

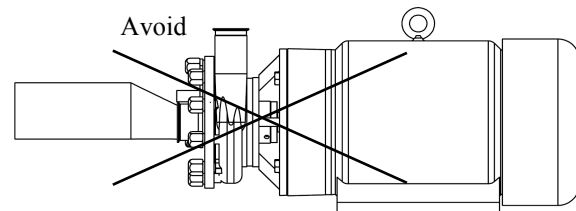


Figure 46

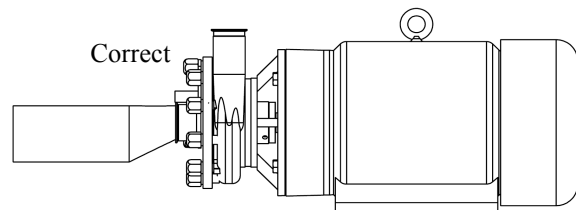


Figure 47

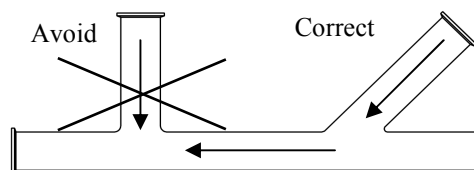


Figure 48

# TROUBLESHOOTING

## COMMON TROUBLES AND THEIR CAUSES

It is to the user's advantage to be familiar with a systematic procedure to determine reasons and causes for unsatisfactory pump operation. The following list of troubles and causes is intended to assist users in determining the cause of any pumping trouble. Faulty installations can then be corrected and clear description given the manufacturer if assistance is required. Human judgment should not be relied on to measure operating conditions. Use proper instruments to measure values of pressure, suction lift, speeds, temperature rise of motors, etc. When motor speeds are incorrect, check connections and measure voltage at motor terminals.

### 1. No liquid delivered

- Pump and suction line not completely primed
- Speed too low
- Required discharge too high
- Suction lift too high
- Impeller, piping, or fittings completely plugged up
- Wrong direction of rotation

### 2. Not sufficient capacity

- Air leaks in suction pipe for shaft seal
- Speed too low
- Required discharge head too high
- Suction lift too high or insufficient NPSH available
- Impeller, piping, or fittings partially plugged
- Insufficient positive suction head for hot water or other volatile liquids
- Liquid viscosity too high
- Mechanical problems-impeller damaged, shaft seal defective
- Wrong direction of rotation
- Suction pipe entrance too close to surface of liquid
- Air pockets in pipe high points

### 3. Not sufficient pressure

- Speed too low
- Mechanical problems- impeller damaged, shaft seal defective
- Small impeller diameter
- Air or gas in liquid
- Wrong direction of rotation
- Air pockets in pipe high points

### 4. pump operates for a while, then quits

- Leaky suction line
- Air leaking in through shaft seal
- Suction lift too high or insufficient NPSH available
- Air or gas in liquid
- Suction piping and fitting not completely freed of air during priming
- Air pockets in pipe high points



#### **5. Pump takes too much power**

- Speed too high
- Pumping too much liquid because required head is lower than anticipated.
- Viscosity and / or specific gravity is higher than specified
- Mechanical problems—binding inside seal from distortion due to piping strains, shaft bent, impeller rubbing casing
- Wrong direction of rotation

Ampco Pumps Company  
2045 W. Mill Road, Glendale, WI 53209  
1-800-737-6871 or (414)643-1852  
Email: [ampcocs@ampcopumps.com](mailto:ampcocs@ampcopumps.com)  
Visit [www.ampcopumps.com](http://www.ampcopumps.com) for more information.

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