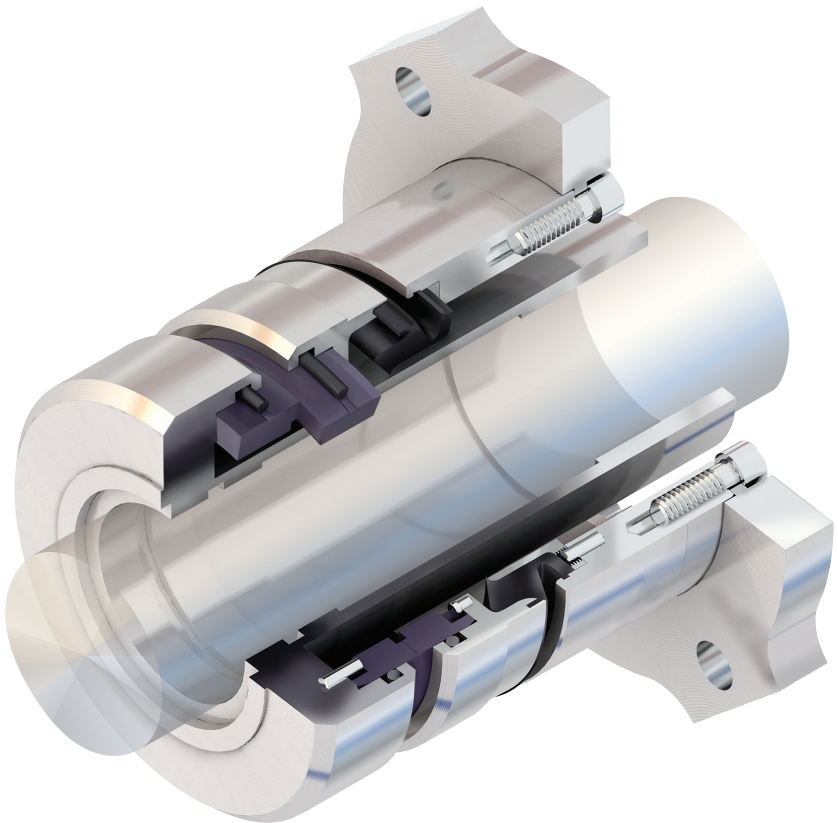




Installation Instructions

BW Seals® RIS Seal

Rubber in shear slurry seal



1 Equipment Check

- 1.1 **Follow plant safety regulations** prior to equipment disassembly:
- lock out motor and valves.
 - wear designated personal safety equipment.
 - relieve any pressure in the system.
 - consult plant MSDS files for hazardous material regulations.
- 1.2 **Remove all burrs, nicks, or scratches, and sharp edges** from the shaft / sleeve including sharp edges of keyways and threads. Replace worn shaft or sleeve. Make sure the seal housing bore, face, and sealing fluid flush taps are clean and free of burrs and sharp edges that might damage gaskets.

2 Preparation For Assembly

- 2.1 General Information
Refer to the seal assembly drawing for details.
- 2.2 Keep the seal face assemblies in their factory packing until they are required for assembly.
- 2.3 Use only silicon grease on rubber in shear element and O-rings.
- 2.4 Prior to final assembly remove all oil or grease from the seal faces using alcohol that does not contain hydrocarbon based lubricants.
- Caution:** Consult material safety data sheet for proper handling of alcohol.
- 2.5 When (10) adjusting studs are mounted to (46) cover or to the pump casing, be sure to adjust the seal after the impeller clearance has been set and after any subsequent impeller adjustments.
- 2.6 If the impeller must be removed after the pump and seal have been in operation, it is recommended that the basic seal ((14) stationary face assembly and (15) rotating face assembly and (240) seal carrier) be replaced with a new or reconditioned seal.
- 2.7 Always vent air from the pump and piping before start-up.

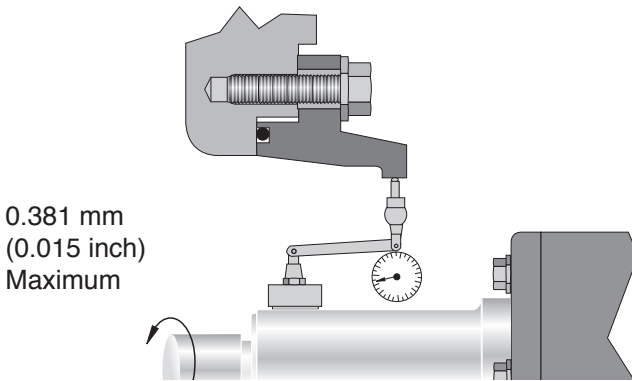
The images of parts shown in these instructions may differ visually from the actual parts due to manufacturing processes that do not affect the part function or quality.

3 Pump Preparation

- 3.1 Check the condition of the bearing assembly and axial shaft movement.
 - 3.1.1 Check radial shaft movement with a dial indicator by forcing the shaft up and down and observe the movement of the dial indicator. Replace or repair bearing assembly if the movement is greater than the manufacturer's specifications or 0.381 mm (0.015 inch).
 - 3.1.2 Shaft run-out should be less than 0.127 mm (0.005 inch). Turn the shaft 360 degrees and observe the movement of the dial indicator. See Figure 1.

Radial Shaft Movement

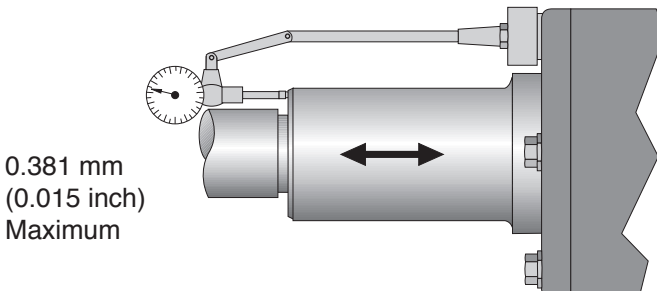
Figure 1



- 3.1.3 Axial shaft movement must be less than 0.381 mm (0.015 inch). Adjust the bearing cover shim thickness according to the manufacturer's instructions. If spring loaded spherical thrust bearings are utilized, it may be necessary to machine the gasket surface of the bearing cover in lieu of adding shims. See Figure 2.

Axial Shaft Movement

Figure 2

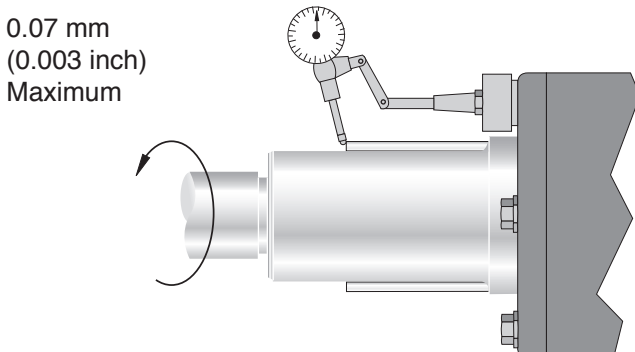


- 3.2 Check squareness of the shaft and end shoulder or shaft sleeve if one is used.

The end of the sleeve that mates with the rotating assembly (15) (or the shaft shoulder if a sleeve is not used) must be square to within 0.076 mm (0.003 inch) total indicator reading. See Figure 3.

Squareness of the Shaft

Figure 3



- 3.3 Enlarge the seal cavity opening or replace the appropriate pump parts as described by the seal assembly drawing.
- 3.3.1 Some pumps only require replacing the packed gland stuffing box with a new (46) cover supplied with the seal. Use the appropriate gaskets supplied with the seal because they may be different than the original gaskets.
- 3.3.2 Other pumps require machining of the packed gland stuffing box, or casing, or rear casing liner to allow (46) cover to be attached. Machine parts as described in the seal assembly drawing. Use the appropriate gaskets supplied as described in (3.3.1.) above.
- 3.3.3 Rubber lined pumps may require enlarging the hole in the center of the inner rubber liner. Cut the liner to the dimensions shown on the seal assembly drawing. Use appropriate rubber repair compound to cover any metal that is exposed when cutting the rubber liner.
- 3.4 Assemble and install (46) cover or modified pump parts as applicable.
- 3.4.1 If a new (46) cover is supplied, install (139) end plate (leaving (40) bolts loose at this time), (10) adjusting stud, (101) clamp ring and (9) jam nuts.

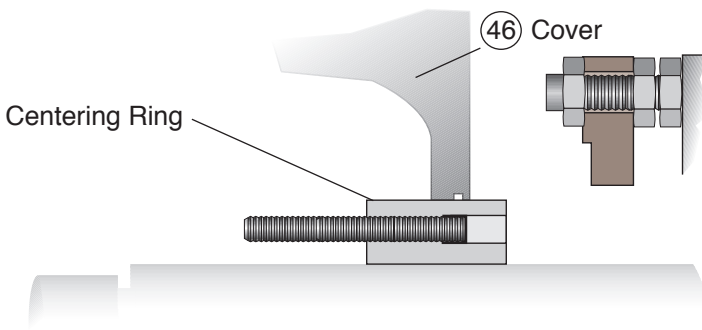
Note: A standard O-ring groove is incorporated in the cover for 3.750 and smaller sizes, and (139) end plate is not used. On some pumps,

⑩ adjusting stud is mounted to the bearing housing. If your pump is this type, mount ⑩① clamp ring, ⑨ jam nuts and ⑩ studs to the bearing housing at this time.

- 3.4.2 If OEM pump parts are modified in lieu of a new ④⑥ cover, install ⑩③⑨ end plate leaving ④⑩ bolts loose at this time (if used), ⑩ adjusting studs, ⑩① clamp ring and ⑨ jam nuts to the modified parts as shown on the form drawing.
- 3.4.3 Install assembled ④⑥ cover or modified pump parts on the pump and tighten the attaching bolts hand tight. Slide the appropriate centering tool on the shaft and through the opening in the seal cover until it slips into the cover bore. Wrench tighten the cover attaching bolts to lock the cover in place. If a centering tool is not available, use a dial indicator and center the cover manually within 0.381 mm (0.015 inch) total indicator reading. See Figure 4.

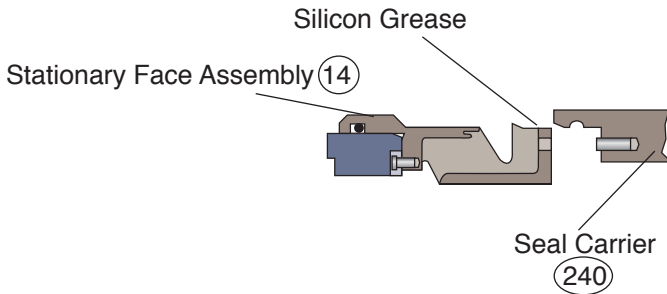
Install Assembled Cover or Modified Pump Parts

Figure 4

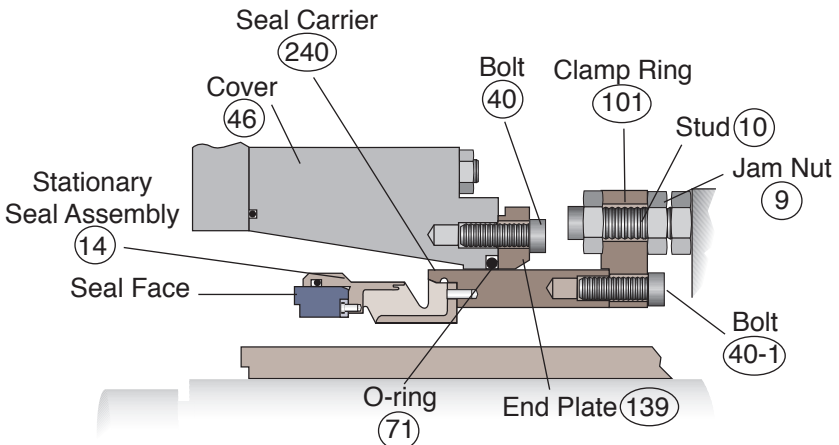


4 Seal Assembly

- 4.1 Assemble the stationary face assembly to the seal carrier. See Figure 5.
 - 4.1.1. Insert drive pins in the stationary face assembly ⑭.
 - 4.1.2. Align the drive pin holes in the stationary face assembly ⑭ with the drive pins in the carrier ②④⑩ and assemble the parts until fully seated.
- 4.2 Install ⑦① O-ring (liberally coat with silicon grease) in the O-ring groove of ④⑥ cover or modified pump parts. Hand tighten end plate ⑩③⑨ bolts.



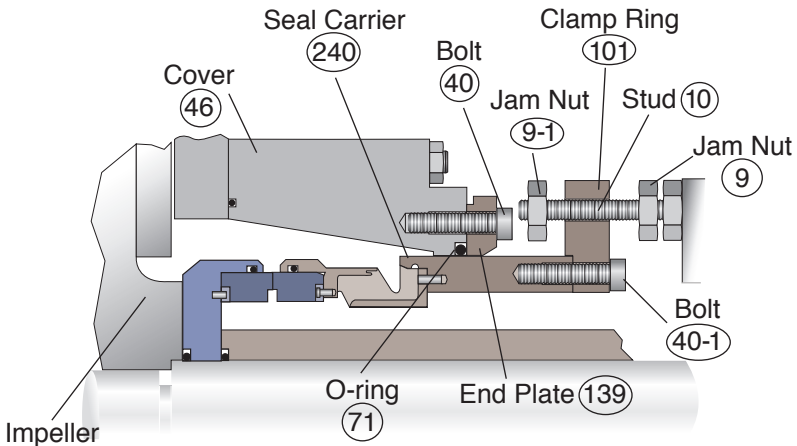
- 4.3 Install the stationary face assembly and the seal carrier on to the pump. See Figure 6.
 - 4.3.1 Apply silicon grease to the outside diameter of the seal carrier (240).
 - 4.3.2 Slide the assembly into the seal cavity until (71) O-ring is located near the end of the seal carrier next to the stationary seal assembly (14).
 - 4.3.3 Attach (101) clamp ring to (240) seal carrier with (40-1) bolts.



- 4.4 Position (9) and (9-1) jam nuts as far as possible to each end of (10) stud so they will not restrict axial movement of (101) clamp ring.
- 4.5 Install rotating face assembly. See Figure 7.
 - 4.5.1 Clean the end of the shaft sleeve of any dirt (or shaft shoulder if a sleeve is not used) and remove any nicks or burrs.
 - 4.5.2 Clean both rotating and stationary seal faces with alcohol by applying it to a lint free tissue and wiping the seal face. Make sure all dirt and grease are removed.
 - 4.5.3 Install the gasket(s) as shown on the seal assembly drawing.
 - 4.5.4 Install the assembly onto the shaft.

Assemble the Rotating Face Assembly

Figure 7



- 4.6 Install the pump impeller.
 - 4.6.1 Apply grease to the impeller threads only.
 - 4.6.2 Install the appropriate gasket or O-ring as described on the form drawing.
 - 4.6.3 Be sure the impeller is tight after assembly.

5 Final Pump Assembly

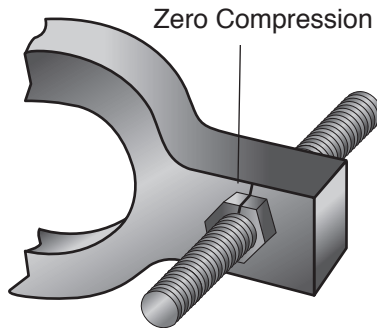
- 5.1 Assemble the suction side of the pump casing or liner or suction cover.
- 5.2 Adjust the impeller clearance according to manufacturer's instructions.

6 Seal Setting Procedure

- 6.1 Set seal to zero compression.
Push ⑩ clamp ring toward the pump impeller until the seal faces make contact. Be certain that ⑨ jam nuts are not touching the clamp ring. While holding the faces in contact, screw down ⑨ adjusting nut until it touches the clamp ring. (See Figure 7). Make sure the faces are in full contact by supporting the weight of the assembly at the top of the the clamp ring as well as on each end near the adjusting nuts. The seal is now at "zero compression". Mark the position of the adjusting nuts. See Figure 8.

Zero Compression

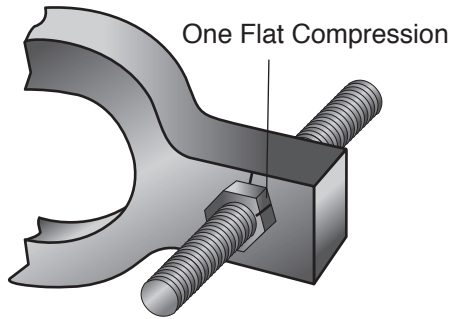
Figure 8



- 6.2 Tighten the end plate screws (40) to compress (71) O-ring where applicable. See Figure 7. For reference, Figure (9) shows "one flat compression".

One Flat Compression

Figure 9



- 6.3.1 Set the seal compression to the values shown below for your seal size.

<p>Size 47.63 thru 241.3 mm (1.875 thru 9.500 inch) (All RIS Sizes)</p>	<p>Compression 1.02 to 1.27 mm (0.040 to 0.050 inch)</p>
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6.3.2 Tighten (9) adjusting nut the number of flats in the table below. (1 flat = 1/6 turn of the nut)

Stud Size (inches)	Compression (inches) 0.040 / 0.050	Compression Per Flat inches (mm)
3/8 - 16 UNC	4 Flats	0.010 (0.254)
1/2 - 13 UNC	4 Flats	0.013 (0.330)
5/8 - 11 UNC	3 Flats	0.015 (0.381)
3/4 - 10 UNC	3 Flats	0.017 (0.432)
1 - 8 UNC	2 Flats	0.021 (0.533)

Stud Size (metric)	Compression (Inches) 0.040 / 0.050	Compression Per Flat mm (inches)
M10 x 1.5	4 Flats	0.254 (0.010)
M12 x 1.75	4 Flats	0.279 (0.011)
M16 x 2.0	3 Flats	0.330 (0.013)
M20 x 2.5	3 Flats	0.406 (0.016)
M24 x 3.0	2 Flats	0.508 (0.020)

6.3.3 Tighten jam nut (9-1) on the impeller side of the clamp.

6.4 Fill the pump with process fluid or water ensuring air is purged from pump to check for static leaks. Repair any leaks before start-up.

6.5 Start the pump and closely monitor seal leakage for approximately two hours. Seal leakage can be initiated by dimensional changes in the pump after start-up that may reduce seal compression. Example:

Axial shaft movement due to bearing clearances and thermal growth. If visible leakage is observed shortly after start-up, adjust the seal one flat and wait 10 to 15 minutes for the full effect of the change. If necessary, repeat the procedure no more than 3 times (6 flat total or 1 complete turn of the nut). If the leak has not been reduced, it is a static leak or the seal faces have been damaged. Further adjustment may damage the seal.

For technical assistance or information pertaining to your particular application, contact your nearest authorized Flowserve distributor.

4 Repair

This product is a precision sealing device. The design and dimension tolerances are critical to seal performance. Only parts supplied by Flowserve should be used to repair a seal. To order replacement parts, refer to the part code and B/M number. A spare backup seal should be stocked to reduce repair time.

When seals are returned to Flowserve for repair, **decontaminate the seal assembly** and include an order marked "**Repair or Replace.**" **A signed certificate of decontamination** must be attached. **A Material Safety Data Sheet (MSDS) must be enclosed** for any product that came in contact with the seal. The seal assembly will be inspected and, if repairable, it will be rebuilt, tested, and returned.



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