



# Table of Contents

Safety .....	3
Care of Stainless Steel.....	4
Technical Specifications .....	5
Curves.....	6-12
Unpacking.....	13
Installation & Start Up.....	14-22
Tools Needed .....	23
Maintenance.....	21-52
Pump Housing Disassembly .....	21-45
Single Mechanical Seal .....	21-29
Double Mechanical Seal.....	30-39?
Triple Lip Seal .....	40-45
Inspection.....	46
Pump Housing Assembly .....	46
Rotor Clearance.....	47-49
Rotor Timing .....	50
Gear Box Disassembly.....	51
Gear Box Assembly.....	51
Maintenance Schedule .....	52
Maximum RPM.....	52
Maximum Solids .....	52
Dimensions.....	53
Bill of Materials .....	54-64
Repair Kits .....	65
Troubleshooting .....	66-69
Warranty .....	70

# Safety

The following signs may be used in this manual. To avoid serious injury and/or possible damage to equipment, pay attention to these messages. Hazards or unsafe practices could result in severe personal injury or death.



Indicates a hazardous situation that, if not avoided, will result in death or serious injury.



Indicates a hazardous situation that, if not avoided, could result in death or serious injury.



Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury. May also be used to alert against an unsafe operating or maintenance practice.

Use only replacement parts and devices recommended by the manufacturer to maintain the integrity of the equipment. Make sure the parts are properly matched to the series, model, serial number, and revision level of the equipment.

Safety labels are placed on equipment where appropriate. Do not remove any labeling from any piece of equipment. Replace any label that is missing.

DO NOT modify any Dixon® product. Non-factory modifications could create hazardous conditions and void all warranties. DO NOT attempt to use a Dixon product in any application that exceeds the product rating.

## General Guidelines

- The owner must comply with these operating instructions and the authorized use of this piece of equipment. Should problems arise that cannot be solved using these operating instructions, please contact Dixon Sanitary. We will be happy to provide further assistance.
- If any modification work is performed on the product by the owner, Dixon shall no longer be considered the manufacturer of the device. In such cases, all components must be subjected to a new certification process for any applicable certifications that the equipment holds. Unless agreed to in writing by Dixon, liability, warranties, and guarantees shall immediately be deemed null and void as soon as you:
  - Perform modifications/conversion work on the product.
  - Use the product for unauthorized purposes.
  - Remove or disable safety elements.
  - Process products whose material, form, and size do not correspond exactly to the description provided.
  - Make alterations to the original state of the device.
- The operating instructions are regarded as part of the valve.
- The operating instructions shall be valid for the entirety of the device's lifespan.
- The operating and maintenance personnel must always be able to access the operating instructions.
- The safety instructions provided in the operating instructions must be observed.
- The operating instructions must be maintained and updated as necessary.
- The operating instructions must be passed on to any subsequent owners or operators of the device.


# Safety

## Owner Must Ensure...

- The product is used only as authorized.
- The product is used only when it is in fault-free, fully functional condition and the safety equipment is regularly checked to ensure that it is fully functional.
- The product is operated, maintained, and repaired only by personnel with the appropriate qualifications and authorization.
- Checks are made before the product is put into operation to ensure that only the authorized person is in the work area and no one is in danger of being injured if the product is in operation.
- The product is checked for visual damage prior to commissioning to ensure that it is operated only when free of faults.
- Any defects are reported immediately to the appropriate supervisor.
- All safety and warning notices attached to the equipment are legible, and none are removed.
- The operating instructions are always kept close to the product operation site, in a legible and complete state.
- Personnel are regularly instructed on all occupational safety and environmental protection issues and are familiar with and observe the operating instructions, especially the safety instructions contained herein.
- Personnel are trained and supervised to ensure that they follow safety measures, including the obligatory use of personal protective equipment.
- The product is only connected to pipelines that are depressurized at the time of connection.
- There is no tensile or compressive stress acting on the product connections.
- There is no residual risk at any point where pressure could occur. Pressure can cause sudden failure in or damage to the lines and connections.
- Warning notices in the documentation for supplier modules are observed and integrated into the risk assessments in the workplace.

## Care of Stainless Steel

The stainless steel components in Dixon® Sanitary equipment are machined, welded, and assembled by skilled craftsmen using manufacturing methods that preserve the corrosion-resistant quality of the stainless steel. Retention of corrosion-resistant qualities under processing conditions requires regular attention to the precautions listed below. Examples of corrosion that can result from improper care are included below.

- Regularly check all electrical devices connected to the equipment for stray currents caused by improper grounding, damaged insulation, or other defects. Corrosion: Pitting often occurs when stray currents encounter moist stainless steel. 
- Never leave rubber mats, fittings, wrenches, or other tools in contact with stainless steel. Corrosion: pitting or galvanic action. Objects retard complete drying, preventing air from reforming the protective oxide film. Galvanic corrosion occurs when two dissimilar metals touch when wet.
- Immediately rinse equipment after use with warm water until the rinse water is clear. Clean the equipment (COP or CIP) as soon as possible after rinsing. Corrosion: discoloration, deposits, and pitting. Product deposits often cause pitting beneath the particles.
- Use only recommended cleaning compounds. Purchase chemicals from reputable and responsible chemical manufacturers familiar with stainless steel processing equipment. Ensure they continuously check the effects of their products on stainless steel.
- Use cleaning chemicals exactly as specified by the manufacturer. Do not use excessive concentrations, temperatures, or exposure times. Corrosion: pitting, discoloration, or stress cracks. Permanent damage often occurs from excessive chemical concentrations, temperatures, or exposure times.
- For manual cleaning, use only soft non-metallic brushes, sponges, or pads. Brush with the grain on polished surfaces to avoid scratching the surface. Corrosion: pitting, scratches. Metal brushes or sponges will scratch the surface and promote corrosion over a period of time. Metal particles allowed to remain on a stainless steel surface will cause pitting.
- Use chemical bactericides exactly as prescribed by the chemical manufacturer in concurrence with the local health authority. Use the lowest permissible concentration, temperature, and exposure time possible. Flush immediately after bacterial treatment. In no case should the solution be in contact with stainless steel for more than 20 minutes. Corrosion: protective film destroyed. Chlorine and other halogen bactericides can destroy the protective film. A few degrees increase in temperature greatly increases chemical activity and accelerates corrosion.
- Regularly inspect the joints in pipelines. Be sure all connections are tight fitting without binding. Corrosion: crevice corrosion. Small crevices caused by improperly seated gaskets will promote crevice corrosion. Stainless steel under stress will develop stress cracking, especially in the presence of bactericides containing chlorine.
- Regularly inspect equipment for surface corrosion (i.e. pitting deposits, stress cracks, etc.). If deposit or color corrosion is detected, remove it immediately using mild scouring powder and detergents. Rinse thoroughly and allow to air dry. Review production and cleaning procedures to determine the cause. NOTE: If corrosion is not removed, the protective film cannot be restored, and corrosion will continue at an accelerated rate.

# Technical Specifications

Model	Maximum Differential Pressure (PSI) <sup>1</sup>	Maximum Flow Rate (GPM)	Temperature Range	Viscosity Range	Noise Level
440	174	299	14°F to 356°F (-10°C to 180°C)	Up to 1,000,000 cPs	60 ~ 80 dB
450	116	441	about 248°F (120°C) may require Hot Clearance Rotors		

<sup>1</sup>Up to **435 PSI** (30 bar) is available with front bearing cover.

## Materials of Construction Technical Data

- Product wetted steel part: AISI 316L stainless steel (standard)
- Product wetted elastomers: EPDM (standard)
- Optional seals: nitrile rubber, FKM

## Shaft Seal Technical Data

- Seal options: single mechanical, double mechanical, and triple lip seal
- Maximum flushing water pressure: **7 PSI** (0.5 bar)
- Flushing water consumption: 30~60 cubic inches/min (0.25~0.5 liter/min)
  - Flush inlet at lowest port on casing
- Stationary seal ring material: tungsten carbide
- Rotating seal ring material: tungsten carbide (standard) or silicon carbide (optional)
- O-ring material: EPDM (standard)
- Optional O-ring material: nitrile rubber, FKM
- Triple lip seal material: PTFE + glass (standard) or PTFE + copper (optional)

## Rotor Information: Not all rotors available in all models

- Single/bi-wing and bi-lobe/tri-lobe/heli-lobe are interchangeable
- Optional rotors: multi-lobe, hardened

## Optional Information

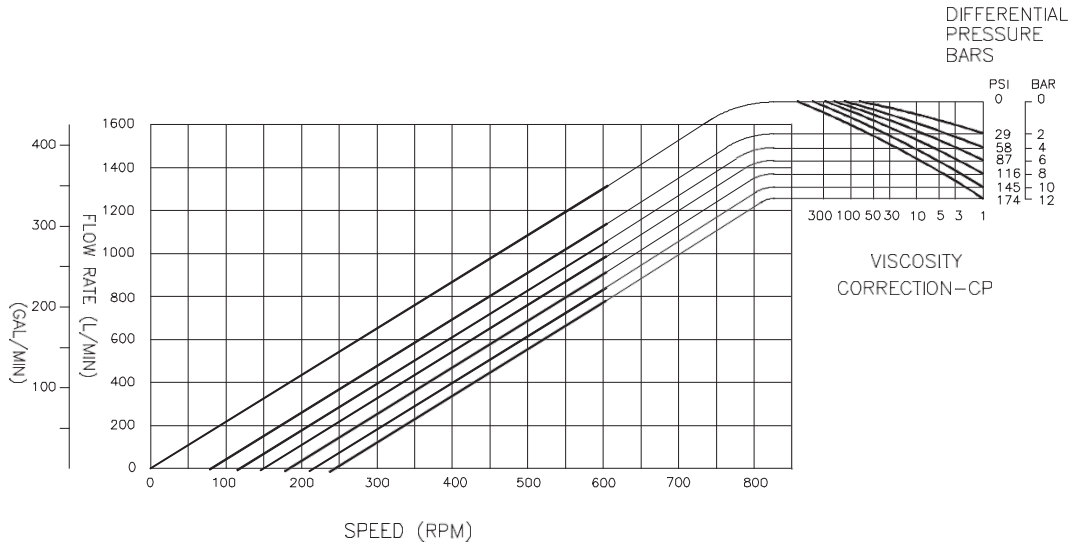
- Ultra clean version
- High pressure version up to **435 PSI** (30 bar)
- Heating jacket on rotor case and front cover
- Rectangular inlet version
- Pressure relief front cover (not 3A)
- Surface hardening

# RZL 440 Curves

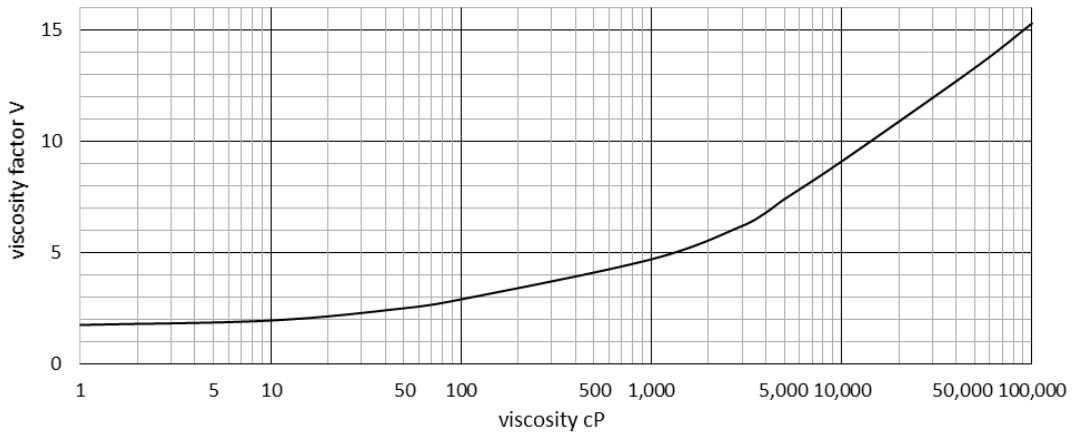
APPLIES TO BI-WING, BI-LOBE, AND SINGLE WING\* ROTORS

\* SINGLE WING ROTOR MAX 100 RPM

PORT SIZE: 4 X 4



## Power Calculation for Viscosity Liquids



$$(HHPT) = \frac{(0.0007 \times pp \times p \times 0.0051 \times vv) \times EE \times m}{(2 \times pp \times p \times vv) \times EE \times m}$$

$$(KKT) = \frac{1000}{1000}$$

$$pp = \text{ppMMNCEEEEMMM} (ppEEE oom bbbMM)$$

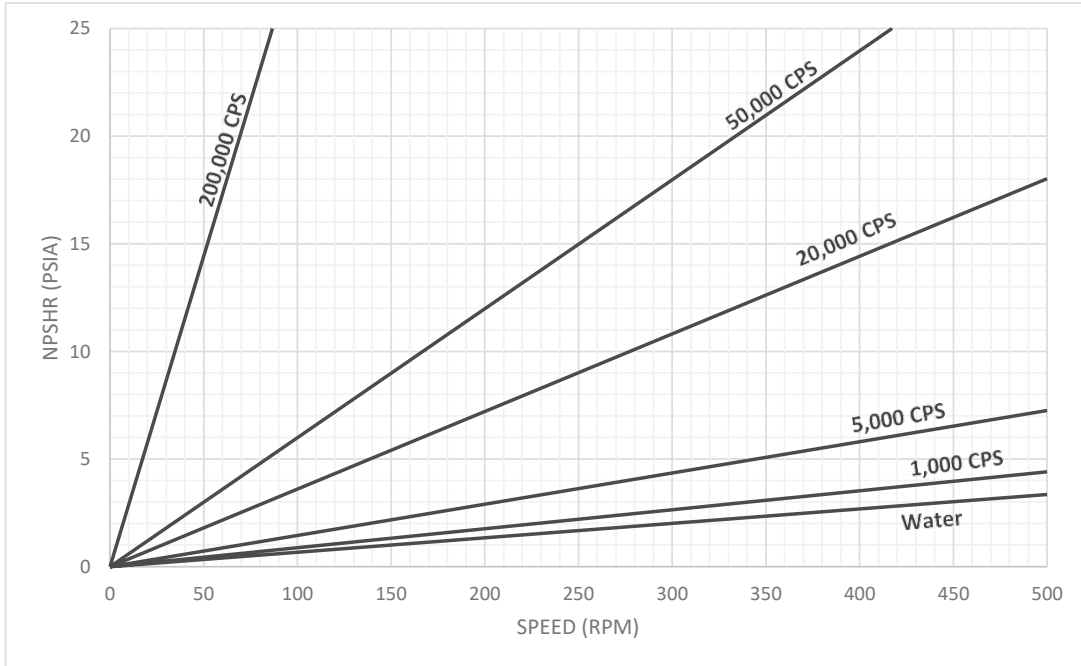
$$vv = vvEEEnooEEEEEvv nnooMMNMMnnEEEEEoE vvvbmmEooMM (vvMMooff EEMMdbppE)$$

$$EE = EEppMMNmm (RRRRMM)$$

$$m = mEEppEEbmmMffMMEEE c0.60 \frac{EEbEE}{MMNvv} oom 2.27 \frac{LL}{MMNvv}$$

# RZL 440 NPSHR Curves

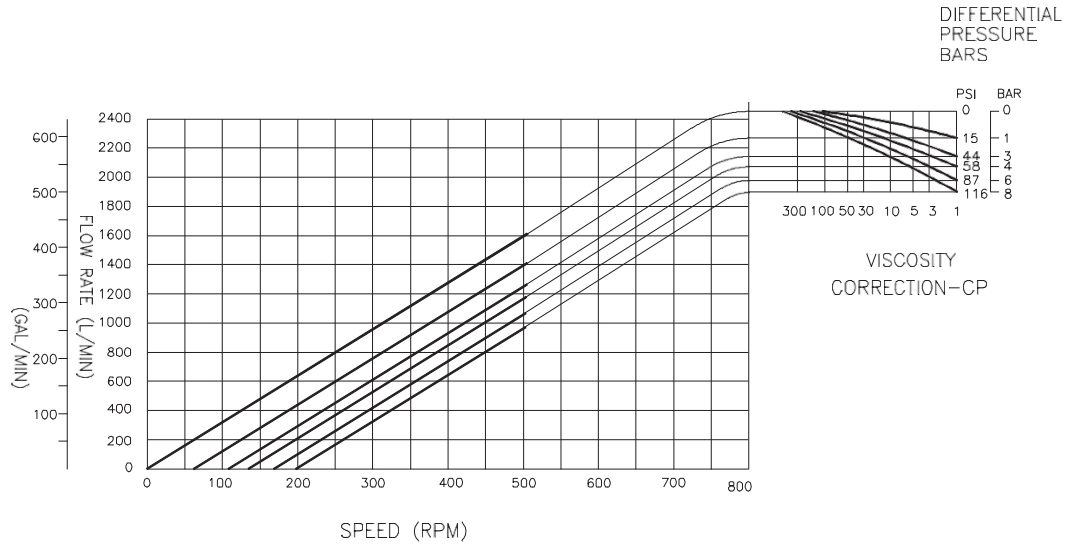
NET POSITIVE SUCTION HEAD REQUIRED  
PORT SIZE: 4 X 4



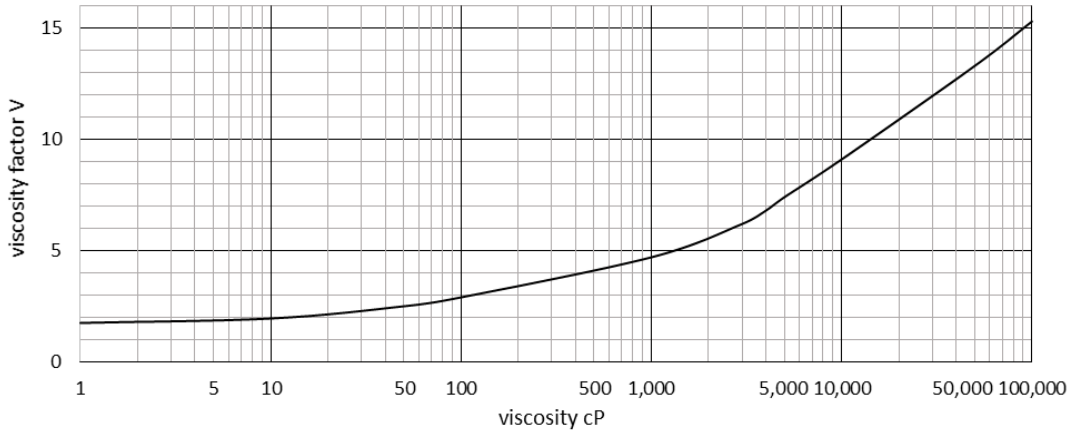


# RZL 450 Curves

APPLIES TO BI-WING, BI-LOBE, AND SINGLE WING\* ROTORS  
 \* SINGLE WING ROTOR MAX 100 RPM  
 PORT SIZE: 5 X 5



## Power Calculation for Viscosity Liquids



$$\left( \frac{0.0007 \times p \times 0.0051 \times v}{2 \times p \times v} \right) \times E \times m = \frac{0.0007 \times p \times 0.0051 \times v \times E \times m}{2 \times p \times v \times E \times m}$$

$$\left( \frac{0.0007 \times p \times 0.0051 \times v \times E \times m}{2 \times p \times v \times E \times m} \right) \times 1000 = \frac{0.0007 \times p \times 0.0051 \times v \times E \times m \times 1000}{2 \times p \times v \times E \times m}$$

$$p = \frac{0.0007 \times p \times 0.0051 \times v \times E \times m}{2 \times p \times v \times E \times m}$$

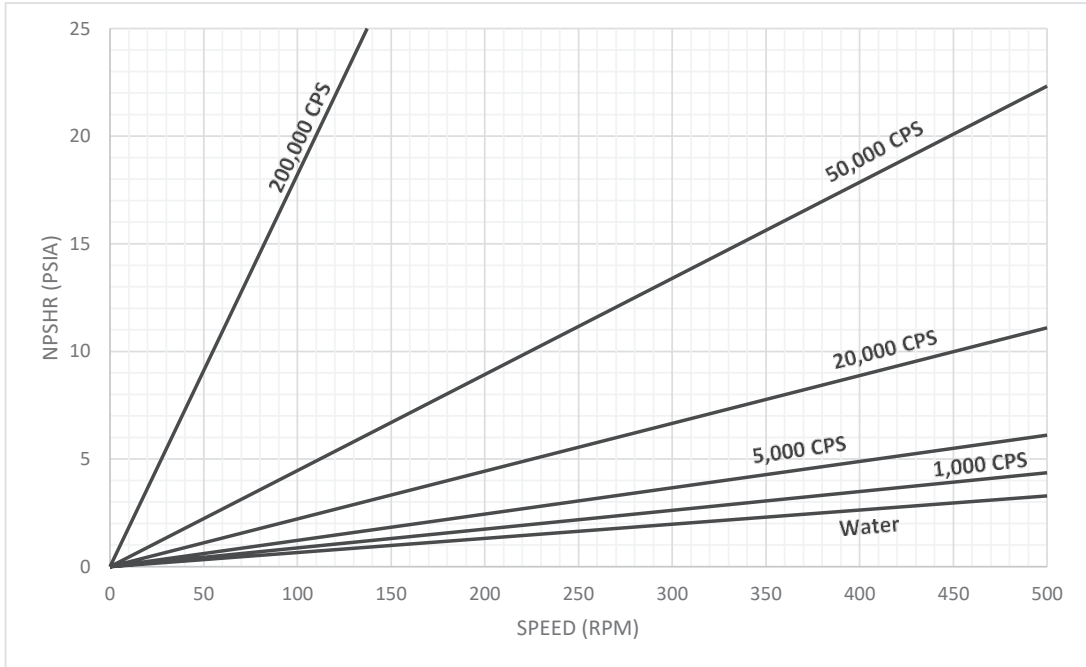
$$v = \frac{0.0007 \times p \times 0.0051 \times v \times E \times m}{2 \times p \times v \times E \times m}$$

$$E = \frac{0.0007 \times p \times 0.0051 \times v \times E \times m}{2 \times p \times v \times E \times m}$$

$$m = \frac{0.0007 \times p \times 0.0051 \times v \times E \times m}{2 \times p \times v \times E \times m} \times 0.88 \times 3.34 \frac{L}{MMIN}$$

# RZL 450 NPSHR Curves

NET POSITIVE SUCTION HEAD REQUIRED  
PORT SIZE: 5 X 5



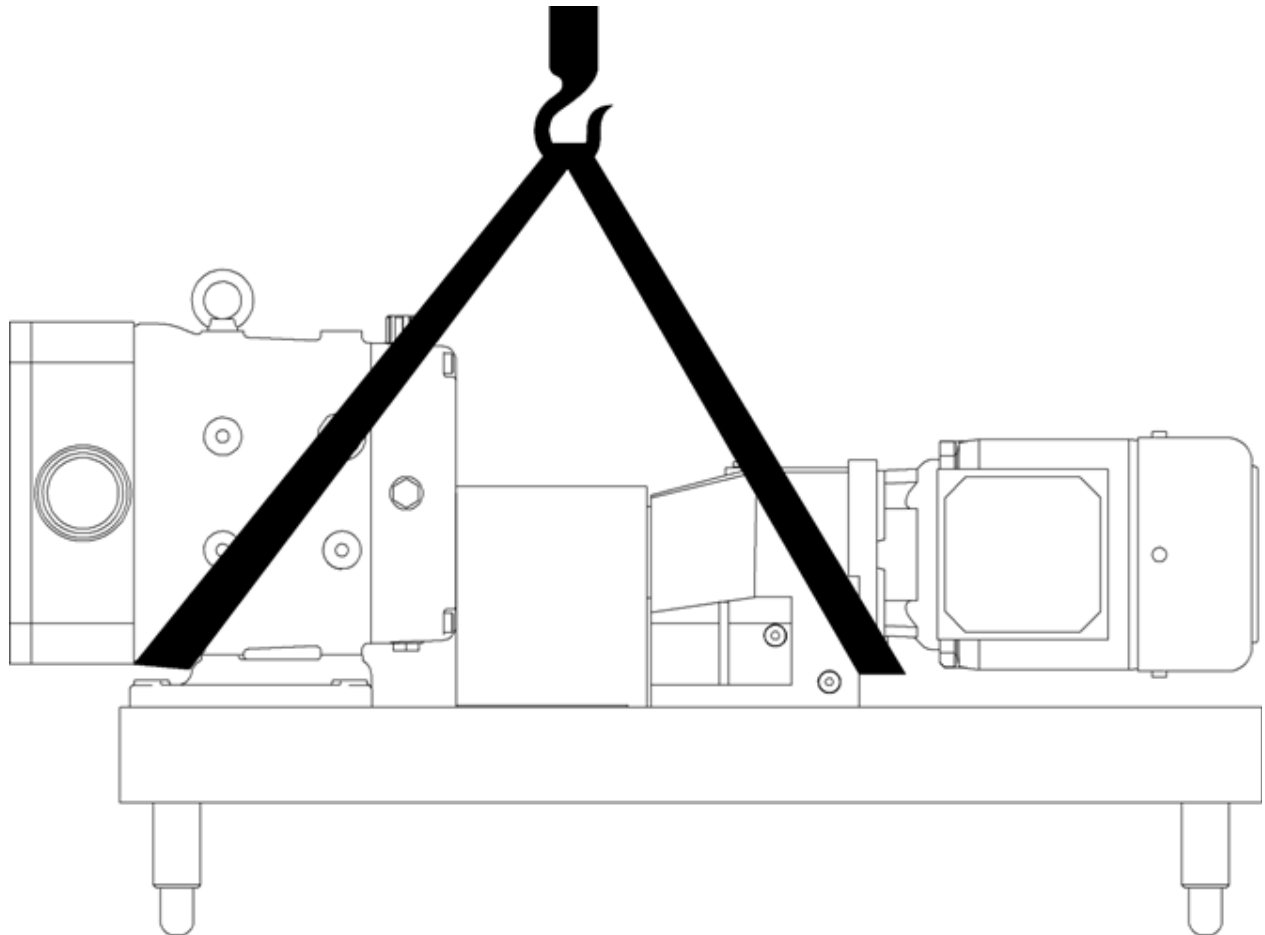
## Unpacking

Carefully unpack all parts of the pump and inspect for damage that may have occurred during shipment. Report any damages to the carrier immediately.

The ports on the pump are protected with a plastic cover. If any covers are missing or damaged, inspect the ports on the pump thoroughly for any damage.

If you are receiving a complete base mounted unit, please check shaft alignment as it may have changed during shipment.

The drawing below shows how the pump should be lifted. Ensure that the lifting equipment is correctly rated.

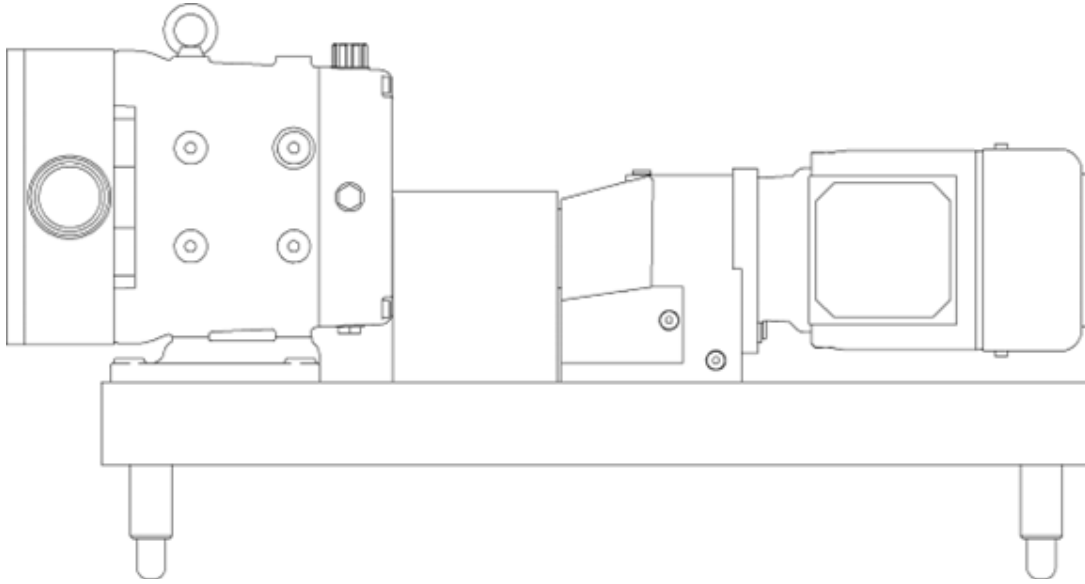


## Installation and Start Up

### Mounting Configurations

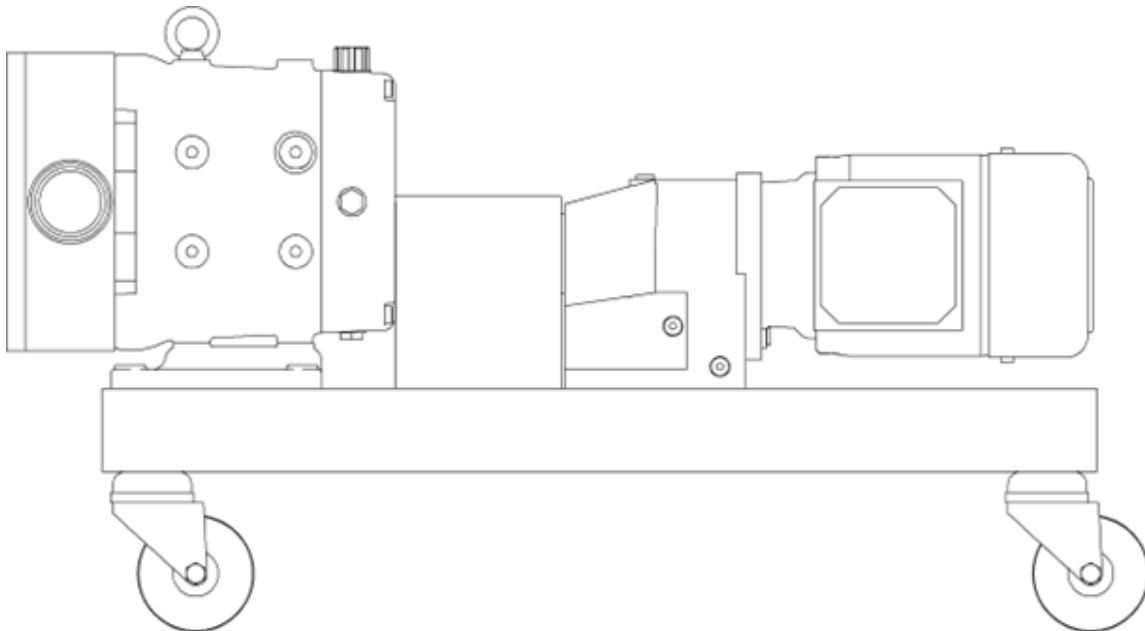
#### Pump Mounting Adjustable:

- Adjustable leg base, commonly used for sanitary pumps for wash down under base. Can be easily moved or repositioned.



#### Pump Mounting Casters:

- Portable bases for movement to different locations. Can also be mounted on a cart with handles.



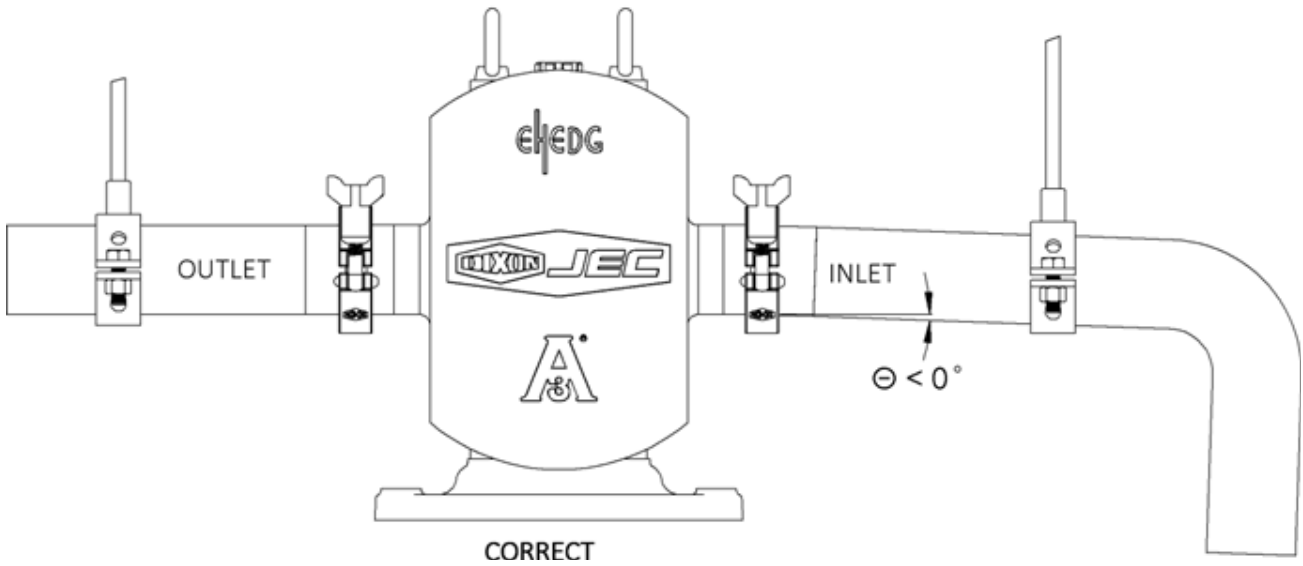
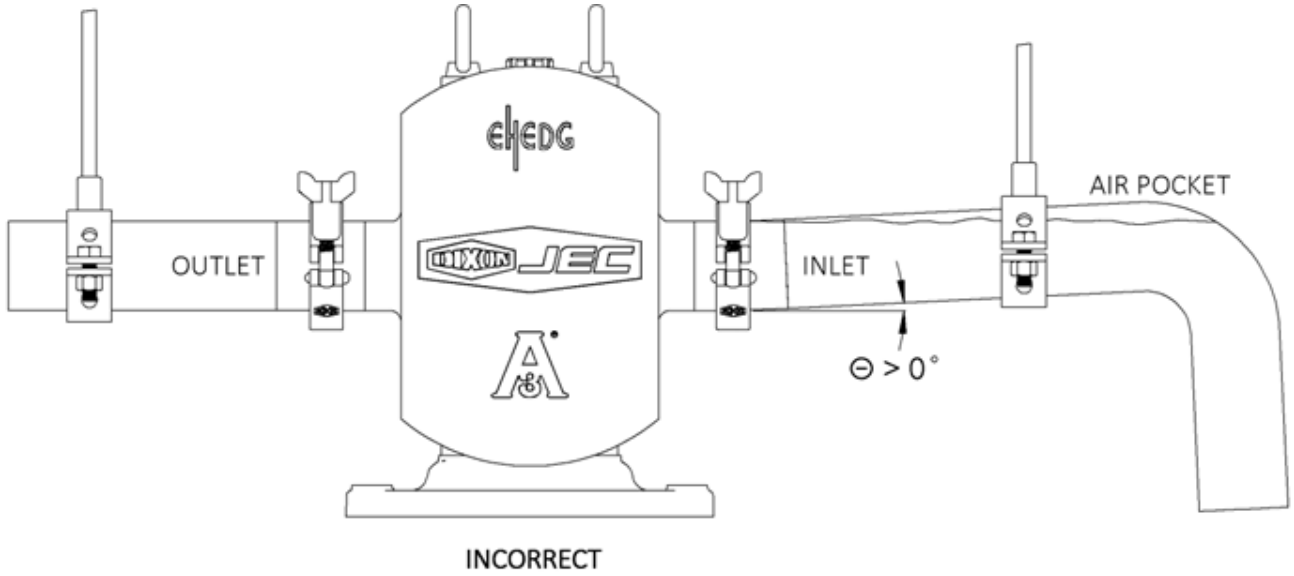


# Installation and Start Up

## Proper Installation

### Piping Slope:

- Inlet side - slope piping up to inlet to avoid air pocket.



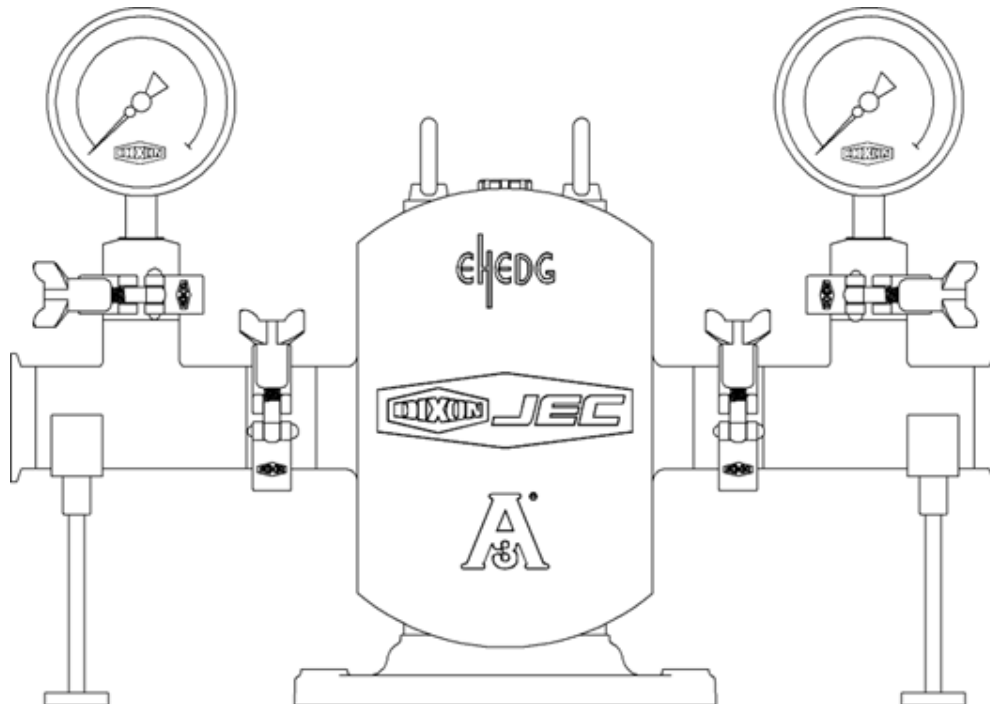
# Installation and Start Up

## Proper Installation

### Pressure Gauges:

Pressure and vacuum gauges provide the easiest way to tell you something about the pump operation.

- Normal or abnormal pressures
- Overflow conditions
- Indication of flow
- Changes in pump condition
- Changes in system conditions
- Changes in fluid viscosity

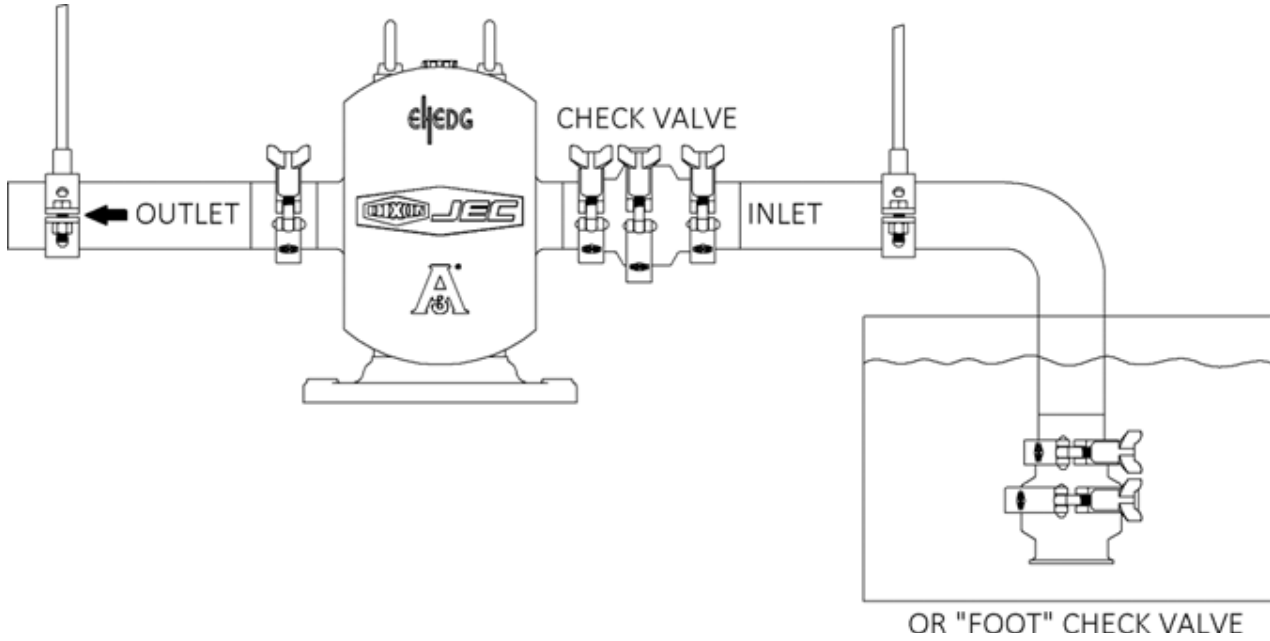


# Installation and Start Up

## Proper Installation

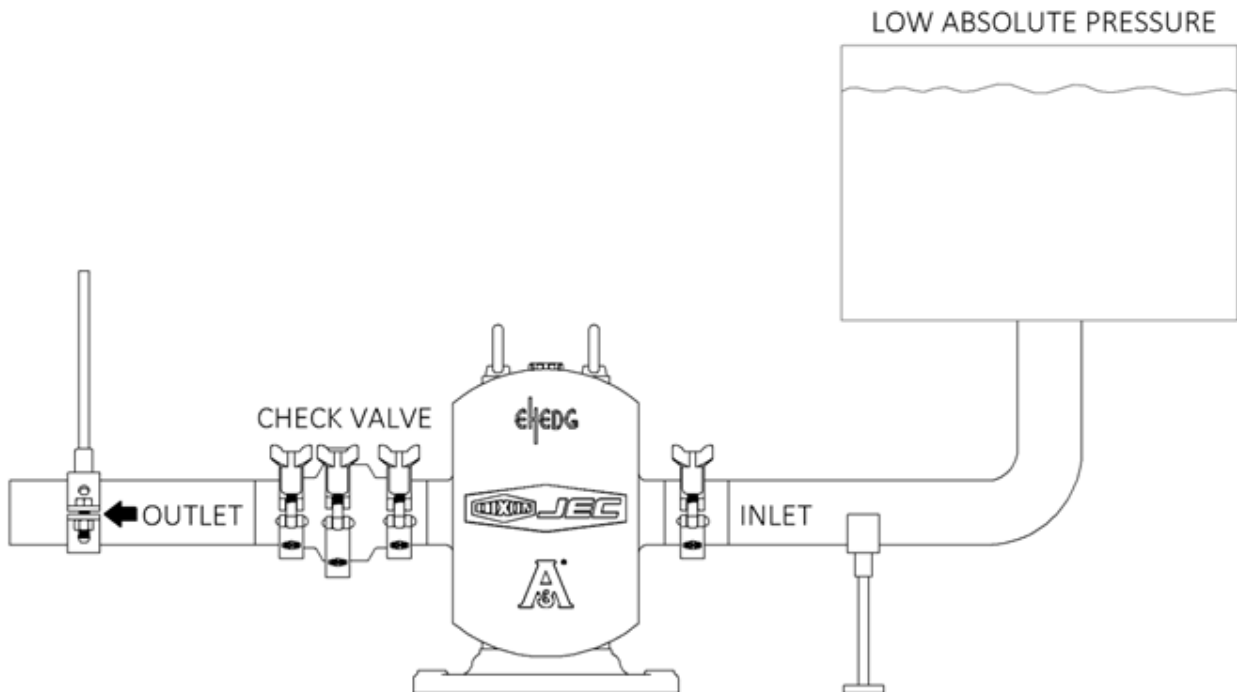
### Inlet Check Valve:

- Inlet side - use check valves to keep inlet line full, particularly with low viscosity fluids, and in start-stop operation.



### Outlet Check Valve:

- Inlet vacuum service - use check valve on outlet side.
- Prevents backflow (air or fluid).
- Facilitates initial start up (minimizes differential pressure pump must supply to start flow).



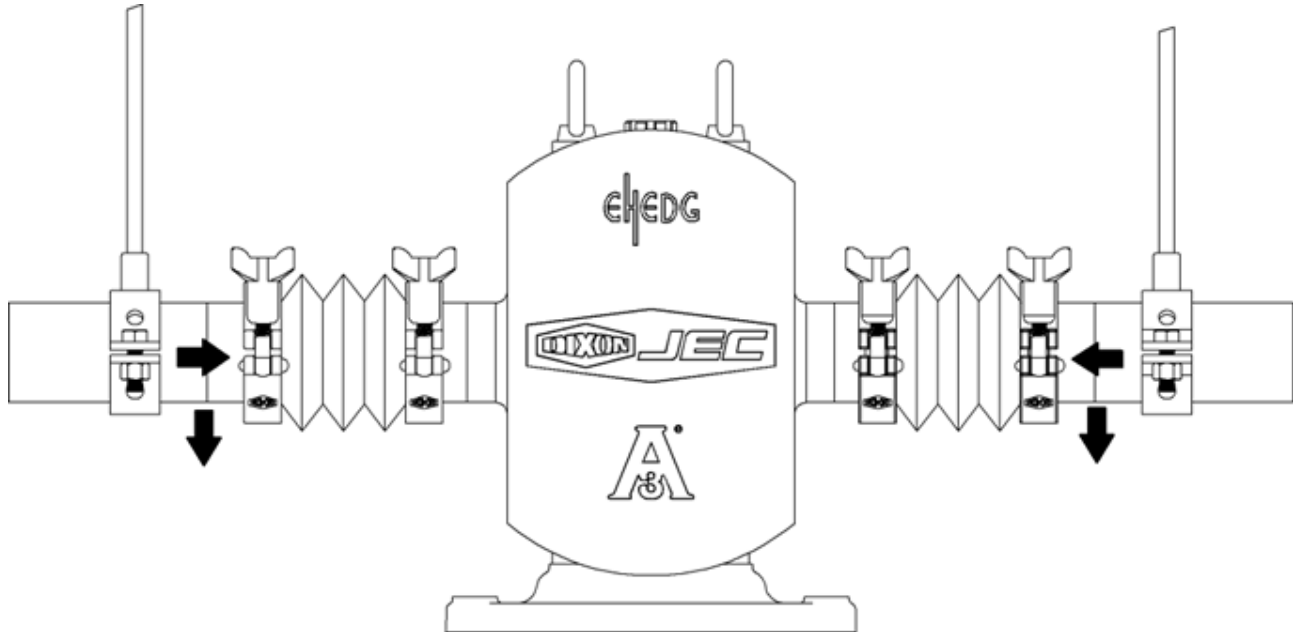


# Installation and Start Up

## Proper Installation

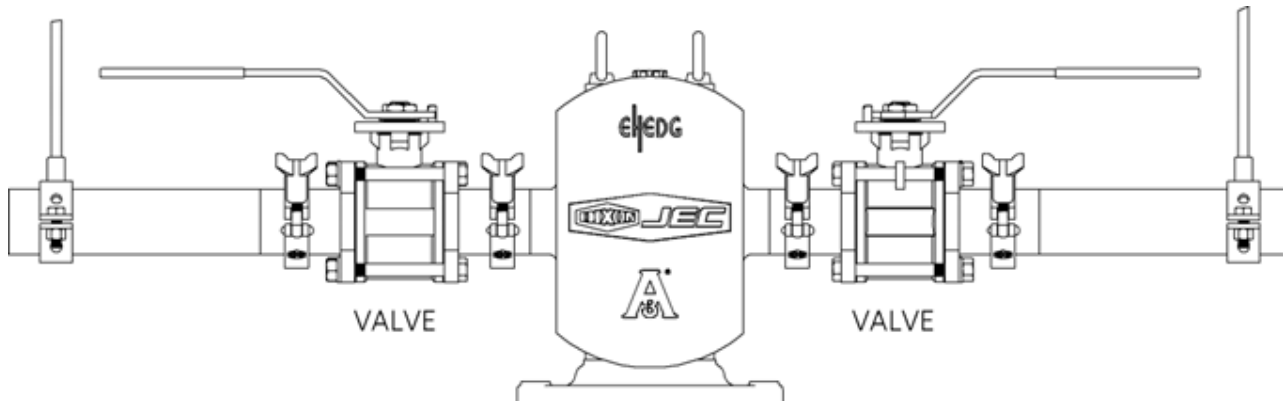
### Thermal Expansion:

- Thermal expansion of piping can cause tremendous forces. Use thermal expansion joints to minimize forces on pump. Flexible joints can also be used to limit the transmission of mechanical vibration. Anchor free ends of any flexible hose in system.



### Isolation Valves:

- Isolation valves - permit pump maintenance and removal safely without emptying entire system.

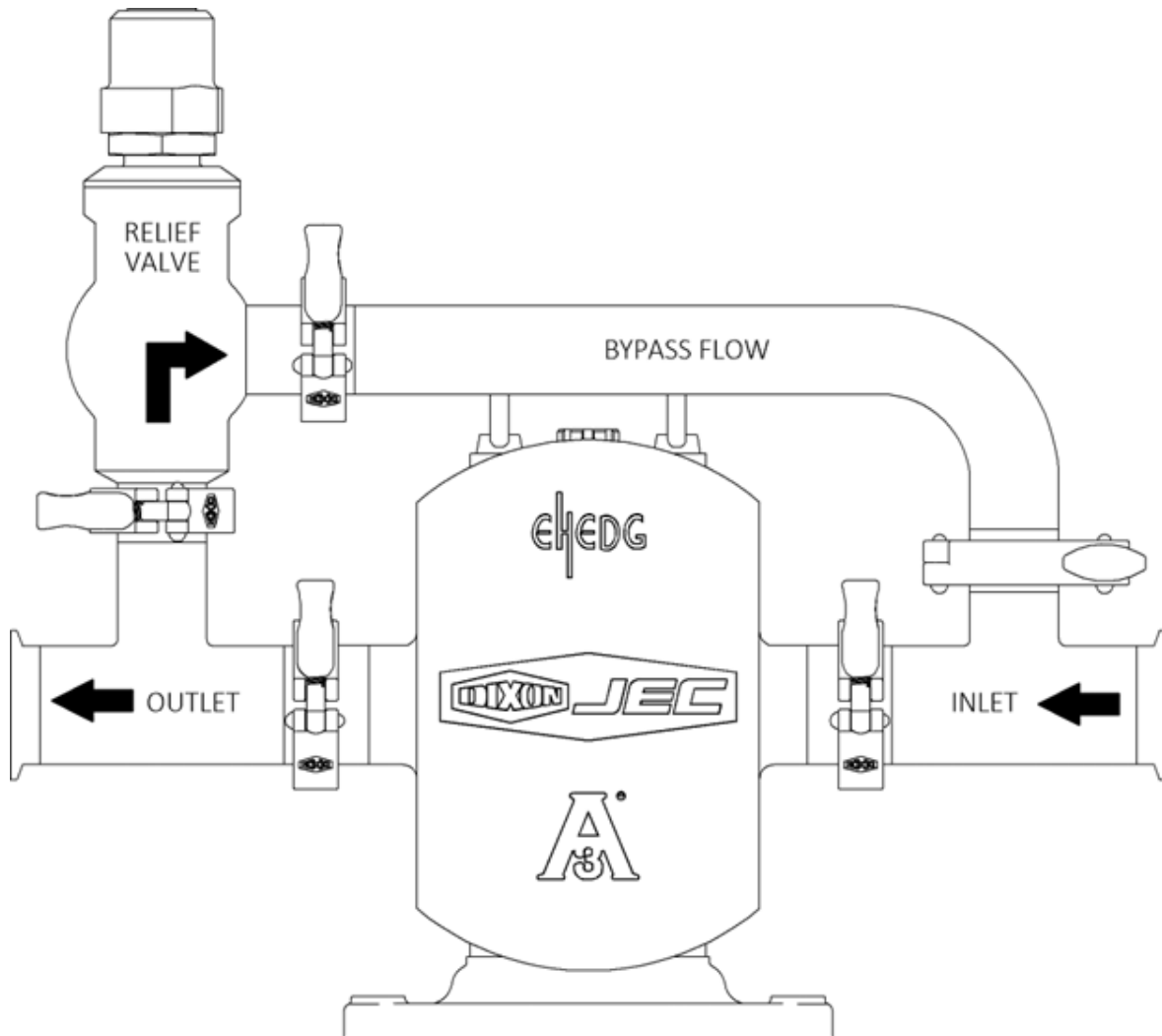


# Installation and Start Up

## Proper Installation

### Relief Loop:

- Relief valve - to protect the pump and piping system against excessive pressure, a relief valve should be installed. An integral relief valve, designed to bypass the fluid internally from the pump outlet to the inlet, should not be used on applications where the discharge must be closed for more than a few minutes. Prolonged operation of the pump with closed discharge will cause heating of the fluid circulating through the relief valve.

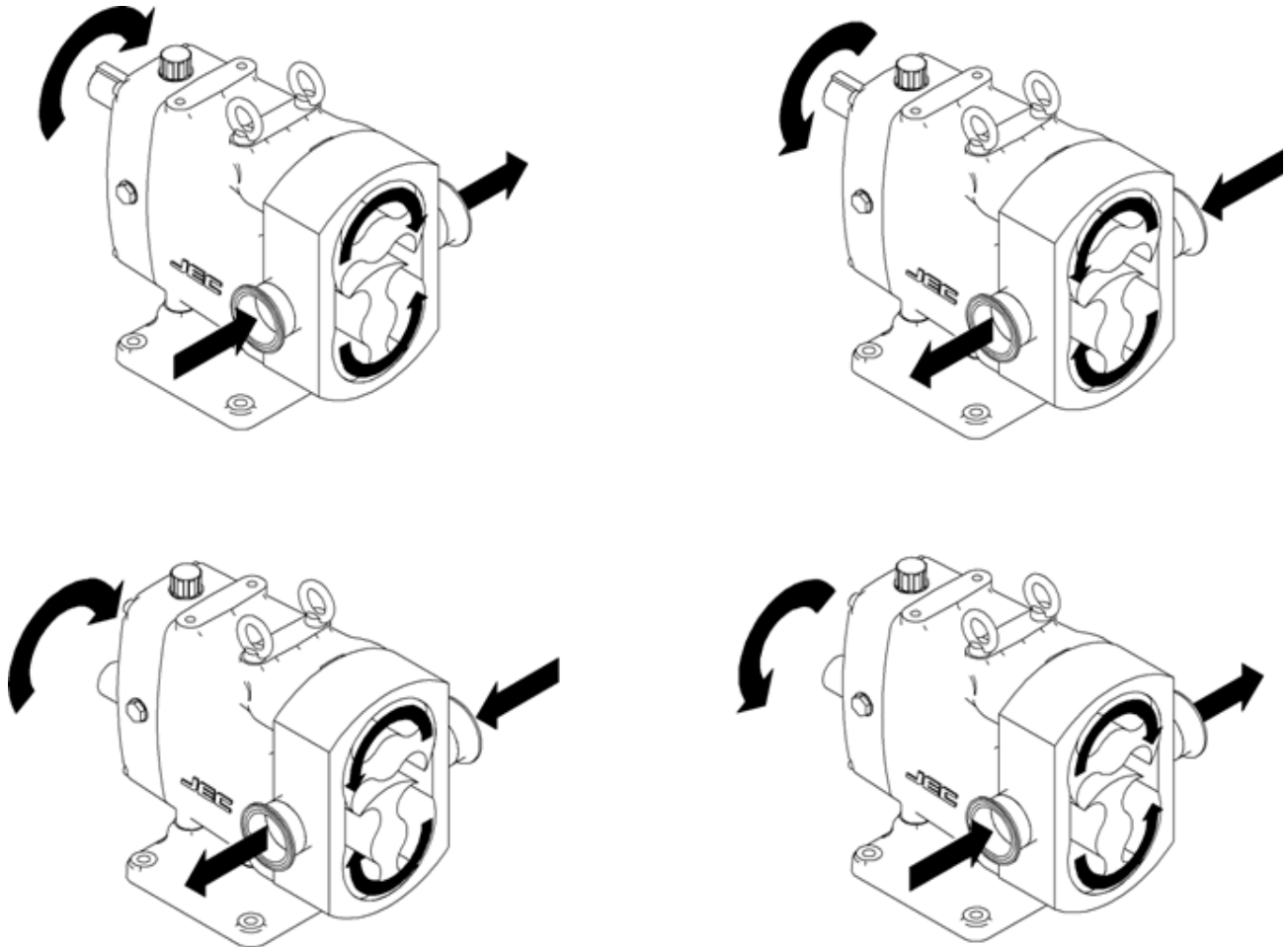


## Installation and Start Up

### At Start Up

#### Pump Flow:

- All pumps are labeled with flow direction based on motor being wired for clockwise rotation. If motor is wired for counterclockwise rotation, flow direction will be opposite of what is indicated on pump head.



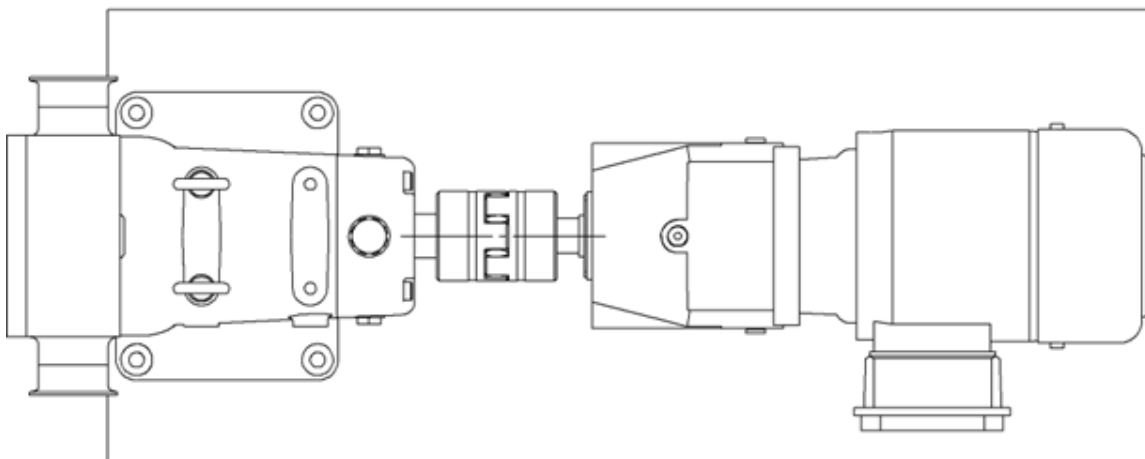
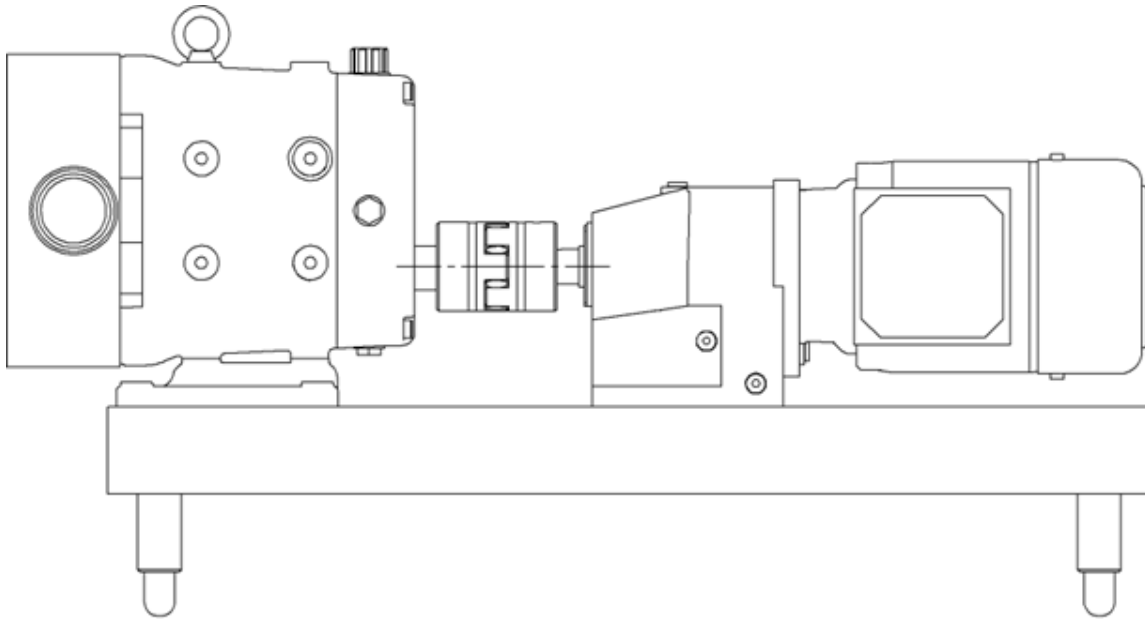
# Installation and Start Up

## At Start Up

### Pump Alignment:

- A flexible coupling is used to compensate for end play and small differences in alignment. The pump and drive shaft should be aligned as closely as possible.
- Check angular alignment using feeler or taper gauge.
- Adjust to get equal dimension at all points - at the same time, set space between coupling halves to the coupling manufacturer's recommended distance.

NOTE: Pump is aligned prior to shipping. After installation, verify alignment as misalignment may have occurred during shipment.



## Tools Needed

- Rotor tool
- Plastic dowel
- Open ended wrench set
- Rubber mallet
- Flat head screw driver
- Feeler gauges
- Hex keys
- O-ring pick
- Spanner wrench
- Rotor extraction tool (optional)

Additional tools needed when reassembling or disassembling gear box.

- Spanner wrench
- Arbor press or bearing puller

## Maintenance

### Pump Housing Disassembly - Single Mechanical Seal



Prior to removal of pump, the shut-off valves in the suction and discharge lines must be closed. If there is any risk that product may harden, crystallize, or freeze in the pump it should be thoroughly drained and cleaned immediately after use. Same attention applies if there is a seal flush option. Power needs to be locked out to prevent unintended start of the pump.

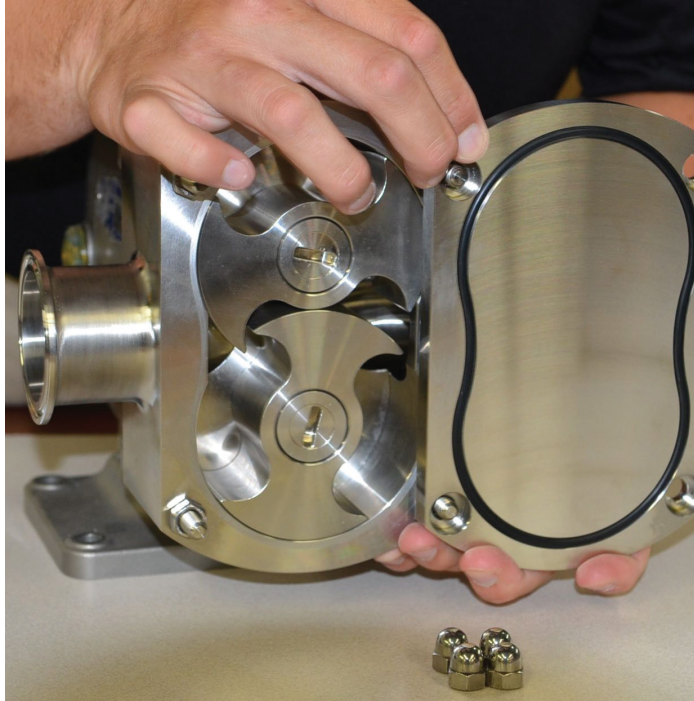
1. Loosen and remove the four hex nuts (**item 33**) from the front cover.



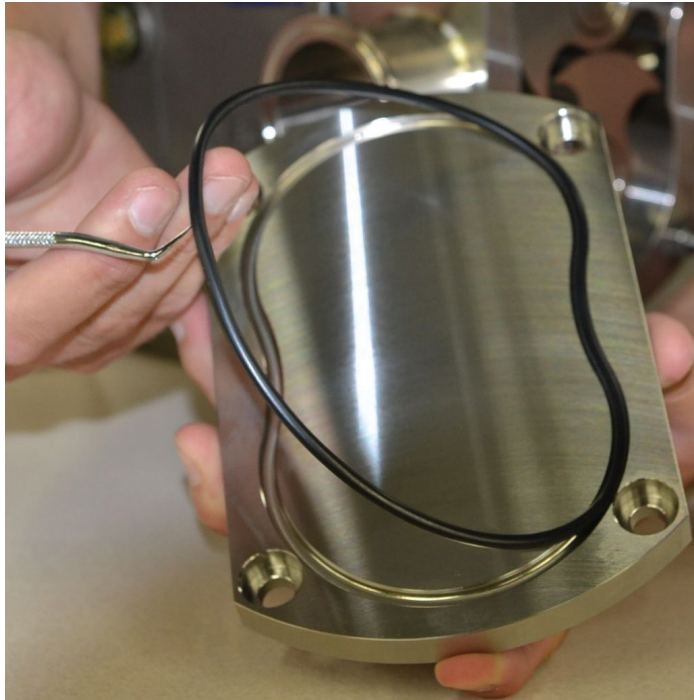
## Maintenance

### Pump Housing Disassembly - Single Mechanical Seal

2. Remove the cover (**item 32**). If it is stuck, tap the cover with a soft hammer.



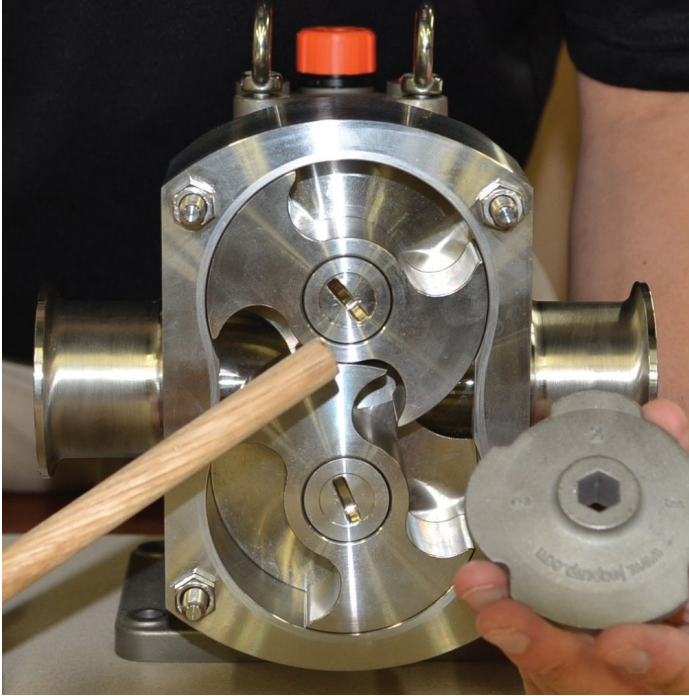
3. Remove the cover O-ring (**item 34**).



## Maintenance

### Pump Housing Disassembly - Single Mechanical Seal

4. Remove the rotor retaining bolts (item 35). To remove the rotor retaining bolts, place the dowel between the rotors. Turn the first rotor bolt counterclockwise.



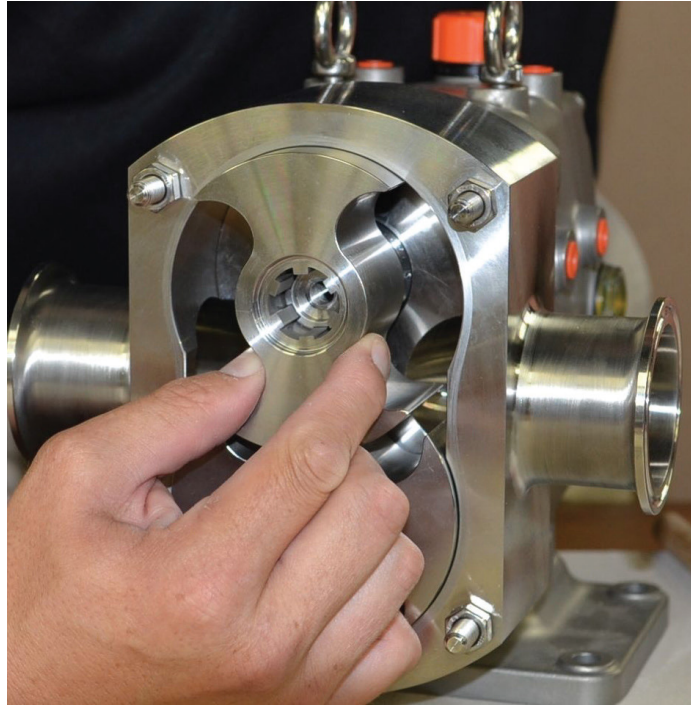
5. Remove the rotor bolts (item 35), spring washers (item 36), and O-ring (item 37).



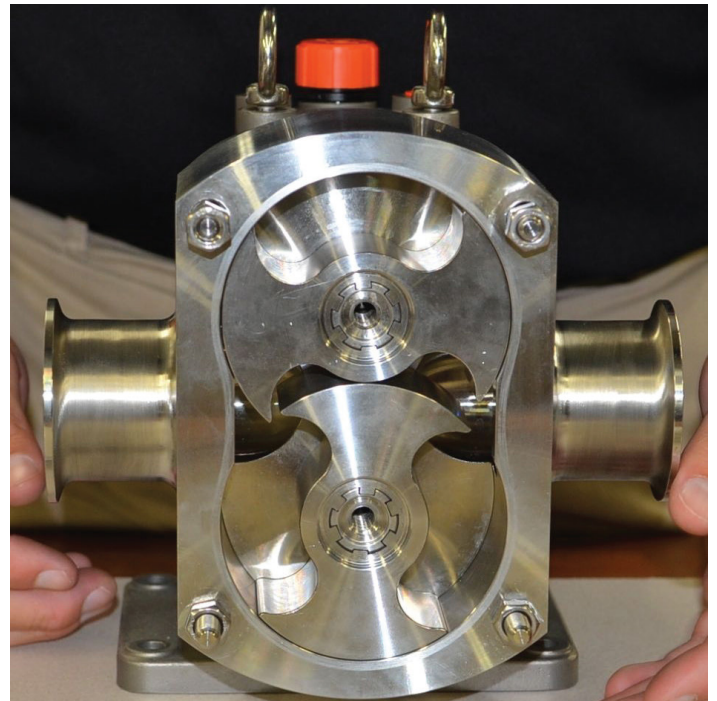
## Maintenance

### Pump Housing Disassembly - Single Mechanical Seal

6. Remove the rotors (**item 38**) from the pump housing (**item 31**) by pulling straight.



- 6a. If the rotors (**item 38**) will not come out freely, remove the stud bolt hex nuts (**item 46**), and then tap on the back of the inlet and outlet ports with a soft hammer. Once the rotors (**item 38**) are loose, then push the casing (**item 31**) back towards the gear box and remove the rotors.





## Maintenance

### Pump Housing Disassembly - Single Mechanical Seal

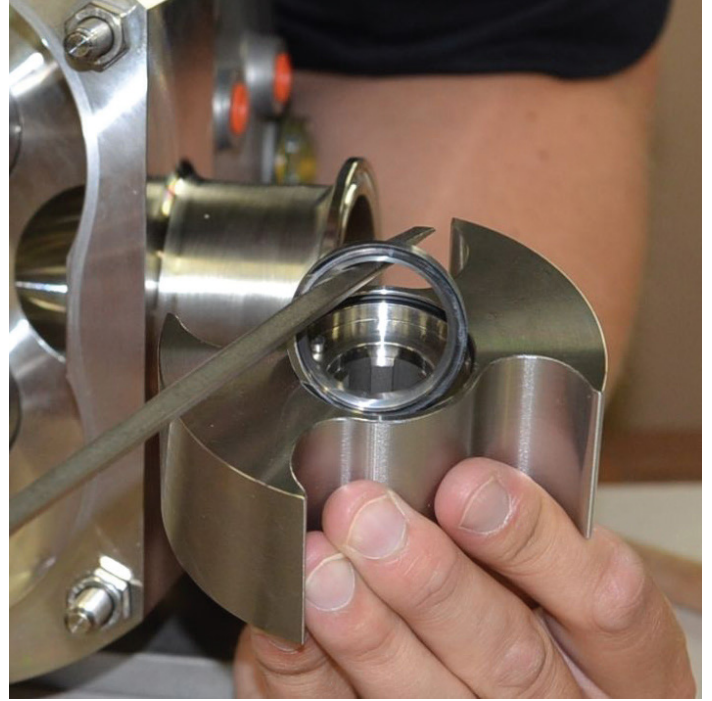
6a. Continued.



## Maintenance

### Pump Housing Disassembly - Single Mechanical Seal

7. Remove the seal ring (item 52) from the back of the rotor (item 38).



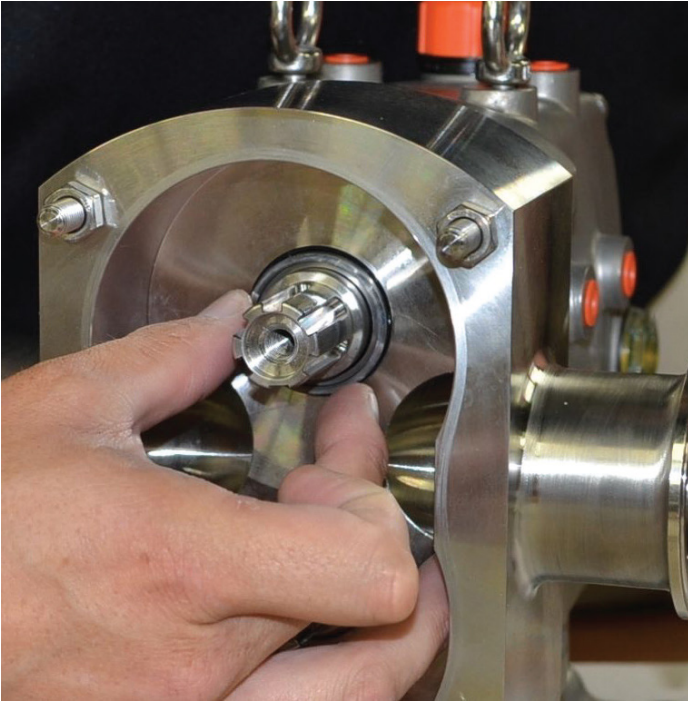
8. Remove the rotor O-ring (item 51).



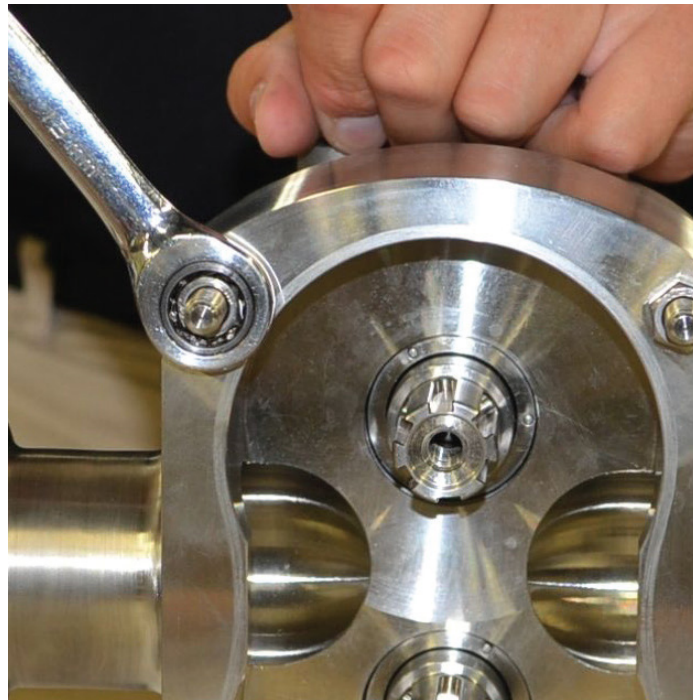
## Maintenance

### Pump Housing Disassembly - Single Mechanical Seal

9. Remove the casing seal rings (item 52).



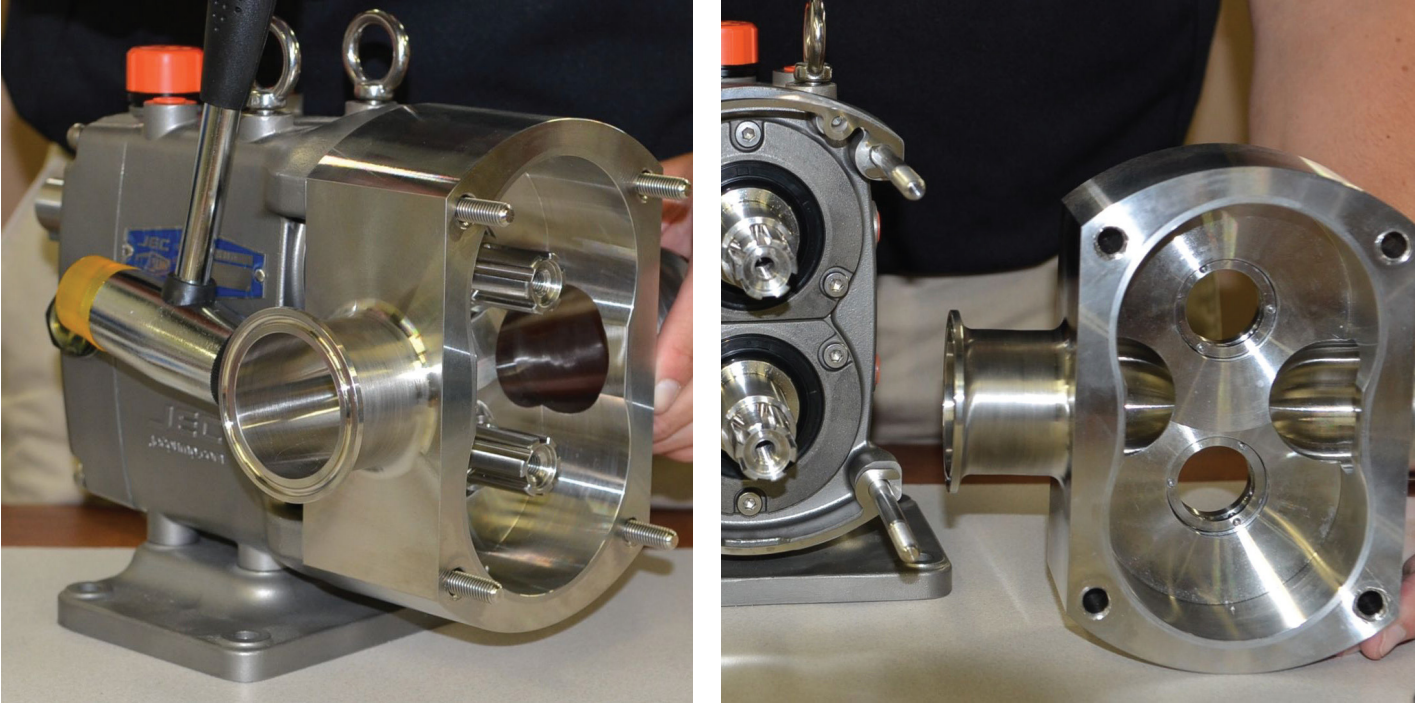
10. Remove the stud bolt hex nuts (item 46).



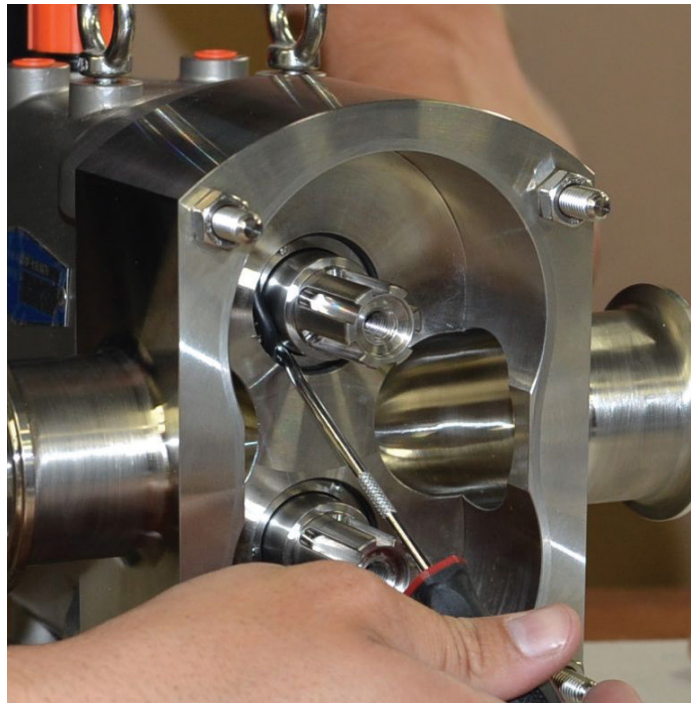
## Maintenance

### Pump Housing Disassembly - Single Mechanical Seal

11. Remove the rotor case (item 31).



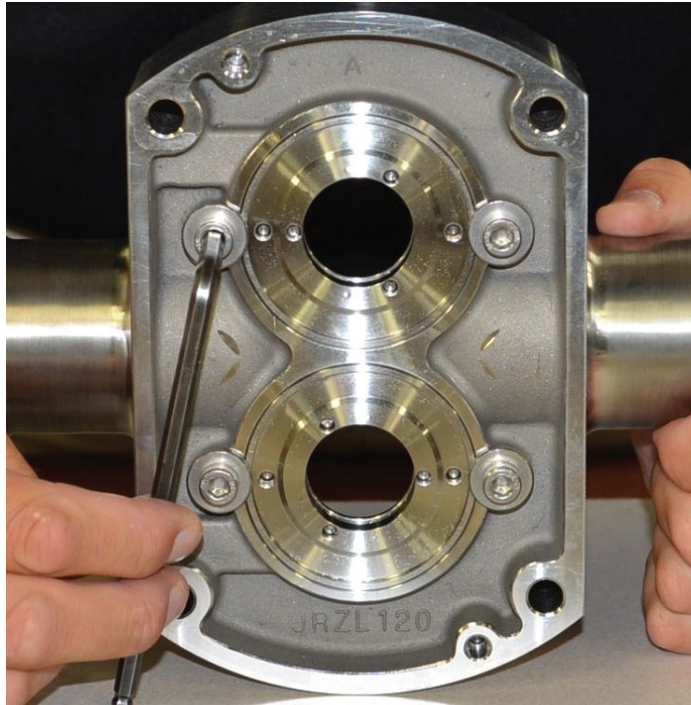
12. Remove the rotor case O-ring (item 53). This can be done before you remove the casing or after.



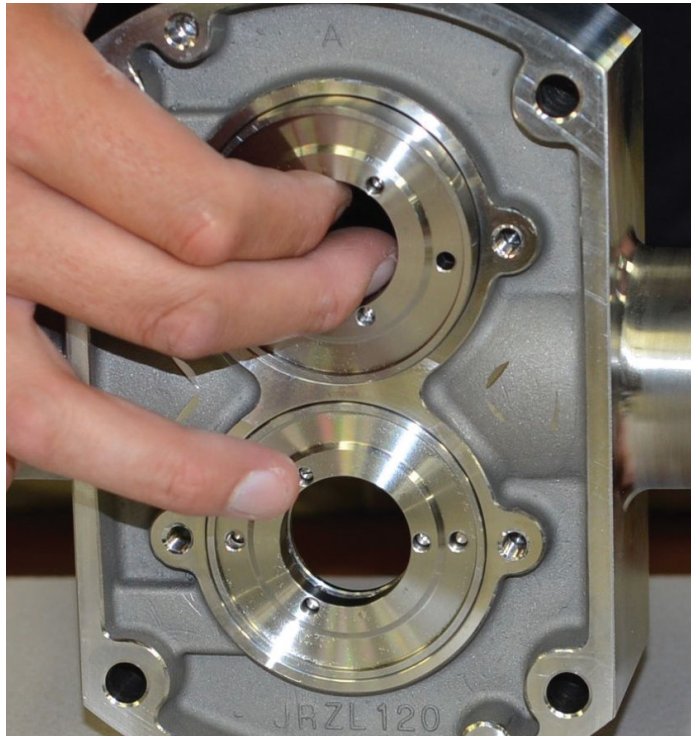
## Maintenance

### Pump Housing Disassembly - Single Mechanical Seal

13. On the back of the rotor case, remove the four mechanical seal gland wrench bolts (item 42 and 43).



14. Remove the single seal body cases (item 54).



## Maintenance

### Pump Housing Disassembly - Double Mechanical Seal

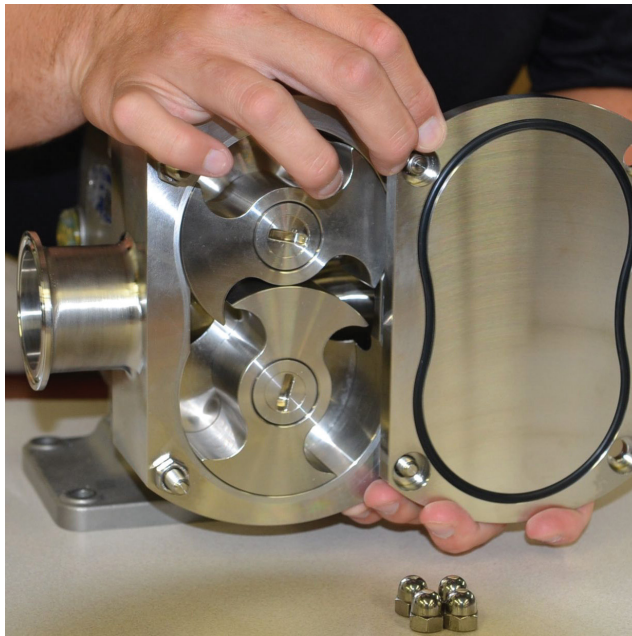


Prior to removal of pump, the shut-off valves in the suction and discharge lines must be closed. If there is any risk that product may harden, crystallize, or freeze in the pump it should be thoroughly drained and cleaned immediately after use. Same attention applies if there is a seal flush option. Power needs to be locked out to prevent unintended start of the pump.

1. Loosen and remove the four hex nuts (**item 33**) from the front cover.



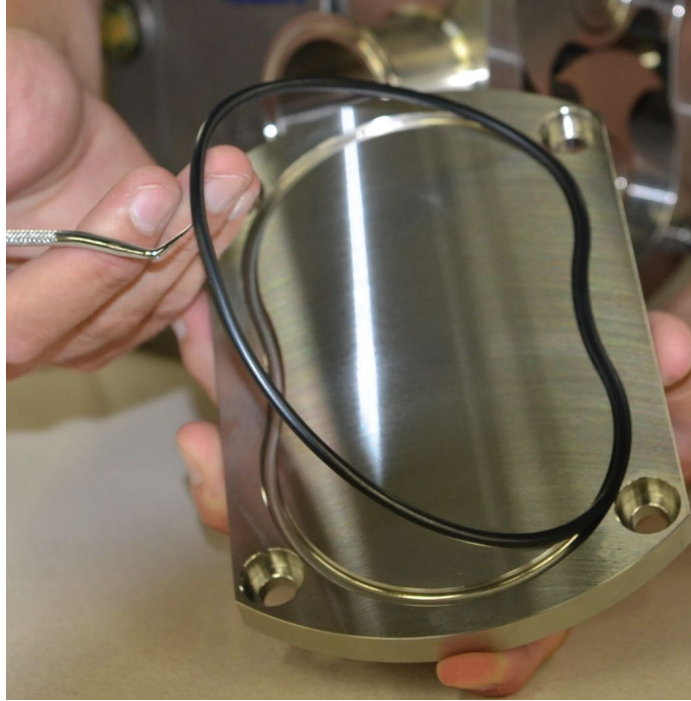
2. Remove the cover (**item 32**). If it is stuck, tap the cover with a soft hammer.



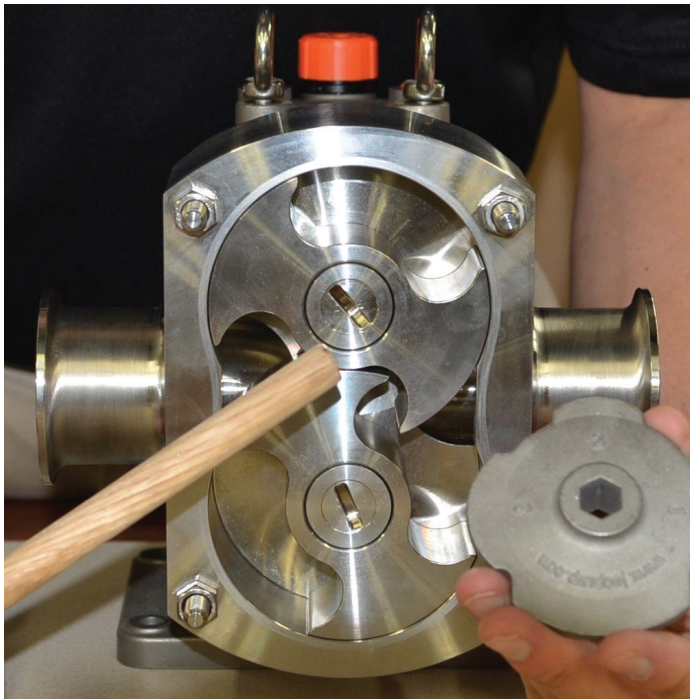
## Maintenance

### Pump Housing Disassembly - Double Mechanical Seal

3. Remove the cover O-ring (**item 34**).



4. Remove the rotor retaining bolts (**item 35**). To remove the rotor retaining bolts, place the dowel between the rotors. Turn the first rotor bolt counterclockwise.



## Maintenance

### Pump Housing Disassembly - Double Mechanical Seal

5. Remove the rotor bolts (**item 35**), spring washers (**item 36**), and O-ring (**item 37**).



6. Remove the rotors (**item 38**) from the pump housing (**item 31**) by pulling straight.

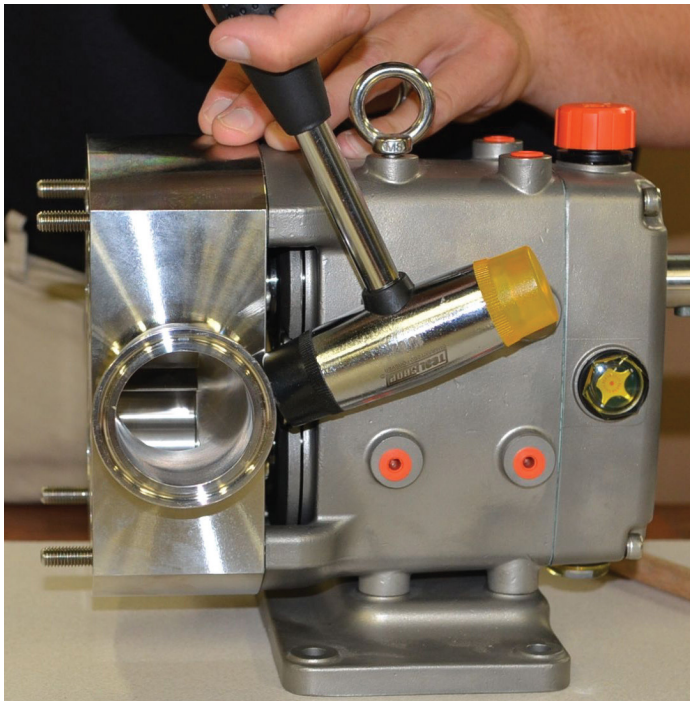
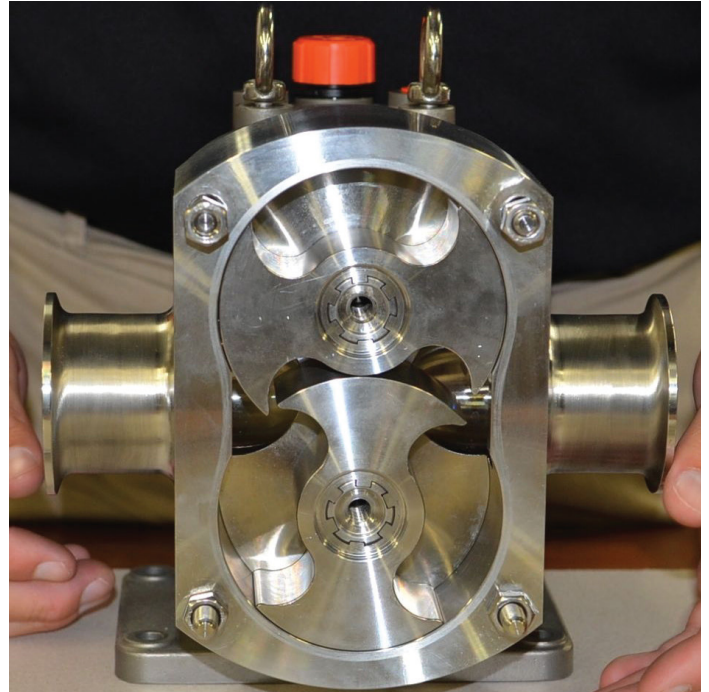




## Maintenance

### Pump Housing Disassembly - Double Mechanical Seal

- 6a. If the rotors (item 38) will not come out freely, remove the stud bolt hex nuts (item 46) and then tap on the back of the inlet and outlet ports with a soft hammer. Once the rotors (item 38) are loose, then push the casing (item 31) back towards the gear box and remove the rotors.



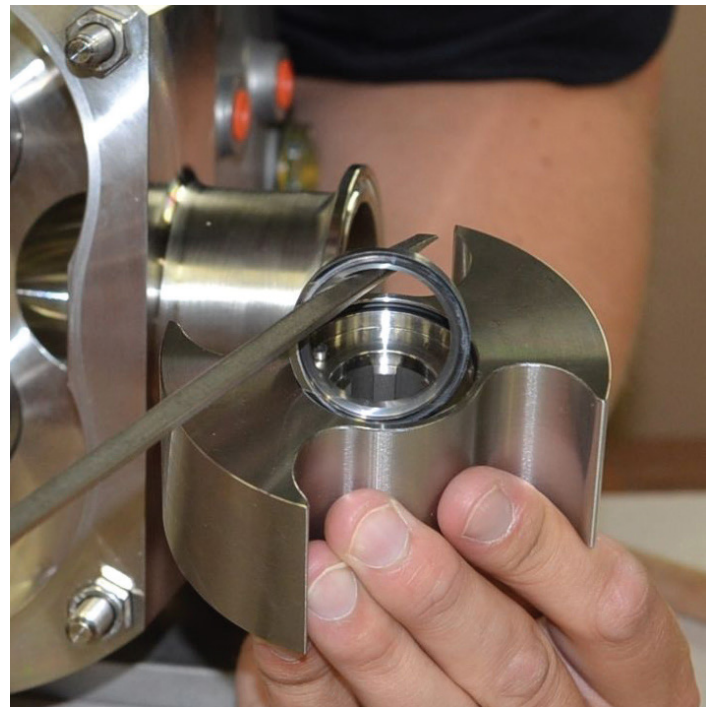
## Maintenance

### Pump Housing Disassembly - Double Mechanical Seal

6a. Continued.



7. Remove the seal ring (item 52) from the back of the rotor (item 38).



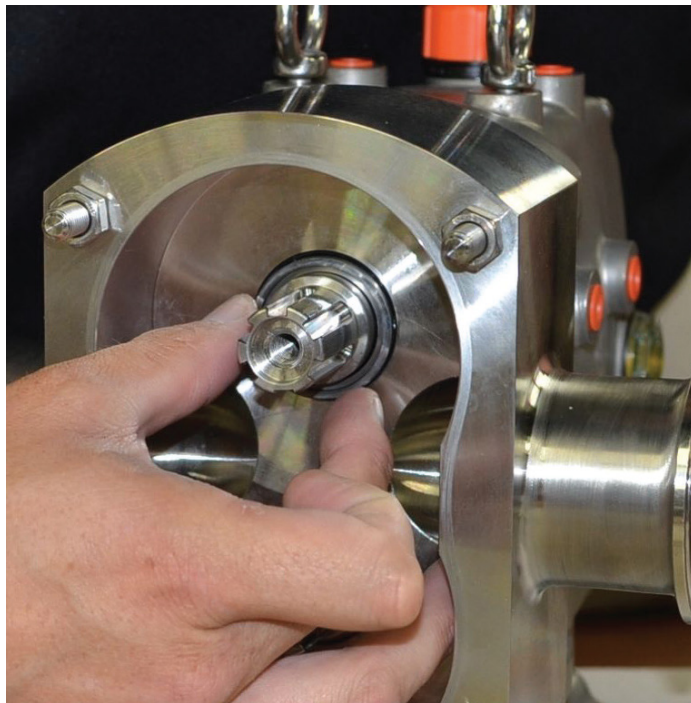
## Maintenance

### Pump Housing Disassembly - Double Mechanical Seal

8. Remove the rotor O-rings (item 51).



9. Remove the casing seal rings (item 52).



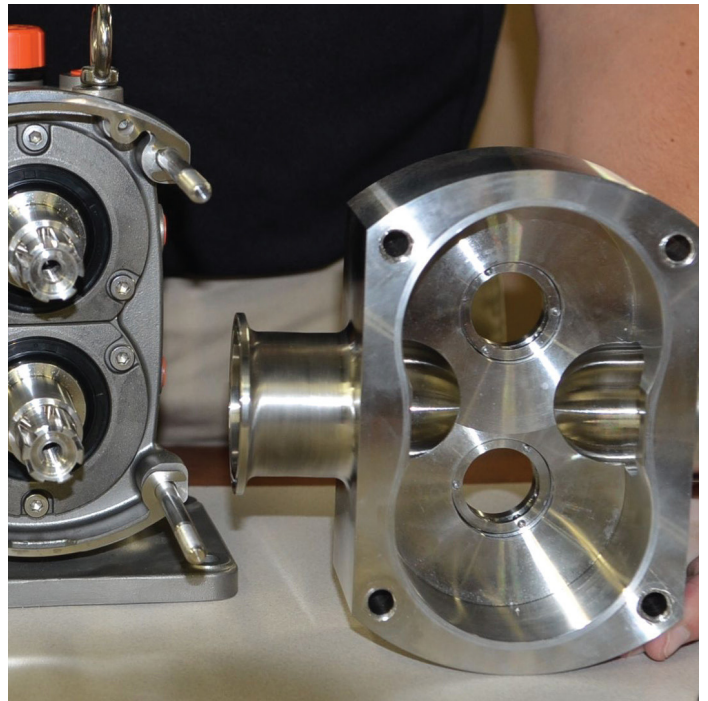
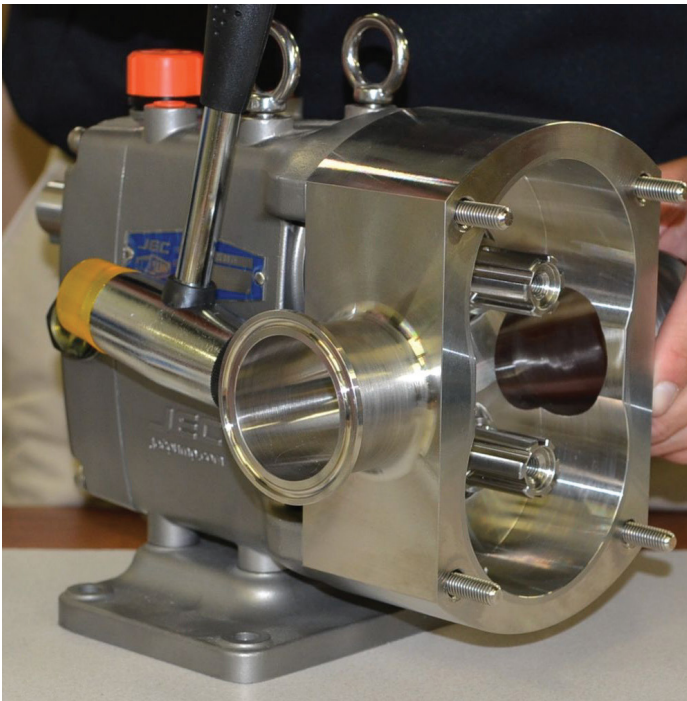
## Maintenance

### Pump Housing Disassembly - Double Mechanical Seal

10. Remove the stud bolt hex nuts (item 46).



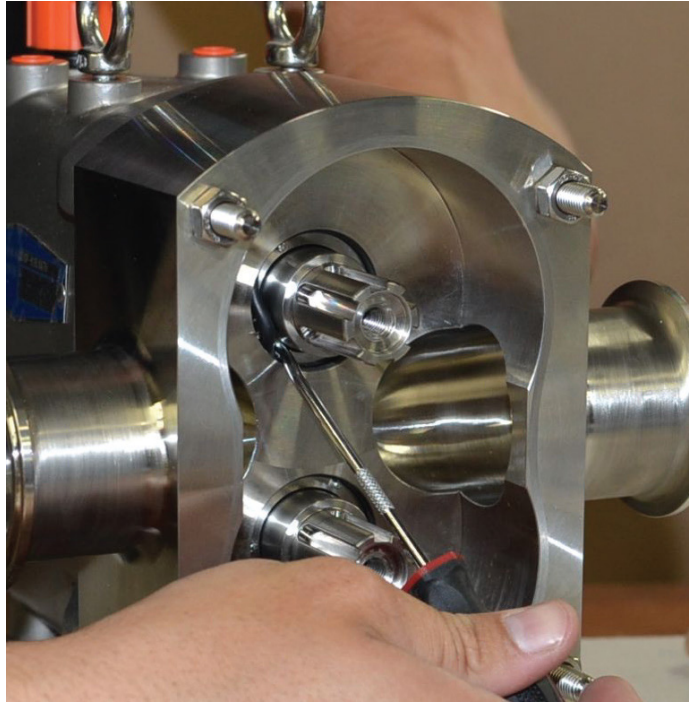
11. Remove the rotor case (item 31).



## Maintenance

### Pump Housing Disassembly - Double Mechanical Seal

12. Remove the rotor case O-ring (**item 53**). This can be done before you remove the casing or after.



13. Remove seal body case (**item 61**) and seal O-ring (**item 62**).



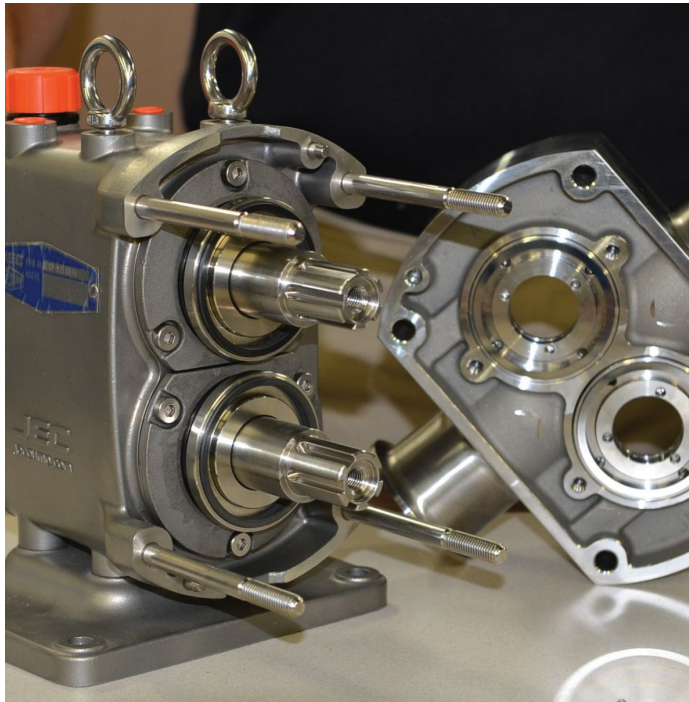
## Maintenance

### Pump Housing Disassembly - Double Mechanical Seal

14. Remove casing O-rings (**item 53**).



15. Remove the shaft seal base (**item 63**).



## Maintenance

### Pump Housing Disassembly - Double Mechanical Seal

16. Remove shaft O-ring (item 64).



## Maintenance

### Pump Housing Disassembly - Triple Lip Seal

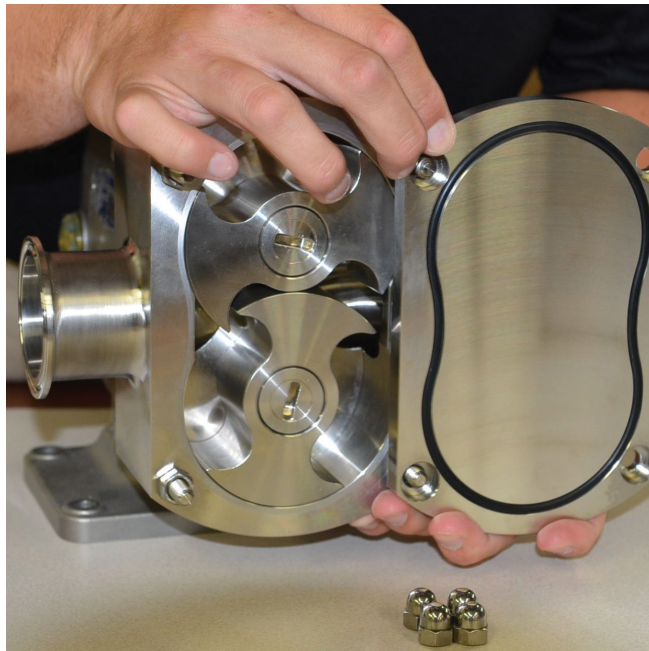


Prior to removal of pump, the shut-off valves in the suction and discharge lines must be closed. If there is any risk that product may harden, crystallize, or freeze in the pump it should be thoroughly drained and cleaned immediately after use. Same attention applies if there is a seal flush option. Power needs to be locked out to prevent unintended start of the pump.

1. Loosen and remove the four hex nuts (**item 33**) from the front cover.



2. Remove the cover (**item 32**). If it is stuck, tap the cover with a soft hammer.

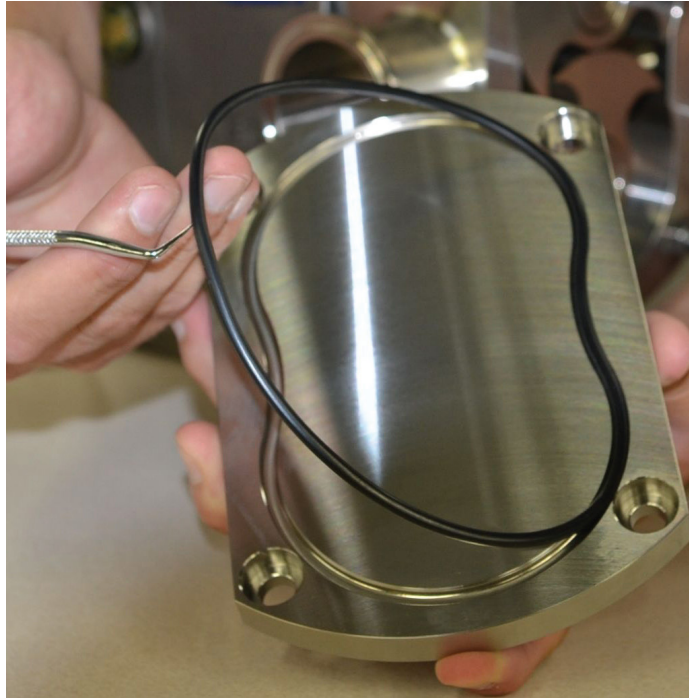




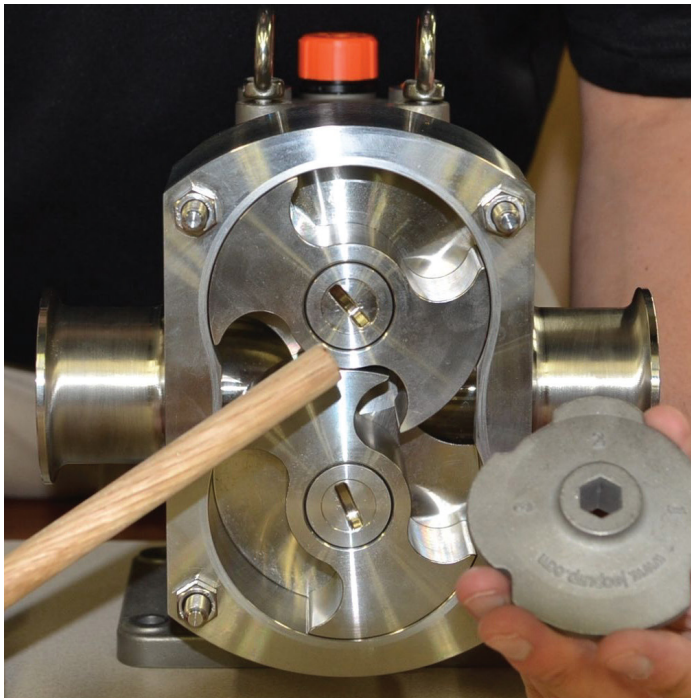
## Maintenance

### Pump Housing Disassembly - Triple Lip Seal

3. Remove the cover O-ring (**item 34**).



4. Remove the rotor retaining bolts (**item 35**). To remove the rotor retaining bolts, place the dowel between the rotors. Turn the first rotor bolt counterclockwise.



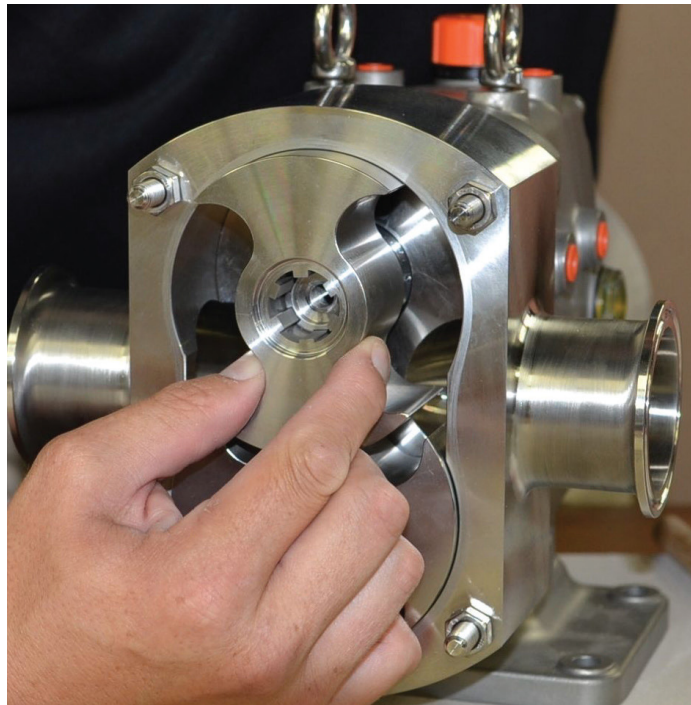
## Maintenance

### Pump Housing Disassembly - Triple Lip Seal

5. Remove the rotor bolts (item 35), spring washers (item 36), and O-ring (item 37).



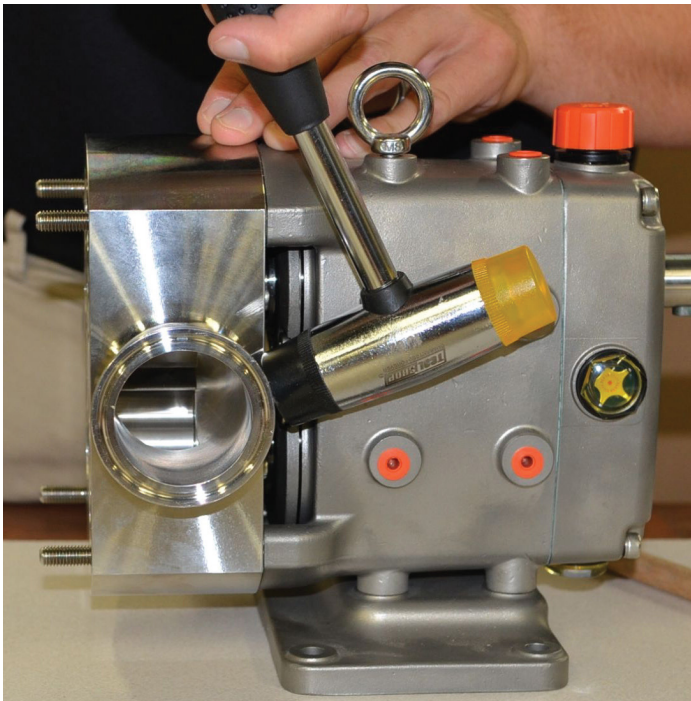
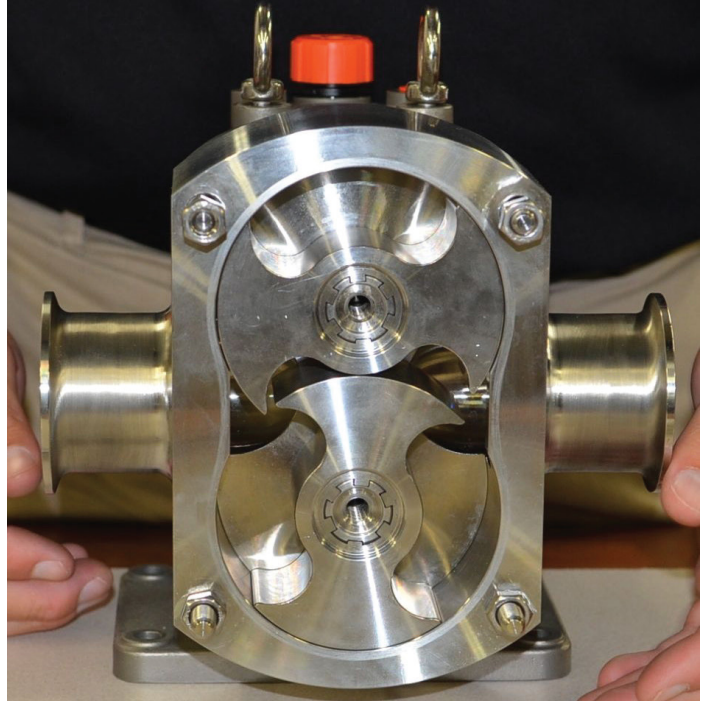
6. Remove the rotors (item 38) from the pump housing (item 31) by pulling straight.



## Maintenance

### Pump Housing Disassembly - Triple Lip Seal

- 6a. If the rotors (item 38) will not come out freely, remove the stud bolt hex nuts (item 46) and then tap on the back of the inlet and outlet ports with a soft hammer. Once the rotors (item 38) are loose, then push the casing (item 31) back towards the gear box and remove the rotors.



## Maintenance

### Pump Housing Disassembly - Triple Lip Seal

6a. Continued.



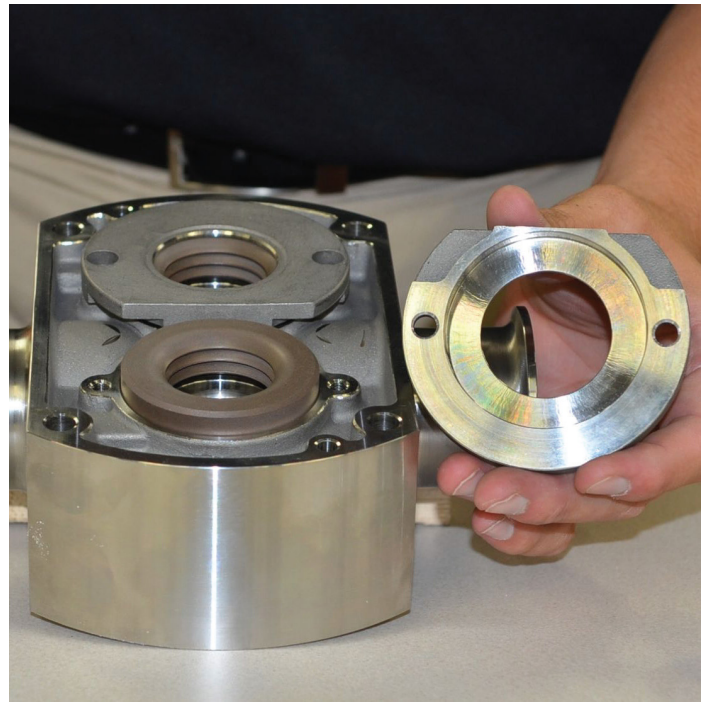
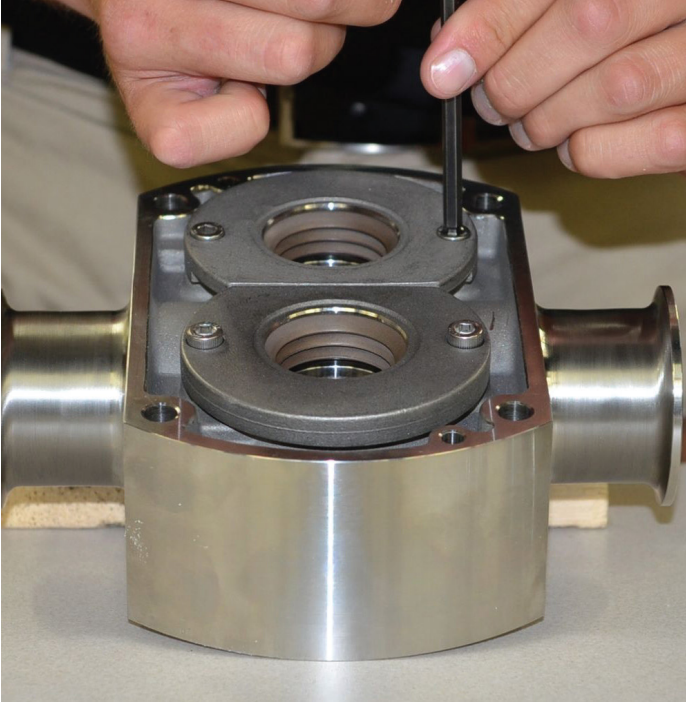
7. Remove O-ring (**item 51**) from the rotor.



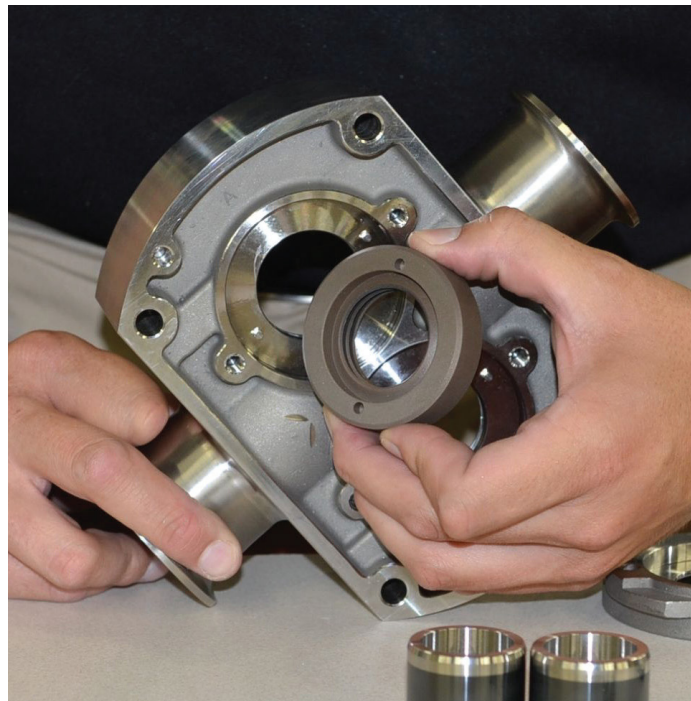
## Maintenance

### Pump Housing Disassembly - Triple Lip Seal

8. Remove lip seal cover (item 56).



9. Remove the triple lip seal (item 55).



# Maintenance

## Inspection

1. Inspect O-rings and seals for reuse. Worn O-rings and seals should be replaced.
2. Inspect seal faces for scoring or cracks. Replace any seal faces that are damaged.
3. Inspect rotors for any damage or abnormal wear.
4. Inspect rotors for wear on splines and that they fit snug on the shafts.
5. Inspect shafts for wear on splines and make sure they are not loose in the gear case.
6. Inspect rotor galling sign among the rotor housing, front cover, and rotors. Must be removed or replaced.
7. Inspect burr of the rotor bolt groove. Must be removed or replaced.

## Pump Housing Assembly

Before installing the pump housing (**item 31**) to the gear box, make sure that the surface of the pump housing and gear box are clean and check the shim plate between pump housing and gear box. Install the pump housing (**item 31**) onto the gear box (**item 1A**) and secure the four housing set nuts (**item 46**).

When installing the ceramic shaft sleeve onto the pump shaft, align sleeve with fit pin.

Follow the disassembly instructions in reverse for all types of seals and rotor assembly's.

Assemble a rotor onto shaft engaging the shallow groove with small spline in rotor and seal side first in to the shaft.

Place the plastic dowel between the rotors. Tighten the first rotor bolt with a special tool to the recommended torque.

Model	Rotor Nut Torque Specification (in-lbs)
RZL 105	116.3
RZL 110	116.3
RZL 115	116.3
RZL 120	116.3
RZL 220	277.8
RZL 225	277.8
RZL 330	434.0
RZL 340	434.0
RZL 440	651.0
RZL 450	651.0

To tighten the second rotor, place the plastic dowel on the opposite side of the rotor and tighten the second rotor bolt to the proper torque.



Install the cover (**item 32**) and tighten the cap nuts (**item 33**).

# Maintenance

## Rotor Clearance

Use feeler gauges to verify the back and radial clearances between the rotors and the housing. A depth gauge should be used to verify the front clearance.

Rotor clearance must be precisely maintained to provide maximum pumping efficiency, prevent contact between rotors, rotor housing, and front cover during operation. If pumping efficiency is below expectations or if parts contact has occurred during operation (within rated differential pressure) check rotor clearances and adjust if incorrect.

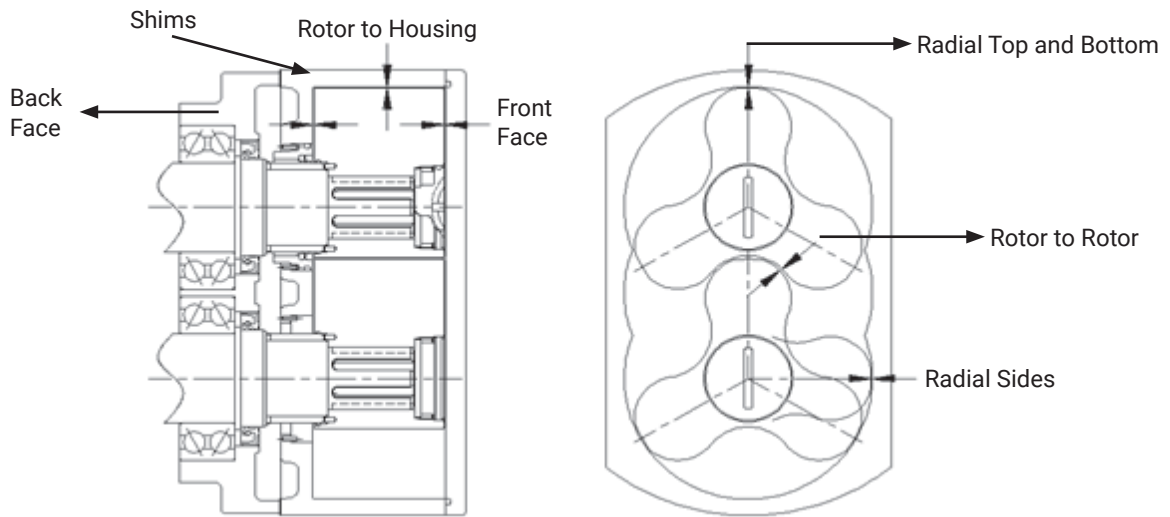


Figure 20

## Standard Rotor Clearance

Model	Back Face (mm/in)	Front Face (mm/in)	Clearances for Rotor Timing		
			Radial Sides (mm/in)	Radial Top and Bottom (mm/in)	Rotor to Rotor (mm/in)
RZL 105	0.05/0.002	0.05/0.002	0.07/0.003	0.07/0.003	0.1/0.004
RZL 110	0.05/0.002	0.05/0.002	0.07/0.003	0.07/0.003	0.1/0.004
RZL 115	0.15/0.006	0.15/0.006	0.27/0.011	0.12/0.005	0.15/0.006
RZL 120	0.15/0.006	0.15/0.006	0.3/0.012	0.15/0.006	0.15/0.006
RZL 220	0.2/0.008	0.2/0.008	0.3/0.012	0.15/0.006	0.2/0.008
RZL 225	0.2/0.008	0.2/0.008	0.4/0.016	0.2/0.008	0.2/0.008
RZL 330	0.3/0.012	0.3/0.012	0.4/0.016	0.2/0.008	0.3/0.012
RZL 340	0.3/0.012	0.3/0.012	0.5/0.020	0.3/0.012	0.3/0.012
RZL 440	0.45/0.018	0.45/0.018	0.55/0.022	0.3/0.012	0.4/0.016
RZL 450	0.45/0.018	0.45/0.018	0.7/0.028	0.45/0.018	0.4/0.016

There are two areas of rotor clearances:

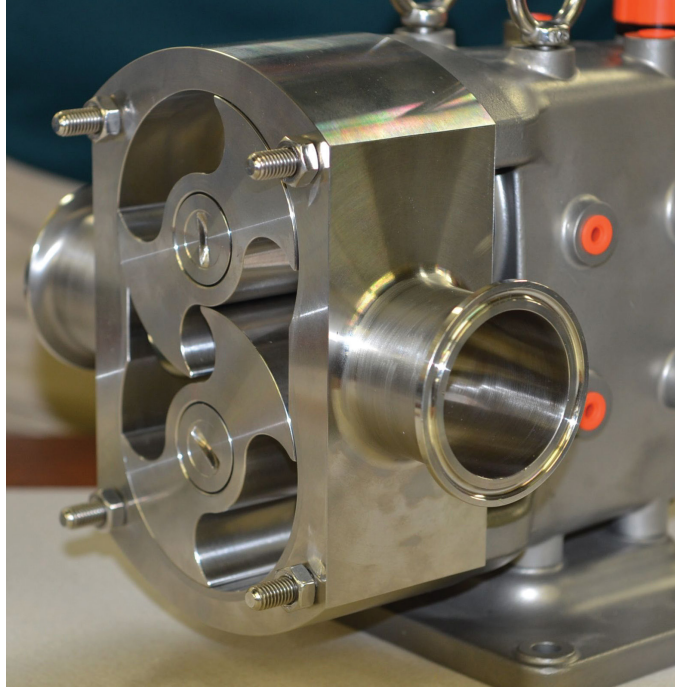
- Rotor tip clearance - not adjustable, set by manufacturer
- Front and back clearance - adjustable by shim

## Maintenance

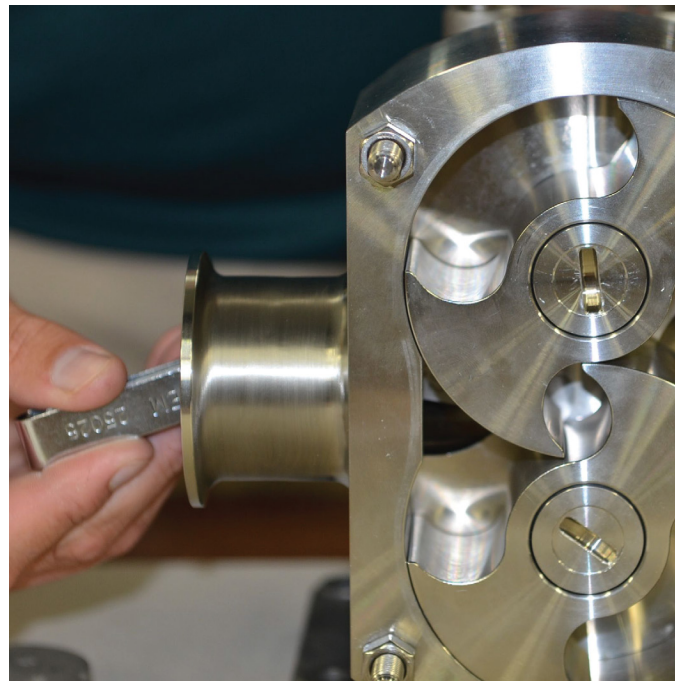
### Rotor Clearance (continued)

Rotor width and body depth are fixed at manufacturer. Therefore, with the correct rotor size selected, the only maintenance adjustment that can be made is the proportion of front and rear clearance. Measure the front clearance as follows:

1. The rotor to rotor housing back face clearance is maintained by the shim (**item 45**).
2. Check that the rotor housing (**item 31**) is tight to gear box (**item 1A**) and check that the rotor bolts (**item 35**) are tight.



3. Measure the clearance between the back face of the pump housing and the back of the rotor with a feeler gauge. Check the reading with the recommended back face clearance.

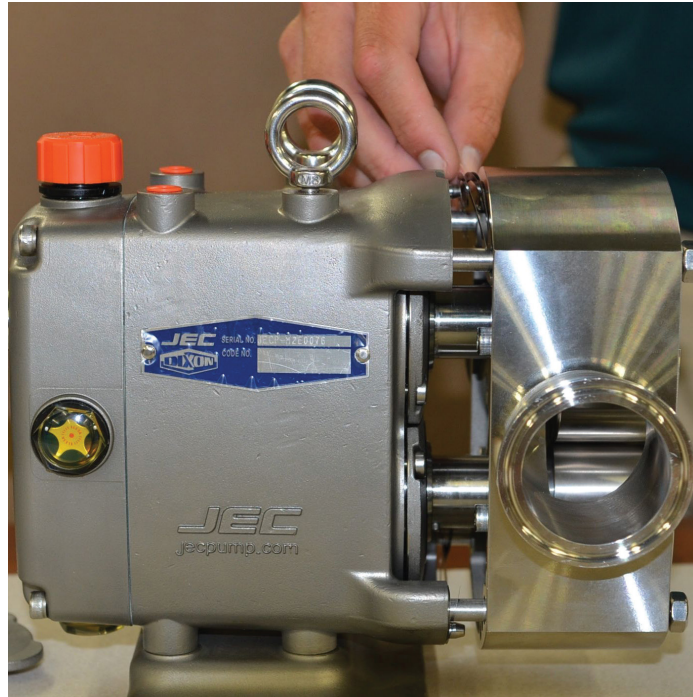




## Maintenance

### Rotor Clearance (continued)

4. If incorrect, adjust by adding or removing shim plates (**item 45**) from behind the pump housing.



5. Check each rotor and adjust as necessary.

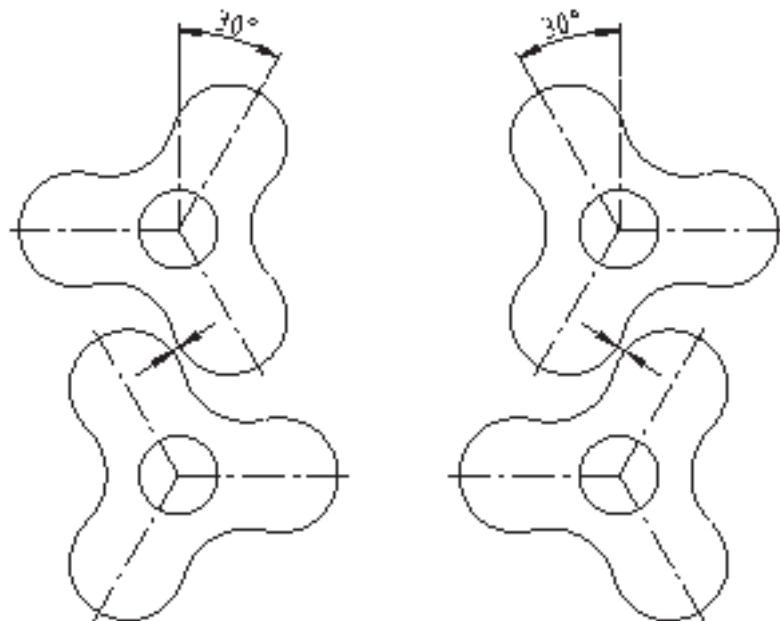
# Maintenance

## Rotor Timing

Rotor timing must be precisely maintained to provide maximum pumping efficiency and prevent contact between rotors during operation. If pumping efficiency is below expectations or if rotors contact during operation (within rated differential pressure), check rotor timing, and adjust if incorrect. Also check rotor timing after any gear box dismantling when the gears are removed and/or replaced.

Check rotor timing as follows:

1. Assemble each rotor in its normal location on the drive shaft and the idle shaft. Assemble each rotor bolt and tighten hand tight.
2. Rotate the shafts 30 degrees and measure gap as illustrated by arrows. Rotate the shafts 60 degrees the opposite direction and measure gap as illustrated.
3. The rotors are correctly timed when the gap measured, using a feeler gauge, at both locations are equal. If the gap is unequal, adjust the timing as follows.
4. Rotor timing is determined by the relative location of the two helical gears (**item 14**) on the shafts. Gear spacers (**item 16**) are used to adjust the location and the timing. When adjusting timing, move only one of the two gears.
5. Place the wooden dowel between the rotors.
6. Bend away the tab of the lock washer (**item 12**) on one shaft. Loosen the lock nut and temporarily insert shim stock between the gear and gear spacer. Tighten the lock nut, reassemble the rotor in its correct location, and recheck rotor timing.
  - If rotor timing is correct, remove the gear and replace added other spacer or add a shim equal in thickness to the shim stock temporarily added. Reassemble the gear and gear nut, tighten to the correct torque, and check rotor timing again to confirm that it is correct.
  - If rotor timing is incorrect, but closer to equal than original measurement, repeat previous step adding additional shim stock.
  - If rotor timing is incorrect and more unequal than original measurement, remove temporary shim stock from one shaft and add instead to the other shaft.
7. Repeat above procedures until the timing gap is equal after gear spacers are in place and gear nuts are tightened to correct torque.
8. Reassemble pump.



## Maintenance

### Gear Box Disassembly

1. Remove the oil drain plug (**item 5**) and drain the oil.
2. Remove the gear box cover bolts (**item 6**) from the rear cover (**item 4**).
3. Pull the rear cover off the drive shaft extension. If the cover is stuck, use a soft hammer carefully to loosen it.
4. Remove the rear cover oil seal (**item 11**) from the rear cover.
5. Remove the paper gasket (**item 26**) from the rear cover or gear box.
6. Straighten the locking tab of the bearing lock washer (**item 12**). Reinstall the rotors (**item 38**) on the drive (**item 8**) and idle (**item 9**) shafts. Lock the rotor with a plastic dowel. Remove the lock nut (**item 12-1**) and lock nut washer from the drive shaft (**item 8**) and idle shaft (**item 9**).
7. Pull the two helical-gears (**item 14**) off the pump shafts. Remove the gear keys (**item 7**).
8. Remove the front bearing gland set bolts (**item 23**).
9. Place the gear box (**item 1**), wet end (rotor side) down, on an arbor press.
10. Protect the shaft ends with a wood block and press the drive and idle shaft out of the gear box.
11. Remove the bearings (**item 17**) and spacers (**item 18**) together by pressing them out from the shafts.
12. Or remove bearings by puller.
13. The taper roller bearings for 400 series must be kept together with in-outside spacer and separated for drive and idle shafts.

### Gear Box Assembly

1. Clean and lubricate the front and rear bearing areas of the drive (**item 8**) and idle shafts (**item 9**) with oil.
2. Fit the front bearing (**item 20**), spacer (**item 18**), and rear bearing (**item 17**) on the shaft by arbor press or heat **250°F (120°C)** up by heater.
3. Lubricate and install the front bearing oil seals (**item 22**) in to the bearing gland.
4. Position the gear box (**item 1**) with wet end up.
5. Clean and lubricate the front and rear bearing areas with oil.
6. Insert the shaft perpendicularly to the gear box properly. There should be a tight sliding fit between the gear box and the bearing outer rings. Press or soft hammer could be used.
7. Place the front bearing gland set bolt (**item 23**) and washer and tighten.
8. Lubricate and install the rear oil seal cover (**item 24**) into gear box.
9. Place the gear spacer (**item 16**) over the shafts.
10. Clean and lubricate the gear area of the shaft and the face of the lock washer with oil.
11. Position both shaft gear keys (**item 7**) to the 12:00 position.
12. Place the gear, lock washer (**item 12**), and lock nut (**item 12-1**) onto the shafts and hand tighten.
13. After the gears are installed, turn the shafts to make sure they turn freely and that the rotors (**item 38**) are timed correctly. (Rotor alignments are required.)
14. Use a spanner wrench to tighten the gear lock nut on the drive shaft. You can install the rotors to hold the shafts in place while you tighten the nut.
15. Tighten the locknut on the idle shaft, following the previous steps.
16. Install the paper gasket to rear cover (**item 26**) and mount the rear cover assembly over the drive shaft extension onto the gear box.
17. Set the cover bolts, oil window, and pressure relief valve.
18. Fill the oil reservoir with oil to the middle of the oil window.

## Maintenance

### Scheduled Maintenance

- After initial start up - change oil after 4,000 hours
- Change oil annually based on 8 hours a day, 5 days a week run time
- Every two years, change oil seals

Recommended spare parts:

- 1 year - (2) seal sets and (1) O-ring set
- 2 years - (4) seal sets, (2) O-ring sets, and (1) rotor set

### RZL Series Maximum RPM

Viscosity (cP)	Model Number - JRZL								
	110	115	120	220	225	330	340	440	450
1 - 100	1000	800	800	700	700	600	600	500	500
100 - 1,000	667	533	533	467	467	400	400	333	333
1,000 - 5,000	417	333	33	292	292	250	250	208	208
5,000 - 10,000	250	200	200	175	175	150	150	125	125
10,000 - 20,000	167	133	133	117	117	100	100	83	83
20,000 - 50,000	117	93	93	82	82	70	70	58	58
50,000 - 100,000	83	67	67	58	58	50	50	42	42

NOTE:

1. This maximum RPM speed is calculated and estimated within the ideal operational condition.
2. Pressure, solid (particle), operation hour, and other operational conditions effect this maximum RPM.
3. High RPM is not recommended for pump durability.

### Maximum Solids with Bi-Wing Rotors

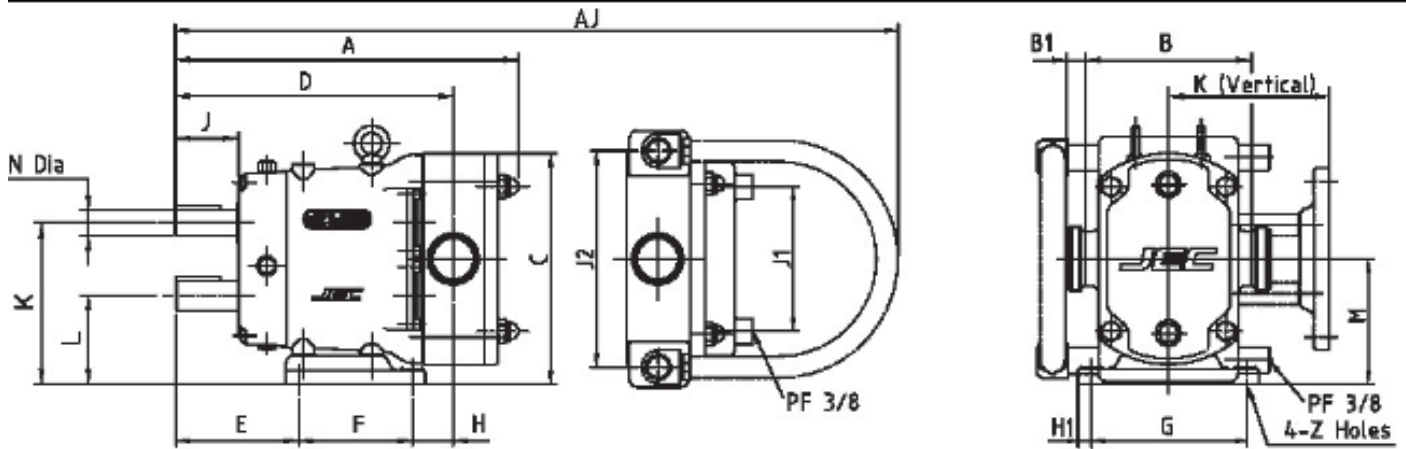
This is intended to be a guideline only, please contact Dixon Sanitary's engineering department to verify specific applications for the best selection of pump and rotor type. Call 800.789.1718 or email [sanitarysales@dixonvalve.com](mailto:sanitarysales@dixonvalve.com) today.

Model	Maximum Solid Size (in)
RZL 100	2 x 3/4
RZL 200	2-1/2 x 1
RZL 300	3 x 2
RZL 400	5 x 2

The following formulas will also help in determining the best pump and rotor type for applications involving solids in the product.

**High Discharge Pressure = Mashed Solid**  
**Low RPM = Increased Possibility of Mashed Solid**

## Dimensions



Model	A (in)	B (in)	C (in)	D (in)	E (in)	F (in)	G (in)	H (in)	H1 (mm)	J (in)	K (in)	L (in)	M (in)	N (mm)	X <sup>1</sup> (mm)	Y <sup>2</sup> (mm)	Z (mm)
RZL 105	10.40	5.98	7.80	8.62	3.78	3.31	5.28	1.54	12	1.85	5.55	3.03	4.29	22	34	8	9
RZL 110	10.40	5.98	7.68	8.35	3.78	3.31	5.28	1.54	12	1.85	5.55	3.03	4.29	22	34	8	9
RZL 115	10.80	5.98	7.80	8.74	3.78	3.31	5.28	1.65	12	1.85	5.55	3.03	4.29	22	34	8	9
RZL 120	11.42	5.98	7.80	9.02	3.78	3.31	5.28	1.93	12	1.85	5.55	3.03	4.29	22	34	8	9
RZL 220	14.84	7.40	10.12	12.09	5.08	5.20	7.09	1.81	15	2.32	7.28	3.98	5.63	32	53	10	11
RZL 225	15.75	7.40	10.12	12.60	5.08	5.20	7.09	2.13	15	2.32	7.28	3.98	5.63	32	53	10	11
RZL 330	18.70	9.53	13.54	15.32	6.06	6.30	9.53	2.95	22	2.76	9.59	5.06	7.32	45	57	14	13
RZL 340	19.69	9.53	13.54	15.83	6.06	6.30	9.53	3.47	22	2.76	9.59	5.06	7.32	45	57	14	13
RZL 440	24.41	12.76	18.03	19.88	7.80	8.27	12.60	3.94	30	3.15	12.76	6.69	9.72	55	67	14	15
RZL 450	25.79	12.76	18.03	20.55	7.80	8.27	12.60	4.61	30	3.15	12.76	6.69	9.72	55	67	14	15

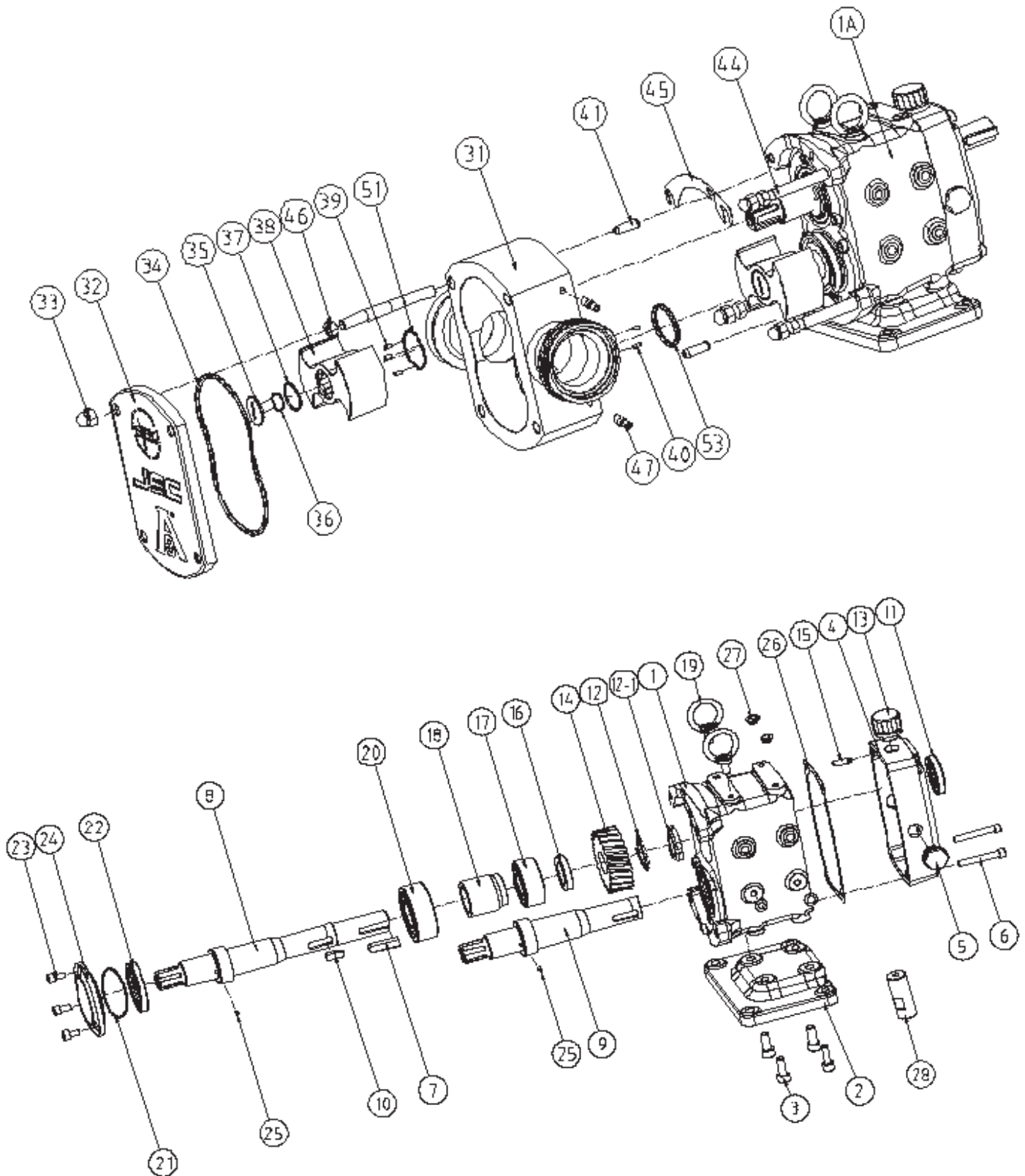
<sup>1</sup> X = Key Length

<sup>2</sup> Y = Key Width

Model	Ports	Dimensions B1 (in)					AJ (in)	J1 (in)	J2 (in)	Weight (lbs)
		Clamp	Bevel Seat	DIN	SMS	Flange				
RZL 105	1"	0.79	1.02	0.98	1.10	1.18	16.73	4.80	7.09	37
RZL 110	1"	0.79		1.18	1.10	1.18	16.73	4.80	7.09	37
RZL 115	1-1/2"	0.87		1.18	0.79	1.18	16.93	4.80	7.09	42
RZL 120	2"	0.87		1.18	0.87	1.18	17.32	4.80	7.09	44
RZL 220	2"	0.87		1.18	0.87	1.18	23.82	6.77	9.25	93
RZL 225	2-1/2"	1.02		1.46	1.10	1.38	24.80	6.77	9.25	106
RZL 330	3"	1.10		1.65	1.10	1.57	28.35	9.69	12.13	207
RZL 340	4"	1.10		1.77	1.38	2.13	28.29	9.69	12.13	227
RZL 440	4"	1.10		1.77	1.38	2.13	32.68	14.09	16.54	496
RZL 450	5"	1.18		1.81	1.38	2.13	35.28	14.09	16.54	551

# Bill of Materials

## Basic Assembly (Single M/Seal)



## Bill of Materials

### Gear Box Assembly (Basic)

Item #	Part #	Description	Material	Used	Qty
1	RZL-440B-GBCI	gear box	FCD40	RZL400	1
2	RZL-440B-GBCIB	base, gear box	FCD40	RZL400	1
3	RZL-440B-BWB	wrench bolt, base (M14x35L)	SUS304		4
4	RZL-440B-GBCCI	cover, gear box	FCD40		1
	RZL-440B-GBCSS	cover, gear box	SUS304		1
5	RZL-330B-PLD	plug, level, drain	-	RZL300/400	3
6	RZL-440B-GBWB	wrench bolt, gear box cover (M10x90L)	SUS304	RZL440	4
7	RZL-440B-DSKEY	key, gear (14x9x67)	S45C		2
8	RZL-440-DSHAFT	shaft, drive	SUS304		1
	RZL-450-DSHAFT	shaft, drive	SUS304	RZL450	1
9	RZL-440-ISHAFT	shaft, idle	SUS304	RZL440	1
	RZL-450-ISHAFT	shaft, idle	SUS304	RZL450	1
10	RZL-440B-GKEY	key, gear (14x9x53)	S45C	RZL400	2
11	RZL-440B-OSCB	oil seal, cover (55x82x12t)	nitrile rubber		1
	RZL-440B-OSCV	oil seal, cover (55x82x12t)	FKM		1
12-1	RZL-440B-TGWSHD	lock washer, drive shaft	S45C	RZL400	2
12-2	RZL-440B-TGNUTD	lock nut, drive shaft	S45C		2
12-3	RZL-440B-TGWSHI	lock washer, idle shaft	S45C		2
12-4	RZL-440B-TGNUTI	lock nut, idle shaft	S45C		4
13	RZL-440B-RVLV	breather, gear box	PE	RZL400	1
14	RZL-440B-TGHELG	helical gear	S45C		2
15	RZL-440B-GBDOW	dowel, gear box (φ8)	SUS304		2
16	RZL-440B-GSPAC	spacer, gear (φ35x5L)	S45C	RZL400	2
17	RZL-440B-RBEAR	bearing, rear (#E32213J)	-		4
18	RZL-440B-BSPCI	spacer, bearing (inner)	S45C		4
18-1	RZL-440B-BSPCO	spacer, bearing (outer)	S45C		4
19	RZL-440B-IBOLT	I-bolt / M14	SUS		2
	RZL-440B-FBEAR	bearing, front (#E32215J)	-		4
21	RZL-440B-OSGOV	O-ring, oil seal gland (AN049)	FKM		2
22	RZL-440B-OSGB	oil seal, gear box (85x110x13t)	nitrile rubber		2
	RZL-440B-OSGV	oil seal, gear box (85x110x13t)	FKM		2
23	RZL-440B-OSGWB	wrench bolt, oil seal gland (M12x25L)	SUS304		8
24	RZL-440B-OSGLD	gland, oil seal	SUS304	2	
25	RZL-440B-DSPIN	pin, double seal	SUS304	4	
26	RZL-440B-GCGP	gasket	paper	1	
27	RZL-440B-PLUG	plug (M14)	PE	8	
28	RZL-440B-VADPT	vertical adapter	SUS304	RZL400	4
29	RZL-115B-LFP	pad, leg feet	SS + rubber	RZL series	4
30	RZL-115B-ERT	rotor tool, extraction	SUS304	RZL series	1

## Bill of Materials

### Pump Assembly

Item #	Part #	Description	Material	Used	Qty
1A	RZL-440-GBAW	gear box assembly - white	FCD40	RZL440	1
	RZL-450-GBAW	gear box assembly - white	FCD40		1
31	see page 54	rotor case	SUS316L	RZL400	1
32	RZL-440B-FCVR	front cover	SUS316L	RZL400	1
33	RZL-440B-CNUT	cap nut	SUS304		4
34	RZL-440B-FCORB	O-ring, front cover (AN278)	nitrile rubber		1
	RZL-440B-FCORE	O-ring, front cover (AN278)	EPDM		1
	RZL-440B-FCORV	O-ring, front cover (AN278)	FKM		1
36	RZL-440B-RBW	spring washer	SUS304		2
37	RZL-440B-RBORB	O-ring, rotor bolt (AN228)	nitrile rubber		2
	RZL-440B-RBORE	O-ring, rotor bolt (AN228)	EPDM		2
	RZL-440B-RBORV	O-ring, rotor bolt (AN228)	FKM		2
38	see page 57	rotor	SUS304		
39	RZL-440B-RTSLP	rotor, seal pin	SUS316L	RZL400	2
40	RZL-440B-CSSLP	seal pin, case	SUS304	RZL400	4
41	RZL-440B-RCDOW	dowel, rotor case (φ15)	SUS304	RZL400	2
44	RZL-440-CSSB	stud bolt, case (M20x198L)	SUS304	RZL440	4
	RZL-450-CSSB	stud bolt, case (M20x223L)	SUS304	RZL450	4
45	RZL-440B-SHIM05	shim (0.05 mm)	SUS304	RZL400	2
	RZL-440B-SHIM1	shim (0.1 mm)	SUS304		2
	RZL-440B-SHIM2	shim (0.2 mm)	SUS304		2
46	RZL-440B-SBHYN	hex nut, stud bolt (M10, 14mm)	SUS304		4
47	RZL-440B-FSNIP	nipple, flush	SUS304		2
51	RZL-440B-RTORE	O-ring, rotor (AN151)	EPDM		2
	RZL-440B-RTORV	O-ring, rotor (AN151)	FKM		2
53	RZL-440B-RCORE	O-ring, rotor case (AN235)	EPDM		2
	RZL-440B-RCORV	O-ring, rotor case (AN235)	FKM		2



## Bill of Materials

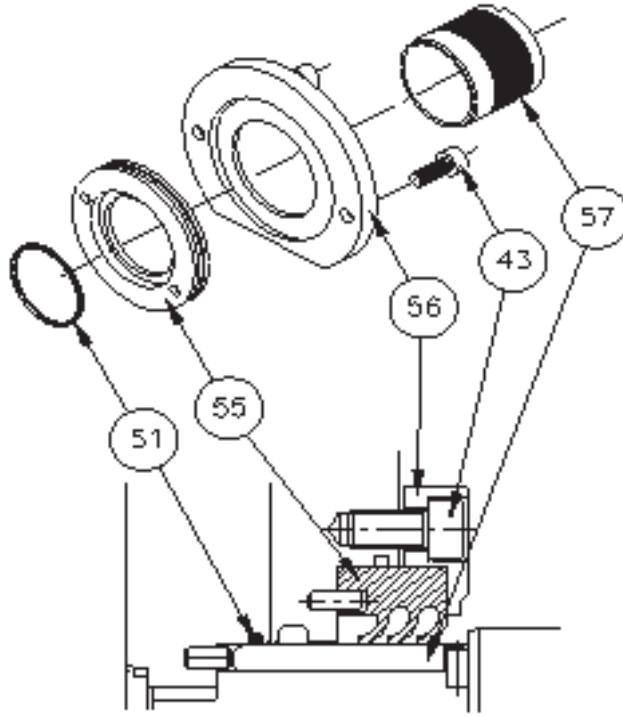
### Rotor Case/Rotor

Item #	Part #	Description	Material	Used	Qty
31	RZL-440-RCCLMP	rotor case - 4" triclamp	SUS316L	RZL440	1
31	RZL-450-RCCLMP	rotor case - 5" triclamp / 5" triclamp	SUS316L	RZL450	1
	RZL-450-RCFLNG	rotor case - 5" flanger	SUS316L		1
38	RZL-440-SWA	rotor set (2), single-wing	SUS316L	RZL440	2
	RZL-440-BWA	rotor set (2), bi-wing	SUS316L		2
	RZL-440-BWTIA	rotor set (2), bi-wing, PTFE inserted	SUS316L/PTFE		2
	RZL-440-HWA	rotor set (2), bi-wing, high temp clearance	SUS316L		2
	RZL-440-BLA	rotor set (2), bi-lobe	SUS316L		2
	RZL-440-3LA	rotor set (2), tri-lobe	SUS316L		2
	RZL-440-HTLA	rotor set (2), tri-lobe, high temp clearance	SUS316L		2
	RZL-440-HELIA	rotor set (2), heli-lobe	SUS316L		2
	RZL-450-SWA	rotor set (2), single-wing	SUS316L	RZL450	2
	RZL-450-BWA	rotor set (2), bi-wing	SUS316L		2
	RZL-450-BWTIA	rotor set (2), bi-wing, PTFE inserted	SUS316L		2
	RZL-450-HWA	rotor set (2), bi-wing, high temp clearance	SUS316L		2
	RZL-450-BLA	rotor set (2), bi-lobe	SUS316L		2
	RZL-450-3LA	rotor set (2), tri-lobe	SUS316L		2
	RZL-450-HTLA	rotor set (2), tri-lobe, high temp clearance	SUS316L		2
	RZL-450-HELIA	rotor set (2), heli-lobe	SUS316L		2

NOTE: All standard rotor cases do not have tap holes for flushing on jacketed options.

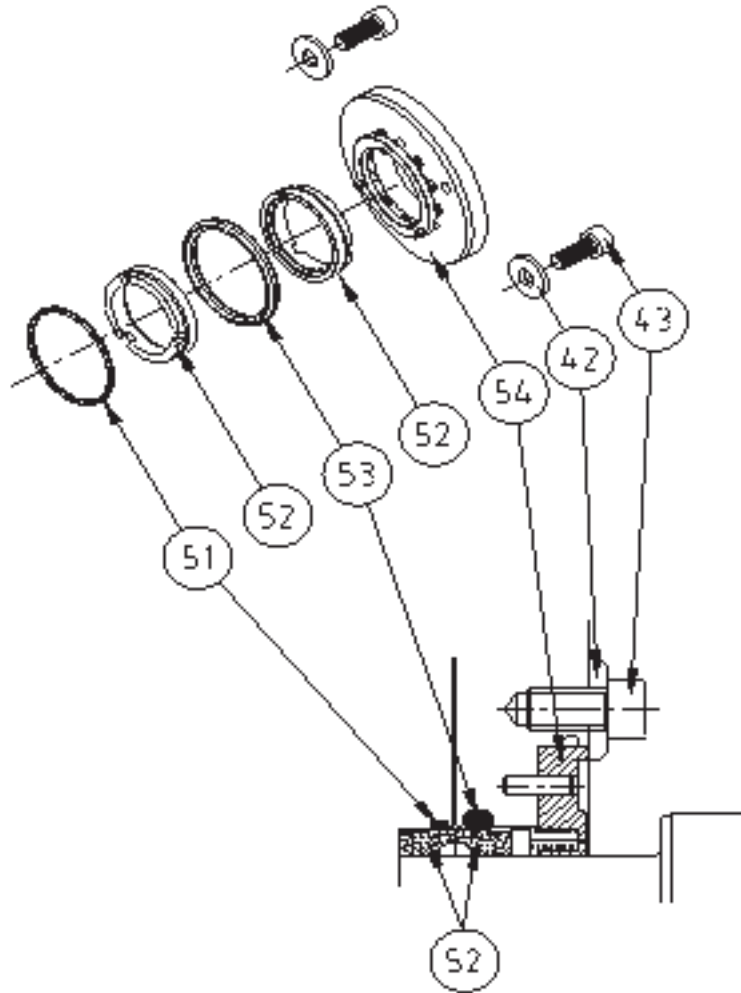
## Bill of Materials

### Triple Lip Seal



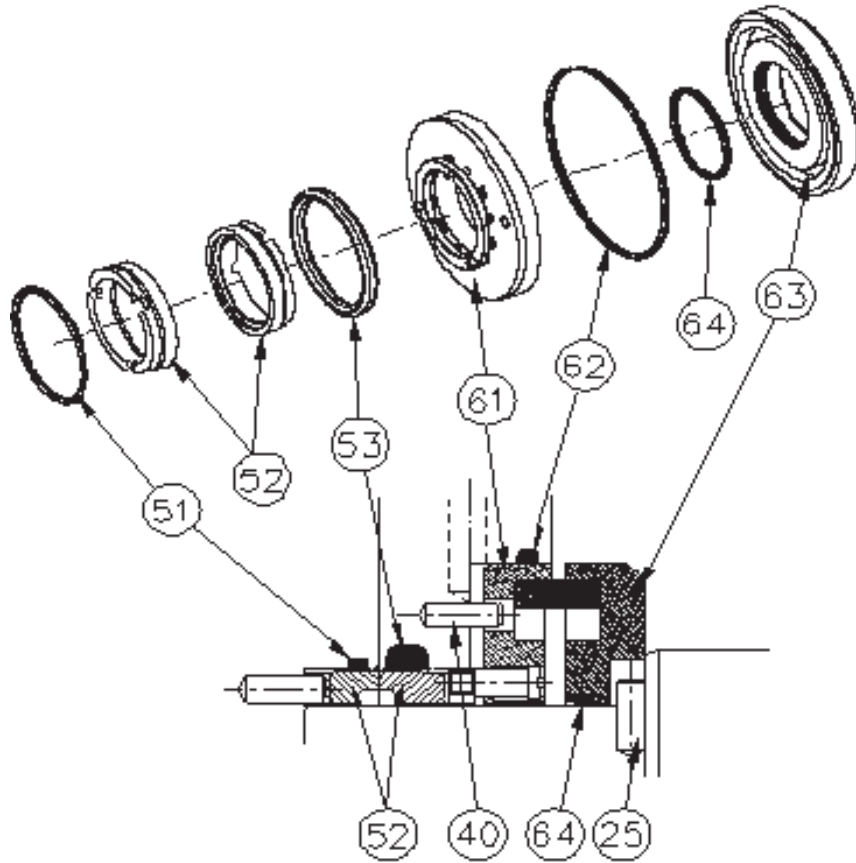
Item #	Part #	Description	Material	Used	Qty
43	RZL-440B-MSGWB	wrench bolt, M/Seal gland (M6x10L)	SUS304	RZL400	4
51	RZL-440B-RTORB	O-ring, rotor (AN151)	nitrile rubber		2
	RZL-440B-RTORE	O-ring, rotor (AN151)	EPDM		2
	RZL-440B-RTORV	O-ring, rotor (AN151)	FKM		2
55	RZL-440B-TRPLSC	triple lip seal, product	PTFE + copper		2
	RZL-440B-TRPLS	triple lip seal, product	PTFE + glass		2
56	RZL-440B-LSC	lip seal cover	SUS304		2
57	RZL-440B-CERCS	ceramic coated sleeve, product	ceramic/304		2

## Bill of Materials Single Mechanical Seal



Item #	Part #	Description	Material	Used	Qty
42	RZL-440B-MSGFW	flat washer, M/Seal gland (φ6)	SUS304	RZL400	4
43	RZL-440B-MSGWB	wrench bolt, M/Seal gland (M6x10L)	SUS304		4
51	RZL-440B-RTORB	O-ring, rotor (AN151)	nitrile rubber		2
	RZL-440B-RTORE	O-ring, rotor (AN151)	EPDM		2
	RZL-440B-RTORV	O-ring, rotor (AN151)	FKM	2	
52	RZL-440B-TCSEAL	seal ring	TC	RZL450	4
53	RZL-440B-RCORB	O-ring, rotor case (AN234)	nitrile rubber	RZL400	2
	RZL-440B-RCORE	O-ring, rotor case (AN234)	EPDM		2
	RZL-440B-RCORV	O-ring, rotor case (AN234)	FKM		2
54	RZL-440B-CSSB	single seal body, case	SUS304		2

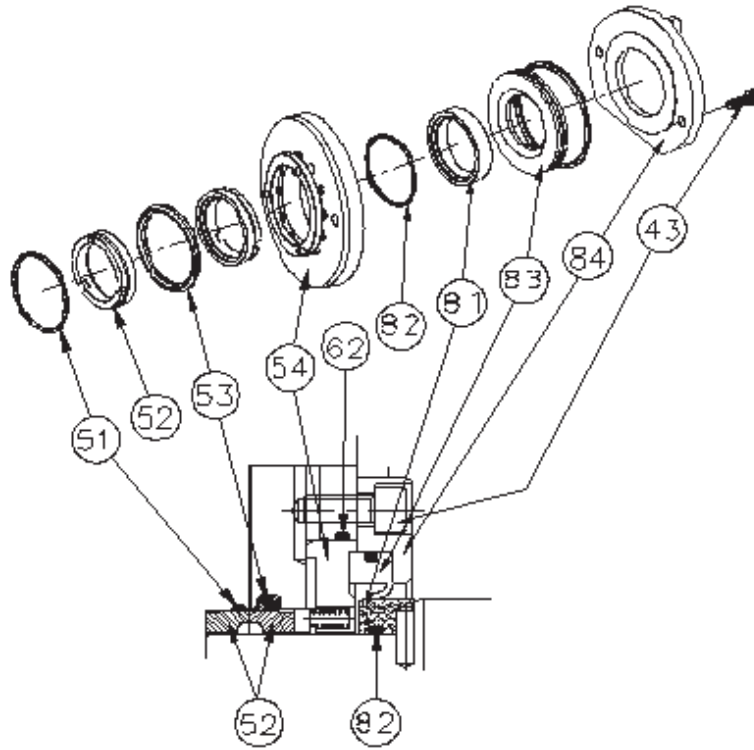
## Bill of Materials Double Mechanical Seal



Item #	Part #	Description	Material	Used	Qty
51	RZL-440B-RTORB	O-ring, rotor (AN151)	nitrile rubber	RZL400	2
	RZL-440B-RTORE	O-ring, rotor (AN151)	EPDM		2
	RZL-440B-RTORV	O-ring, rotor (AN151)	FKM		2
52	RZL-440B-TCSEAL	seal ring	TC	RZL450	4
53	RZL-440B-RCORB	O-ring, rotor case (AN234)	nitrile rubber	RZL400	2
	RZL-440B-RCORE	O-ring, rotor case (AN234)	EPDM		2
	RZL-440B-RCORV	O-ring, rotor case (AN234)	FKM		2
61	RZL-440B-CDSBTC	double seal body, case	TC/SUS304	RZL400	2
	RZL-440B-CDHPTC	double seal body, case, high pressure	TC/SUS304		2
62	RZL-440B-CORDSB	O-ring, case, double seal (AN045)	nitrile rubber	RZL400	2
	RZL-440B-CORDSE	O-ring, case, double seal (AN045)	EPDM		2
	RZL-440B-CORDSV	O-ring, case, double seal (AN045)	FKM		2
63	RZL-440B-SDSBC	rotation part, double seal, shaft	carbon/SUS304	RZL400	2
64	RZL-440B-SORDSB	O-ring, shaft, double seal (AN038)	nitrile rubber	RZL400	2
	RZL-440B-SORDSE	O-ring, shaft, double seal (AN038)	EPDM		2
	RZL-440B-SORDSV	O-ring, shaft, double seal (AN038)	FKM		2

## Bill of Materials

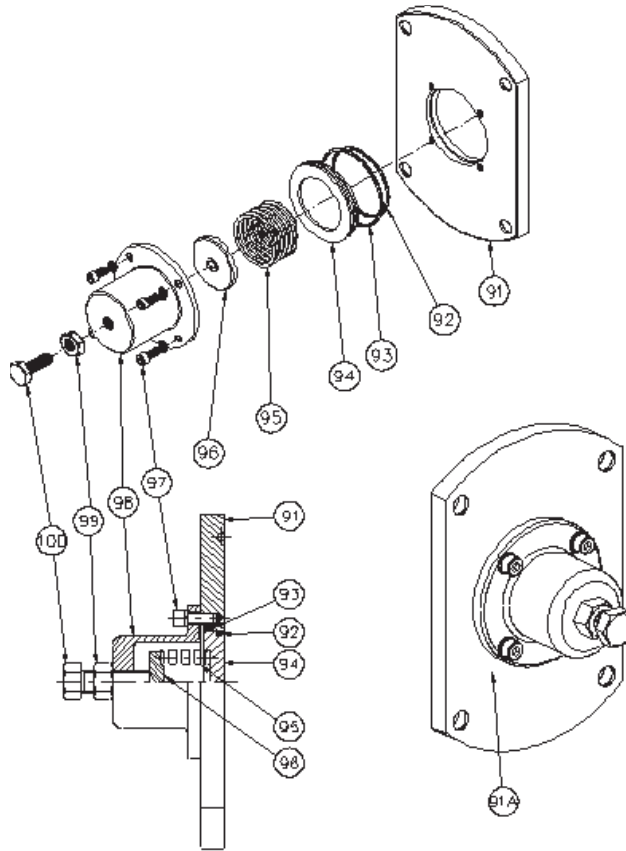
### Single Mechanical Seal with Flush



Item #	Part #	Description	Material	Used	Qty
43	RZL-440B-MSGWB	wrench bolt, lip seal gland (M6x10L)	SUS304	RZL400	4
51	RZL-440B-RTORB	O-ring, rotor (AN151)	nitrile rubber		2
	RZL-440B-RTORE	O-ring, rotor (AN151)	EPDM		2
	RZL-440B-RTORV	O-ring, rotor (AN151)	FKM		2
52	RZL-440B-TCSEAL	seal ring	TC	RZL450	4
53	RZL-440B-RCORB	O-ring, rotor case (AN234)	nitrile rubber	RZL400	2
	RZL-440B-RCORE	O-ring, rotor case (AN234)	EPDM		2
	RZL-440B-RCORV	O-ring, rotor case (AN234)	FKM		2
54	RZL-440B-CSSB	seal base, single mech.	SUS304		4
62	RZL-440B-CORDSB	O-ring, flushed seal, case (AN045)	nitrile rubber	RZL400	2
	RZL-440B-CORDSE	O-ring, flushed seal, case (AN045)	EPDM		2
	RZL-440B-CORDSV	O-ring, flushed seal, case (AN045)	FKM		2
81	RZL-440B-CERFL	ceramic sleeve, flushing	ceramic		2
82	RZL-440B-ORFLB	O-ring, ceramic sleeve, flushing (AN038)	nitrile rubber	RZL400	2
	RZL-440B-ORFLE	O-ring, ceramic sleeve, flushing (AN038)	EPDM		2
	RZL-440B-ORFLV	O-ring, ceramic sleeve, flushing (AN038)	FKM		2
83	RZL-440B-LSFLT	lip seal, flushing	PTFE		4
84	RZL-440B-SLPFLG	gland, lip seal, flushing	SUS304	2	

## Bill of Materials

### Pressure Relief Front Cover

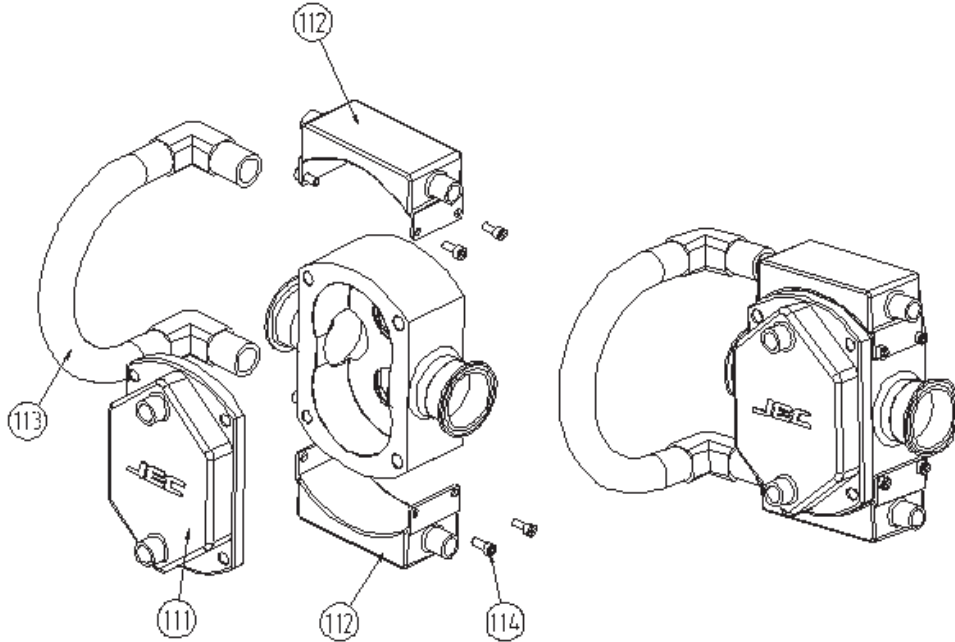


Item #	Part #	Description	Material	Used	Qty
91	RZL-440B-RVFC	front cover, relief valve	SUS316L	RZL400	1
91A	RZL-440B-C	pressure relief front cover assembly	SUS316L		1
92	RZL-440B-OR1B	O-ring, 1 stage, plate (AN252)	nitrile rubber		1
	RZL-440B-OR1E	O-ring, 1 stage, plate (AN252)	EPDM		1
	RZL-440B-OR1V	O-ring, 1 stage, plate (AN252)	FKM		1
93	RZL-440B-OR2B	O-ring, 2 stage, plate (AN249)	nitrile rubber		1
	RZL-440B-OR2E	O-ring, 2 stage, plate (AN249)	EPDM		1
	RZL-440B-OR2V	O-ring, 2 stage, plate (AN249)	FKM		1
94	RZL-440B-VP	plate, valve	SUS316L		1
95	RZL-440B-RVSP	spring	SS41 + Cr		1
96	RZL-440B-SPGP	plate, spring	SUS304		1
97	RZL-440B-RVWB	wrench bolt (M8x25)	SUS304		4
98	RZL-440B-RVC	cover, relief valve	SUS304		1
99	RZL-440B-RVLN	lock nut (M20)	SUS304		1
100	RZL-440B-RVAB	adjusting bolt (M20x80)	SUS304	1	

NOTE: Must supply setting pressure.

## Bill of Materials

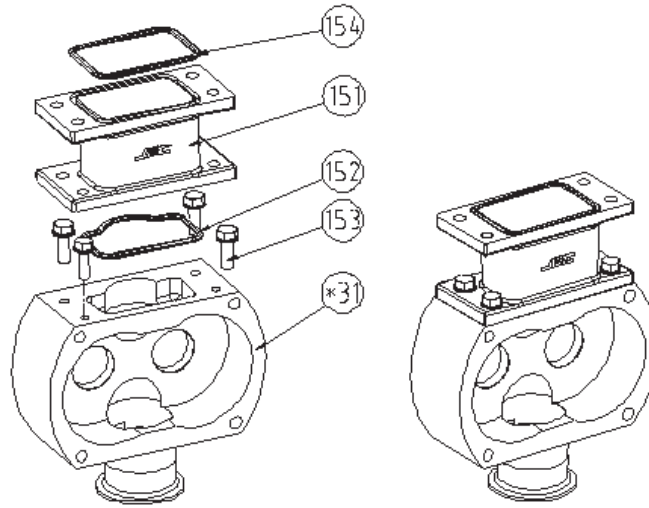
### Jacket Front Cover and Case



Item #	Part #	Description	Material	Used	Qty
111	RZL-440B-FCJ	front cover jacket	SUS316	RZL400	1
112	RZL-440-CTJ	jacket, case top	SUS304	RZL440	1
	RZL-440-CBJ	jacket, case bottom	SUS304		1
	RZL-450-CTJ	jacket, case top	SUS304	RZL450	1
	RZL-450-CBJ	jacket, case bottom	SUS304		1
113	RZL-440B-JT	tube, jacket	SUS304	RZL400	1
	RZL-440B-JWB	wrench bolt, jacket (M8x15L)	SUS304		8

## Bill of Materials

### Rectangular Inlet



Item #	Part #	Description	Material	Used	Qty
31	RZL-440-RCRI2C	rotor case - rect/5" triclamp	SUS316L	RZL400	1
	RZL-440B-RFLG	rotor case - rect/5" flanger	SCS14		1
152	RZL-440B-RIORB	O-ring, rectangular inlet (AN262)	nitrile rubber		1
	RZL-440B-RIOR	O-ring, rectangular inlet (AN262)	EPDM		1
	RZL-440B-RIORV	O-ring, rectangular inlet (AN262)	FKM		4



## Repair Kits

### Complete Replacement Seal Kits

Part #	Description	Material	Kit Includes
RZL-440B-3E-KIT	triple lip seal repair kit	EPDM	items 51, 55, 56, and 57
RZL-440B-3V-KIT	triple lip seal repair kit	FKM	
RZL-440B-2E-KIT	single mech. seal repair kit TC/TC	EPDM	items 51, 52, and 53
RZL-440B-2V-KIT	single mech. seal repair kit TC/TC	FKM	
RZL-440B-4E-KIT	double mech. seal repair kit TC/TC	EPDM	items 51, 52, 53, 62, and 64
RZL-440B-4V-KIT	double mech. seal repair kit TC/TC	FKM	

### Pump Elastomers Only

Part #	Description	Material	Kit Includes
RZL-440B-3E-EK	triple lip seal elastomers	EPDM	items 34, 37, 51, and 55
RZL-440B-3V-EK	triple lip seal elastomers	FKM	
RZL-440B-2E-EK	single mech. seal elastomers	EPDM	items 34, 37, 51, and 53
RZL-440B-2V-EK	single mech. seal elastomers	FKM	
RZL-440B-4E-EK	double mech. seal elastomers	EPDM	items 34, 37, 51, 53, 62, and 64
RZL-440B-4V-EK	double mech. seal elastomers	FKM	

### Set of TC Seats

Part #	Description	Material	Kit Includes
RZL-440B-TC-SET	TC seal ring	-	item 52

## Troubleshooting

Problem	Possible Cause	Suggested Action
No flow, pump rotors are not turning.	Drive motor isn't running	Check resets, fuses, and circuit breakers.
	Key is sheared or missing.	Replace.
	Drive belts, power transmission components are slipping or broken.	Replace or adjust.
	Pump shaft, keys, or gears are sheared.	Inspect and replace parts as necessary.
No flow, pump rotors are turning.	Rotors are turning in the wrong direction.	Check motor hookup to reverse motor rotation.
	Relief valve is not properly adjusted or held open by foreign material.	Adjust or clear the valve.
	Suction port is blocked, not allowing flow to the pump.	Check all inlet valves, strainers, and tank outlet ports.
No flow, pump not priming.	Valve is closed in the inlet line.	Open valve.
	Inlet line is clogged or restricted.	Clear line, clean filters, etc.
	Air leaks due to bad gaskets or pipe connections.	Replace gaskets, check lines for leakage (can be done by air pressure or by filling with liquid and pressurizing with air).
	Pump speed is too slow.	Increase pump speed.
	Pump speed too fast for high viscosity liquid.	Decrease pump speed.
	Liquid drains or siphons from system during off periods.	Use foot valve or check valve. Filling inlet lines with material before start up may solve start up priming problems due to no material in the system.
	"Air" lock caused by fluids which "gas off" or vaporize or allow gas to come out of material during off periods.	Install and use a manual or automatic air bleed from pump or lines near pump.
	Extra clearance rotors, worn pump.	Increase pump speed within limits, use foot valve to improve priming.
		Replace worn rotors.
	NPSHA is too low.	Check net inlet pressure available against net inlet pressure required. Change inlet system as needed.
On "vacuum" inlet system: On initial start up, atmospheric "blow back" prevents pump from developing enough differential pressure to start flow.	Install check valve in discharge line.	

## Troubleshooting

Problem	Possible Cause	Suggested Action
Insufficient flow.	Speed it too low or too high to obtain desired flow.	Check curve and adjust as necessary.
	Air leak due to bad seals, pipe connections, or other equipment.	Replace seals, check inlet fittings.
Insufficient flow - flow being bypassed somewhere.	Flow diverted in branch line, open valve, etc.	Check system and controls
	Relief valve not adjusted or jammed.	Clear or adjust valve.
Insufficient flow - high slip.	Hot (HC) or extra clearance rotors being used on "cold" fluid and/or low viscosity fluid.	Replace with standard clearance rotors.
	Worn pump.	Increase pump speed (within limits).
		Replace rotors.
	High pressure.	Reduce pressure by adjusting system settings or hardware.
Cavitation.	Strainer, foot valves, inlet fittings, or lines are clogged.	Clear lines. If problem continues, inlet system may require changing.
	Inlet line size is too small or too long. Too many fittings or valves. Foot valve or strainers are too small. NPSHA too low.	Increase inlet line size. Reduce length, minimize direction and size changes, reduce number of fittings.
		Raise liquid level in source tank to increase net inlet pressure.
		Increase net inlet pressure by raising or pressurizing source tank.
		Select larger pump size with lower net inlet pressure required.
	Fluid viscosity is greater than expected.	Reduce pump speed and accept lower flow or change system to reduce line losses.
		Change temperature of product to reduce viscosity.
Fluid temperature is higher than expected (vapor pressure higher).	Reduce temperature, reduce speed, and accept lower flow or change system to increase net inlet pressure available.	
Noisy operation.	High fluid viscosity, vapor pressure fluid, or temperature.	Slow down pump, reduce temperature, change system setup.
	NPSHA less than NPSHR.	Increase NPSHA or decrease NPSHR.
	Air or gas in fluid.	Fix the leaks.
	Leaks in the pump or priming.	
	Dissolved gas or naturally aerated products.	Minimize discharge pressure.

# Troubleshooting

Problem	Possible Cause	Suggested Action	
Noisy operation caused by mechanical problems.	Rotor to Body Contact		
	Improper assembly of pump.	Check clearance and adjust shimming.	
	Distortion of pump due to improper piping installation.	Change piping installation to eliminate piping stress and distortion on body.	
	Pressure required is higher than the pump is rated for.	Reduce discharge pressure required.	
	Worn bearings.	Rebuild with new bearings and lubricate regularly.	
	Rotor to Rotor Contact.		
	Loose or incorrectly timed gears.	Rebuild with new parts. NOTE: This will cause severe damage.	
	Sheared keys.	Rebuild with new parts. NOTE: This will cause severe damage.	
	Worn gear splines.	Rebuild with new parts. NOTE: This will cause severe damage.	
	Drive noise caused by gear trains, chains, couplings, or bearings.	Repair or replace drive parts. Check bearings for damage and replace as necessary.	
Pump requires excessive power (overheats, stalls, high current draw, or breakers trip).	Higher than expected viscosity losses.	If within pump rating, increase drive size.	
	Higher than expected pressures.	Reduce pump speed. Increase line sizes.	
	Fluid is colder with a higher viscosity than expected.	Heat fluid, insulate lines, or heat trace lines.	
	Fluid sets in line and pump during shutdown.	Increase line size.	
		Insulate lines or heat trace lines.	
		Install a "soft start" drive.	
		Install a recirculating bypass system.	
Flush system with a nonsetting fluid.			
Fluid builds up on pump surfaces.	Replace the pump with more running clearances.		

## Troubleshooting

Problem	Possible Cause	Suggested Action
Short pump service life.	Pumping abrasives.	Larger pumps at slower speeds.
	Speeds and pressures higher than rated.	Reduce speeds and pressure by making changes in the system.
		Replace pump with larger model with higher pressure ratings.
	Worn bearings and gears due to lack of lubrication.	Check and replace bearing and gears as necessary. Adjust lubrications schedule to decrease time between lubrication.
Modify external wash down method to reduce water entering into gear case.		
	Misalignment of drive and piping (excessive overhung load or misaligned couplings).	Check alignment of piping and drive. Adjust as necessary.

NOTE: For any other issues, please contact Dixon Santuary at 800.789.1718.

## Limited Warranty

DIXON VALVE AND COUPLING COMPANY, LLC (herein called "Dixon") warrants the products described herein and manufactured by Dixon to be free from defects in material and workmanship for a period of one (1) year from date of shipment by Dixon under normal use and service. Its sole obligation under this warranty being limited to repairing or replacing, as hereinafter provided, at its option any product found to Dixon's satisfaction to be defective upon examination by it, provided that such product shall be returned for inspection to Dixon's factory within three (3) months after discovery of the defect. The repair or replacement of defective products will be made without charge for parts or labor. This warranty shall not apply to: (a) parts or products not manufactured by Dixon, the warranty of such items being limited to the actual warranty extended to Dixon by its supplier; (b) any product that has been subject to abuse, negligence, accident, or misapplication; (c) any product altered or repaired by others than Dixon; and (d) to normal maintenance services and the replacement of service items (such as washers, gaskets, and lubricants) made in connection with such services. To the extent permitted by law, this limited warranty shall extend only to the buyer and any other person reasonably expected to use or consume the goods who is injured in person by any breach of the warranty. No action may be brought against Dixon for an alleged breach of warranty unless such action is instituted within one (1) year from the date the cause of action accrues. This limited warranty shall be construed and enforced to the fullest extent allowable by applicable law.

Other than the obligation of Dixon set forth herein, Dixon disclaims all warranties, express or implied, including but not limited to any implied warranties of merchantability or fitness for a particular purpose, and any other obligation or liability. The foregoing constitutes Dixon's sole obligation with respect to damages, whether direct, incidental or consequential, resulting from the use or performance of the product.

Some products and sizes may be discontinued when stock is depleted or may require a minimum quantity for ordering.

