



Technical Service Bulletin

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HydraClam 8.0 Inch and 8.5 Inch Membrane Element Loading and Removal Procedure for End Entry Pressure Tubes

This bulletin provides the guidelines for loading and unloading Hydranautics' Reverse Osmosis (RO) membrane elements. Two figures are included at the end of the bulletin. Figure 1 illustrates the series 8000 pressure tube assembly; Figure 2 is a detailed illustration of the pressure tube end cap assembly (call-out #7 in Figure 1). Numbers given in parentheses in the procedures below refer to the call-out numbers in Figures 1 and 2.

Loading RO Membrane Elements

Load the RO membrane elements in each of the pressure tubes as follows:

1. Remove the end clamps and end cap assemblies from all pressure tubes as follows:
 - a. Remove one clamp nut (21) and clamp bolt (20) from each end clamp. Leave the other bolt in place to serve as a hinge pin, and loosen it, if necessary, so that it does not bind.
 - b. Carefully withdraw the end cap assembly (7) as a unit from the end of the pressure tube. Leave the flexible tubes attached and the end cap assemblies hanging. If any flexible tubes are removed from the end cap assemblies, mark or tag all items for return to the same location.
2. Spray clean water through the open pressure tubes to remove any dust or other foreign matter.

Note: If additional cleaning is needed, improvise a swab large enough to fill the inside diameter of the pressure tube. Soak the swab in a fifty percent by

volume glycerin/water solution and force it back and forth through the pressure tube until the tube is clean and lubricated.

3. Lubricate the O-ring seal (10) with a very thin layer of silicone-base O-ring lubricant. When installing O-rings, do not roll them into position. Expand the O-rings slightly to install. Do not pull the rings over any sharp edges. Lubricate all other O-rings with a glycerin/water solution.

Note: Always load RO membrane elements into the feedwater end of the pressure tube.

4. Place the leading end of the first RO membrane element (2) in the first pressure tube and slide it in about three-quarters of the element length.
5. Verify that the brine seal (3) is properly seated in the groove on the trailing end (feed end) of the RO membrane element, in such a way that the chevron seal opens in the upstream direction. Then install the interconnector (4) with two O-rings (5) in place on the core tube of the membrane element. Push the element into the pressure tube until less than one-quarter of the element length extends.
6. Lift the next RO membrane element into position, and install the trailing end on the interconnector (4). Be very careful to hold the next element so that the weight is not supported by the interconnector, and push the element into the pressure tube until about one-quarter of the second element extends from the pressure tube.
7. Repeat Steps 5 and 6 until all RO membrane elements are loaded in the pressure tubes.
8. Install the two inboard end connectors (8) with O-rings (5) over the element core tubes at each end of the pressure tube. (Placement of the adapters onto the core tubes provides better sealing than placement of the adapters into the outboard adapters when closing).
9. Install a spacer tube (6) in the concentrate discharge end of the pressure tube. Center the train in the pressure tube.

10. Install end cap assemblies (7) on each end of the pressure tube, as follows:
 - a. Carefully position the downstream end cap assembly (7) outboard end connector (9) on the inboard end connector (8) and push the end cap assembly (7) as a unit squarely into the end of the pressure tube. Use care to seat the O-ring seals properly and to avoid pinching the O-rings.
 - b. Rotate the end cap assembly to ensure proper alignment with the connecting tubes.
 - c. Position the downstream end clamp over the end of the pressure tube with one clamp bolt (20) and clamp nut (21). Tighten both clamp nuts (21) finger tight, plus one-quarter turn. **Do not overtighten.**
 - d. Push the RO membrane element stack from the feed (upstream) end towards the downstream side.
 - e. Before closing the feed end of the vessel, it may be advisable to shim the vessel to take up any free space between elements and the end plates. This procedure helps to prevent movement and hammering of elements when the system starts and shuts down. Take plastic washers ~1/8 inch thick (i.e., slices of PVC piping) with a minimum ID of 1 1/2 inches and place them over the neck of the feed side inboard adapter before placing the end cap on the vessel. Add or subtract shims as needed to minimize free space. For further information, please refer to TSB 109, Vessel Shimming Procedure.
 - f. Repeat Steps a through c for the upstream end cap and end clamps.
11. If any flexible tubes were removed, return them all to the same location from which they were removed.

Note: Connecting the Victaulic couplings next to the ends of the pressure tubes requires special attention. When a coupling has been disconnected, reassemble the coupling by first positioning the lower half in place below the

pressure tube connector. Then position the stainless steel U-bend or J-bend in place on the lower half of the Victaulic connector. The upper half of the Victaulic connector can then be placed into position, and the attaching bolts can be installed.

RO Membrane Element Removal

Two operators are recommended when removing RO membrane elements. Remove the elements from each pressure tube as follows:

1. Disconnect the hard plumbing at each end of the pressure tube. The flexible tubing may remain attached to leave the end cap connected to the manifold. Mark or tag all removed items for return to the same location.
2. Remove the end caps and end clamps from each end of the pressure tube as follows:
 - a. Remove one clamp nut (21) and clamp bolt (20) from each end clamp. Leave the other bolt in place to serve as a hinge pin, and loosen it, if necessary, so that it does not bind.
 - b. Push the end cap assembly (7) into the pressure tube to loosen the end clamp (19).
 - c. Remove the end cap assembly (7) as a unit; reinstall the clamp bolt and clamp nut to the end clamp to prevent loss.
 - d. Carefully withdraw the end cap assembly (7) from the end of the pressure tube, unassembled.
3. Push the RO membrane elements from the pressure tube in the same direction as feedwater flows. Push the elements out one at a time. Support each element as it is being pushed out of the tube until the element is free of the pressure tube.

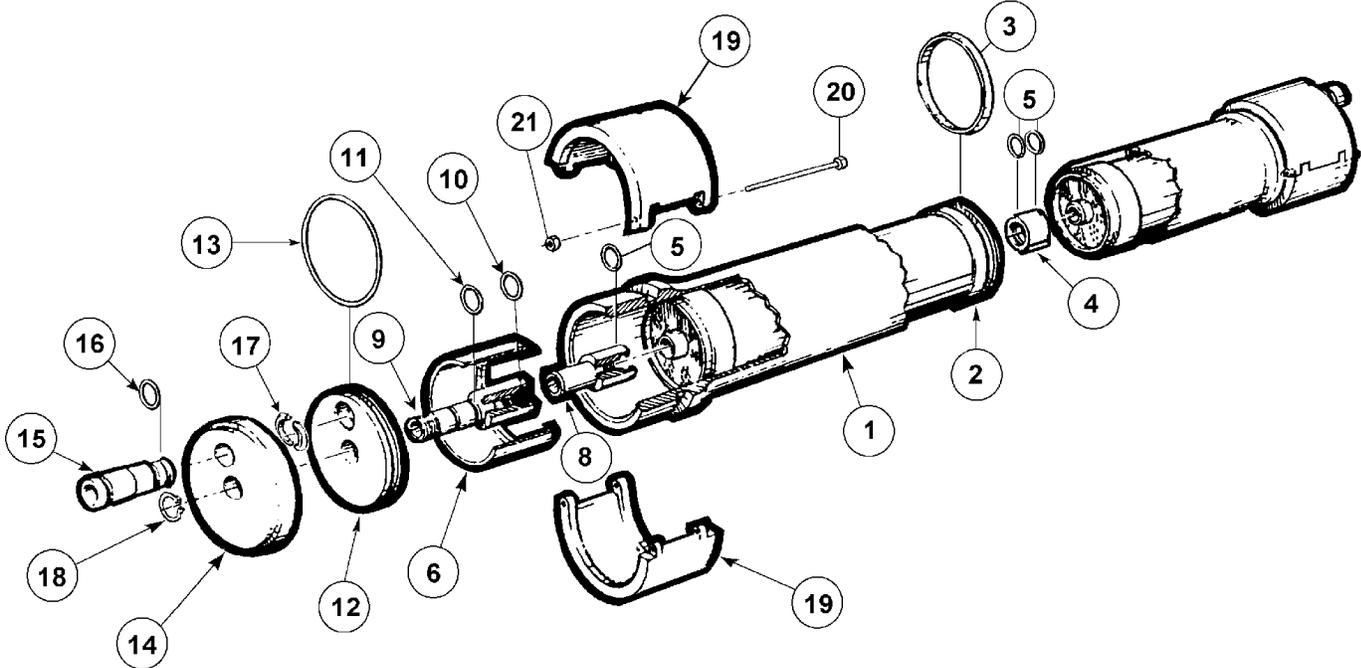


Figure 1. Pressure Tube Assembly

Legend for Figure 1
8.0-inch Pressure Tube

Item Number	Hydraulics Description	Part Number
1	Pressure Tube	10131.X000
2	Membrane Element	See O&M manual
3	Brine Seal	10144.0000
4	Interconnector	10113.0000
5	O-Ring	10185.5232
6	Spacer Tube	10112.0000
7	End Cap Assembly	10103.0000
8	Inboard End Connector	10106.0000
9	Outboard End Connector	10107.0000
10	O-Ring (Purple)	10185.3232
11	O-Ring	10185.2232
12	End Cap Diaphragm	10105.0000
13	O-Ring	10185.3442
14	End Cap Hub	10104.0000
15	Feed Connector	10044.0000
16	O-Ring	10185.2222
17	Thrust Ring	10045.0000
18	Retaining Ring	10103.1500
19	End Clamp Half	10211.0000
20	Clamp Bolt	10132.4000
21	Clamp Nut	10132.5000

Legend for Figure 1
8.5-inch Pressure Tube

Item Number	Hydraulics Description	Part Number
1	Pressure Tube	10124.X000
2	Membrane Element	See O&M manual
3	Concentrate Seal	10145.0000
4	Interconnector	10113.0000
5	O-Ring	10185.5232
6	Spacer Tube	10076.0000
7	End Cap Assembly	10123.0000
8	Inboard End Connector	10106.0000
9	Outboard End Connector	10107.0000
10	O-Ring (Purple)	10185.3232
11	O-Ring	10185.2232
12	End Cap Diaphragm	10126.0000
13	O-Ring	10185.5442
14	End Cap Hub	10125.0000
15	Feed Connector	10044.0000
16	O-Ring	10185.2222
17	Thrust Ring	10045.0000
18	Retaining Ring	10103.1500
19	End Clamp Half	10212.0000
20	Clamp Bolt	10084.4000
21	Clamp Nut	10084.5000

Note: Feed and concentrate end cap assemblies (7) are essentially the same.

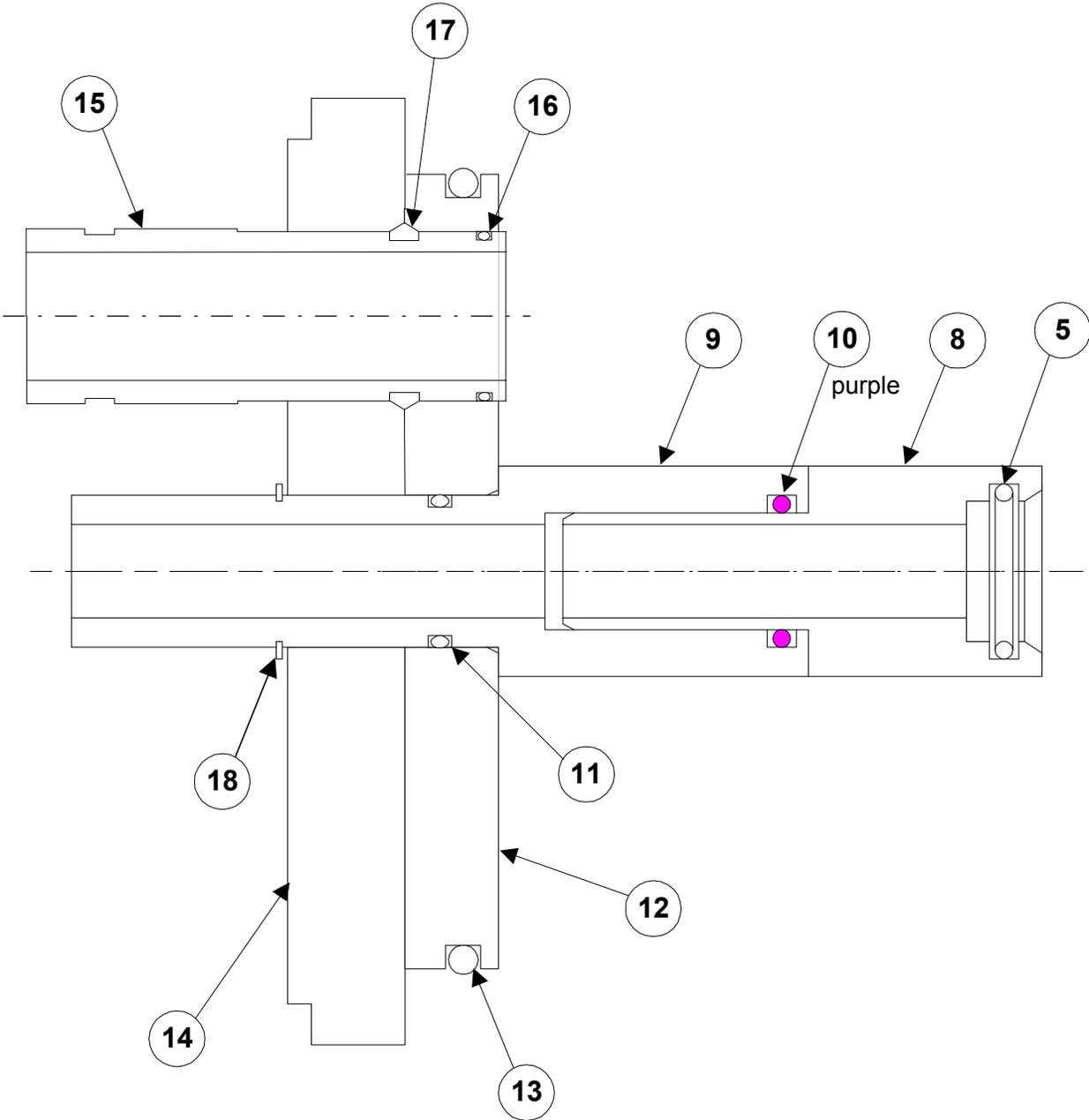


Figure 2. End Cap Assembly

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