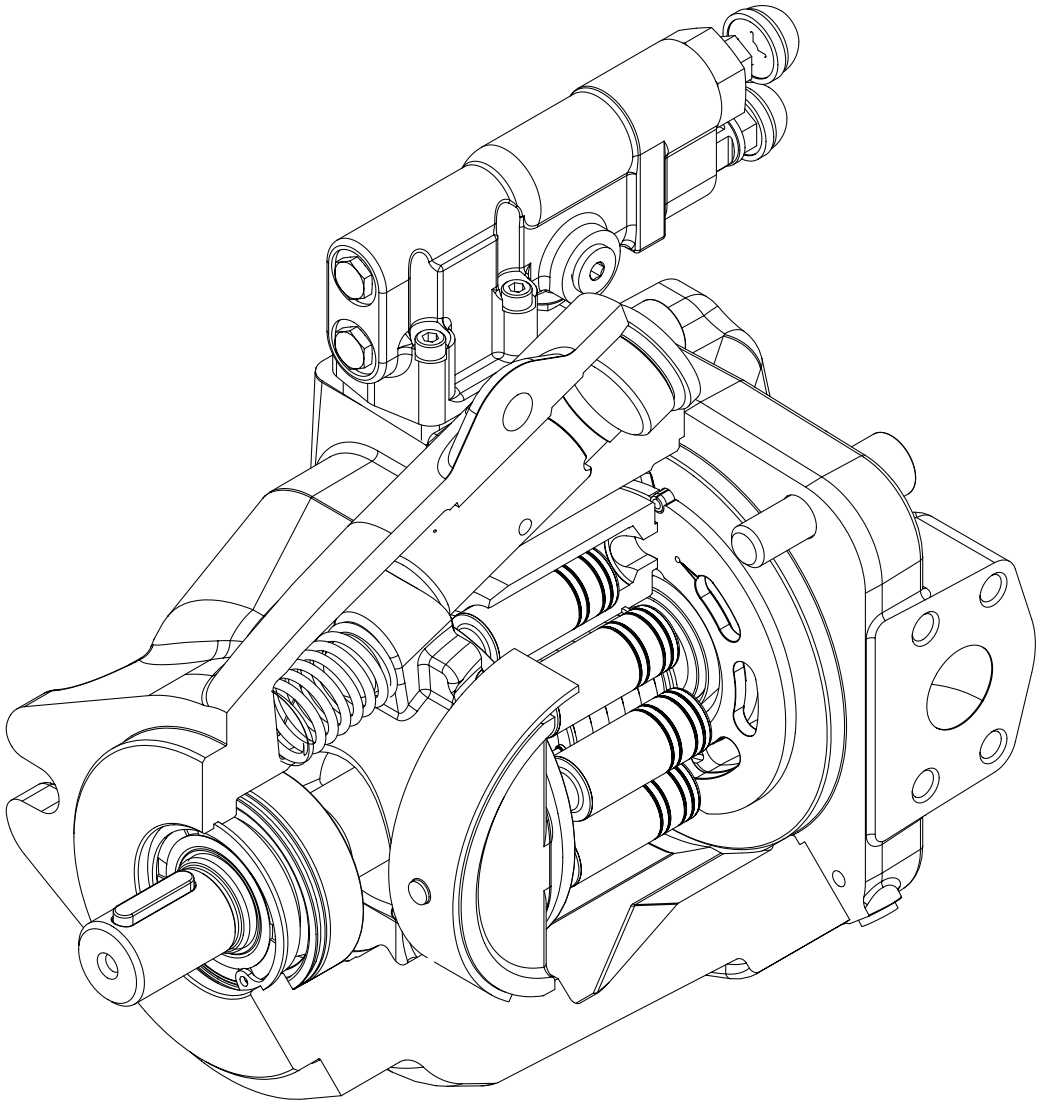
420 Mobile Piston Pump Repair

Cutaway



General Information

Ordering Replacement Parts

Read this assembly manual thoroughly before starting work on the pump.

This manual assumes appropriately trained technicians with specialized knowledge of mechanical and hydraulic component assembly and disassembly.

Replacement Parts

When ordering replacement parts, give the product number, date code, part name, part number and quantity of parts required. This product information is found stamped on the tag which is located on the side of the housing.

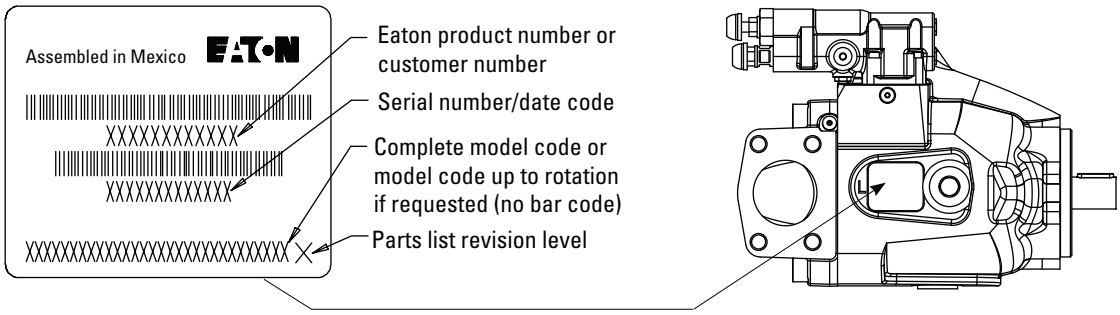
When the Eaton model 420 pressure, pressure-flow compensated piston pump is repaired, thoroughly clean the pump before any repairs are attempted.

The part number and serial number are on the tag.

Serial Number/Date Code Interpretation

08 02 17 RC 1010

- 08 — Year Built
- 02 — Month
- 17 — Day of Month
- RC — Manufacturing Plant - Reynosa, MX
- 1010 — Serial Number



Required Tools

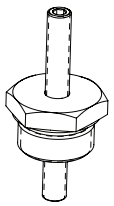
Standard Tools For Disassembly

- Ball Peen Hammer
- Plastic Tip Hammer
- Flat Tip Screw Driver
- Snap Ring Pliers
- Torque Wrench
- Magnet Stick
- 1-1/4" Wrench
- 1-3/8" Wrench
- 4mm Allen Wrench
- 3/32" Allen Wrench
- Impact Screwdriver
- Sliding Bearing Remover Hammer
- Dial Indicator and Accessories
- Marker or Paint Pen
- Petroleum Jelly
- Cleaning Solvent

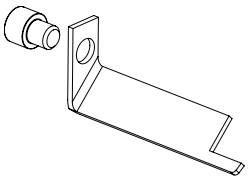
Special Tools

- Assembly Tool Kit 9900275-000 (includes)

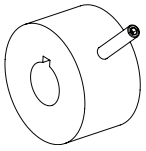
– Swashplate Locator Tool



– Swashplate Retainer Tool



– Shaft Retainer Tool



Disassembly

Before attempting to disassemble, clean the pump exterior. Dispose of leakage oil and oily cloths in an environmentally responsible manner. All parts within the unit must be kept clean during the overhaul process. Handle each part with great care, marking as necessary to ensure proper reassembly. The close tolerance of the parts makes this requirement very important. Clean all parts that are removed from the unit with a commercial solvent that is compatible with the system fluid. Compressed air may be used in the cleaning process. However, it must be filtered to remove water and other contamination.

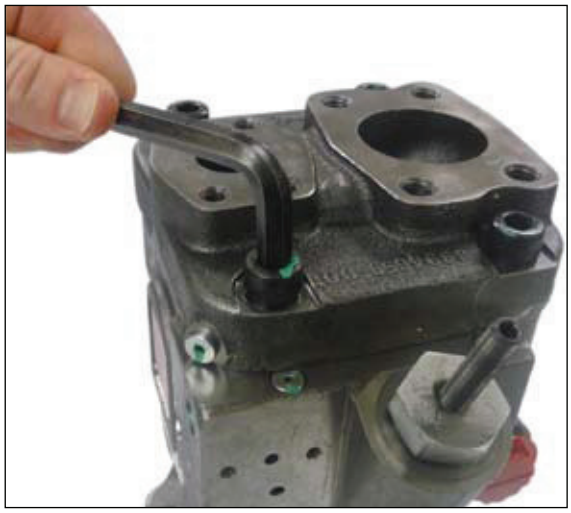
1. Remove Control Piston Plug Assembly

2. Install Swash Plate Locator Tool

Note: Adjustment will take place in Step 11.

3. Remove Compensator

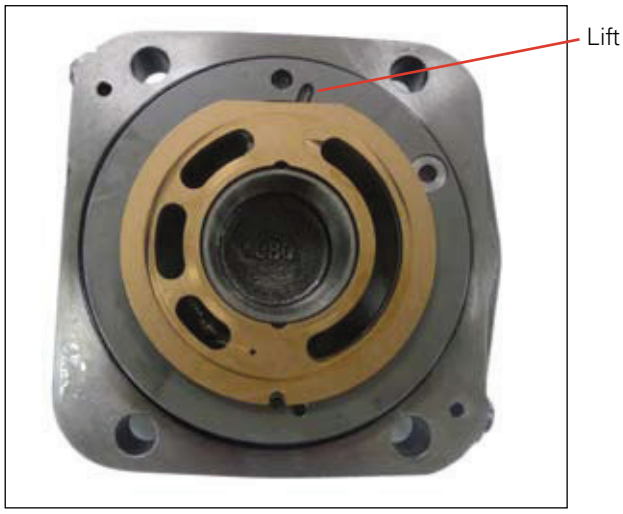
4. Remove End Cover



Note: The valve plate may stick to end cover. Use caution so valve plate does not fall off.

Mark the housing and end cover to ensure orientation. Remove the four cap screws that hold the end cover in place.

5. Remove Valve Plate

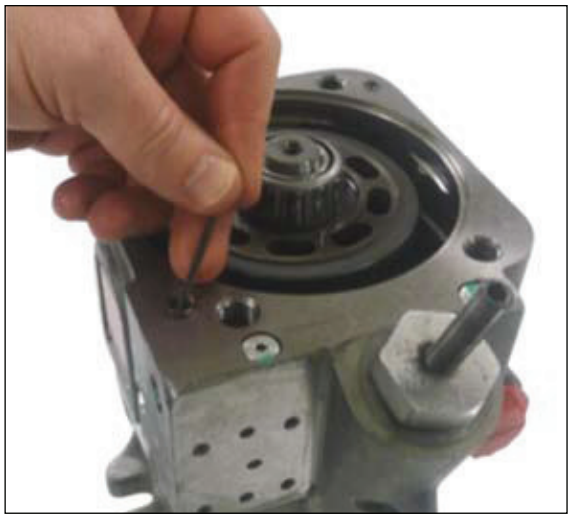


6. Remove O-ring Seal

7. Remove Bearing Race

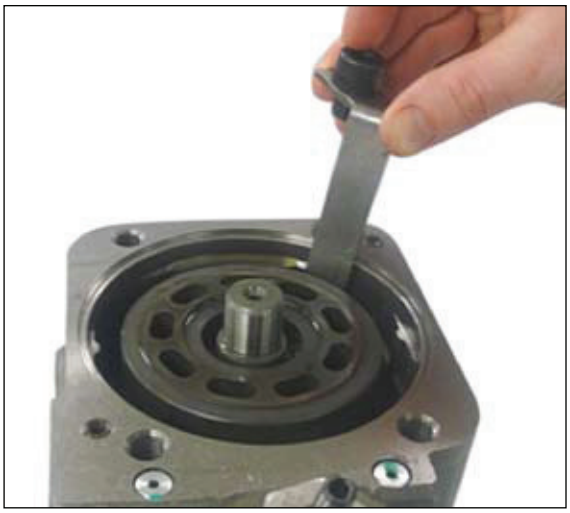
Note: The bearing race is pressed in and will require the use of a sliding bearing removal hammer or similar tool to remove it.

8. Remove Housing O-rings



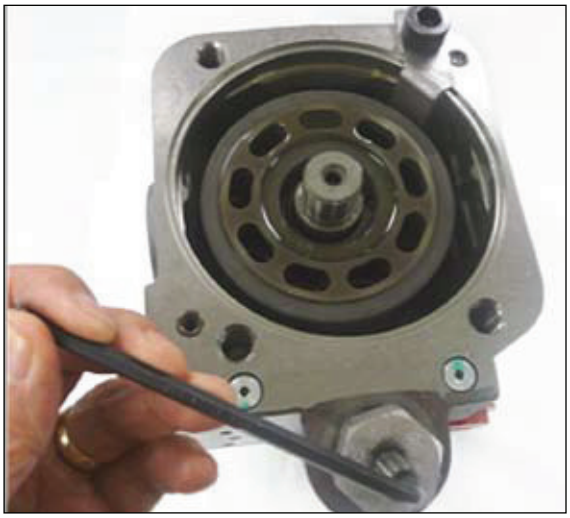
9. Remove Bearing

10. Install Swashplate Retainer



Note: Install the swash plate hold down tool and tighten the cap screw 16147-804. This will prevent the swash plate from moving.

11. Swashplate Locator Adjustment



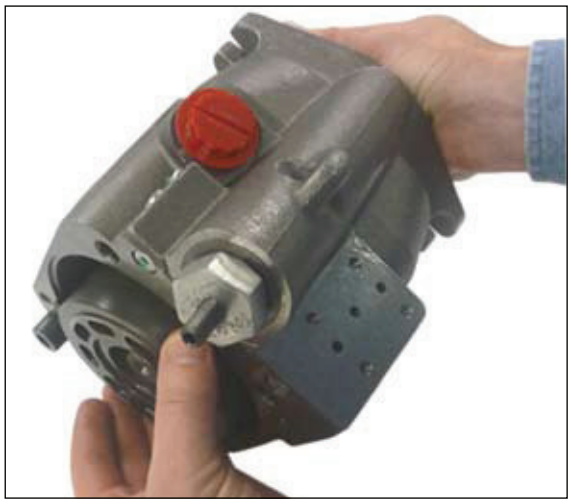
Note: This step is designed to force the swashplate to a neutral position to enable easy removal of the rotating group, and to retain the swashplate.

With the hold down tool in place, tighten the adjustment screw so the control piston spring is compressed.

12. Install Shaft Retainer Tool

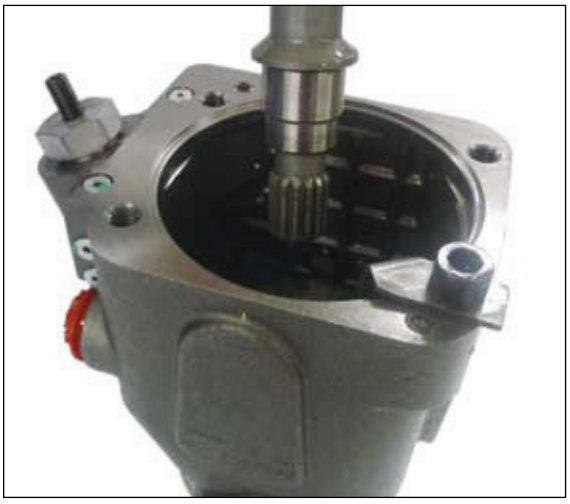
Note: Tighten the set screw while being careful not to damage shaft.

13. Remove Rotating Group



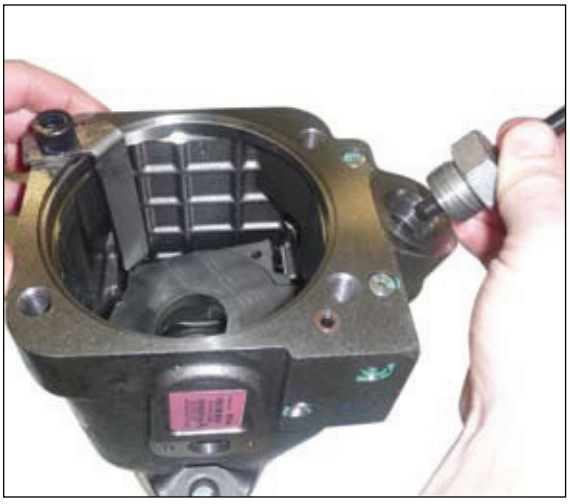
Note: Position shaft upwards and carefully remove rotating group.

14. Remove Shaft

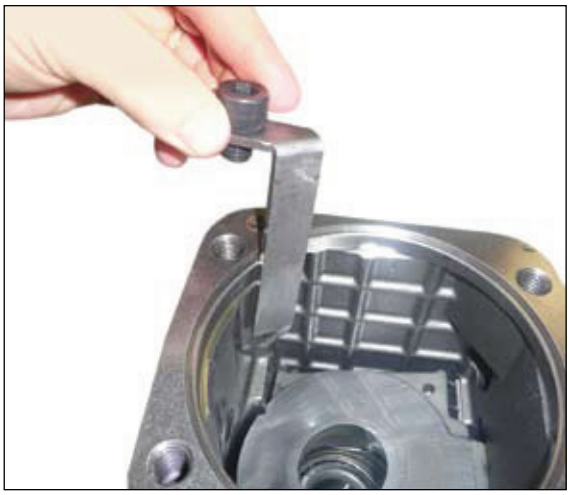


Note: Remove shaft retainer tool and lift out shaft. Use caution when moving shaft through shaft seal.

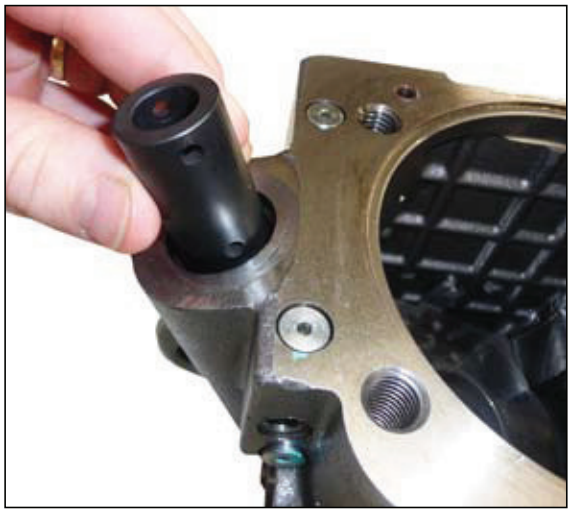
15. Remove Swashplate Locator



16. Remove Swashplate Retainer



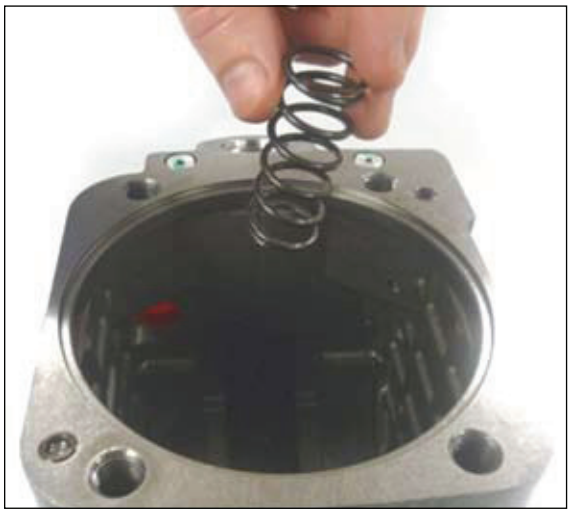
17. Remove Control Piston



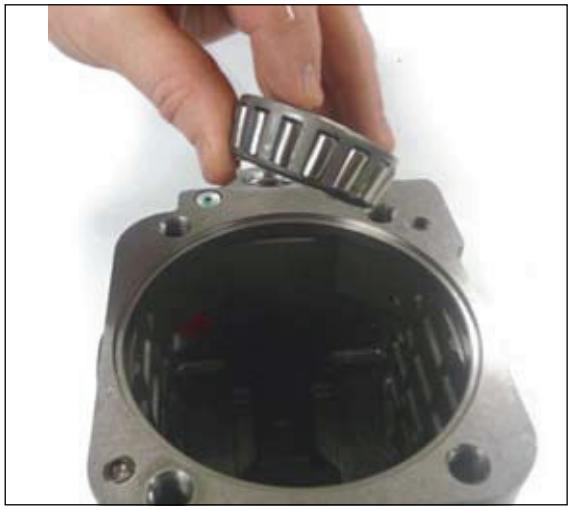
Note: The open end of the control piston is positioned up. The control piston is allowed to rotate.

18. Remove Swashplate

19. Remove Bias Spring



20. Remove Bearing



21. Remove Cradle Bearing Screws

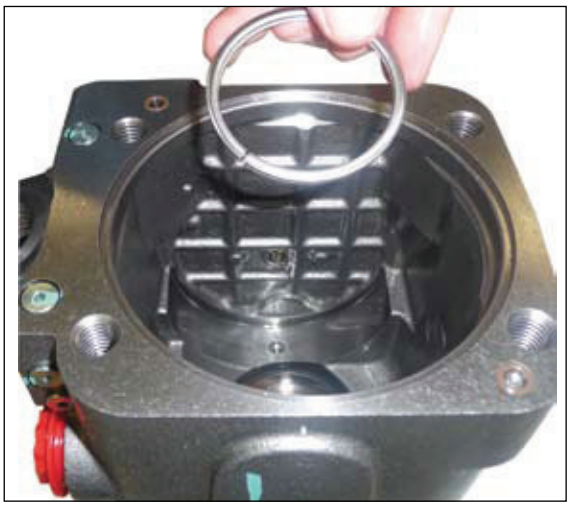
Caution: Socket head cap screws are easily damaged during repair with improper tool.

22. Remove Cradle Bearings

Note: The cradle bearings are asymmetrical. The proper orientation is shown.

23. Remove Front Bearing Race

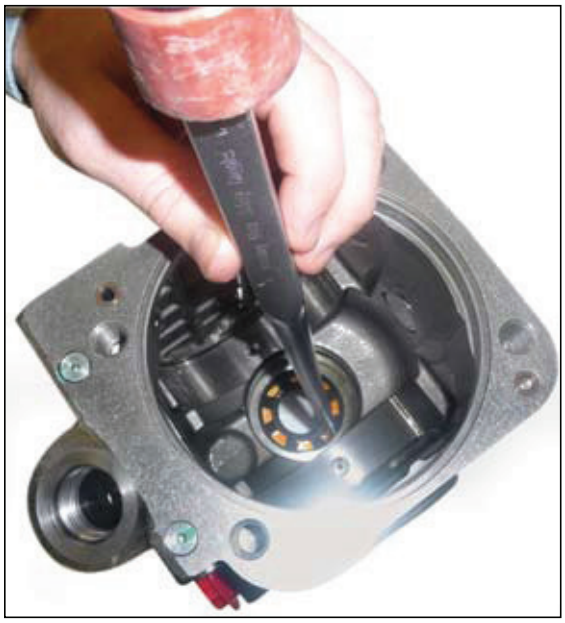
24. Remove Crush Ring



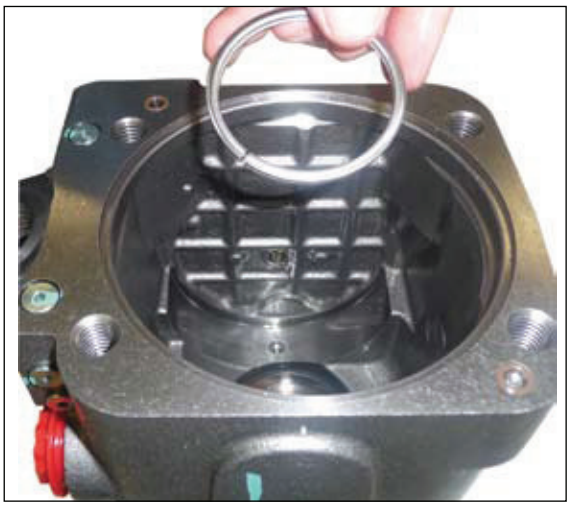
Note: The crush ring located under the bearing cup in the housing does not need to be removed. The only time the crush ring needs to be removed is when the front or rear shaft tapered roller bearings, bearing cups, drive shaft, end cover or housing assembly is replaced. A shim kit is required if the crush ring is replaced.

25. Remove Shaft Seal

Note: With the seal retaining ring removed use a punch or similar tool to knock out the shaft seal.



24. Remove Crush Ring



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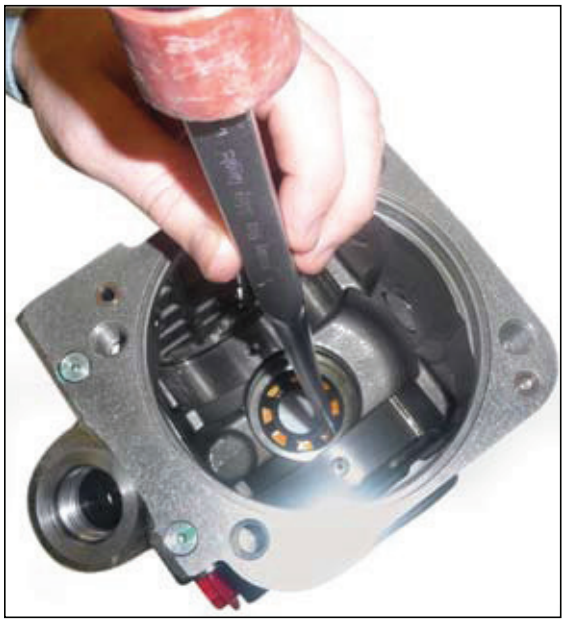
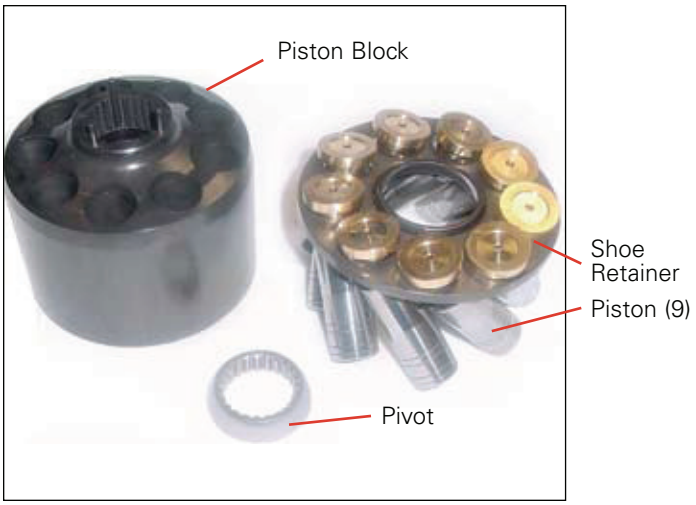


Inspection

Before inspection of parts, clean with a solvent that is compatible with system fluid.

Rotating Group Parts

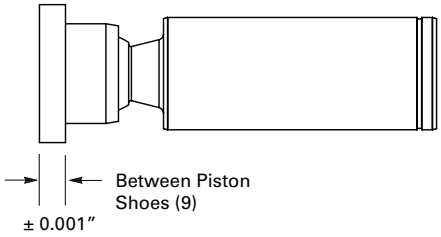
1. Inspect cylinder block face for wear, scratches, and/or erosion. If cylinder block condition is questionable, replace the entire rotating group.
2. Remove the pistons, shoe retainer, and pivot from piston block. The piston block assembly doesn't need to be disassembled unless the internal pins or spring are damaged.
3. Check each cylinder block bore for excessive wear. Use the piston and shoe S/A (37) for this purpose. The pistons should be a very close fit and slide in and out of the cylinder block bores. NO BINDING CAN BE TOLERATED. If binding occurs, clean the cylinder block and pistons. Lubricate the cylinder block bores with clean fluid and try again. Even minor contamination of the fluid may cause a piston to freeze up in a cylinder bore.
4. Inspect each of the nine piston and shoe subassemblies (31) for a maximum end play of 0.005 inch between the piston and shoe. Also check the face dimension of each shoe. The face dimension must be within 0.001 inch.
5. Inspect shoe retainer and pivot for wear and/or scratches. If condition is questionable, replace entire rotating group.



Note: Do not lap the face of piston block assembly.

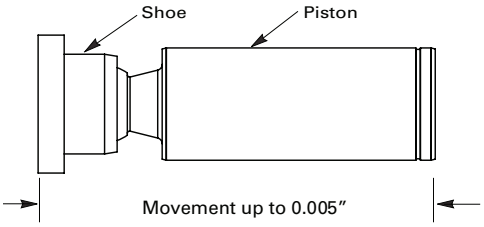
Piston S/A Tolerances

This dimension must be maintained on all nine shoes within 0.001 inch.



Shoe face rides on swash plate. Shoe must swivel smoothly on ball.

End play must not exceed 0.005 inch.



Inspection, Repair and Part Replacement

End Cover & Associated Parts

1. Inspect end cover for erosion, cracks, and burrs. Clean up minor burrs with an India stone. If erosion or cracks are found, replace the valve block.
2. Inspect roller bearing and bearing race for nicks and pitting. Make sure the roller bearing turns freely within the bearing race. If the roller bearing needs replacement, both the roller bearing and the bearing race must be replaced.
3. Inspect valve plate for erosion, excessive wear, heavy scratches, and cracks. If any of the above conditions are found, replace the valve plate.
4. Inspect control piston and maximum displacement screw for burrs, scratches and cracks. Clean up minor scratches with 500 grit paper. Remove burrs with an India stone. The control piston should move freely in the bore.

Swashplate Parts

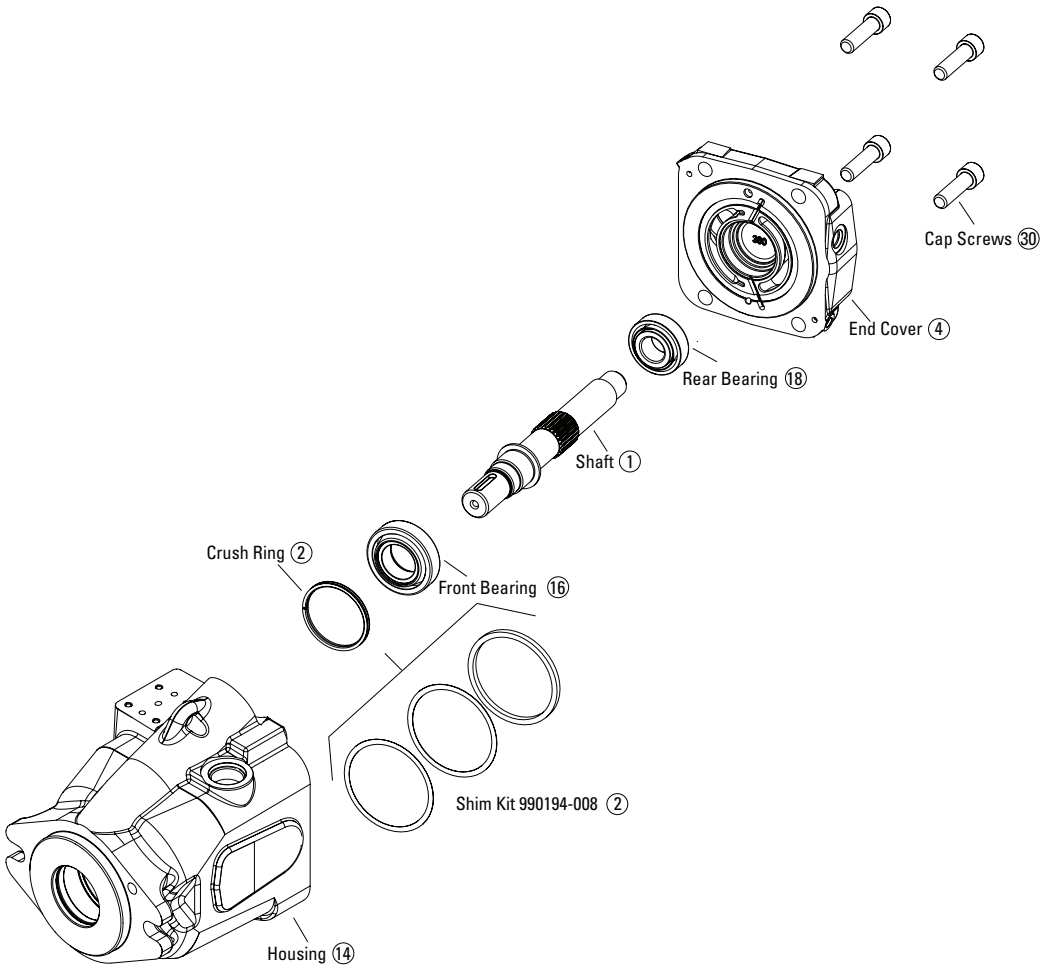
1. Inspect swashplate face for wear, roughness or scoring. Check the swashplate hubs and bearing surfaces for wear and cracks. Replace if defective.
2. Inspect saddle bearing surfaces for wear, pitting, and smooth operation. Replace if necessary.

Shaft/Housing Parts

1. Inspect drive shaft for wear, stripped splines, and burrs. Remove burrs with an India stone. Inspect the contact area of bearing and shaft seal). Replace the drive shaft if wear or scoring is greater than 0.005 T.I.R. (total indicator reading).
2. Inspect drive shaft bearing for roughness, pitting of rollers, and excessive end play. Replace, if defective. If the bearing needs to be replaced, the bearing race also requires replacement.
3. Inspect housing mounting flange for nicks and burrs. Remove minor nicks and burrs with an India stone. Also check the housing for damaged or stripped threads. If any thread is damaged, replace the housing.
4. Check remaining pump parts for excessive wear, damaged threads, burrs, cracks and erosion. Replace any part that is in questionable condition.

Inspection, Repair and Part Replacement

Shimming Process



Kit 9900194-008

Shimming Process
Installation Information

This skim kit is to replace the crush ring within the pump housing. If the housing, drive shaft, shaft bearings or end cover is replaced during servicing, the original crush ring can no longer be used to assure proper bearing set.

Shimming Procedures

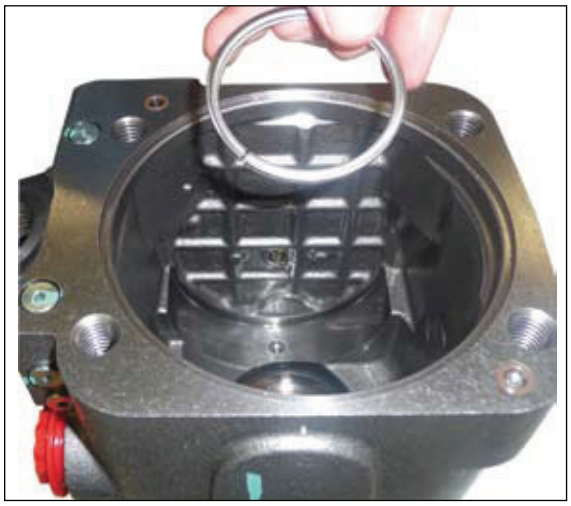
1. Measure the thickness of the existing crush ring.
2. To obtain a starting point, stack shims to a few thousandth of an inch less than the measurement of existing crush ring. Then insert shims into the housing in the same location as the removed crush ring.
3. Assemble the housing (without interface 0-ring seals), shaft bearings, shaft and end cover. Install the end cover cap screws and torque to 97+/- 9 lb-ft.
4. Using a dial indicator, measure drive shaft end play. Target bearing set range is .001" clearance to .002" interface (preload). Add shims to achieve proper bearing set. If no movement of the shaft is observed, shims will need to be removed and steps 3 and 4 repeated.
5. Finish the assembly of the pump.

Assembly

Assembly must be conducted in a clean environment. Dispose of leakage oil and oily cloths in an environmentally responsible manner. Before assembly carefully clean all parts and blow out holes with compressed air. Tighten all screws plugs to the specified torque (see Appendix A). Exceptions are specified in the text. Lubricate O-rings and shaft sealing rings lightly with acid free lubricant for easier installation and to hold the O-ring in place in its groove or cavity.

1. Install Snap Ring and Shaft Seal

2. Install Crush Ring



3. Insert the Shaft Bearing Race

4. Install Cradle Bearings

Note: The cradle bearings are asymmetrical. Install as shown in picture.

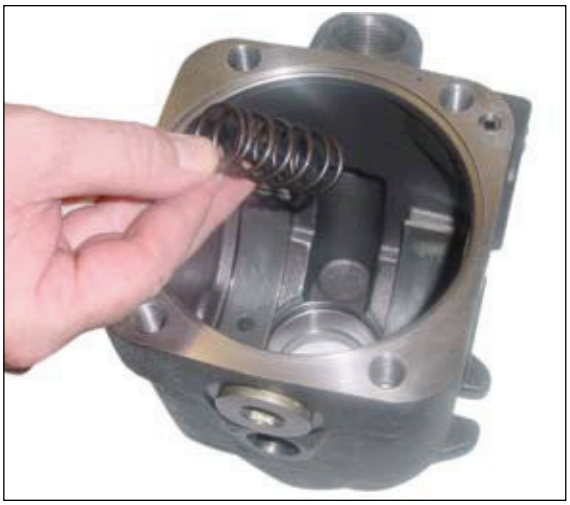
5. Install Cradle Bearing Screws

Note: The old cap screws cannot be reused and must be replaced with new ones because the screws will be damaged during disassembly. The new cap screw threads will be coated with loctite.

Kit #9900194-002 (2) bearings and (2) screws per kit.

6. Install Bearing

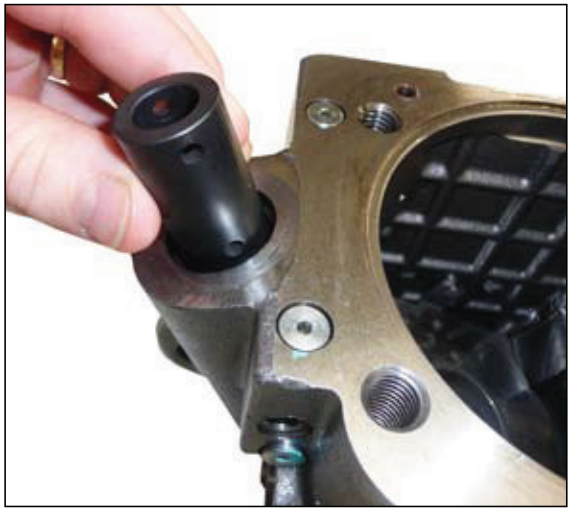
7. Install Bias Spring



8. Install Swashplate

Note: With the bias spring in place, tilt the swash plate toward the spring and install the swash plate.

9. Install Control Piston



10. Install Swashplate Retainer

11. Install Swashplate Locator

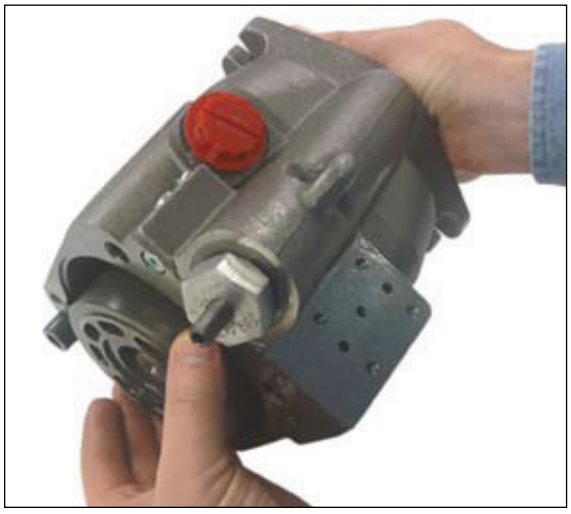
Note: Adjust the screw until the swashplate is near neutral (will look flat in housing).

12. Install Shaft

Caution: Use care while inserting shaft end through shaft seal.

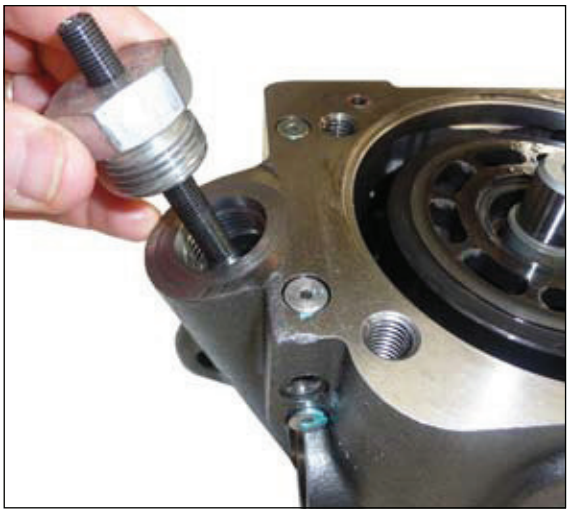
13. Install Shaft Retainer Tool

14. Install the Rotating Group

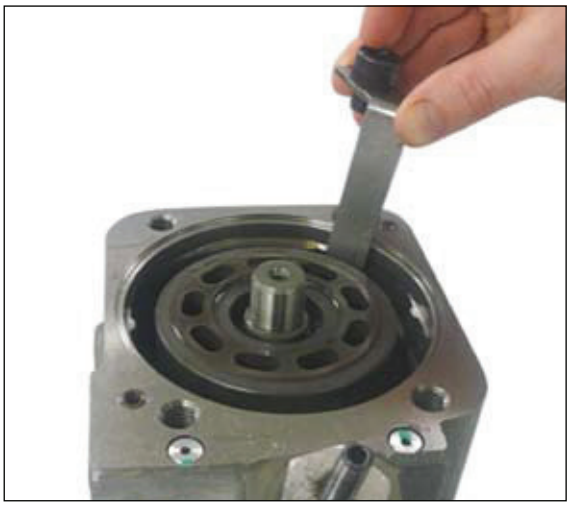


Note: Position shaft upwards and carefully install rotating group.

15. Remove Swashplate Locator

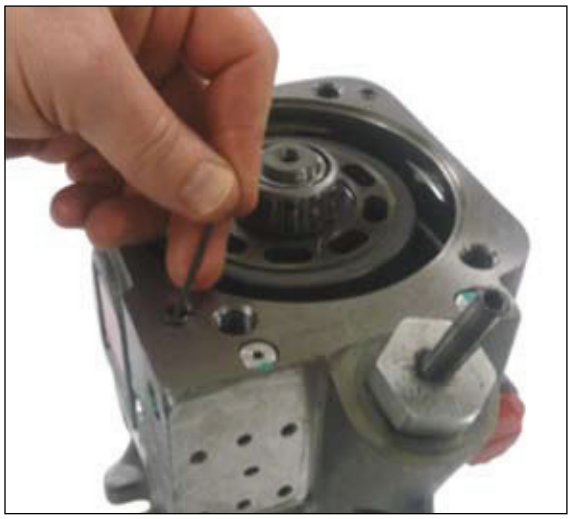


16. Remove Swashplate Retainer

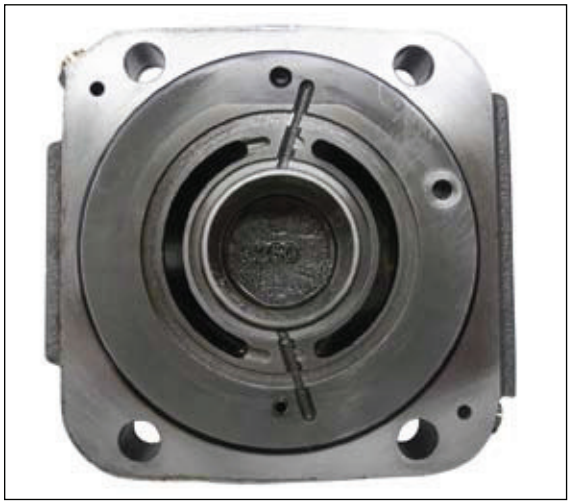


17. Install O-ring Seal

18. Install Housing O-rings

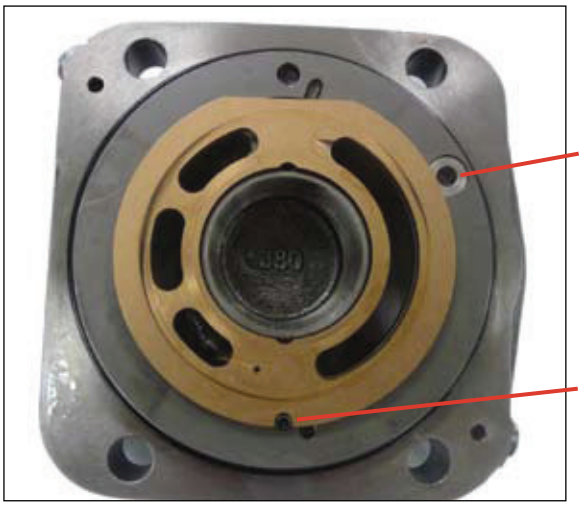


19. Install Bearing Race



Note: Using a press, install the bearing race.

20. Install Valve Plate



Note: Lightly coat the back plate side of the valve plate with petroleum jelly for retention during assembly.

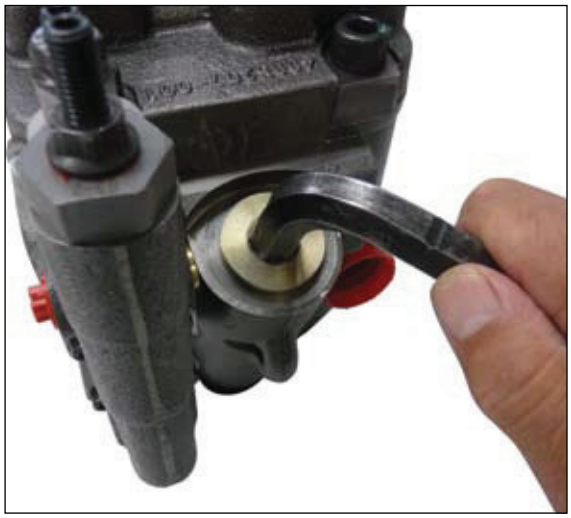
Install the valve plate over the bearing race aligning the small slot on the outside of the valve plate with the dowel pin in the back plate.

21. Install Bearing

22. Install End Cover

Note: Ensure correct orientation. Use caution so valve plate does not fall off.

23. Install Control Piston Plug Assembly



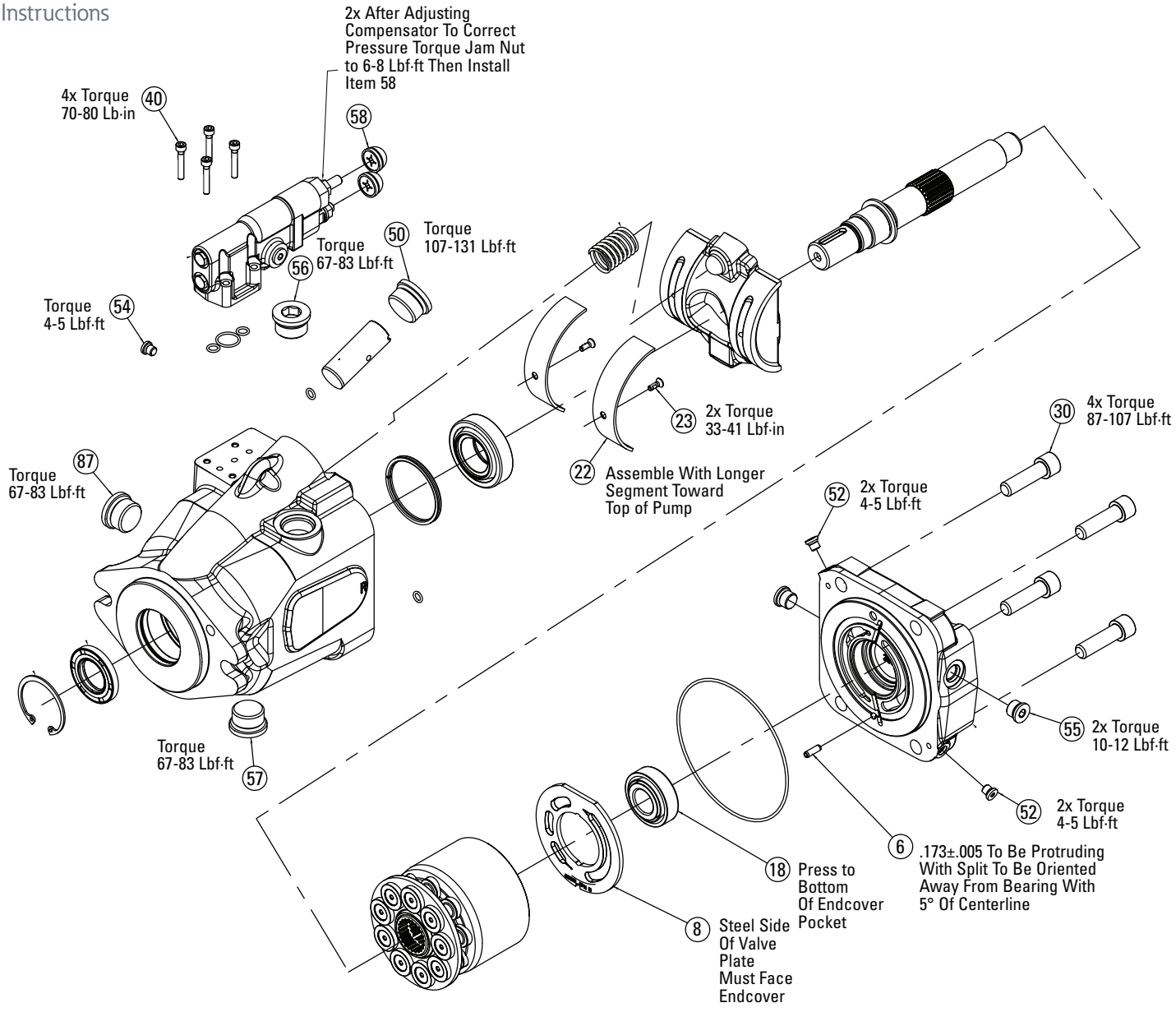
24. Install Compensator

25. Testing

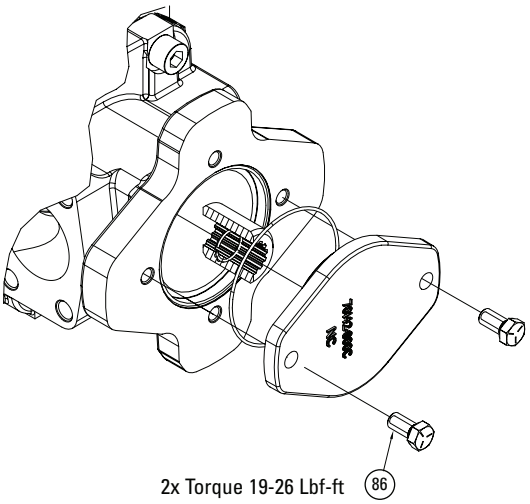
Perform functional test on pump according to Eaton test procedure. Contact your area sales manager for more information.

Assembly Torque Values

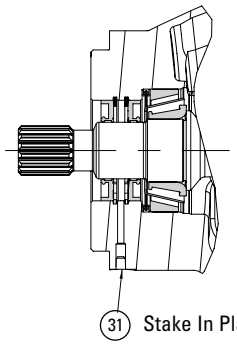
Instructions



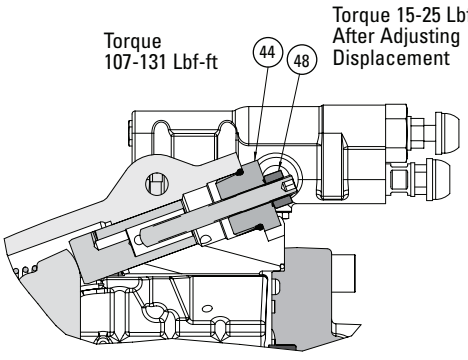
Thru-Drive Part Option



Dual Shaft Seal Option



Adjustable Maximum Stop Option



(Replaces Plug Sub-Assembly Item 50-Reference Kit 9900194-004)

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