

Foreword

This manual is written for an experienced technician. Essential tools required in performing certain service work are identified in this manual and are recommended for use.

This manual covers the base pump end for the QSF6X6 Portable Pump.

Live with Safety: Read the safety messages in the introduction of this manual and the cautions presented throughout the text of the manual.



CAUTION:

This is the safety-alert symbol. When you see this symbol on the machine or in this manual, be alert to the potential for personal injury.

Information in this manual is organized in sections and sub divided into groups.

Section 01 – covers the safety measures to follow while repairing the pump; identification features, identification plates, and information about lubricants.

Section 02 – covers the repair and adjustment procedures.

This manual contains the U.S. customary units of measure. Most original hardware on the pump end is SAE.

Read each block of material completely before performing service to check for differences in procedures or specifications.

SRVMAN_FOR

Understanding Signal Words

A signal word – CAUTION, DANGER, or WARNING – is used with the safety-alert symbol.

DANGER – identifies the most serious hazards.

DANGER or WARNING safety-alert signs or symbols are located near specific hazards. General precautions are listed on CAUTION safety-alert signs or symbols. CAUTION also call attention to safety messages in this manual.



CAUTION:

This is the safety-alert symbol for CAUTION. CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury. CAUTION may also be used to alert against unsafe practices associated with events which could lead to personal injury or property damage.



DANGER:

This is the safety-alert symbol for DANGER. DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.



WARNING:

This is the safety-alert symbol for WARNING. WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

When you see any safety-alert symbol on the machine or in this manual, be alert to potential for personal injury. Follow recommended precautions and safe operating practices.

Follow Safety Instructions

Carefully read all safety messages in this manual and on your machine safety signs. Keep safety signs in good condition. Replace missing or damaged safety signs. Be sure new equipment components and repair parts include the current safety signs. Replacement safety signs are available from Thompson Pump & Manufacturing.

There can be additional safety information contained on parts and components sourced from suppliers that is not reproduced in this service manual.

Learn how to operate the machine and how to use controls properly. Do not let anyone operate without instruction. Keep your machine in proper working condition.

Unauthorized modifications to the machine may impair the function and/or safety and affect machine life.

If you do not understand any part of this manual and need assistance, contact Thompson Pump & Manufacturing.

SRVMAN_SAFINST

Use Proper Tools

Use tools appropriate to the work. Makeshift tools and procedures can create safety hazards.

Use power tools only to loosen threaded parts and fasteners.

For loosening and tightening hardware, use the correct size tools. DO NOT use U.S. measurement tools on metric fasteners. Avoid bodily injury caused by slipping wrenches.

Use only service parts meeting John Deere specifications.

SRVMAN_PRPTLS

Service HOT Pump Safely



DANGER:

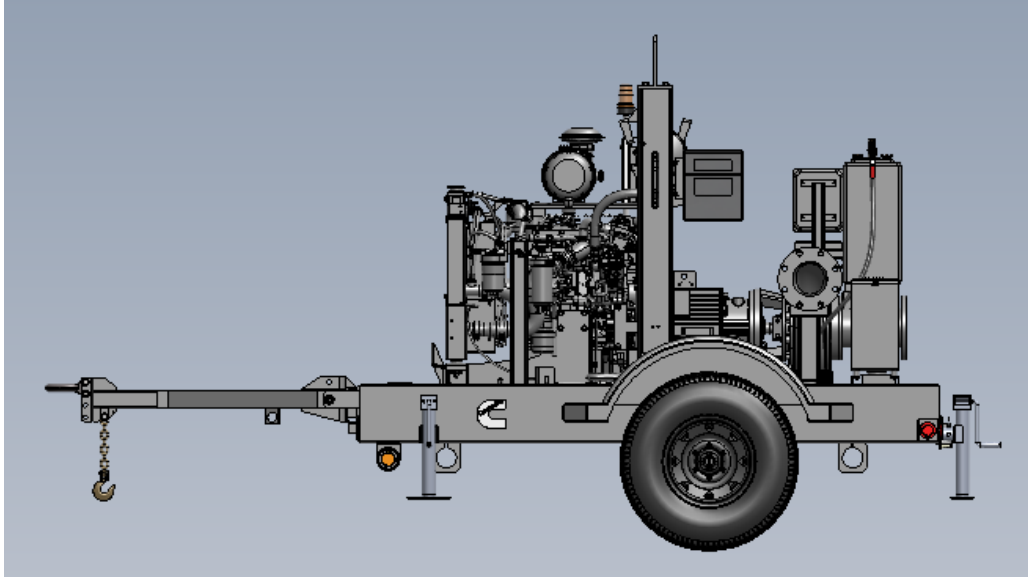
Explosive release of fluids from pressurized system can cause serious burns.



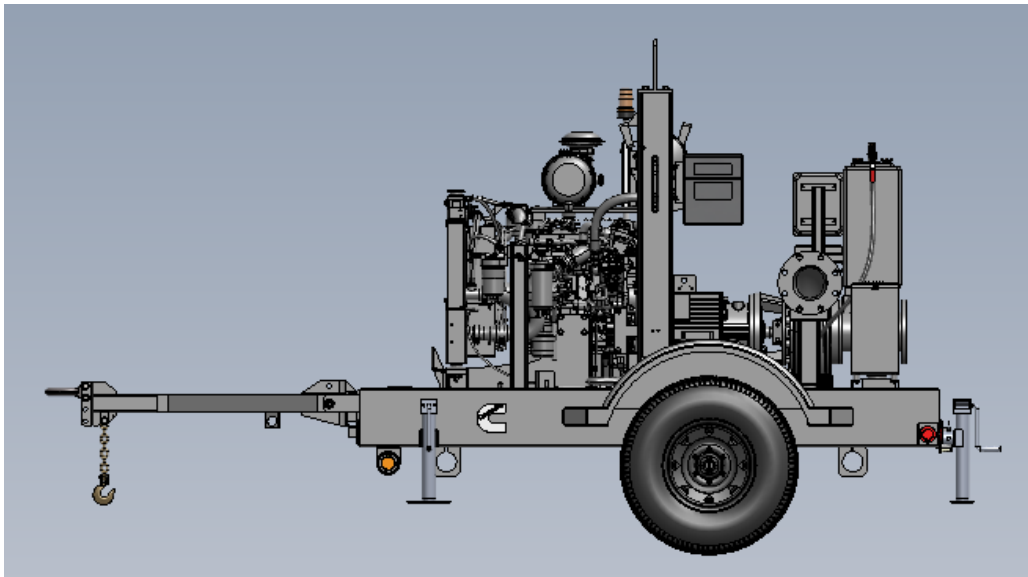
Shut off engine. Only remove filler cap when cool enough to touch with bare hands. Slowly loosen vent pump case drain valve first to relieve pressure before opening covers or disconnecting hoses.

SRVMAN_HTPMPC

Identification Views



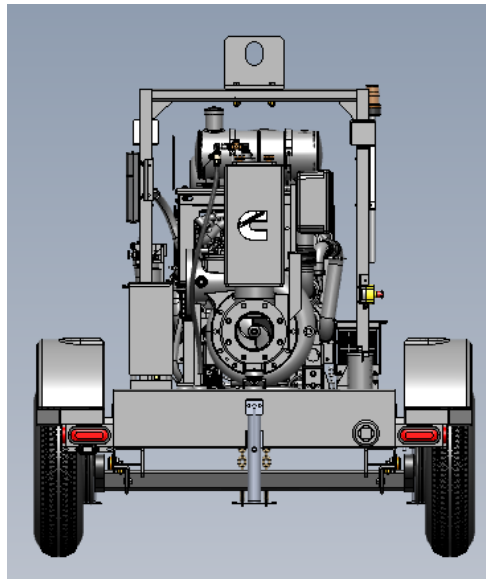
Road Side View



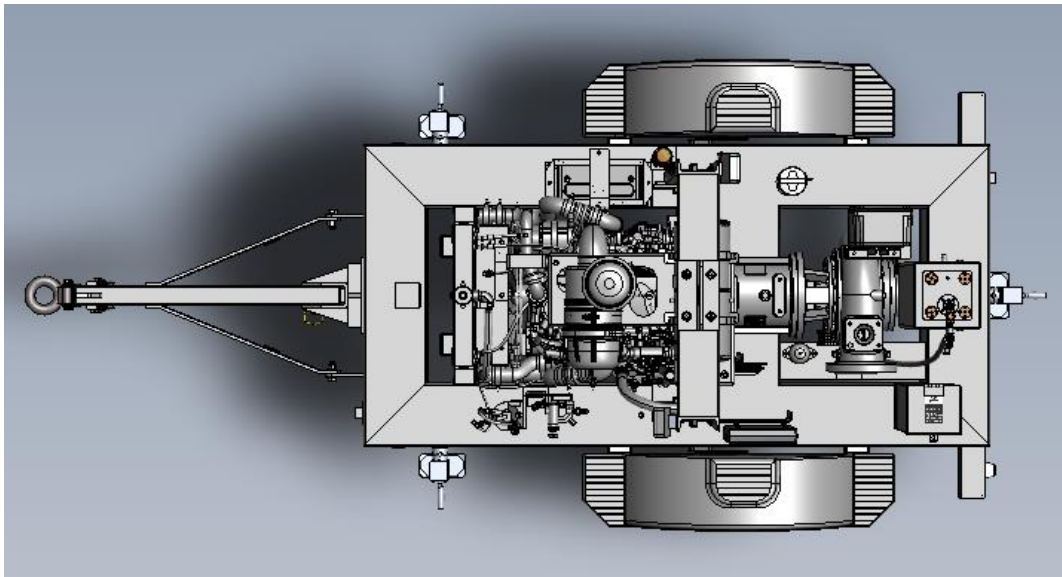
Curb Side View

SRVMAN_QSF4X4VIEW1

Identification Views



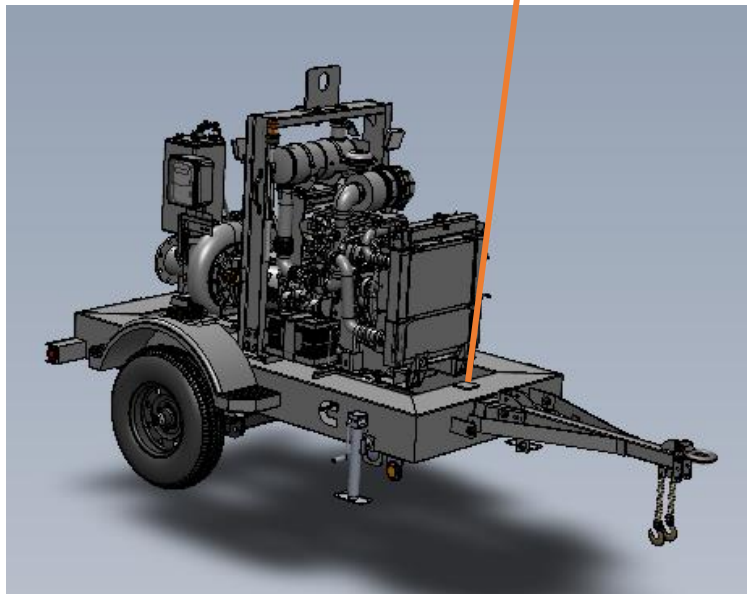
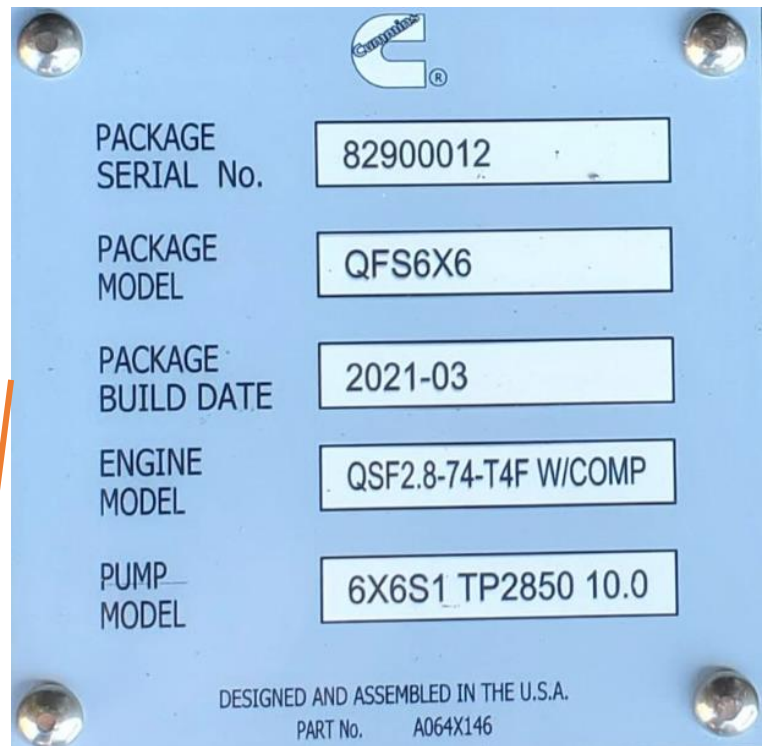
Rear View



Top View

SRVMAN_QSF4X4VIEW2

Identification Plates



SRVMAN_QSF4X4IDPLTS

Lubrication

| Engine | | |
|--|--|---|
| Equipment | Standard Lubricant | Cold Weather Lubricant |
| See engine or motor OEM manual for correct oils, lubricants, and coolants. | | |
| Pumps | | |
| Equipment | Standard Lubricant | Food Grade Lubricant |
| Mechanical seal (grease version) | Delo Heavy Duty Moly 3% EP2 | Royal Purple Ultra Performance Clear FDA Grease No. 1 ½ |
| Mechanical seal (oil lube version) | Havoline Full Synthetic Multi-Vehicle ATF | Royal Purple Barrier Fluid FDA 22 |
| Bearings (grease version) | Delo Heavy Duty Moly 3% EP2 | Royal Purple Ultra Performance Clear FDA Grease No. 1 ½ |
| Diaphragm pump connecting rod bearing grease | Delo Heavy Duty Moly 3% EP2 | Royal Purple Ultra Performance Clear FDA Grease No. 1 ½ |
| Rotary pump oil | Delo 400 XLE SAE 15W-40 | Royal Purple Barrier Fluid FDA 22 |
| Priming Systems | | |
| Equipment | Standard Lubricant | Cold Weather Lubricant |
| Model 216P and 240P air compressor oil | Quin-Cip SAE 40W ISO-150 | See OEM Recommendations |
| H3F vacuum pump oil | Delo 400 XLE SAE 15W-40 | |
| M10WOF vacuum pump oil | Chevron Hydraulic Oils AW 32 | |
| MM1142 Oil-less vacuum pump | VS 150/200 Busch Genuine Synthetic Gearbox Oil | See OEM Recommendations |
| Hydraulics | | |
| Equipment | Standard Lubricant | |
| Hydraulic petroleum (blue 10) oil | Chevron Rando HD 46 | |
| Hydraulic environmentally friendly oil | Clarity Hydraulic Oils AW 46 | |
| Transmission | | |
| Equipment | Standard Lubricant | |
| 3D Diaphragm pump transmission oil | DELO Gear ESI SAE 80W-90 | |
| 4D Diaphragm pump transmission oil | Chevron Cylinder Oils W ISO 460 | |
| Piston pump transmission oil | Meropa® ISO 220 Gear Lubricant | |
| Cotta transmission | Chevron Regal R&O ISO 220 | |
| Rotary pump transmission oil | Delo Gear ESI SAE 80W-90 | |
| PTO bearing grease | Delo Heavy Duty Moly 3% EP2 | |

SRVMAN_LUBCRT



Section 02 – Repair and Adjustments

02 - 01 - Contents 1

| Group | Page | Group | Page |
|--------------------------------------|------|-------|------|
| RD474 – Pump End | | | |
| P55-6X6S2G100E01 – Pump End Assembly | | | |
| 003 - Volute | | | |
| 022 - Bearings | | | |
| 009 - Impeller | | | |
| 010 - Mechanical Seal | | | |
| 015 - Backplate | | | |
| 023 - Bearing Housing | | | |
| 025 - Shaft | | | |
| 038 - Suction Cover | | | |
| 039 - SAE Adapter | | | |
| 057 - Drive Coupling | | | |

SRVMAN_SEC2GRP1



Section 02 – Repair and Adjustments

02 - 01 - Contents 2

Group

Page

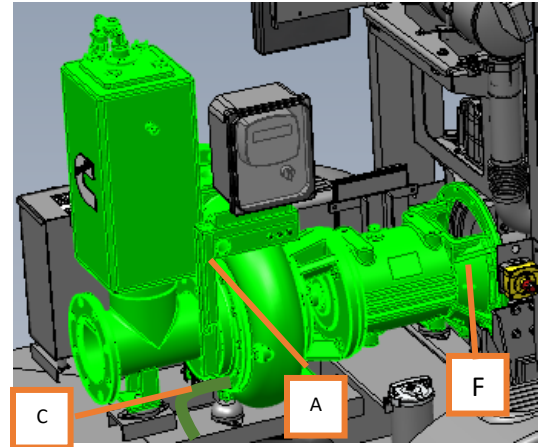
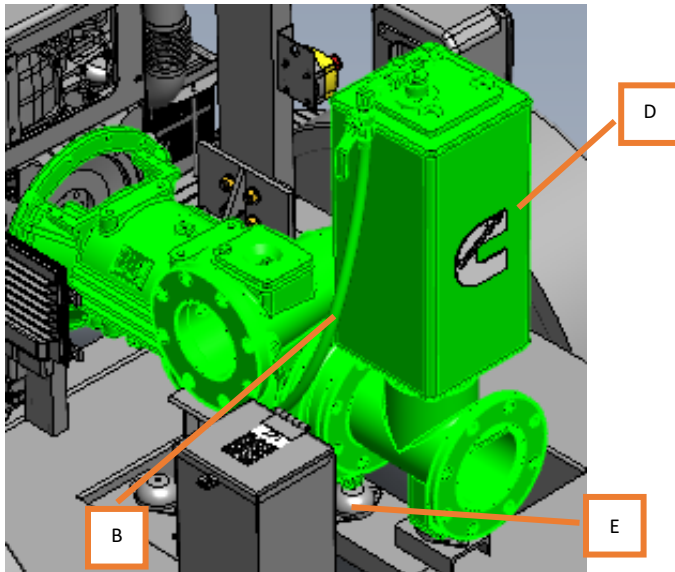
Group

Page

SRVMAN_SEC2GRP2

Remove Pump End

02 - RD474 - P55-6X6S2G100E01



- A. Control Panel Mounting Bracket
- B. Venturi Hose
- C. Volute Drain Assembly
- D. Plenum Chamber Assembly
- E. Mounting Isolator

- F. SAE Adapter

1. Disconnect negative battery cable.
2. Remove control panel and bracket.
3. Disconnect venturi hose from venturi housing.
4. Remove drain valve assembly from pump case.
5. Remove plenum and chamber.
6. Rig hoist to pump end as shown in figure 1.
7. Remove bolts from the SAE adapter to flywheel housing adapter at back of engine.



Figure 1 for reference only

SRVMAN_RD474P55-6X6S2G100E01R

Remove Volute

02 - RD474 - 003

1. Disconnect negative battery cable.
2. Remove control panel and bracket.
3. Remove plenum and chamber.
4. Remove discharge check valve.
5. Rig volute with overhead support by installing lifting tool (A) at the clean out cover using $\frac{1}{2}$ "-13 X 2" bolts and take up slack in rigging.
6. Remove 8 volute retaining bolts (B).
 - a. 2 volute retaining bolts secure the backplate to the bracket.
 - b. These 2 bolts are threaded into the backplate.
7. Use 2 each $\frac{1}{2}$ "-13 X 1-1/2" bolts (C) to separate the volute from the backplate.

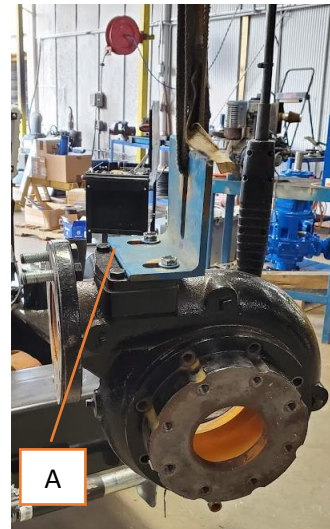
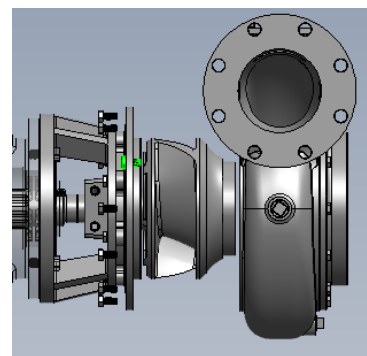
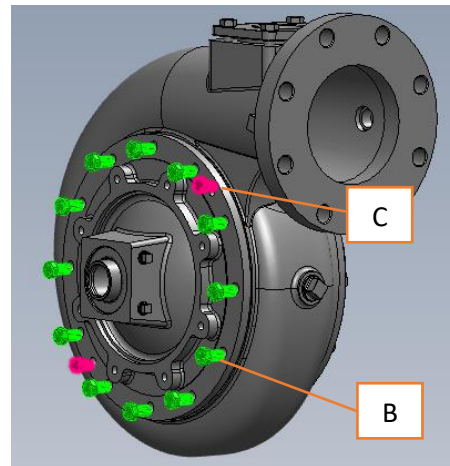
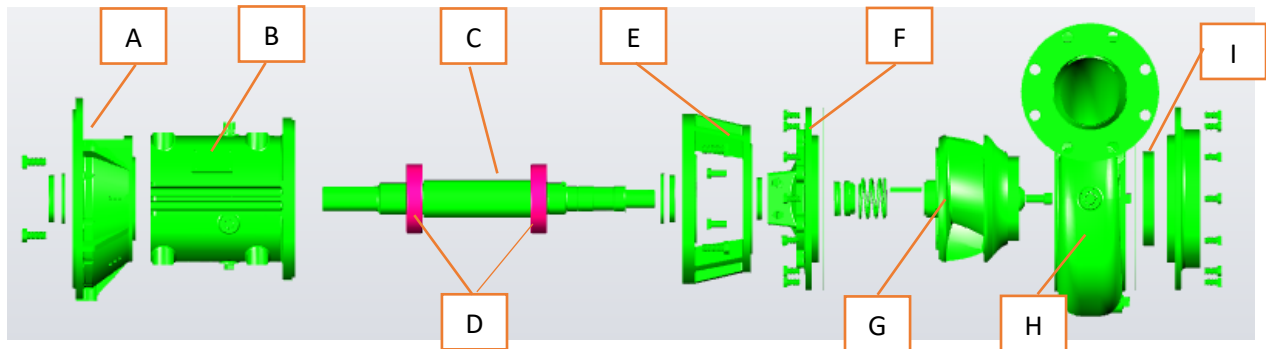


Figure 2 for reference only



Remove Bearings

02-RD474-033



| | | | |
|---|-----------------|---|-----------|
| A | SAE Adapter | E | Bracket |
| B | Bearing Housing | F | Backplate |
| C | Shaft | G | Impeller |
| D | Bearings | H | Volute |
| | | I | Wear Ring |

On Unit

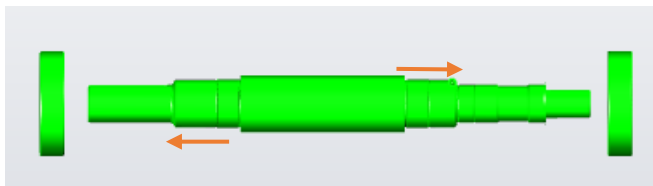
1. Disconnect negative battery cable.
2. Remove control panel and bracket.
3. Remove drain valve assembly from pump case.
4. Remove plenum and chamber.
5. Rig hoist to pump end as shown in figure 1.

On Bench

6. Remove volute.
7. Remove Impeller.
8. Remove backplate.
9. Remove drive coupling.
10. Remove SAE adapter.
11. Remove shaft assembly.

On Press

12. Press bearings off shaft



Inspect Bearings

02-RD474-033

Check bearings for evidence of
excessive wear;
overheating, discoloration;
presence of grease;
spinning in the housing, wear marks;



SRVMAN_RD474-033I

Assemble Bearings

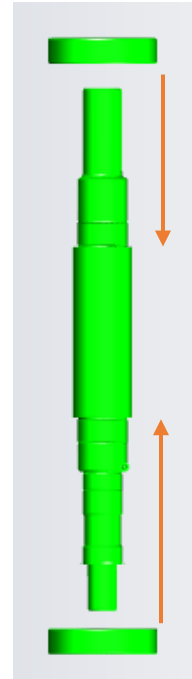
02-RD474-033

1. Press bearings onto Shaft
2. Pre-grease bearings before install into housing.



Important:

Before installing shaft assembly in housing, ensure both sides of each bearing are packed with recommended type of grease.

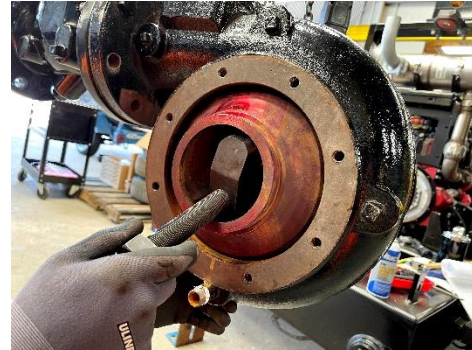


SRVMAN_RD474-033A

Remove Impeller

02-RD474-009

1. Disconnect negative battery cable.
2. Disconnect venturi hose from venturi housing.
3. Remove plenum and chamber.
4. Remove 8 suction cover retaining bolts.
5. Remove suction cover.
6. Remove cleanout cover to access the impeller.
 - a. Wedge impeller with suitable tool through cleanout cover into impeller vane.
7. Remove impeller bolt and washer
8. Use impeller puller to remove impeller



Note: Use heat on impeller bolt to aid in the breaking of Loctite if needed. Use torch on head of bolt to reach $\approx 400^{\circ}$ f

Note: QSF6X6 uses a straight shaft, once it breaks loose it will most likely need to be pulled all the way off the shaft with the puller.



SRVMAN_RD474-009R

Inspect Impeller

02-RD474-009

1. Visually inspect impeller for wear.



Chemical attack on metal parts



Cavitation damage to impeller vane



Cavitation damage on impeller shroud



Abrasive damage to impeller vane



Impeller to suction cover contact



Impeller to wear ring contact

SRVMAN_RD474-009I

Assemble Impeller

02-RD474-009

1. Use a thread tap in the impeller bolt hole on the shaft to clean out any old Loctite
Clean inside threads to remove any oils or grease
2. Ensure spring is still in place and against the
Rotating seal.
3. Install impeller on to shaft, washer and bolt
4. Torque impeller bolt to 90 ft.lbs



Important:

Never reuse an impeller bolt. Always replace with new.



Important:

Apply Loctite 271 to impeller bolt threads and the internal threads of the shaft.



Important:

Apply Loctite LB 8150 anti-seize to the shaft and bore of the impeller.



SRVMAN_RD474-009A

Remove Mechanical Seal

02-RD474-010

1. Remove volute
2. Remove the impeller
3. Using two prybars remove rotating seal from shaft
4. Remove the backplate
5. With backplate on bench use a suitable drift, tap the stationary seal out of the pocket



Figure 3 For reference only



Figure 4 For reference only



Important:

Inspect the fit of the stationary seal in the backplate seal pocket. If you are able to fit the tip of a pick or small screwdriver between the pocket wall and stationary seal and touch the o-ring the backplate will need to be replaced.

SRVMAN_RD474-010R

Inspect Mechanical Seal

02-RD474-010



Important:

Never reuse any part of a mechanical seal. Always replace with new.

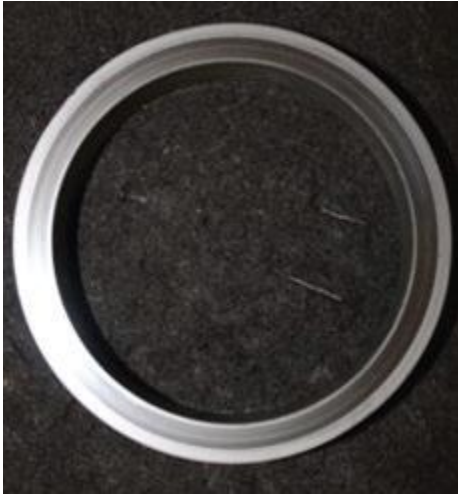
Below is examples of failed mechanical seals and their causes



Important:

The purpose of the below examples is to provide educational information about seal leakage. These observations made about seal parts and their installation are not all inclusive of the possible causes and corrective actions.

| Figure No. | Description | Observation |
|------------|----------------------------|--|
| 1 | Full contact pattern | Typical and desired contact pattern. Full contact on both parts of the seal through 360° . There is little to no wear on either sealing surface. |
| 2 | Coning | Heavy contact on the stationary ring pattern at the outside diameter of the seal. Fades away to no visible contact at the inside diameter of contact pattern. Possible edge chipping on the outside diameter of rotating ring. |
| 3 | Mechanical distortion | Two large contact spots on stationary ring pattern fades away between contact areas. 360° contact on rotating seal. |
| 4 | High wear or heat checking | High wear of stationary ring or thermally distressed surface (heat checking) through 360°. High rotating ring wear with carbon deposits on atmosphere side of seal. Possible edge chipping of rotating ring. |
| 5 | High wear and grooving | High wear of the mating ring. Primary ring has grooved the mating ring evenly through 360°. |
| 6 | Eccentric contact pattern | Eccentric contact pattern on stationary ring. Width of contact equal to rotating ring through 360°. No leakage if shaft has not contacted inside diameter of stationary ring. |



5



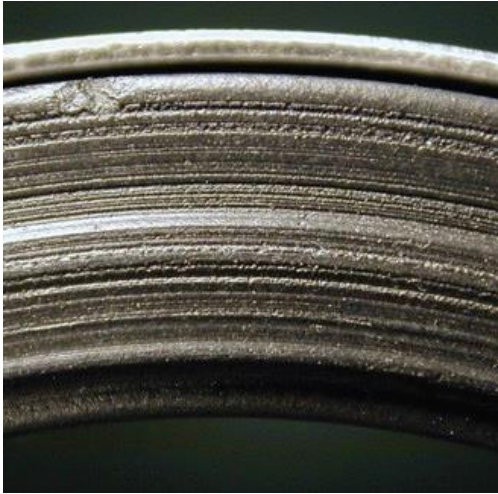
6



7



8



9



10

SRVMAN_RD474-010I

Install Mechanical Seal

02-RD474-010

1. Be sure the backplate and stationary seal pocket is clean and free from rust and/or debris.



Important:

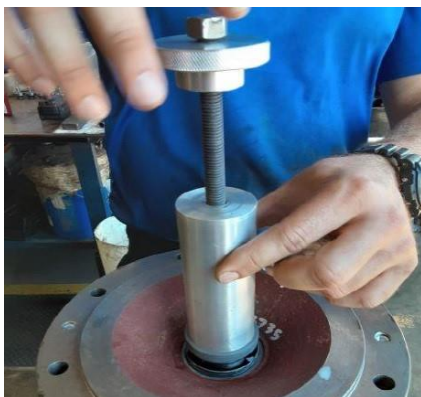
To use the mechanical seal installation tool, it is necessary to have the backplate installed on the bearing frame and bracket with shaft.

2. Apply P-80 Rubber Assembly Lubricant to the O-ring of the stationary seal face
3. Install the seal face (polished side toward impeller) down the pump shaft until the O-ring contacts the backplate.
4. Screw the forcing screw of the seal installation tool in to the impeller bolt hole on the shaft
 - a. Lower the install tool until it comes in contact with the face of the stationary seal.
 - b. Turn the adjustment knob until it comes in contact with the top of the cylinder. Continue turning the adjustment knob until the seal face bottoms out in the pocket in the backplate.
 - c. Remove the tool and clean the face of the stationary seal.
5. Apply P80 lubricant to the I.D. of the rotating seal, and to the pump shaft. Make sure the face of the rotating seal is clean before installation on the shaft
 - a. Place the seal over the shaft and push it down
 - b. Screw the forcing screw of the seal installation tool in to the impeller bolt hole on the shaft
 - c. Lower the tool cylinder until it comes in contact with the face of the mechanical seal.
 - d. Turn the adjustment knob until the rotating seal face comes in contact with the stationary seal face.



Important:

When using the seal installation tool, only tighten the seal installer by hand. It is not necessary to use any tools turn the hand nut or forcing screw.



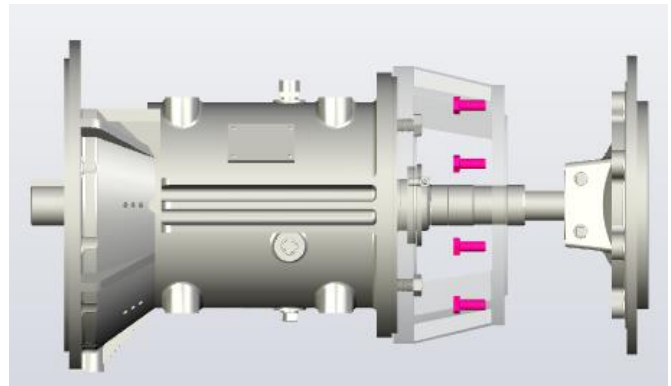
Images for reference only

SRVMAN_RD474-010A

Backplate Removal

02-RD474-015

1. Remove volute
2. Remove impeller
3. Remove 8 ea ½-13 bolts
 - a. If necessary hit the backplate with a dead blow hammer to loosen from bracket



SRVMAN_RD474-015R

Backplate inspection

02-RD474-015

1. Inspect the stationary seal pocket for wear or corrosion
 - a. If the chamfer is worn and the tip of a pick can touch the stationary seal o-ring the backplate must be replaced



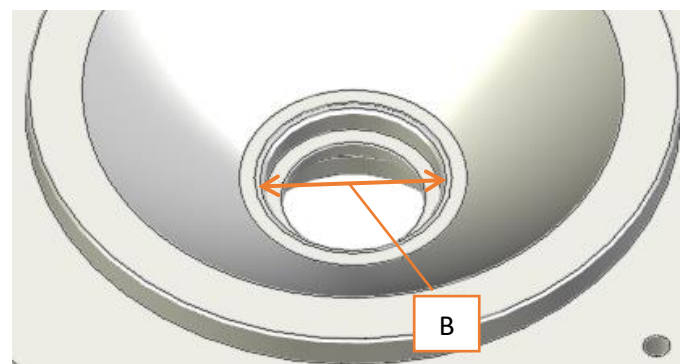
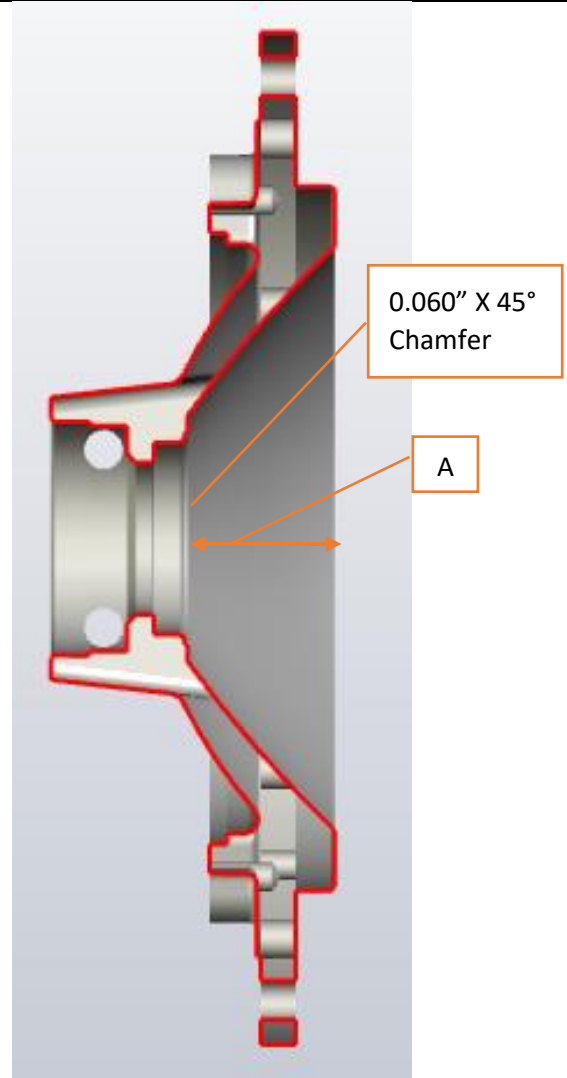
Important:

Do not be too aggressive with sanding pads on the chamfer. If too much material is removed from the pocket the seal will fail prematurely.



Important:

The pocket should be smooth a 63/32 RMS is required. If the surfaces are too coarse the o-ring will leak, too smooth and the seal will spin or pop out.



Pocket Dimensions

| | | |
|---|---------------|-------------------|
| A | Bore Depth | 2.150" +/- 0.005" |
| B | Bore Diameter | 2.750" +/- 0.002" |

SRVMAN_RD474-015I

Backplate assembly

02-RD474-015

1. Apply Loctite 680 on the outside seal casing and install in bore
2. Apply red Loctite 545 on the bolts and thread in hand tight
3. Alternate tightening bolts as shown below
4. Final torque is 78ft.-lbs

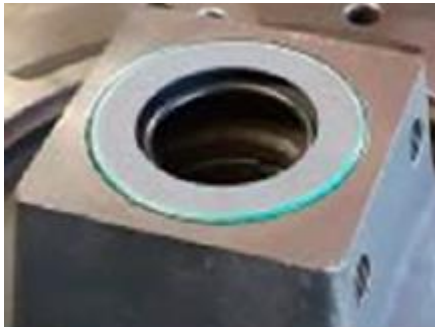
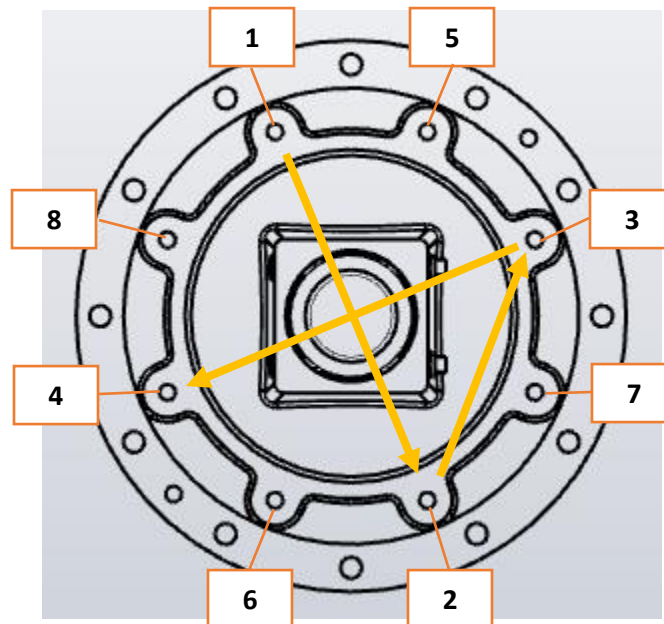


Figure 11 Seal should be flush and garter spring removed



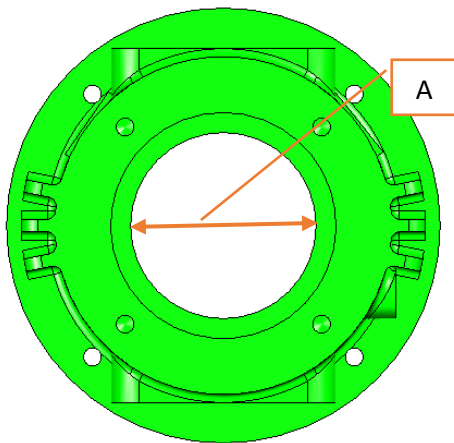
| Torque step | Amount |
|-------------|-----------|
| 1 | 26 ft-lbs |
| 2 | 51 ft-lbs |
| 3 | 78 ft-lbs |

SRVMAN_RD474-015A

Bearing Housing Inspection

02-RD474-023

1. Check bearing surface for evidence of bearing spinning
2. Check bearing bore measurement
3. Check for opening distortion "egg shaped"
4. Inspect for cracks, breaks or evidence of overheating.



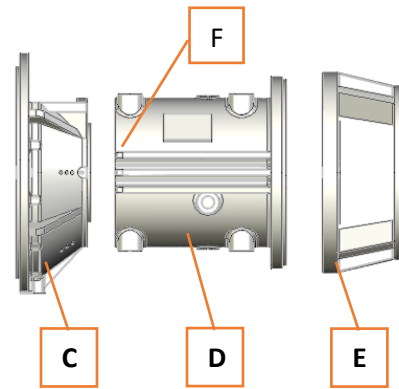
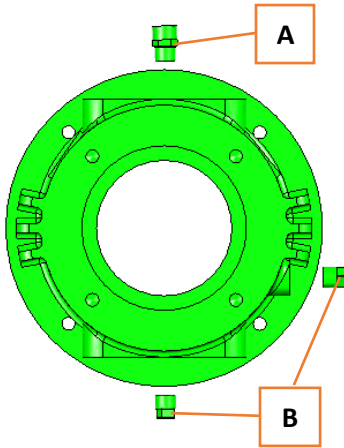
Bearing Bore Dimension
A Bore Diameter 5.5120" – 5.5128"

SRVMAN_RD474-023I

Bearing Housing Assembly

02-RD474-023

1. Install plugs and breather
2. Install bracket and gasket on bearing housing
3. Insert the shaft into the housing.
 - a. If needed, lightly tap the shaft with a rubber mallet to push through the assembly

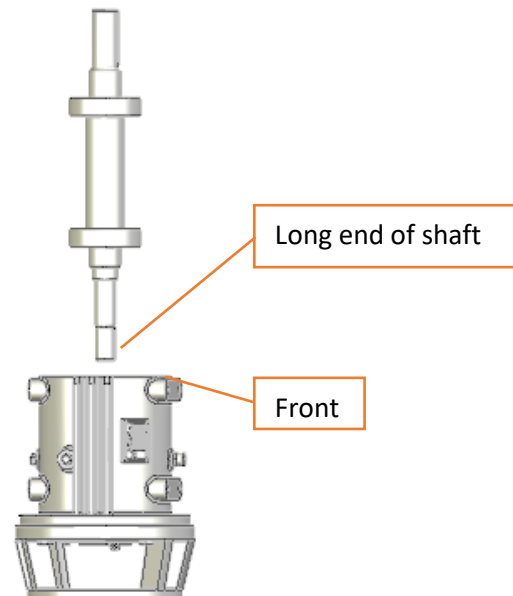


- | | | | | | |
|---|----------|---|-----------------|---|--------------------------|
| A | Breather | C | SAE Adapter | E | Bracket |
| B | Plug | D | Bearing Housing | F | Front of bearing housing |



Important:

Before installing shaft assembly in housing, ensure both sides of each bearing are packed with recommended grease.

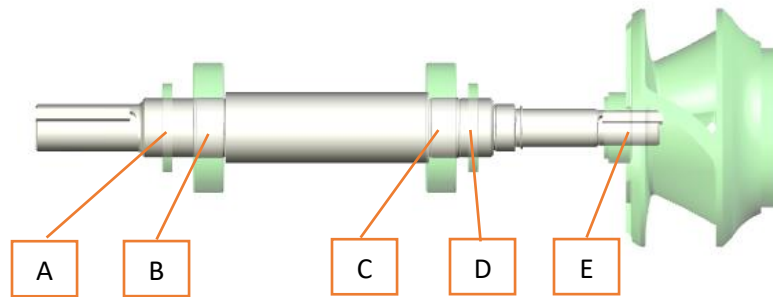


SRVMAN_RD474-023A

Shaft Inspection

02-RD474-025

| ID | Description | Diemension (inch) | Surface roughness (RA) |
|----|---------------------------------|-------------------|------------------------|
| A | SAE adapter grease seal journal | 2.500" +/- 0.003" | 20 |
| B | Forward bearing journal | 2.5592" – 2.5597" | 125 |
| C | Rear bearing journal | | |
| D | Bracket grease seal journal | 2.500" +/- 0.003" | 125 |
| E | Impeller journal | 1.498" – 1.499" | 125 |



Important:

Do not use too aggressive of polishing method on shaft. Inspect the key way for any wear and replace as needed to ensure proper impeller fit.

SRVMAN_RD474-025I

Shaft Assembly

02-RD474-025

1. Press bearings onto Shaft
2. Pre-grease bearings before install into housing.



Important:

Before installing shaft assembly in housing, ensure both sides of each bearing are packed with recommended type of grease.

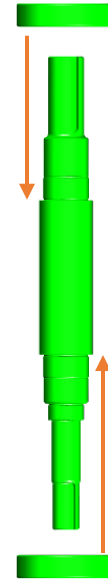


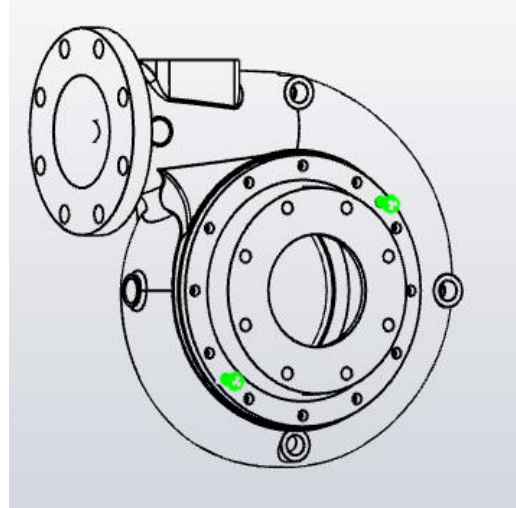
Figure 12 For reference only

SRVMAN_RD474-025A

Suction Cover Removal

02-RD474-038

1. Disconnect negative battery cable.
2. Remove control panel and bracket.
3. Disconnect venturi hose from venturi housing.
4. Remove drain valve assembly from pump case.
5. Remove plenum and chamber.
6. Remove qty. 12 bolts
7. Remove suction cover using two of the bolts in the threaded pusher bolt holes.

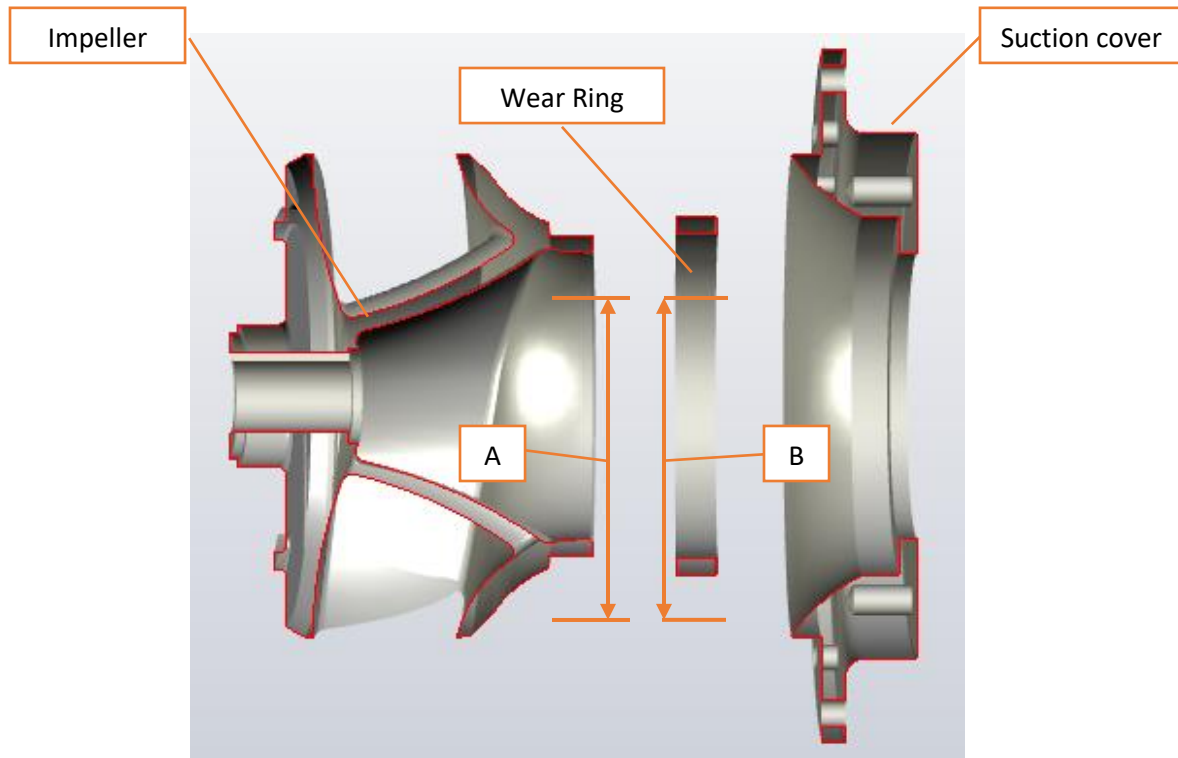


SRVMAN_RD474-038R

Suction Cover Inspection

02-RD474-038

Inspect suction cover for wear and replace as needed
 Suction cover should fit impeller as tight as possible
 without scrubbing impeller.



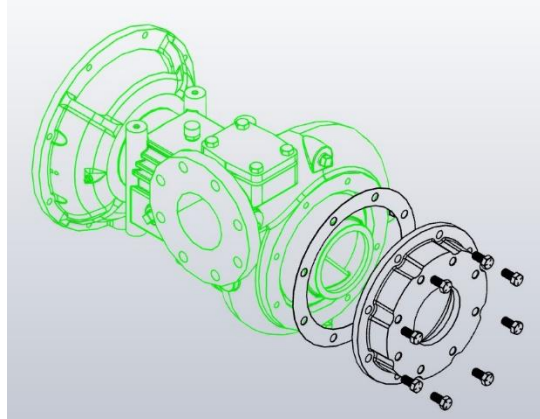
| Fig | Diemension (inch) | Surface Roughness (RA) |
|---|-------------------|------------------------|
| A | 6.718" +/- 0.005" | 125 |
| B | 6.750" – 6.755" | 125 |
| Max wear clearance between A and B = 0.050" | | |

SRVMAN_RD474-038I

Suction Cover Assembly

02-RD474-038

1. Line up paper gasket with holes on volute
2. Use Loctite 545 for all of the bolts.
3. Tighten in a star pattern to 78 ft.lbs



Important:

To make suction cover installation easier, use studs to hold gasket in place and align the cover.

SRVMAN_RD474-038A

SAE Adapter Removal

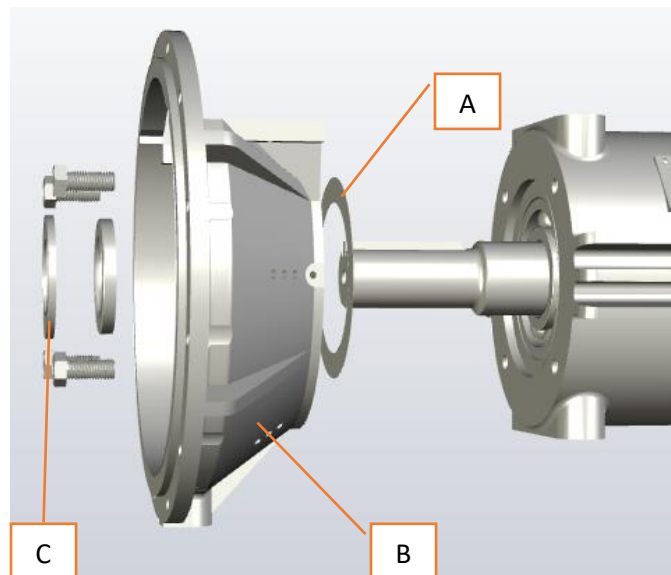
02-RD474-039

On Unit

1. Disconnect negative battery cable.
2. Remove control panel and bracket.
3. Remove drain valve assembly from pump case.
4. Remove plenum and chamber.
5. Rig hoist to pump end as shown in figure 1.

Off Unit

6. Remove drive coupling
7. Remove deflector
8. Loosen and remove 4 retaining bolts
 - a. Lift off SAE adapter housing



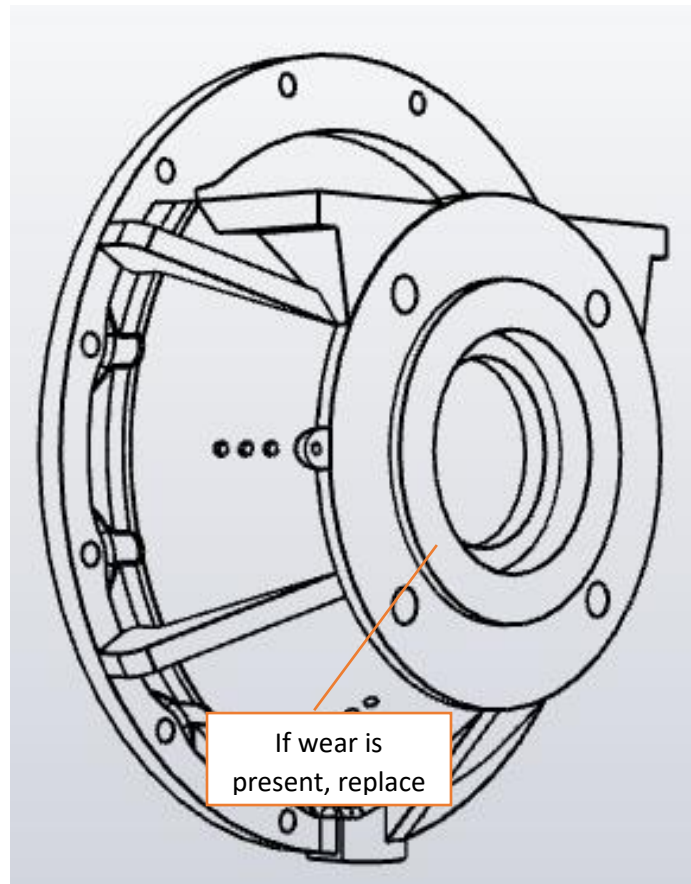
- A Shim
B SAE Adapter
C Deflector

SRVMAN_RD474-039R

SAE Adapter Inspection

02-RD474-039

1. Inspect bearing race contact point on back of SAE adapter
 - a. If any wear is present it will need to be replaced



Important:

If wear is present on the bearing race contact surface, be sure the bearing housing bore is within tolerance and bearing do not fit loose in housing.

SRVMAN_RD474-039I

SAE Adapter Assembly

02-RD474-039

1. The tolerance between the bearing housing and bell Housing must be between 3 and 10 thousandths.
2. cut roughly an inch of .060 solder to place on the edge of the bearing on the bell housing side as shown.
3. Using 5/8-11 X1.5", bolt on the bell housing to the bearing housing using two bolts diagonally placed and tighten fully. Once completely tight, remove the bolts and solder.
4. Measure the crushed section
Note: the end play should be in the range of .007-.012
5. Add shims accordingly to get in that range.
6. Bolt on SAE adapter



SRVMAN_RD474-039A

Drive Coupling Removal

02-RD474-057

1. Remove Pump End
2. Remove the 2 allen head screws.
3. Grease one screw and install into the half thread hole
4. Tighten screw until taper bushing is loose in the hub
5. The element hub and taper bushing can be pulled off the shaft



SRVMAN_RD474-057R

Drive Coupling Assembly

02-RD474-057

1. The outer taper of the taper bushing and the bore along with the inner taper of the element hub shall be free of rust proofing oil and coatings must be removed completely.
2. Insert the taper bushing into the element hub and line up all connecting bores.
3. Make sure that half threaded holes coincide with half plain holes
4. Screw in lightly greased or oiled assembly screws. Do not tighten the screws yet.
5. Slide the element hub with inserted taper bushing onto the cleaned shaft with keyway and put it into the mounting position.
Tighten the screws uniformly up to 23 lb-ft.
6. Tap against the taper bushing with a hammer using an intermediate plate.
7. Re-torque to 23 lb-ft



Figure 13 For reference only. Drive coupling model could be different

SRVMAN_RD474-057A