

# INSTALLATION INSTRUCTIONS

## REPAIR SEAL KIT

### PowerSurvivor 40E

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#### PURPOSE OF THE KIT

The Repair Seal Kit should be installed after 1000 hours of operation. It should be installed regardless of whether or not there is leakage or a reduction of fresh water. Learning to perform this procedure will ensure optimal performance of your watermaker.

#### INSTALLATION INSTRUCTIONS

**NOTE:** See Fig. A-2 for an overall view of the Pump Assembly.

Over time, the dynamic Seals and O-rings in the PowerSurvivor 40E will wear. The Repair Seal Kit contains the major Seals and O-rings that should be replaced to improve operating efficiency. It also contains new Check Valve Poppets, Springs, and Drive Oil which should be replaced simultaneously. This Repair Seal Kit should be installed after roughly 1000 hours of operation. It should be installed regardless of whether or not there is leakage or a reduction of fresh water. Learning to perform this procedure will help users ensure optimal performance.

Before beginning the Repair Seal Kit procedure, note the following precaution:

1. Keep the work area clean and clear of dirt, hair, and other contaminants.
2. Avoid scratching Pump Components when removing or replacing O-rings.
3. All seals and o-rings should be lubricated with silicone grease; Never use petroleum-based lubricants as a substitute.
4. When installing O-rings, do not roll or twist them.

**NOTE:** Average time to replace all seals is 1 hour. If you are performing this maintenance for the first time, expect it to take 3 hours.

**KIT CONTENTS** (See Figs. 1a and 1b)

#### TOOLS REQUIRED

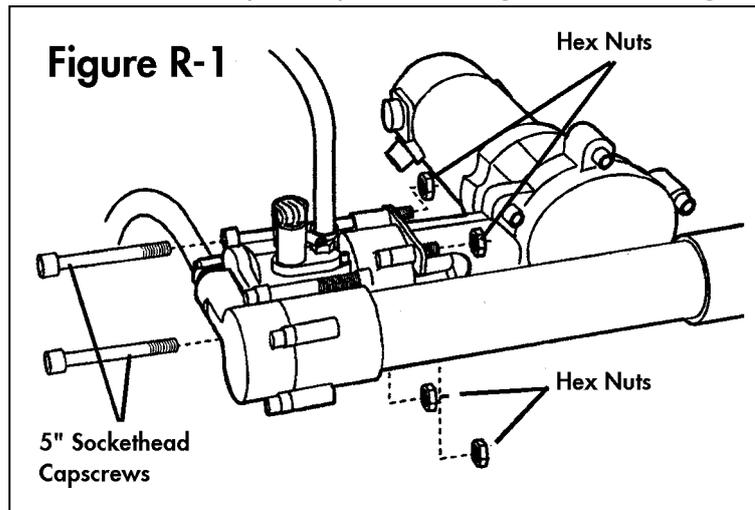
Piston Seal Installation Tool – supplied with kit

1/2-inch open-end wrench  
1/4-inch allen wrench  
5/32-inch allen wrench  
5/8-inch open-end wrench  
small flat-bladed screwdriver  
needle-nosed pliers  
medium channel lock pliers  
small scissors

## Disassembly:

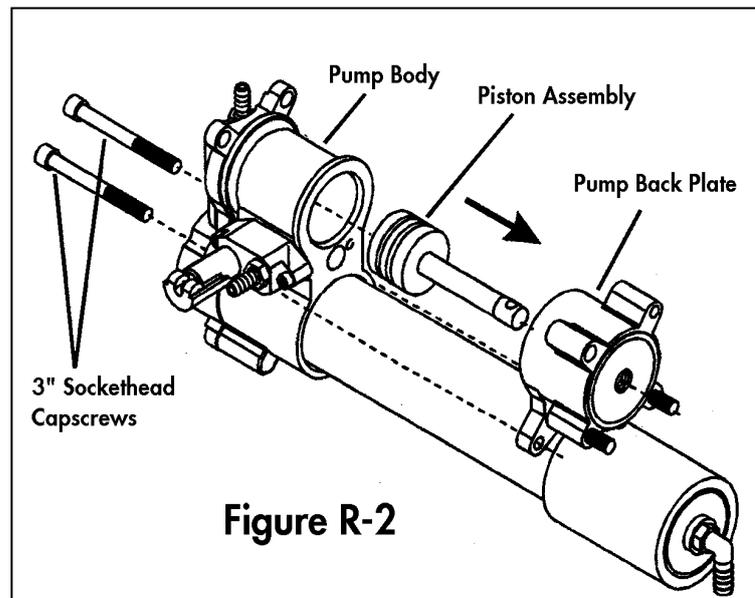
1. Before beginning disassembly, run the watermaker and stop it when the piston shaft is at its farthest point of travel away from the pump (i.e., toward the drive assembly). This provides enough room for sliding the rubber boot toward the pump in Step 3.

2. Disconnect the pump from the drive assembly by first removing the two hex nuts and 5" sockethead cap-screws from the check valve plate, using the 1/2" open-end wrench and 1/4" allen wrench. Also remove the two hex nuts securing the pump back plate to the drive assembly. See **Figure R-1**.



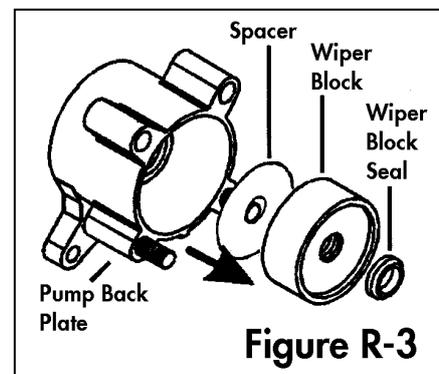
3. Slide the black rubber boot on the piston shaft toward the pump to expose the drive shaft coupling pin. Use a small allen wrench or similar tool to push the coupling pin out of the drive shaft (see **Figure 6**). Be aware that the coupling pin fits loosely in the drive shaft and may fall out when the rubber boot is removed. Be careful not to lose it. Separate the drive assembly from the pump and set the drive assembly aside.

4. Remove the two 3" socket-head capscrews using a 1/4" allen wrench. Separate the pump back plate and piston assembly from the pump body (see **Figure R-2**).

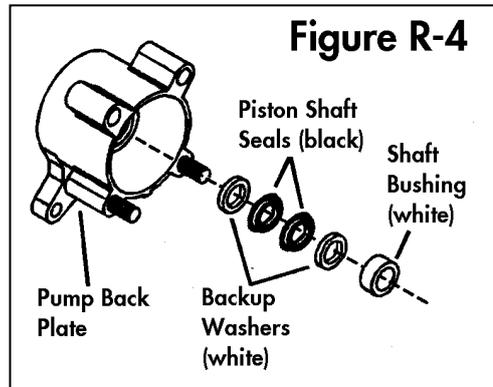


5. If the piston assembly remained with the pump back plate when it was removed, pull the piston out of the back plate and set it aside. If the piston stayed in the main pump body, pull it out of the cylinder. If the piston assembly is difficult to remove from the pump body, insert a small allen wrench or Phillips screwdriver through the coupling pin hole. This will provide a "t-handle" with a better grip for extracting the piston assembly. **Be aware not to damage the surface of the piston shaft.**

6. Remove the large o-ring (8012588) from its groove in the side of the pump back plate that faces the pump body. Remove the wiper block and spacer (if present) from the pump back plate. Use needle-nosed pliers to pull the old wiper block seal out of the wiper block. See **Figure R-3**. (Note: This seal is usually damaged during removal. Be sure you have a replacement on hand before removing it.)



7. From the side of the pump back plate that contained the large o-ring, insert a round drift of slightly smaller diameter than the hole for the piston shaft. (Note: a small socket on an extension or a wooden dowel makes a suitable drift). Tap the drift with a mallet to drive the two backup washers, two piston shaft seals and the piston shaft bushing out of the pump back body. See **Figure R-4**.
8. Remove the remaining two 3/4" sockethead capscrews from the check valve plate using a 1/4" allen wrench. Separate the check valve plate from the pump body. If it is difficult to remove, try rotating the check valve plate 90°. This provides a better grip for pulling the check valve plate from the pump body.
9. After the check valve plate has been separated from the pump body, the membrane tube plug will remain in either the check valve plate or the pump end of the membrane housing. Use one of the following procedures to remove it:



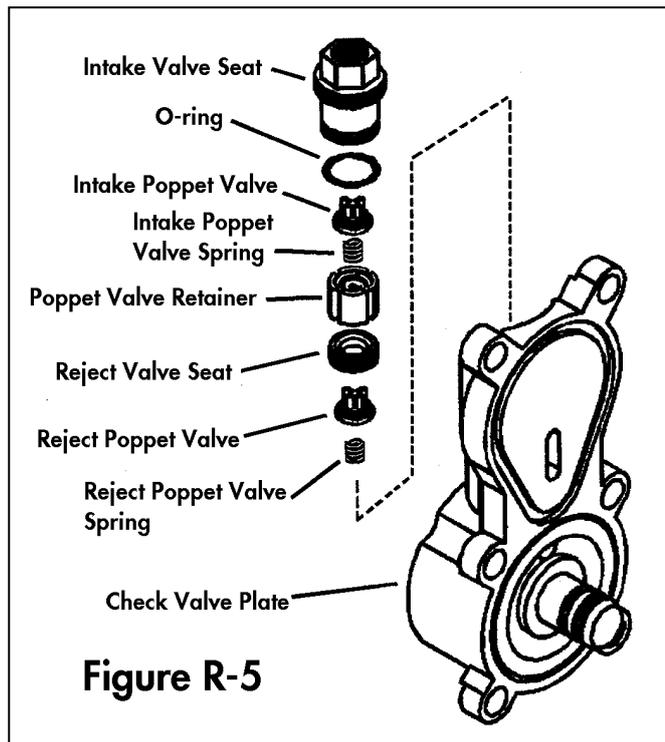
**A.** If the membrane tube plug remains in the membrane housing, insert a hard, thin edge (e.g., a dull pocket knife) between the tube plug and the fiberglass molding of the membrane housing. Work the blade sideways to pry the tube plug out slightly, until there is enough of a gap between the tube plug body and the membrane housing to insert a flat blade screwdriver. Then use two screwdrivers on opposite sides of the tube plug to carefully work it out of the membrane housing. Avoid gouging or damaging the membrane housing or the tube plug.

Then use two screwdrivers on opposite sides of the tube plug to carefully work it out of the membrane housing. Avoid gouging or damaging the membrane housing or the tube plug.

**B.** If the membrane tube plug remains in the check valve plate, use a thin edge and/or flat blade screwdrivers, on opposite sides of the membrane tube plug, to carefully pry the plug out of the check valve plate. Avoid damaging the membrane tube plug.

10. Disassemble the valves in the check valve plate (see **Figure R-5**.) Use a 5/8" open end wrench to unscrew the intake valve seat. Remove the intake poppet valve and its spring. If necessary, use needle-nosed pliers to remove the poppet valve retainer. Then use the pliers to lift out the reject poppet valve and its seat. Grip the x-shaped ribs of the reject poppet valve and pull straight up. The seat will be pulled out along with the valve. After the reject poppet valve and its seat have been removed, retrieve the reject poppet valve spring from the bottom of the check valve plate cavity.

This completes the disassembly of all user-serviceable parts of the Katadyn *PowerSurvivor 40E* watermaker.



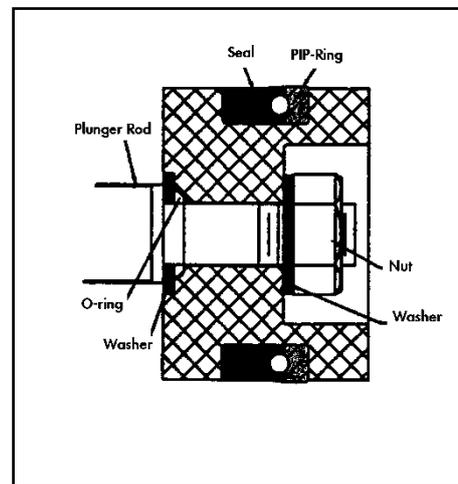
**Reassembly:** Before you begin reassembly of the watermaker, clean all parts using clean, lint-free rags. At this time, all parts should be carefully inspected for wear or damage. Use a 10x magnifier or loupe to examine the seals, o-rings and other small parts. Stubborn rust stains and other deposits on metal parts can be cleaned with a soft-metal wire brush (e.g., stainless steel or brass). Do *not* use polishes, cleaning compounds containing abrasive materials, or regular steel wire brushes. During reassembly, refer to **Figures A-3** and **A-4** in the *Appendix* for full-size drawings and identification of the components included in the Repair Seal Kit.

In the following procedure for reassembling the watermaker, it is assumed that all parts have been cleaned and that all o-rings, seals, and mating surfaces have been lightly lubricated with non-petroleum silicon grease (supplied with the Repair Seal Kit). References to the Repair Seal Kit will be abbreviated to "RSK."

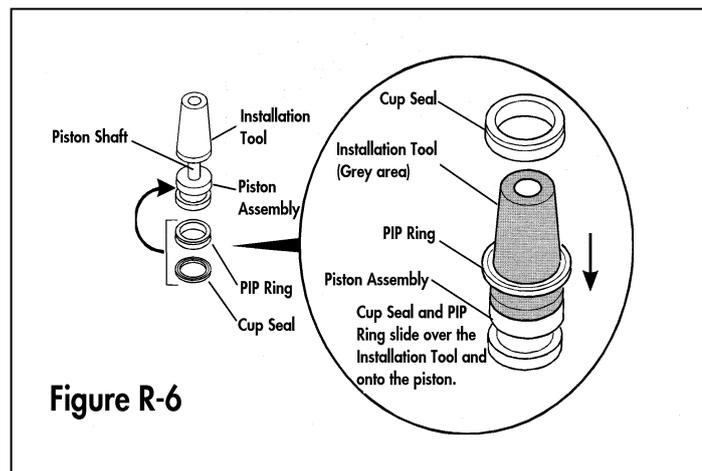
**Warning:** Use only non-petroleum silicon grease to lubricate your watermaker. Lubricants with a petroleum base will damage several watermaker components, including the reverse osmosis membrane. Be especially cautious of lubricants that "contain" teflon, silicon, etc.—such products could also contain petroleum-based components. An ample supply of silicon grease is included with each RSK.

1. Make a note of the correct orientation of the old cup ring and PIP seal and then remove them from the piston assembly. Since these components are made of rather stiff rubber, it is usually easier to cut them off. Use a small screwdriver to wedge under the cup seal and pry it up. While holding it up, cut it with a small pair of scissors. Repeat this process for the PIP ring.

- **Reinstall the piston:** If you want to replace the O-rings on the piston, refer to the figure below
  - Install washer with chamfer on washer facing  $\frac{1}{2}$ " dia of plunger rod and a new O-ring onto the plunger rod, if you have an old-style piston, you only have to install a new O-ring into the plunger rod without a washer.
  - Slide piston onto the threaded end of the plunger rod, and secure with the washer and nut.

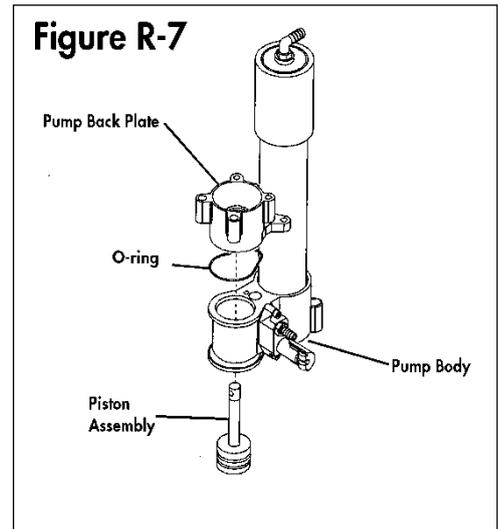


2. Refer to **Figure R-6** during the following procedure. Place the piston assembly on a flat, stable surface with the shaft pointing up. Slide the installation tool (provided in the RSK) over the piston shaft with the wide end down. Lubricate the new PIP ring, cup seal and the installation tool with silicon grease. With the grooved side facing up, slide the PIP ring down the installation tool and onto the piston. Repeat this process for the cup seal. Note that the grooved side of the cup seal should be facing down; i.e., the grooved sides of the PIP ring and the cup seal should be facing each other. When finished with the installation, remove the installation tool from the piston shaft.



3. Lightly lubricate the cylinder in the pump body with silicon grease. Slide the finished piston assembly, shaft first, into the pump body from the side of the pump body that faces the check valve plate. Install the large o-ring (8012588) into its groove in the pump back plate and lower the pump back plate over the piston shaft. The side of the back plate with the large o-ring should be facing the pump body. See **Figure R-7**.

4. Refer to **Figure R-4**. Slide one of the white backup washers over the piston shaft and press it into its bore in the pump back plate. Next, slide one of the two black rubber piston shaft seals over the piston shaft and work it into the bore on top of the backup washer. Note that the shaft seals are flared out on one side. It is important that the flared (wider) side should be down, facing the shaft bore. Install the second piston shaft seal in exactly the same way. It too should be installed with its flared side facing down. Next, install the second white backup washer and, finally, the white bushing. Slide the installation tool (used in Step 2 above) over the piston shaft with the narrow end facing the white bushing. Use the installation tool to press the shaft washers, seals and bushing all the way into the bore. When finished, the outside end of the bushing should be flush with the bore opening.



5. Install a new wiper block seal into the wiper block. The seal must be pressed into a groove inside the bore in the middle of the wiper block with the narrower side of the seal facing outwards. Form the seal into an oval shape by squeezing it between your fingers and press one side of the seal into the groove in the wiper block. Once an edge of the seal is started into the groove, carefully work the rest of the seal into place. After the seal has been installed, slide the spacer (if present) and wiper block onto the piston shaft. The side of the wiper block from which the seal was installed should be facing outward. Refer to **Figure R-3**.

6. Prepare the check valve plate for reassembly by installing the new poppet valves. Note that both the intake and reject poppet valves and valve springs are identical. Refer to **Figure R-5** during the following procedure:

A. Lower a new poppet valve spring into the bottom of the bore in the check valve plate. Use your little finger or the eraser end of a pencil to press it into its seat. It is designed to be a light press fit and, when installed correctly, it should stay vertical in place during the next step.

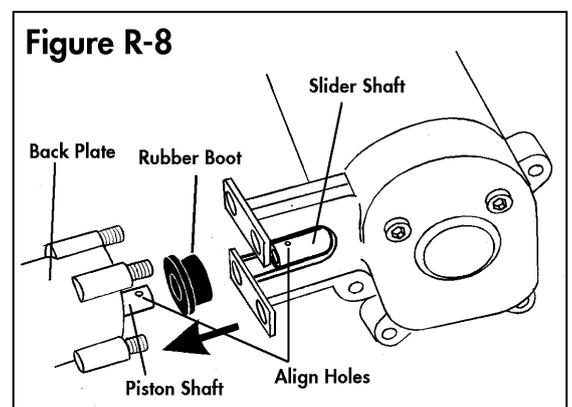
B. Use needle-nosed pliers to carefully lower one of the new poppet valves into the bore. The poppet valve should rest on top of the spring with the poppet's cross side facing up.

C. Lower the new reject valve seat into the bore and use a finger to press it down as far as it will go. Note that the hole in the middle of the valve seat has a beveled edge on one side. The side with the beveled edge *must* face downward; i.e., it must face the poppet valve. When properly installed, the valve seat should fit neatly over the poppet valve. Test the poppet valve by pressing it with the eraser end of a pencil. It should move up and down slightly and seat squarely in the valve seat.

D. Locate the small depression in the center of one end of the poppet valve retainer and press the second valve spring into the depression. It was designed as a light press fit and should stay in place after being installed. Then lower the poppet valve retainer into the bore in the check valve plate with the spring facing upward.

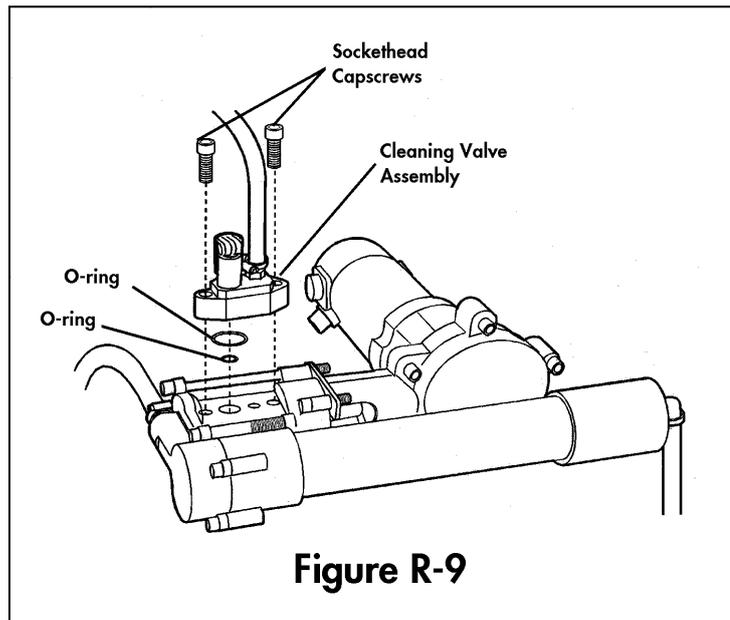
E. Lower the second poppet valve into the bore in the check valve plate and rest it carefully on top of the valve spring.

F. Remove the old o-ring (8013015) from the intake valve seat and replace it with the new one from the RSK. Carefully screw the intake valve seat into the check valve plate and tighten with a 5/8" open end wrench. Use the eraser end of a pencil or a small allen wrench to test the operation of the intake poppet valve. The poppet valve should move down slightly and then spring back up against its seat.





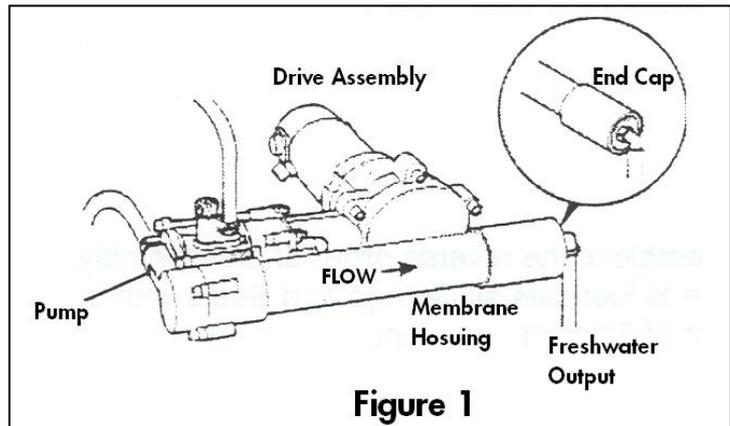
7. Replace the two large o-rings (8012947) and the two smaller o-rings (8013006) on the membrane tube plug with new o-rings from the RSK. Insert the small end of the membrane tube plug into the exposed hole in the membrane element (which should have been left installed in the membrane housing) and press the tube plug into the membrane housing as far as it will go. The ridge on the outside of the tube plug should be flush against the end of the membrane housing.
8. Press the piston as far as it will go toward the pump back plate. Install a new o-ring (8012588) into its groove in the check valve plate.
9. Press the check valve plate over the exposed end of the membrane tube plug. If necessary, rotate the check valve plate to align it accurately with the pump body and install the 3/4" and the 3" sockethead capscrews. Check that the two large o-rings (8012588) in the check valve plate and the pump back plate are still seated in their grooves and then tighten the four capscrews evenly with a 1/4" allen wrench.
10. Slide the two 5" sockethead capscrews through the holes in the check valve plate and the back plate. Slide the rubber boot onto the piston shaft. See **Figure R-8**.
11. Insert a small screwdriver or an allen wrench through the hole in the piston shaft and rotate the shaft to align its hole with the hole in the slider shaft of the drive assembly. When they are aligned, slide the holes in the drive assembly bracket over the studs projecting from the pump back plate. Insert the coupling pin through the aligned holes in the slider shaft and piston shaft. Push the rubber boot over the coupling pin to hold it in place.
12. Install the four hex nuts on the studs projecting from the pump back plate through the drive assembly bracket and tighten evenly with a 1/2" open-end wrench and 1/4" allen wrench. *Do not overtighten these fasteners!*



13. To replace the o-rings beneath the cleaning valve assembly, refer to **Figure R-9**. Unscrew the two sockethead capscrews using a 5/32" allen wrench and remove the assembly from the pump body. Remove old o-rings (8012594) and (8012697) and replace them with new o-rings from the RSK. Replace the cleaning valve assembly on the pump body and install the two capscrews. This completes the procedure for reassembly of the watermaker. When operation is commenced again, carefully inspect the watermaker for proper operation and any leaks or other signs of incorrect assembly.

## MEMBRANE REPLACEMENT

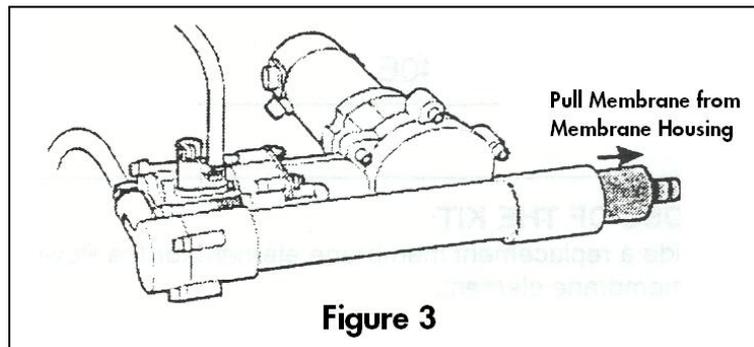
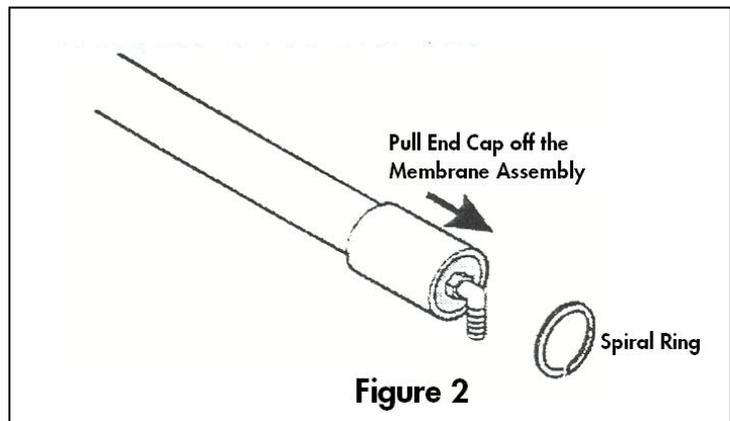
1. If the End Cap has Fresh Water Product Hose attached, remove the Hose (see Figure 1).
2. Use the flat-head screwdriver to lift the end of the Spiral Ring on the End Cap. Pull the Spiral Ring off (see Figure 2).



3. Remove the End Cap by pulling gently on the Hose Barb and End Cap taking care not to destroy the Hose Barb.

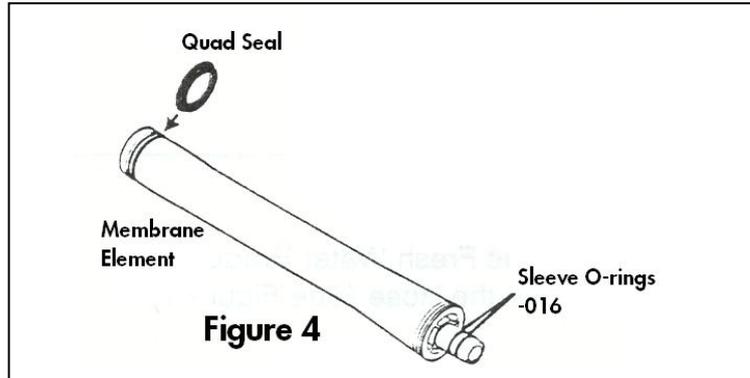
**NOTE:** End Caps may not come off easily. Grasp the Hose Barb gently and pull the End Cap off. It may be necessary to wrap a piece of cloth around the Hose Barb (to protect it), then grasp the base of the barb with the channel lock pliers and leverage the End Cap up and away.

4. With the End Cap removed, gently pull the Membrane Element out the open end of the Membrane Assembly (see Figure 3).



5. Install the new Quad Seal on the end of the Membrane Element farthest from the Fresh Water Product output (the end where the seawater enters the Membrane) (see Figure 4).

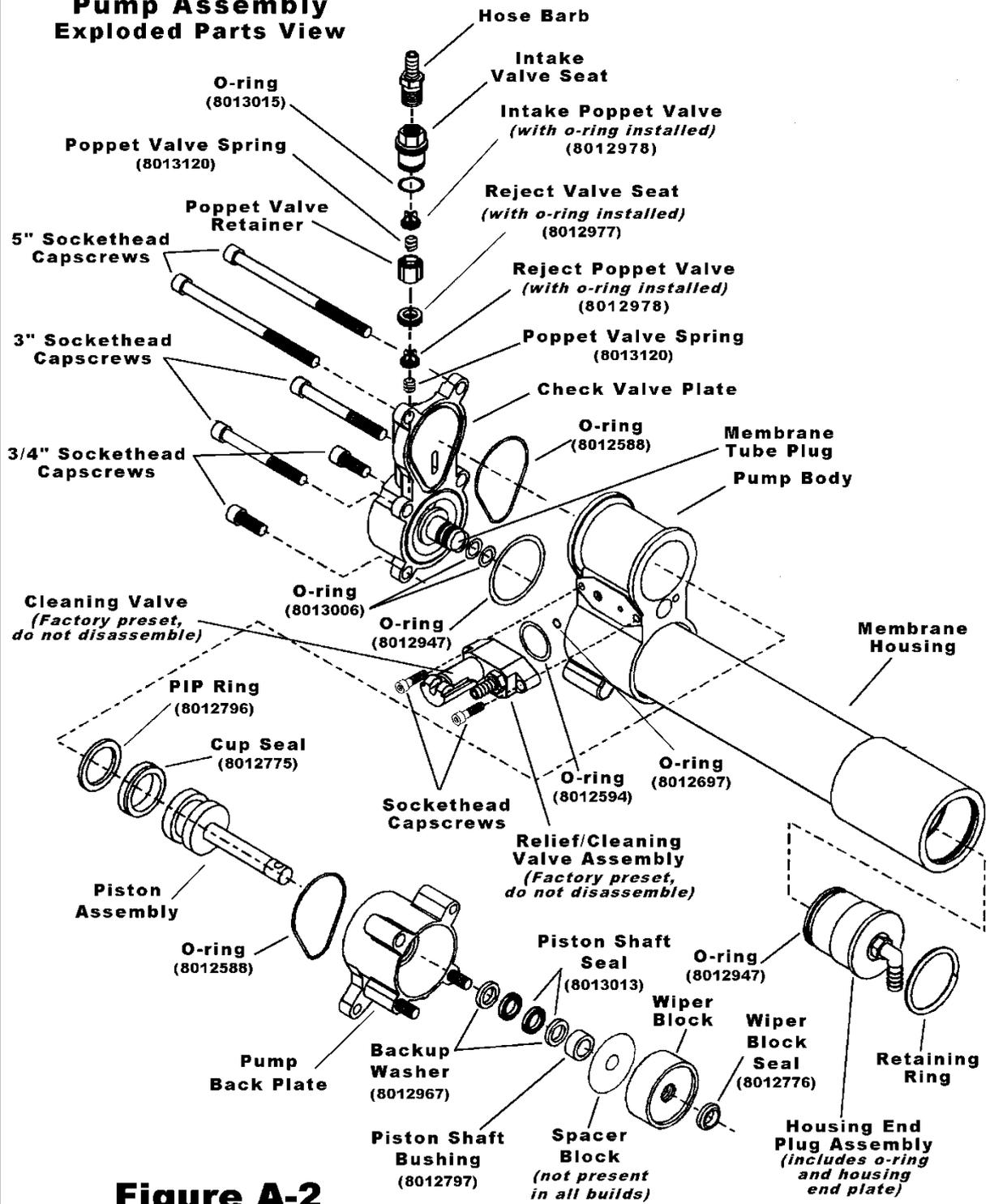
**NOTE:** Only one end of the Membrane Element gets a new Quad Seal.



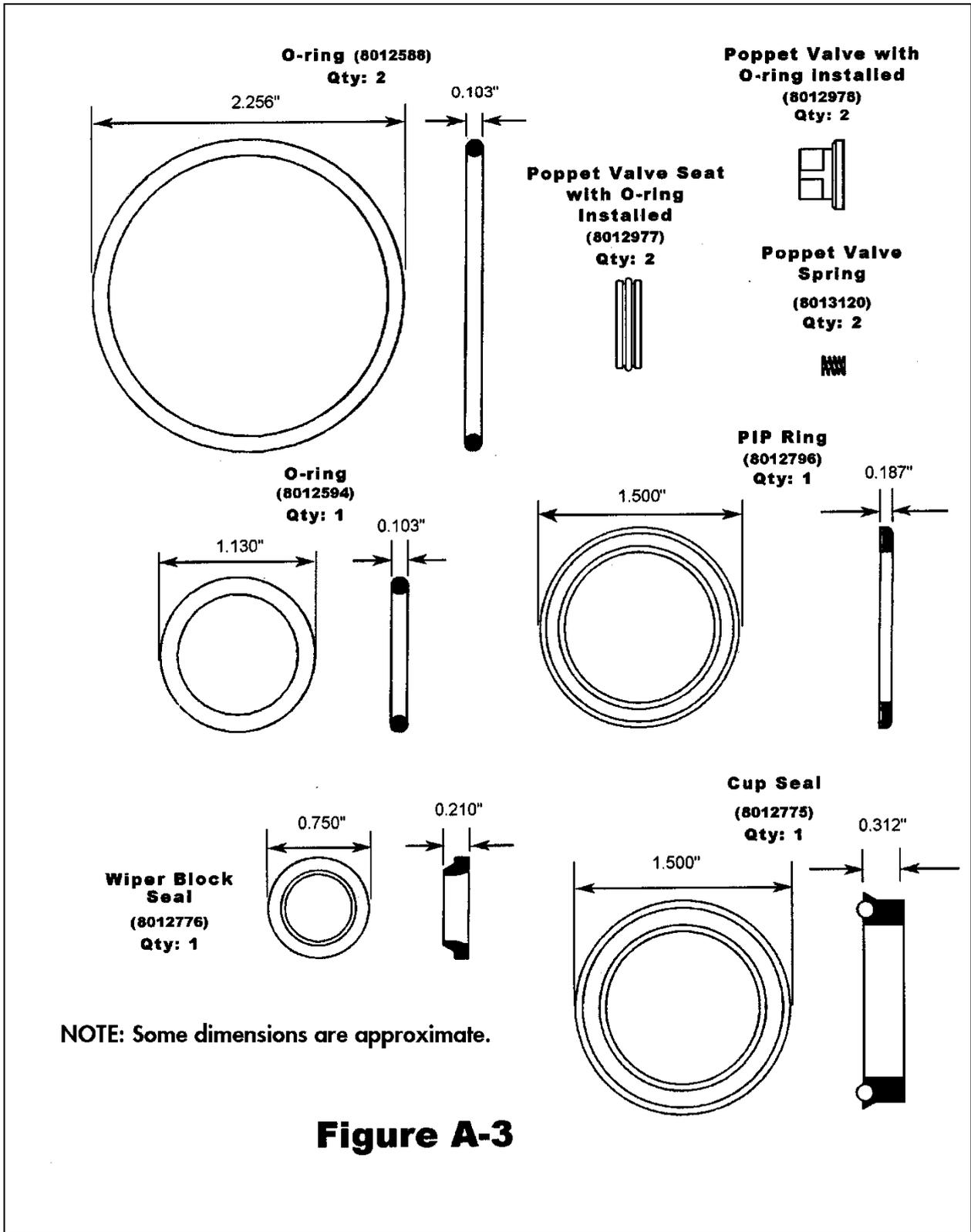
6. Install two new O-rings -016 on the male end of the Membrane (see Figure 4).
7. Reassemble in the reverse order of disassembly. Be sure to lubricate all O-rings and Seals with a thin film of Silicone Lubricant.

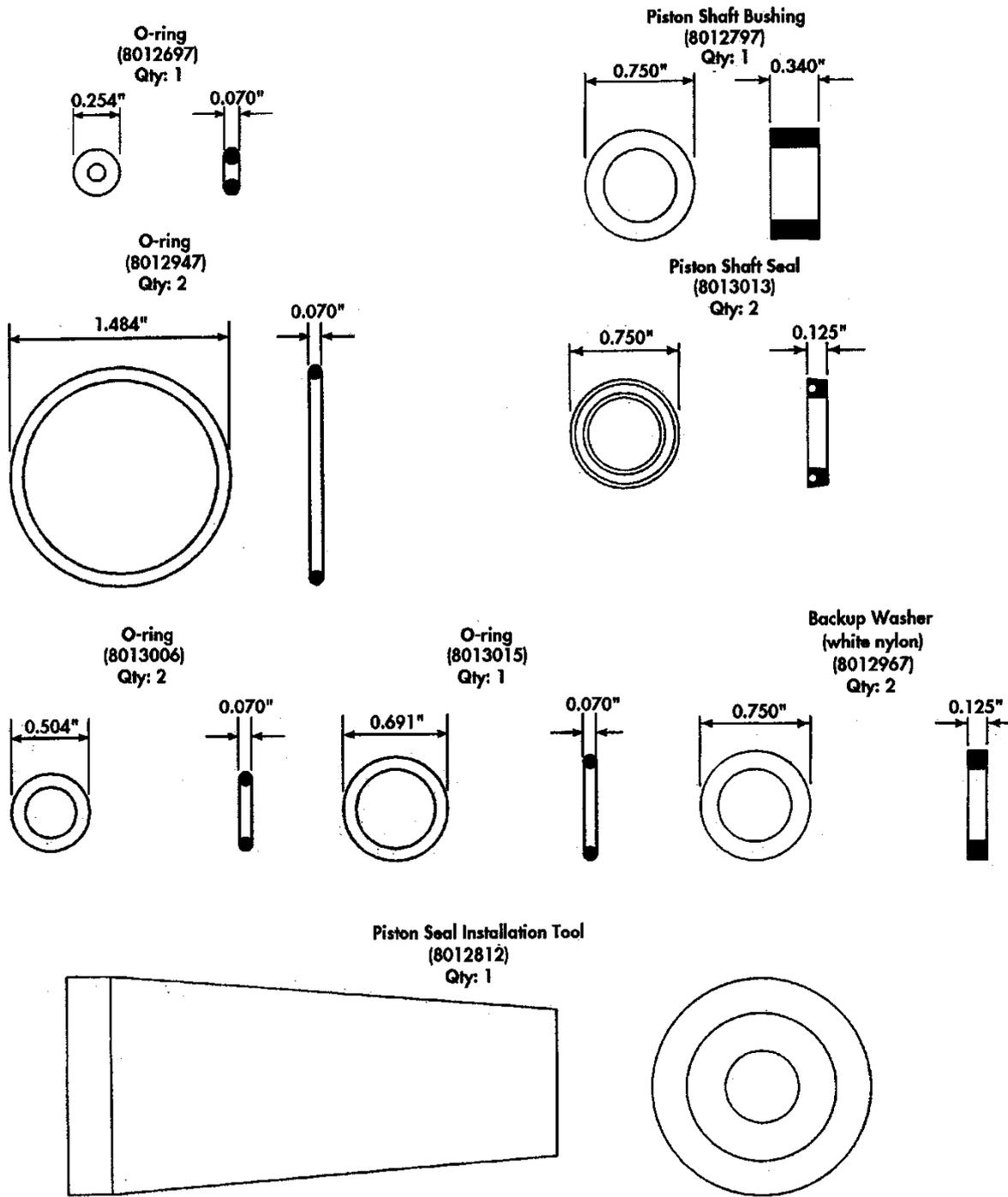
**CAUTION:** Do not use petroleum-based lubricants on the O-ring.

**Pump Assembly  
Exploded Parts View**



**Figure A-2**





**NOTE: Some dimensions are approximate.**

**Figure A-4**