



USER'S GUIDE

CodeLine

Side Ported Membrane Housings For Reverse Osmosis

MODEL – 40S

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DANGER – HIGH PRESSURE DEVICE

This vessel may cause loss of life, severe bodily harm, or property damage if not correctly installed, operated and maintained. Read and understand all guidelines given in this bulletin before attempting to open, operate or service this vessel. Failure to follow these guidelines and observe every precaution will result in malfunction and could result in catastrophic failure. Misuse, incorrect assembly, or use of damaged or corroded components can result in high-velocity release of the end closure. We recommend that only a qualified technician experienced in servicing high-pressure hydraulic systems open, close and service this vessel.

Important Safety Precautions

Do	Do Not
<ul style="list-style-type: none"> • Read, understand and follow every guide-line in this bulletin. Failure to take every precaution may void warranty and could result in catastrophic failure. • Install in an area where a vessel or piping malfunction that result in water leakage would not damage sensitive or expensive equipment, such as electronic components. • Verify that head locking components are properly placed and secured. • Inspect end closures regularly, replace deteriorated components and correct causes of corrosion. • Follow membrane element manufacturer's recommendations for loading elements into the vessel (see Replacing Elements). • The vessel is designed for continuous use at a pH of 3-11 and for intermittent cleaning (max. 43.2 hours per year at a pH of 2-12). • Flush the vessel before system shut down. Some feed waters may cause corrosion under static conditions. Flushing with noncorrosive permeate is recommended. 	<ul style="list-style-type: none"> • Operate the vessel outside the recommended operating and cleaning pH range. • Operate vessel at pressures and temperatures more than their specific rating. • Service any component until you verify that pressure is fully relieved from the vessel. • Use corroded components. Use of such components may result in catastrophic failure. • Pressurize vessel until after visually inspecting to ensure that the spiral retaining rings is correctly installed and seated in their grooves. • Tolerate leaks or allow end closures to be routinely wetted in any way. • Use excessive silicone lubricant. • pressurize vessel without element in place unless permeate ports are plugged internally. • Use vessel at negative pressure. • Pressurize vessel with Compressed Air. • Stand or climb on the pressure vessel, or the feed/ Concentrate or permeate ports. • Allow petroleum or silicone-based products to come in contact with membrane elements during installation or maintenance.

General Information

The 40S RO/UF Pressure Vessel is designed for continuous, long-term use as a housing for reverse osmosis and ultrafiltration elements in typical commercial water treatment systems. Models are available for 300, 450 and 600 psi.

The 40S series vessels are designed to accommodate any make of 4-inch nominal diameter element.

The fiberglass shell can be damaged by rigid clamping, impact, scratches, or abrasion. Metal parts must be maintained free of corrosion to eliminate potentially unsafe conditions due to corrosion.

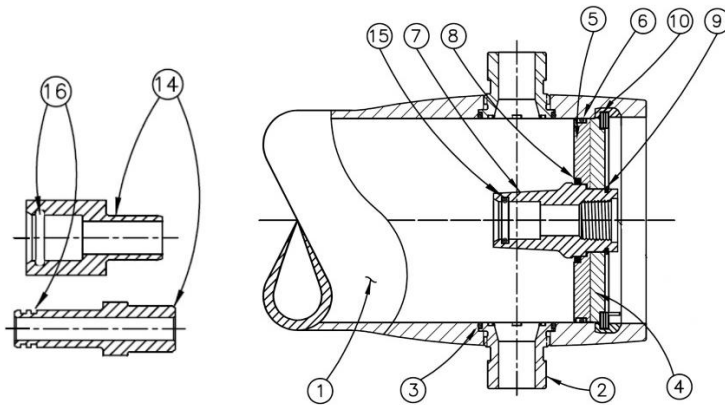
The fiberglass shell can be damaged by rigid clamping, impact, scratches or abrasion. Metal parts must be maintaining free of corrosion to eliminate potentially unsafe conditions due to corrosion.

The information and guidelines incorporated in this User's Guide are intended only as a supplement to good industrial practice. Full responsibility for correct operation and maintenance of vessel remains with the user.

This guide should be used in conjunction with drawing numbers **40S30(C):#200339;** **40S30(NC):#200244;** **40S45(C):#200340;** **40S45(NC):#200245,** **40S60(C):#200341;** **40S60(NC):#200246.**

When properly installed and maintained, Model 40S vessels can be expected to provide safe operation over a long service life.

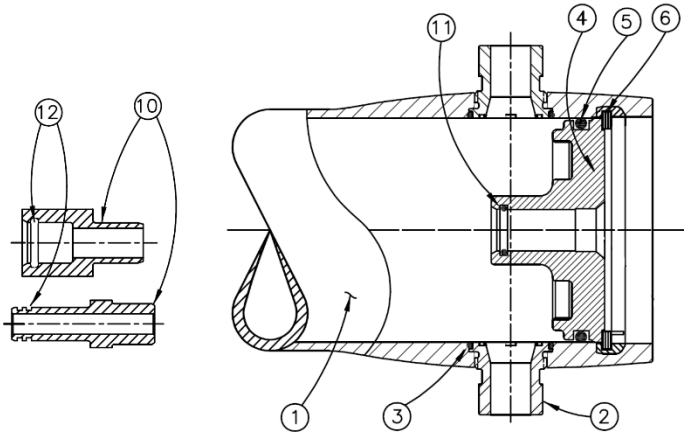
CODED 40S: 300 / 450 / 600 psig



SECTION THROUGH END CLOSURE
(ENDS ARE IDENTICAL)

Dwg Ref	Qty Per	Item #	Description	Materials
Shell				
1	1	Order Section	Shell	Filament Wound Epoxy/Glass composites - Head locking grooves integrally wound in place.
2	A/R		F/C Port	SA-351 CF8M
3	A/R	196596	F/C Port Seal	Ethylene Propylene - O-ring
Head				
4	2	96803	Bearing Plate	SA-479 316 L
5	2	96855	Sealing Plate	Engineering Thermoplastic.
6	2	196266	Head Seal	Ethylene Propylene - O - Ring
7	2	96807	Permeate Port	Engineering Thermoplastic.
8	2	196274	Permeate Port Seal	Ethylene Propylene - O - Ring
9	2	45242	Port Retainer	PH-15-7Mo Stainless Steel
Head Interlock				
10	2	45260	Retaining Ring	SA-479 SS 316
Vessel Support				
11	2 ⁺	45058	Saddle	Engineering Thermoplastic
12	2 ⁺	47459	Strap Assembly	304 Stainless Steel-PVC Cushion
13	4 ⁺⁺	97821	Strap Screw	5/16-18 UNC x 1.5"Long, 304 Stainless Steel
ELEMENT INTERFACE				
14	2	A/R	Adapter	Engineering Thermoplastic
15	2	196271	Adapter seal	Ethylene Propylene - O - Ring
16	A/R	A/R	PWT Seal	Ethylene Propylene - O - Ring
*3 each & +6 nos. furnished with length code 4,5, & 6.				
Item No.11 to 13 not shown into the section view.				

NON-CODED 40S: 300 / 450 / 600 PSig



SECTION THROUGH END CLOSURE
(ENDS ARE IDENTICAL)

Dwg Ref	Qty Per	Item #	Description	Materials
Shell				
1	1	Order Section	Shell	Filament Wound Epoxy/Glass composites - Head locking grooves integrally wound in place.
2	A/R		F/C Port	SA-351 CF8M
3	A/R	196596	F/C Port Seal	Ethylene Propylene - O-ring
Head				
4	2	96827	End Plug	Engineering Thermoplastic.
5	2	196266	Head Seal	Ethylene Propylene - O - Ring
Head Interlock				
6	2	45260	Retaining Ring	SA-479 316
Vessel Support				
7	2 ⁺	45058	Saddle	Engineering Thermoplastic
8	2 ⁺	47459	Strap Assembly	304 Stainless Steel-PVC Cushion
9	4 ⁺⁺	97821	Strap Screw	5/16-18 UNC x 1.5" Long, 304 stainless Steel
ELEMENT INTERFACE				
10	2	A/R	Adapter	Engineering Thermoplastic
11	2	196271	Adapter seal	Ethylene Propylene - O - Ring
12	A/R	A/R	PWT Seal	Ethylene Propylene - O - Ring
+3 each & +6 nos. furnished with length code 4,5, & 6.				
Item No.7 to 9 not shown into the section view.				

INSTALLATION

Regardless of when or by whom your vessel may have been installed, there are a few quick checks you should make before use. Check that each vessel is:

- Mounted with compliant material (Polyurethane saddle) between the fiberglass shell and any rigid frame.
- Free to expand under pressure - shell not clamped rigidly in place, no rigid piping connections to port fittings.
- Not used in any way to support other components such as piping, manifolds hanging from ports.

OPENING THE VESSEL

WARNING

Relieve pressure from vessel before beginning this procedure.

Contamination Removal

Metal oxidation products and mineral deposits can interfere with vessel disassembly. Remove all foreign matter from both ends of vessel as follows:

1. Remove contaminants using a small wire brush or suitable abrasive (such as medium-grade ScotchBrite™).



Cleaning inside the vessel

2. Flush away loosened deposits with clean water.

Removing the Head

The head assembly is shown in Figure on Page No.10.

Remove head as follows:

Disconnect Permeate Piping -

1. Disconnect permeate piping as required at nearest convenient joint, being careful not to place undue stress on the threaded connections of the plastic permeate port(s).

CAUTION

DO NOT tap on fittings as this could damage the ports.

Remove the Retaining Ring from the groove –

1. Lift the tabbed end of the retaining ring up out of the stainless-steel groove in the shell and then away from the head so that it rests in the end margin of the vessel. This is best accomplished by using CodeLine Removal Tool, part number 50303, which is available from your supplier. This can also be accomplished using a screwdriver and a pair of pliers if the tool is not readily available.

With the removal tool the retaining ring can be lifted upward by simply rotating the tool counterclockwise after inserting it over the tab on the retaining ring. (Use the smaller hole). Hold the tool flat against the end margin and parallel to the vessel bore. It is then possible to pull the end of the retaining ring straight out. The retaining ring snap back into the groove if this alignment is not closely adhered to. If the retaining ring is difficult to remove, try soaking with a release agent such as LPS™ or WD40™, being careful to avoid any contamination of a membrane element.



Retaining Ring Removal Tool

When using screwdriver and pliers, pry the tabbed end of the retaining ring out of the stainless-steel groove with the tip of the screwdriver. Once the end of the retaining ring is clear of the groove, grab the tab with the pliers and pull towards the end of the

vessel until the end of the ring is resting in the end margin of the shell.

2. Remove the 4" retaining ring from the stainless groove in the shell by rotating your finger behind the ring as it continues to exit the groove.



Removal of Retaining Ring

3. Once the retaining ring has been removed, examine the area for burrs or dings which could damage the head or membrane. If necessary, use ScotchBrite™ or 600 grade sandpapers to smooth the area.

Removing Head Assembly –

1. Install a ½"NPT x 6" long nipple into product port of the head on one end of the vessel.
2. Grasp the nipple and pull the head straight out. A small amount of side-to-side movement may be necessary to start the end plug moving. Care should be taken to avoid placing too much stress on the port thread.



Removing the head assembly

3. Remove and discard plug seal, taking care not to scratch or otherwise damage the sealing surfaces.
4. Repeat above procedure for the opposite end of the vessel.
5. As soon as possible after removal, disassemble and check all head components, as described in Rebuilding the Head and Refurbishing Parts.

REPLACING ELEMENTS & CLOSING THE VESSEL

The following procedures are provided for information only. Elements should be installed in accordance with the element manufacturer's recommendations. Where conflicts exist, contact the element manufacturer or Pentair Water for clarification.

Removing Elements

1. Remove heads from both ends of vessels as described in Opening the Vessel.
2. Push element out of vessel from the upstream end.

NOTE

Always remove and install element in the direction of feed flow. The feed end (upstream end) is the end plumbed most directly to the pump.

3. For multi-element vessels, remove the inter-connectors and retain for reinstallation.

Inserting Elements

1. Ensure that heads are available in clean, as-new condition before proceeding. (If in doubt as to head condition see section on inspecting parts, page 12).
2. Check that all required elements are ready for assembly, with no dings or other damage which could scratch the inside of the vessel.
3. Reinstall head assembly at the downstream end as described in Closing the Vessel. Make sure the smaller of the two adapters supplied with the vessel is installed in the permeate port.
4. Lubricate element seals sparingly with the element manufacturers recommended lubricant or with glycerin.

CAUTION

DO NOT lubricate element seals with a silicone based material (such as Parker Super O-Lube the recommended lubricant for head seal.)

5. Insert each element with the brine seal (typically a U-cup seat) installed on the upstream end with its lip facing upstream.
6. Install the interconnectors between multiple elements as each succeeding element is installed.

CAUTION

System malfunctions and element damage may result if elements are installed in the

7. Push each element downstream into the shell as it is installed until the element is fully engaged with the downstream head. If the elements are hard to push, make sure the brine seal is properly installed and you are pushing from the upstream end.
8. When the elements are installed, close the vessel as described in the following section -

Prepare and Install head assemblies as described below -

1. Refurbishing or replace head components as required to ensure as-new condition. (see Refurbishing parts). The PWT O-ring should be replaced each time.
2. Cover O-ring with a thin even layer of Parker Super O-lube silicone lubricant or the lubricant recommended by your element supplier.

NOTE

Glycerin is a commercially available lubricant that will not foul elements. However, silicone lubricant is recommended for this application.

3. Remove any residual lubricant from the head and work a fresh, thin film of Parker Super O-Lube silicone lubricant into the outer diameter of the bearing seal plate, where it contacts the plate seal in the vessel.

REPLACING ELEMENTS & CLOSING THE VESSEL (Cont...)

4. Install adapter into one end plug. At downstream end of vessel, orient end plug ports into desired position and push plug fully into vessel. A sharp, forceful thrust may be needed to enter plug seal into the vessel bore.



Installation of the End Plug Assembly into the vessel

CAUTION

If vessel is to be pressurized above 125 psi without elements installed, the central permeate port should be plugged from the inside. Solid adapters are available for this purpose.

5. Carefully insert retaining ring into its groove. This is done by inserting the lead end of the spiral retaining ring (end without bent tab) into the stainless-steel retaining ring groove located in the shell, and slowly pushing the remaining turns into the shell.



Inserting Retaining Ring into the groove

6. Check that the spiral retaining ring is fully seated in the groove. If it is not, remove and check for foreign material that is causing the spiral ring not to sit into the groove.



Retaining ring seated in the groove

7. Inert elements if not already installed and

CAUTION

DO NOT pressurized vessel without elements (s) properly installed.

insert longer adapter into the remaining head. Then install this in the upstream end of the vessel, using technique given in step 4 & 5.

8. Reconnect piping to vessel as described in Refurbishing Parts. (Page no. 12)

CAUTION

Be sure to hold feed/concentrate port with a wrench when tightening fittings.

9. If threading fittings into the head, avoid overtightening. Hand tight plus approximately $\frac{1}{4}$ turns should produce a satisfactory seal. If leak occur on pressurization, a small amount of further tightening may be required.
10. Pressurize the vessel. Inspect for leaks at connections to the vessel and all around the vessel itself. If any leaks occur, release pressure from the vessel and tighten the fittings as necessary. Then pressurize vessel and check for leaks again.

CAUTION

DO NOT tolerate any leaks. Leaks can result in corrosion and eventual catastrophic vessel failure..

HEAD DISASSEMBLY - CODED

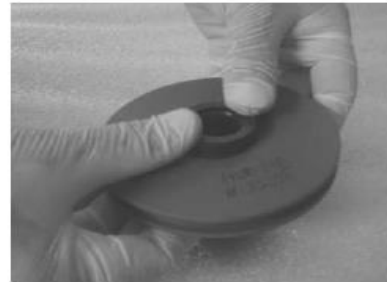
NOTE

Head Rebuilding should be performed in a clean work area. Dust or dirt on O-rings or other parts can scratch inner surfaces, with subsequent leakage.

1. Using a small screwdriver or similar tool remove the Plug Seal. However, do not damage the sealing surface in any way as it may lead to leakage.
4. Remove the Sealing Plate by pressing it out from one end of the permeate Port.



Removal of the Plug Seal



Removal of the Sealing Plate

2. Remove Port Retainer from its groove in the Permeate port. Take care not to scratch the hard-anodized surface of the bearing plate.
5. Remove the Permeate Port Seal from the Sealing Plate. However, do not damage the sealing surface in any way as it may lead to leakage.



Removal of the Port Retainer Ring



Removal of the Permeate Port Seal

3. Bearing Plate is held in the head assembly by Port Retainer, Once the Port Retainer is removed the bearing plate is free to move.
6. Remove the PWT / Adapter Seal from the permeate Port using a small screwdriver or similar tool. However, do not damage the sealing surface in any way as it may lead to leakage.



Removal of the Bearing Plate



Removal of the PWT/ Adapter Seal

NOTE It is recommended that all seals be replaced each time the head is assembled.

HEAD DISASSEMBLY – NON-CODED

1. Using a small screwdriver or similar tool remove the Plug Seal. However, do not damage the sealing surface in any way as it may lead to leakage.
2. Remove the PWT / Adapter Seal from the permeate Port using a small screwdriver or similar tool. However, do not damage the sealing surface in any way as it may lead to leakage.

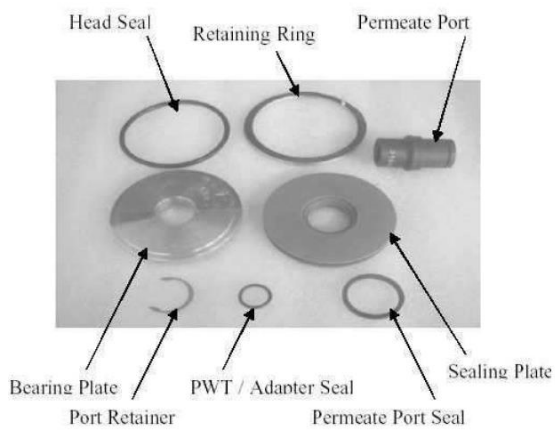


Removal of the Head Seal

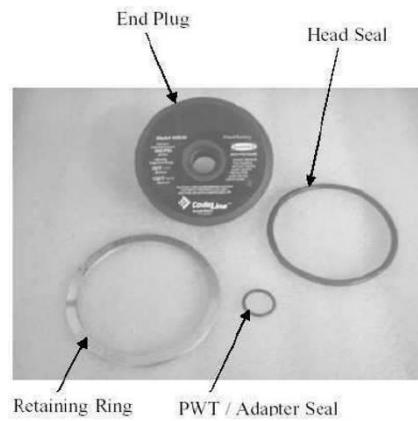


Removal of the PWT/Adapter Seal

HEAD DISASSEMBLY



40S Coded Head Disassembled



40S Non Coded Head Disassembled

Head Component Identification (40S) – Head Disassembled

HEAD ASSEMBLY - CODED

1. Use only head components in as-new condition. Use new O-rings each time the head is assembled.
2. Cover O-rings with a thin even layer of Parker SuperO-Lube silicone lubricant or the lubricant recommended by your element supplier.



Lubricating Plug seals and O-rings

NOTE

Glycerin is a commercially available lubricant that will not foul elements. However, silicone lubricant is recommended for this application.

3. Assemble the Adapter Seal into the groove in the sealing plate.



Inserting Permeate Port seal

4. Assemble PWT/ Adapter Seal in the Permeate Port seal groove.



Inserting PWT/ Adapter Seal

5. Insert the port retainer end of the permeate port through the sealing plate. Press firmly till permeate port bottoms on the sealing Plate.

Please ensure that the side of the sealing Plate with the Permeate Port seal faces the permeate port hub.



Installing Sealing Plate

6. Place the bearing plate over the sealing plate through the permeate port, ensure that the port retainer groove on the permeate port is exposed.



Installing Bearing Plate

7. Snap the port retainer ring into the groove in the permeate port, up against the face of the bearing plate.

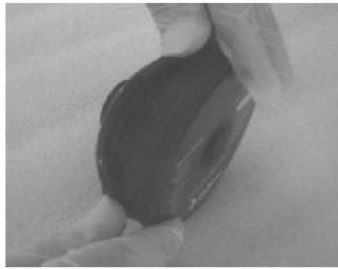


Installing Port Retainer

8. Examine the assembly to ensure that the mating faces of the Sealing and Bearing Plate are in complete contact. If they are not, disassemble the head and start over.
9. When head is correctly assembled, insert the Head Seal O-ring into the groove on the outside diameter of the Seal Plate.
10. Protect heads from contamination until ready to assemble into the vessel(s).

HEAD ASSEMBLY – Non-Coded

1. Install the Head Seal on the End Plug as Shown in the picture.



Installing Head Seal

2. Install the PWT / Adapter Seal in the End Plug as Shown in the picture.



Installing PWT / Adapter Seal

REFURBISHING PARTS

Inspecting Parts -

Plastic parts: examine for cracking, softening, or discoloring. This may indicate chemical attack of the material. Defective parts must be replaced. Alternate material may be required. Contact your supplier or Pentair Water for assistance.

Metal parts: check for corrosion, scratches, dents, cracks, or other damages to insert ring and spiral retaining ring.

Other parts: examine for any damage, such as gouges, chips, or cracks, that could affect structural strength or sealing characteristics. The following are some examples of defects that may require replacement of the affected part.

- Bearing/Sealing Plate and Permeate port: cracked, discolored, sealing areas damaged (chipped or gouged), port threads stripped or cross-threaded.
- Spiral Retaining rings: are the sole means of end plug retention. Parts bent, corroded, cracked, or damaged in any way must not be used. Carefully check for hairline cracks.

Refurbishing Shell -

1. Using a fine wire brush, remove any large deposits from locking ring groove in the shell.
2. Using a medium or finer grade of ScotchBrite™ and mild soap solution, clean the inside of the vessel at least 4 inches in from each end.
3. Use clean water to rinse away all loosened deposits and soap residue.
4. Examine inside of vessel for scratches, gouges, or other imperfections that could prevent proper sealing. If such areas exist and leaks are observed when the vessel is placed back in service, the shell may need to be replaced.

Refurbishing Other Parts –

1. Remove any large deposits from metal parts using a wire brush.
2. Scrub the entire surface with medium grade ScotchBrite™ until all contaminants are removed.
3. Rinse parts clean with fresh water and dry.
4. Inspect all parts for serviceability as specified above.

Refurbishing Other Parts –

1. Remove any large deposits from metal parts using a wire brush.
2. Scrub the entire surface with medium grade ScotchBrite™ until all contaminants are removed.
3. Rinse parts clean with fresh water and dry.
4. Inspect all parts for serviceability as specified above

Remaking Pipe Connection to Permeate Port-

1. Use a wire brush to remove all foreign matter from threads on pipe fittings.
2. Apply non-hardening thread sealant or Teflon tape to fitting and install in permeate port. Tighten fitting a maximum one quarter-turn past hand tight; the plastic port could be damaged if fittings are over-tightened.
3. Fit head and spiral retaining ring as described in Closing the Vessel (page 7).

Remaking Pipe Connection to Feed/Concentrate Port-

Follow steps 1 & 2 above. Be sure to hold feed/concentrate port with a wrench when tightening fitting. Movement of the port could damage shell and/or port.

Part Replacement –

1. Replace all parts that cannot be restored to as-new condition.
2. Replace any parts showing signs of structural damage or corrosion.

CAUTION - Use of components damaged by corrosion can cause catastrophic failure.

3. Seals should be replaced as necessary each time the vessel is serviced.
Any parts that need to be replaced are available from your supplier or from Pentair.

SHIMMING

1. Shutdown the system and remove both vessel fiberglass endcaps.
2. Drain the vessel.
3. Check the location of the membrane column on each end of the vessel.
You want to look at the distance that the face of the membrane is from the ramp on the counter bore of the vessel. Push the membrane column from the feed so that the brine seal has sufficient engagement to the 4" dia. bore of the vessel.

NOTE: The Membrane should be flush to the counter bore ramp.

4. Re-install the end cap on the feed end and make sure that you can get the end cap in far enough to get the spiral ring in.
5. Go around to the reject end / downstream end and remove the square head seal.
6. Remove the adapter-
Flush cut membrane or Type II style adapter: Put a shim or two on the membrane side of the adapter and re-insert the adapter into the membrane.
Membrane with male product water tube or Type I adapter: Leave the adapter attached to the membrane and place a shim on the end of the adapter inserted into the permeate port. Insert end cap assembly, engage the adapter, and see how far you can push the head assembly into the vessel. If it can go deep, check the distance between the back of the groove on the stainless-steel insert ring on the vessel and the fiberglass end cap. If you have at least 0.15-inch gap, take the head out and put another shim on. Repeat the shimming until you reach the point where you can just get the end cap and spiral locking ring to engage. (Do not use more than four spacers).
7. Reinstall end cap square head seal and reinstall end cap.
8. Re-start system

NOTE: Ease the water pressure up on start up, you don't want to damage the downstream adapter by ramping pressure into it.

9. Run the system and check the water quality to make sure that your seals are all in the proper places.

NOTE - AFTER END OF SERVICE LIFE OF VESSEL, DISPOSE THE VESSEL AND ITS COMPONENTS AS PER APPLICABLE LOCAL LAWS AND REGULATIONS

WARRANTY TERMS & CONDITION

FOR LATEST WARRANTY TERMS & CONDITIONS VISIT ON <https://codeline.pentair.com/en/downloads> (Document Name - Warranty Terms & Conditions - Pentair Warranty FRP Housings)

