



PRF-RO

Pentair Reverse Osmosis System Installation and Maintenance Manual

SAFETY GUIDES

Read and follow all steps and guides carefully before installing and using your reverse osmosis system.

Do not use this product to make safe drinking water from non-potable water sources. Do not use the system on microbiologically unsafe water, or water of unknown quality without adequate disinfection before or after the system.

This reverse osmosis system contains replaceable components (membrane elements). These components are critical for the effective reduction of total dissolved solids and specific contaminants that are listed in the Product Data Sheet.

The Reverse Osmosis System does not have a monitoring device for contaminants. To verify that the system is performing satisfactorily the product water should be tested periodically by the system's installing dealer or a certified laboratory, every six months. The laboratory should be certified for testing the specific contaminants of concern. For a listing of certified laboratories, contact local regulatory agencies. Within the United States, many state-run Department of Natural Resources or Department of Health Services maintain listings of certified laboratories.

Consult your local public works department for plumbing and sanitation codes. Follow your local codes if they differ from this manual.

The reverse osmosis system works on water pressures of 40 psi (2.8 bar) minimum to 80 psi (5.5 bar) maximum. Water pressure can be reduced by installing a pressure reducing valve in the water supply pipe to the RO system. A booster pump should be used for low pressure applications.

Do not install the reverse osmosis system in extreme hot or cold temperatures. Temperature of the water supply to the reverse osmosis system must be between 40°F (4°C) and 100°F (38°C). Do not install on hot water lines.

The reverse osmosis membranes contain a foodgrade preservative for storage and shipment. All new membranes require a minimum 2 hour rinse to properly rinse out the preservative. The preservative is not harmful but makes the product water taste objectionable. Rinsing the membrane also acts a performance conditioner. All new membranes will reach their stable maximum performance after 8 hours of rinsing.

THE BASIC REVERSE OSMOSIS SYSTEM

Your Reverse Osmosis System is a water treatment unit. It uses water pressure to reverse a natural physical process called osmosis. Water, under pressure, is forced through a semi-permeable membrane to filter out minerals and impurities. Treated drinking water goes to the faucet. Minerals and impurities are sent to the drain with RO waste water.

The system includes replaceable filters and membrane elements. The prefilter reduces sand, silt, dirt, rust particles, other sediments, and chlorine from the water supply before they enter the RO membrane elements. The postfilter reduces any tastes and/or odors that may remain in the water after passing through the RO membrane elements.

BEFORE INSTALLING THE RO SYSTEM

- Best performance of the system will be achieved when the incoming water has been treated (softened).
- The water coming into the system must be within certain limits for sediments, pressure, etc. Refer to the specifications to determine if your installation is within the limits.
- A water quality analysis can be performed to determine if incoming water requires any treatment. Contact your dealer/installer.
- The filters and membrane elements in the RO system need to be replaced on a regular basis. Follow the instructions for replacement that are in this manual.

NOTE: For optimal system performance, use the system for at least 2 minutes continuously each day.

⚠ WARNING: The RO system is designed to work without the aid of a pressurized storage tank. Installation of a pressurized storage tank will negatively affect system performance.

Tools and Materials Required

- Adjustable wrench, and larger adjustable jaw pliers or pipe wrench to fit sink drain
- Saw for cutting drain pipe
- Slotted and Phillips head screwdrivers
- Tubing cutters
- Electric drill and bits for cutting the faucet mounting hole

NOTE: Note that some sinks will have a pre-drilled hole with a plug for the faucet.

THE BASIC REVERSE OSMOSIS SYSTEM cont.

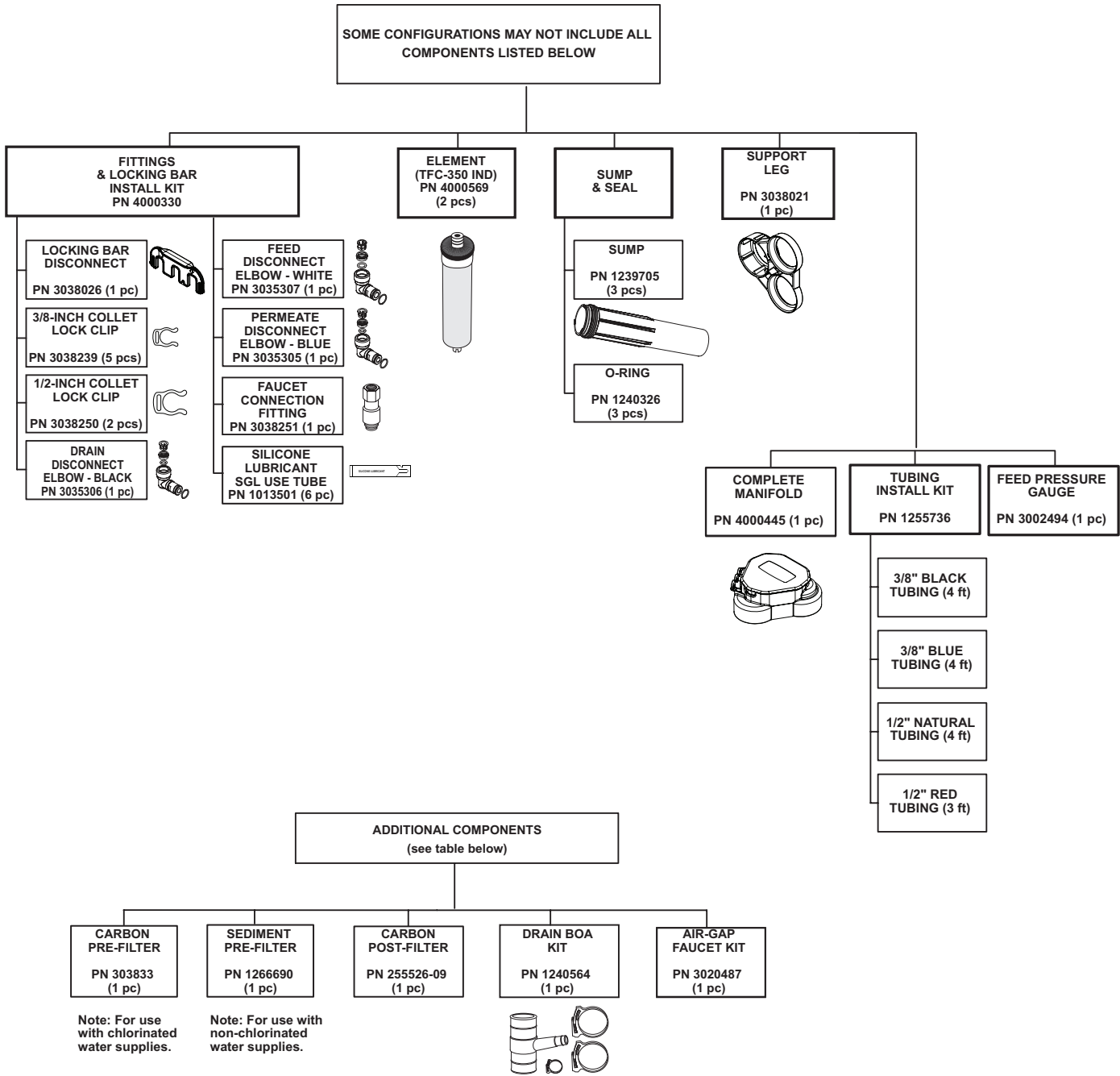


Figure 1

THE BASIC REVERSE OSMOSIS SYSTEM cont.

LOCATION OF SYSTEM

The reverse osmosis system is designed for installation under a sink, usually in the kitchen or bathroom. The RO assembly can be placed on the cabinet floor in any position that does not apply pressure on the disconnect elbows. The RO product water faucet installs on the sink or on the countertop next to the sink.

The RO system can also be located in a location away from the faucet. A nearby water source and drain point are required.

NOTE: Keep the lengths of tubing short. Longer lengths of tubing will decrease system performance. A booster pump can be used on the supply line.

NOTE: All plumbing should be done in accordance with state and local plumbing codes.

Some codes may require installation by a licensed plumber. Check with the local plumbing authority prior to installation.

⚠ WARNING: All components and tubing should be located in an area which is not exposed to freezing temperatures. Do not expose unit or tubing to direct sunlight.

Water Supply: To provide supply water to the RO system inlet, a feed supply fitting is required or install pipe fittings as needed. The feed water valve should be located as close to the manifold assembly as possible. **USE A POTABLE COLD WATER SUPPLY ONLY.** Softened water is preferred as it will extend the life of the RO membrane element.

Drain Point: A suitable drain point is needed for reject water from the RO system. A floor drain, laundry tub, standpipe, sump, etc. are all acceptable. If discharging into the utility sink or standpipe, an air gap of greater than 1/2-inches above the flood rim must be provided. A sink p-trap drain adapter is included to install as an optional drain point where codes permit.

Do not connect the system drain line to the dishwasher drain or near the garbage disposal. Back pressure from these units may cause the air gap to overflow.

Faucet: The faucet should be placed near the sink where drinking water is normally obtained. Convenience of use (filling of water pitchers and glasses) and an open area beneath the faucet under the sink for attaching product and drain tubing are considerations. A 2-inch diameter flat surface is required above and below the installation site. The thickness of mounting surface should not exceed 1-1/4-inches. Avoid any strengthening webbing on the underside of the sink.

RO Manifold Assembly: The manifold can be installed on either the right or left side of the under-sink area or cabinet. Installation in the basement is also an option. One possible location is near the laundry/utility sink where cold potable water and drain access are close. The location chosen should allow adequate clearance and accessibility for membrane element changes.

In restricted under-sink areas, it may be easier to install the faucet first. Allow adequate tubing lengths for final system placement.

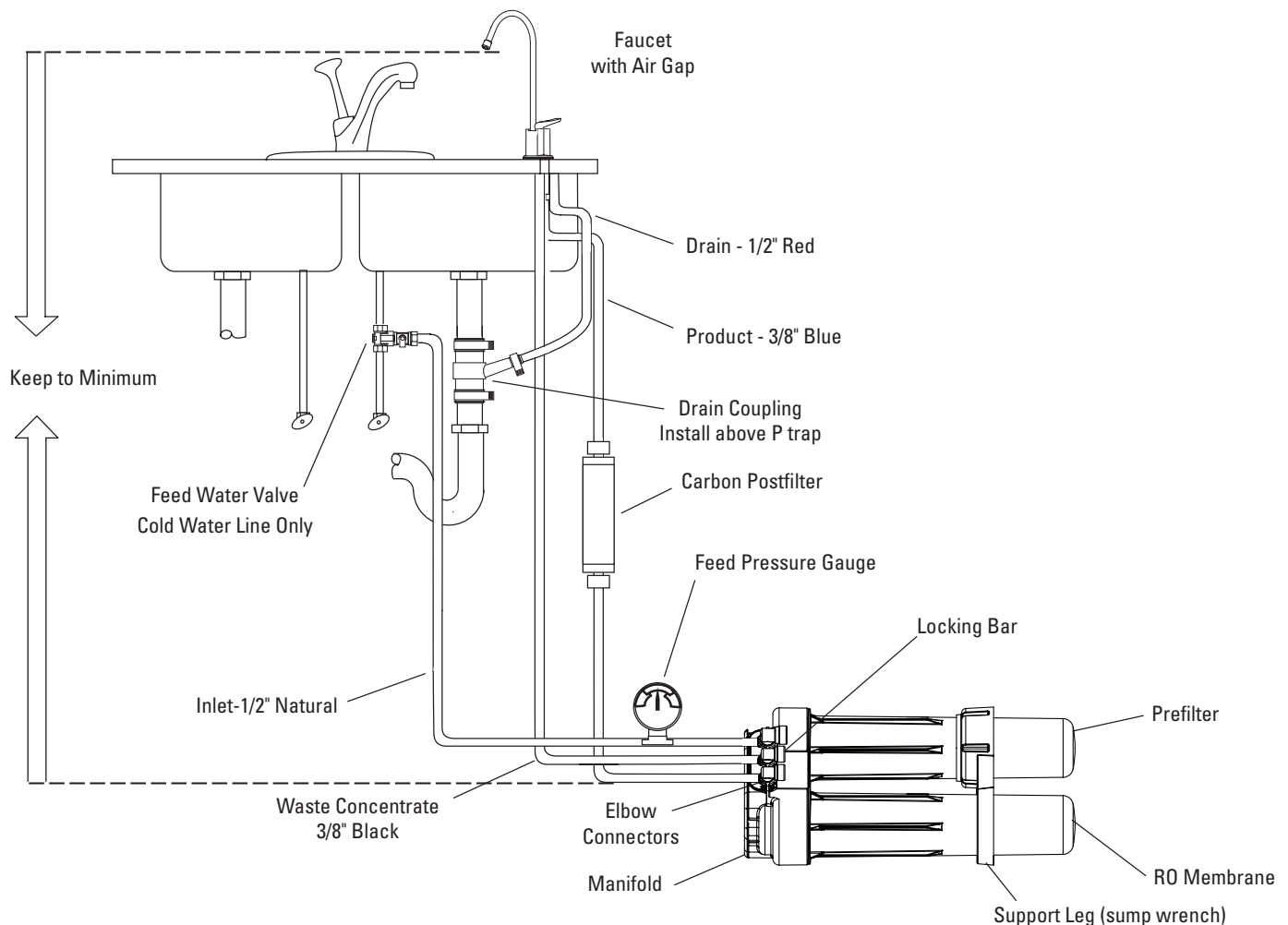


Figure 2 Typical Under-Sink Installation

THE BASIC REVERSE OSMOSIS SYSTEM cont.

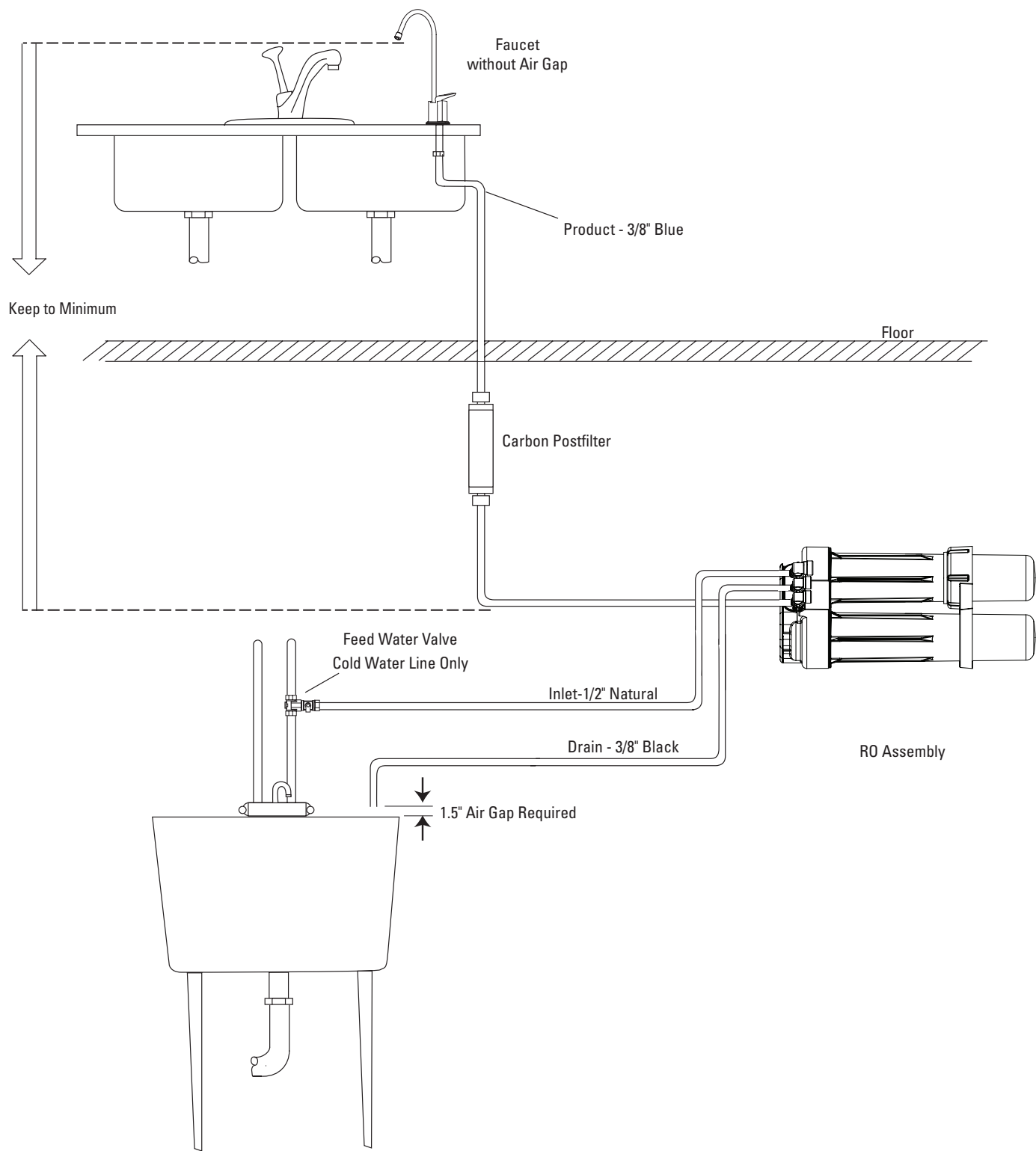


Figure 3 Typical Basement Installation

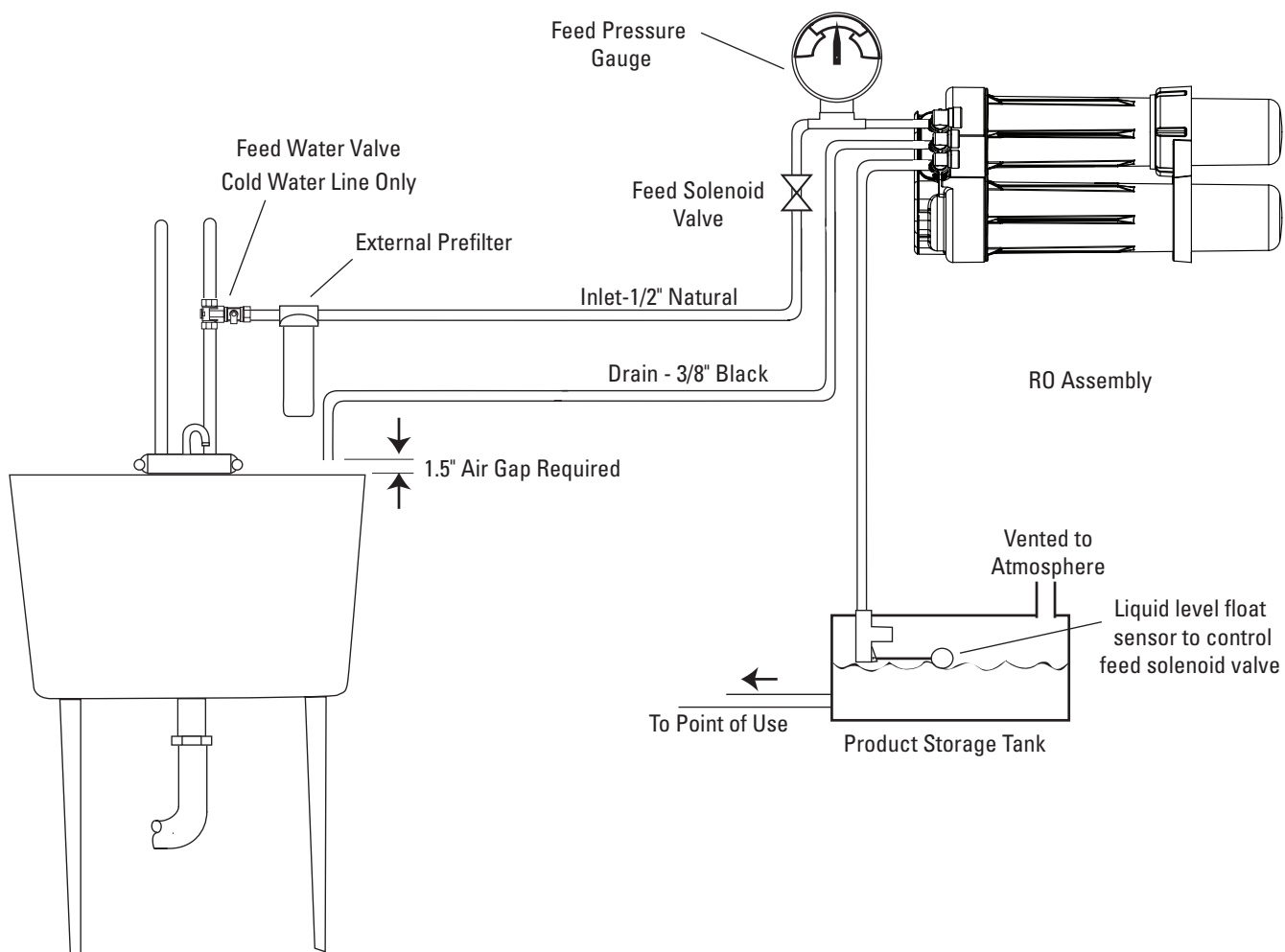


Figure 4 Typical Light Commercial Installation

INSTALLATION

STEP 1: Install cold water supply valve

STEP 2: Install drain adapter

STEP 3: Install faucet

STEP 4: Make tubing connections

STEP 5: Install RO assembly

STEP 6: Put system into operation

NOTE: Consult a licensed plumber if you are not familiar with plumbing procedures.

Step 1: Install Cold Water Supply Valve

Comply with local plumbing codes. A typical connection using a water supply valve is shown in Figure 5.

WATER SUPPLY VALVE

NOTE: Be sure to turn off the water supply and open a low faucet to drain the pipe.

Cold water pipes vary in size and style. The installer will determine type of valve that will be used. Install a valve on the cold water supply pipe to adapt 1/2-inch OD tubing. If threaded fittings are used, be sure to use pipe joint compound or Teflon tape on outside threads.

Turn the valve off.

Step 2: Install Drain Adapter

Follow the instructions in the Appendix for installation of the Drain Boa™, if used.

The drain adapter is designed to fit 1-1/2-inch (3.8 cm) sink drain pipe.

The adapter installs directly to the sink tailpiece.

Step 3: Install Faucet

A. Prepare Mounting Hole

1. Select a location for the faucet. Be sure it will fit flat against the sink or counter and that there is space underneath for tubing.
2. If drilling is needed, make a 1-1/2-inch diameter hole.

⚠ WARNING: To avoid damaging a sink, consult a qualified plumber or installer for the proper method of drilling holes in porcelain or stainless steel.

B. Assemble Faucet

The tubing and fasteners are assembled to the faucet before the faucet is placed in position. This can be done above the sink.

1. Slide the decorative ring over the tubing connections and up to the bottom of the faucet.
2. Slide the gasket over the tubing connections and up to the bottom of the faucet.
3. Slide the standoff onto the threaded tube, followed by the standard washer, the lock washer and nut.
4. Screw the threaded hose connector on the end of the threaded tube.
5. Connect the blue 3/8-inch product tubing by firmly pushing it into the connector.
6. Push the black 3/8-inch tubing onto the small hose barb. The red 1/2-inch tubing is pushed onto the large hose barb.
7. Put the faucet into position.
8. The horseshoe clip is positioned around the threaded pipe under the sink and above the standoff. This clip should engage the tubing connected to the air gap.
9. Tighten the nut against the clip to hold the faucet in position.

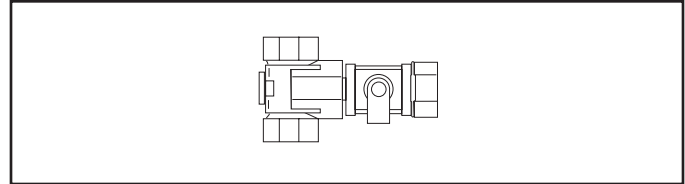


Figure 5

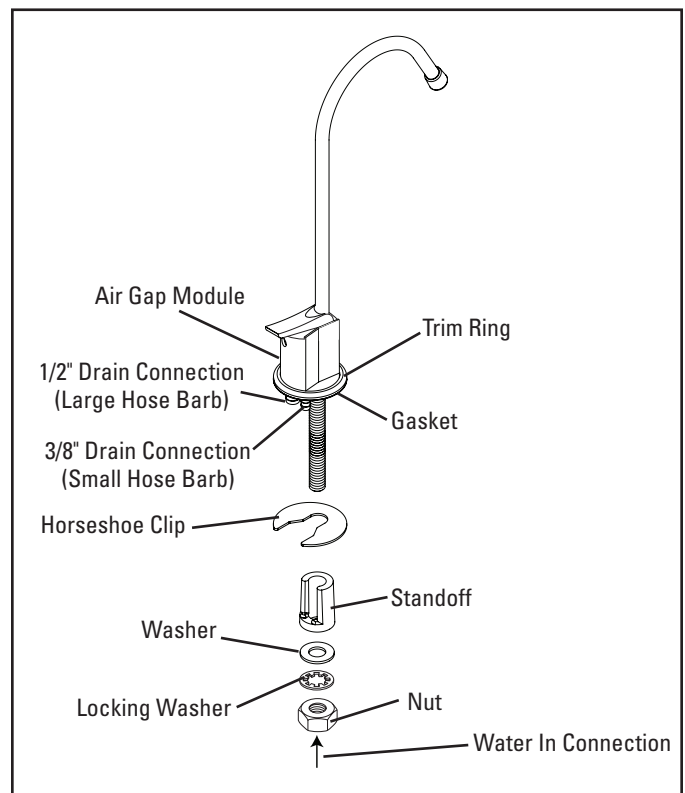


Figure 6

INSTALLATION cont.

Step 4: Make Tubing Connections

The connections to the faucet should be complete, the remaining connections are:

- Feed connection—clear tubing from feed valve to white elbow connector
- Drain connection—either red tubing from the air gap or black tubing from grey elbow connector will attach to the drain adapter
- Permeate connection—blue tubing from faucet to blue elbow connection
- Attach the fittings to the manifold

A typical connection is shown in Figure 7 Side View and Cutaway of Tubing Fitting.

NOTE: For optimal system performance, we recommend using tubing lengths that are as short as possible.

Postfilter

Install the postfilter in line with the blue permeate tubing. Make sure flow direction aligns with water path. Secure tubing with collet lock clips.

Drain Adapter (Optional)

The drain adapter has a rubber inlet that accepts the 3/8-inch black drain tube or the 1/2-inch red tube. The 3/8-inch black tubing will connect here if the faucet is not using the air gap module.

When the tubing is in position, use the supplied hose clamps to secure the connection.

NOTE: When sliding tubing into the drain adapter inlet, wet the tubing. Water will help the tubing slide into the rubber inlet.

Feed Pressure Gauge

The supplied pressure gauge can be connected to the feed line to monitor system feed pressure. For proper system performance, the dynamic feed pressure must be between 40 psi (2.76 bar) and 80 psi (5.52 bar) when the system is in operation.

CAUTION: The feed pressure gauge is intended for use only during installation and troubleshooting of the RO system. The pressure gauge should be removed during normal system operation because some regulatory agencies did not evaluate the RO system with the feed pressure gauge in place.

Step 5: Install RO Assembly

The RO Assembly includes the following components: sumps (3), support leg, prefilter, RO membrane elements (2), and postfilter. The tubing is attached to the manifold by the elbow connectors. When choosing a location for the system, allow enough tubing for it to be moved for periodic servicing of the filters and membrane elements (Figure 8 RO Assembly).

⚠ WARNING: Do not attempt to mount/hang the system. Do not try to drill mounting holes anywhere on the system. If putting above ground/cabinet level, a sturdy, permanent shelf is recommended.

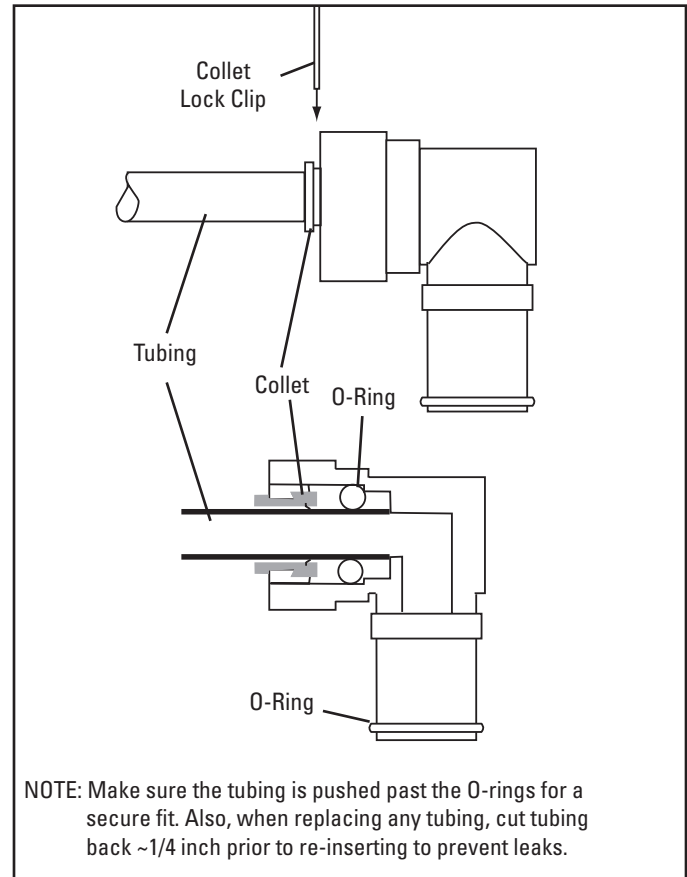


Figure 7 Side View and Cutaway of Tubing Fitting

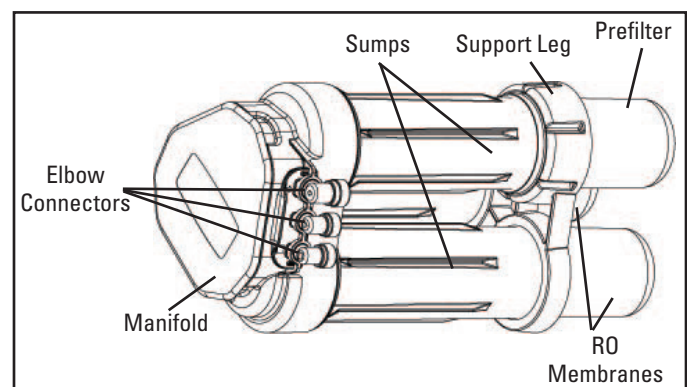


Figure 8 RO Assembly

INSTALLATION cont.

Recommended Placement Positions

The RO assembly should be positioned in one of two ways.

The first position is with the unit standing upright using the support leg with the sumps horizontal. The tubing is directed to provide the best fit.

The second position, sets the unit on end so the sumps are pointing up. The tubing is directed upward and the locking bar is down to lock the tubing connections. See Figure 9 System Positions.

NOTE: Ensure that the support leg is installed on the sumps.

Connection Lubrication

Connections with O-rings must be properly lubricated. The following instructions describe the method and locations for lubrication.

Six packets of silicone lube are supplied. One packet should be completely used to lubricate the O-ring contact surfaces in the 3 manifold ports and 2 RO membrane locations (Figure 10). Follow Figure 11 and lubricate the filter seat and the flat surface below the threads for the 3 sump locations. Use a complete packet of silicone for each sump location.

NOTE: To properly lubricate the O-ring contact area, a film of clean silicone grease is applied. The film should cover all of the surface area that the O-ring will slide over and seal with. Do not use grease containing petroleum products.

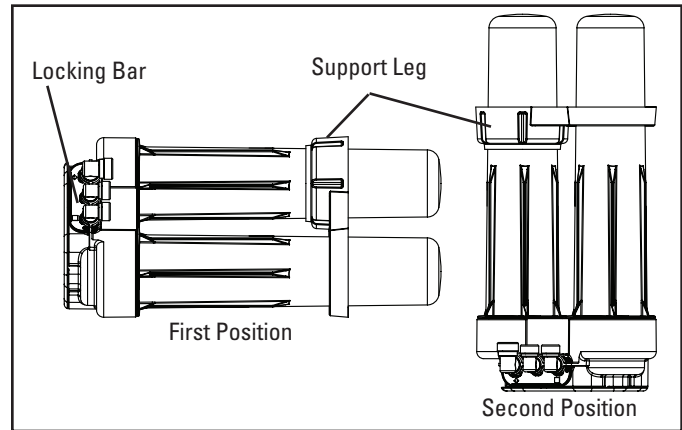


Figure 9 System Positions

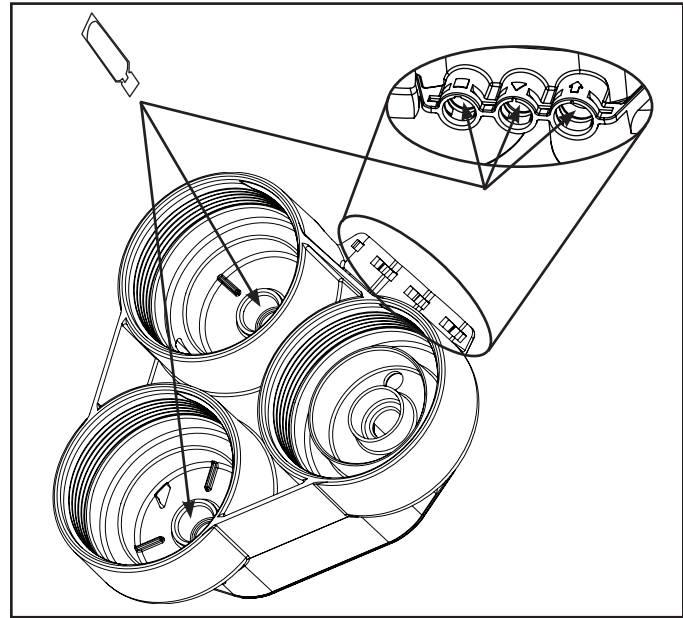


Figure 10

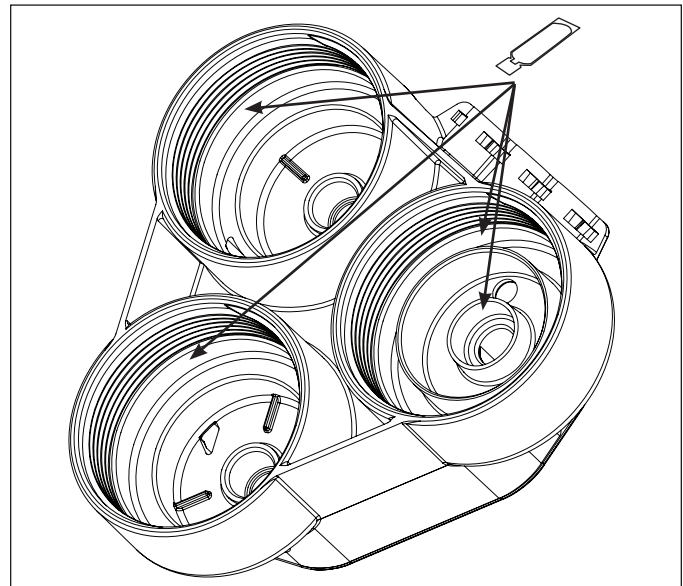


Figure 11

INSTALLATION cont.

The table below shows the coding system for the fitting connections. Each fitting has a unique "keyed" socket on the manifold. Each fitting also has a graphic symbol molded into the elbow with a corresponding symbol on the manifold.

Connector Symbol	Connection	Tubing Color
↵	Feed-Inlet	Natural
—	Concentrate	Black
□	Product	Blue

⚠ WARNING: Be sure to lubricate the manifold ports with silicone lubricant, prior to inserting the fittings into manifold.

⚠ WARNING: Do not turn the incoming water valve on until the locking bar is in place.

When all of the connections have been made, use the locking bar to hold the fittings in position. Match the symbols on the locking bar to the corresponding symbols on the manifold (Figure 12).

Step 6: System Startup

1. Inspect all connections.
2. Position manifold horizontal with openings facing up.
3. Remove new membrane elements from plastic packaging. The black and yellow tapes surrounding the membrane are an important part of the membrane element and should not be removed.

CAUTION: Elements contain a foodgrade preservative. The use of sterile/latex gloves is recommended.

4. Lubricate all O-ring seats in the manifold that come in contact with the sump and element O-rings. Refer to "Connection Lubrication" on page 8.

NOTE: To properly lubricate the O-ring contact area, a film of clean silicone grease is applied. The film should cover all of the surface area that the O-ring will slide over and seal with. Do not use grease containing petroleum products.

5. Securely insert O-ring end of membrane elements into manifold.
6. Remove prefilter from packaging. Check that gaskets are in place.
7. Place prefilter in manifold.
8. Replace sumps and tighten until it bottoms out.

Pressure Test System

To check for leaks, the system must be filled with water and brought up to operating pressure.

1. Open cold water feed valve slowly. Run at 1/2 open for a minute, then open fully.
2. Open faucet until water runs.
3. Check for leaks.

NOTE: When the faucet is initially turned on, water may temporarily sputter from the air gap until the air is purged. Allow 1 to 3 hours for any trapped air noise in the system to subside.

4. Purge the system. Open the faucet and run the water through the RO system for two to eight hours.

NOTE: A minimum of 2 hour flush is required to remove the food grade preservative. After 8 hours performance will reach its stable maximum performance.

The RO system is now ready for use.

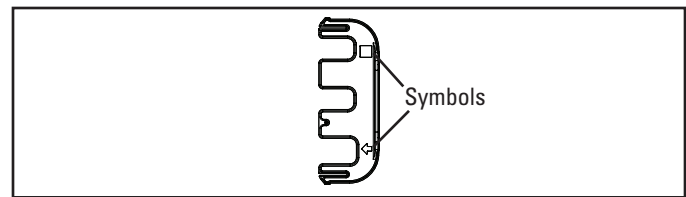


Figure 12

TO CARE FOR THE RO SYSTEM

The components of the RO system are designed to function with minimal maintenance. However, the membrane elements and filters will need to be replaced on a regular schedule.

For optimal performance the system should be flushed for 2 minutes if periods of inactivity extend past six hours.

REPLACEMENT OF PREFILTER AND POSTFILTER

The carbon/sediment prefilter reduces sediment and certain chemicals, such as chlorine, from the water. Depending on water use and the amount of impurities, this filter should be replaced every six to twelve months for point-of-use applications.

Whenever the prefilter is replaced, the postfilter should also be replaced.

Installations using more than 20 gallons product water per day should install external filters (not supplied) to reduce chlorine and sediment larger than 10 microns.

REPLACEMENT OF RO MEMBRANE ELEMENTS

The functional life of the RO membrane elements will vary based on feed water quality. Product water should be tested periodically to verify the membrane elements are performing properly. For most point-of-use applications, the RO membrane elements should be replaced every two to four years.

NOTE: Softened water is recommended for optimal system performance and RO membrane element life.

REPLACEMENT OF THE PREFILTER, POSTFILTER, AND RO MEMBRANE ELEMENTS

1. Turn off the water supply to the RO System.
2. Reduce system water pressure by opening the faucet.

CAUTION: Even with the water supply turned off the membrane and prefilter sumps will contain a considerable amount of water. By positioning the RO assembly in a sink or tub, most of the water will be contained.

3. Disconnect locking bar and place the fittings (with tubing still connected) into a tub or bucket.
4. Move system into a contained area, such as a sink or tub.
5. Remove the support leg from the three sumps and unscrew the top sump as shown to access the prefilter element. The support leg functions as a wrench to loosen the sump, Figure 13.

NOTE: There is no need to disconnect tubing from fittings on the manifold. Remove locking bar and pull fittings out. Lubricate O-rings with silicone prior to re-assembly.

NOTE: If changing only the prefilter and postfilter, the other sumps do not need to be removed.
If changing the membrane elements, the prefilter and postfilter should also be changed.

6. Remove exhausted prefilter and discard.

CAUTION: The person handling the filters and membrane elements must have clean hands to keep the system sanitized. The use of sterile/latex gloves is recommended.

7. If changing membrane elements:
 - a. Remove membrane sumps. Remove and discard used elements.
 - b. Remove new elements from packaging.

CAUTION: Elements contain a foodgrade preservative. The use of sterile/latex gloves is highly recommended.

- c. Lubricate element O-rings, brine seals, and sump O-rings with silicone lubricant. Refer to "Connection Lubrication" on page 8 for correct lubrication procedure of elements cartridge.
- d. Securely insert O-ring end of elements into manifold. See Figure 13.

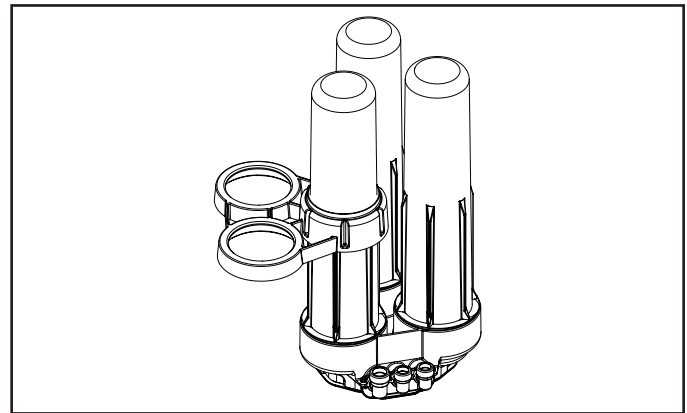


Figure 13

REPLACEMENT OF THE PREFILTER, POSTFILTER, AND RO MEMBRANE ELEMENTS

cont.

- e. Replace sumps and tighten until it bottoms out.

NOTE: The system should be sanitized whenever a membrane element or filter is replaced.

8. Sanitize the system.
 - a. The manifold should be positioned flat with the sump connections facing up.
 - b. Pour a tablespoon (15 milliliters) of chlorine bleach into the center opening of the prefilter sump connection. See Figure 14.
9. Install prefilter.
 - a. Remove new prefilter from packaging. Ensure gaskets are secure. Insert prefilter into proper opening on manifold.
 - b. Lubricate sump O-ring with silicone lubricant.
 - c. With the prefilter element in place, screw the sump into the connection. Tighten until it bottoms out.
10. Replace the postfilter.
 - a. To unlock the fittings from the tubing, push down on the collet sleeves and pull the tubing out.
 - b. Discard the exhausted postfilter.
 - c. To prevent leaks, cut the tubing back approximately 1/4-inch prior to connecting the new postfilter. Make sure flow direction arrow aligns with water path. Reinsert tubing and collect locks.
11. Re-connect the fittings to the manifold and lock in position with locking bar.
12. Re-position the assembly and turn the water supply on. Check the system for any leaks.

CAUTION: When the faucet is opened, water may sputter from the air gap until the trapped air is purged.

13. Open the faucet and run water for two minutes.

NOTE: Carbon fines may be present until the postfilter element is flushed out.

14. Shut off the faucet and allow the system to stand idle for 20 to 30 minutes.
15. Open the faucet and run water for five minutes.
16. Check for any system leaks.

NOTE: If the two RO membrane elements were replaced the system must be flushed according to Step 6 the system startup procedure as stated above.

The RO system is now ready for use.

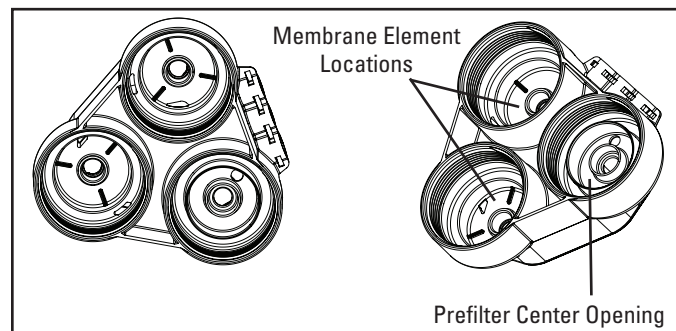


Figure 14

Performance Specifications

Minimum and Maximum Operating Conditions

Condition	Minimum	Maximum
Inlet Pressure	40 psi (2.76 bar)	80 psi (5.52 bar)
Inlet Temperature	40°F (4.44°C)	100°F (37.78°C)
Inlet TDS	50 mg/L	2,000 mg/L
Inlet Hardness	0 mg/L (0 grain)	171 mg/L (10 grain)
Inlet Chlorine	0 mg/L	1.0 mg/L
Inlet Iron	0 mg/L	0.1 mg/L
Inlet Manganese	0 mg/L	0.05 mg/L
Inlet pH	4	10
Inlet Turbidity	0	1 NTU

Dimensions

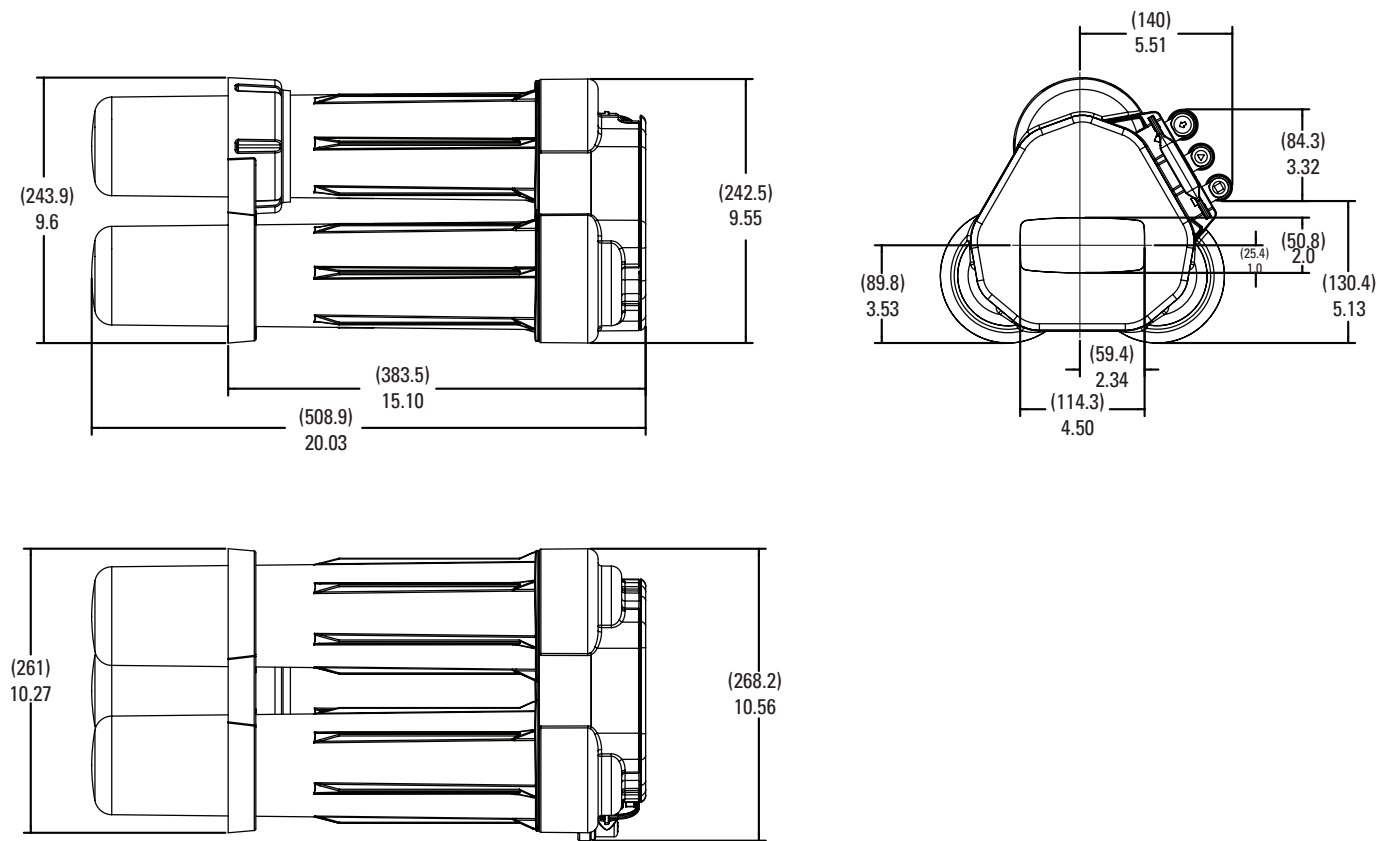


Figure 15

TROUBLESHOOTING

Issue	Possible Cause	Corrective Action
Low product flow rate	Low driving pressure.	Increase feed pressure. Consider pump for low pressure locations. Use short tubing runs to decrease flow restriction. Increase tubing diameter for longer distances.
	Low water temperature or high total dissolved solids (TDS).	Increase feed water temperature or feed pressure to compensate.
	Plugged prefilter.	Replace plugged prefilter. Consider sediment prefilter for non-chlorinated applications.
	Scaled or fouled RO membrane.	Replace membranes.
	Faucets not adjusted properly.	Adjust faucet t-bar setting as tight as possible without causing leaks from the faucet.
	Plugged postfilter.	If flow into the postfilter is acceptable, replace postfilter.
	Leak or kink in product line.	Find and repair leak or kink.
Concentrate water runs to drain after faucet shut off	Plugged prefilter	Replace plugged prefilter. Consider sediment prefilter for non-chlorinated applications.
	Leak in product line.	Find and repair leak. Install pressure gauge in product line to help identify a product pressure leak.
Poor product water quality	Water sample taken during system flush.	Take sample after three minutes of continuous operation.
	Low driving pressure.	Increase feed pressure. Consider pump for low pressure locations. Use short tubing runs to decrease flow restriction. Increase tubing diameter for longer distances.
	Plugged prefilter.	Replace plugged prefilter. Consider sediment prefilter for non-chlorinated applications.
	Scaled, fouled, or damaged RO membrane.	Replace RO membranes.

INSTALLATION INFORMATION AND INSTRUCTIONS FOR [DRAIN-BOA™ MODEL DC9700] DRAIN COUPLING [Please study all information included before first installation.]

Form# 970000 (Sheet 1)
 Drain-BOA™ (P/N DC9700)

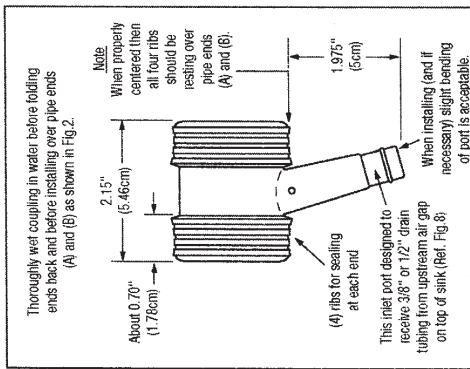


Fig. 1
Drain-BOA™ Rubber Coupling folded back on itself at each end and ready to be installed in the kitchen sink tailpiece
 [Measures just over 2.125" when fully folded back as shown.]

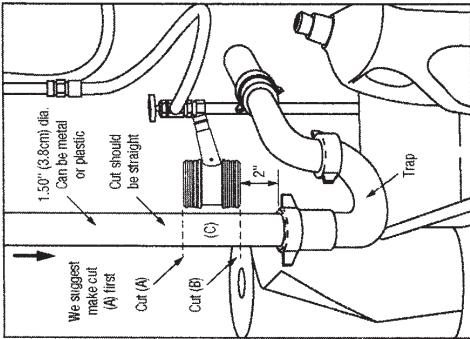


Fig. 2
Typical view under kitchen sink with 1.5" dia. plastic tailpiece and sink trap.
 [Use very fine teeth hacksaw blade, recommend 32 teeth per inch. Use folded coupling as a template to mark tailpiece for cuts (A) and (B). Discard item (C).]

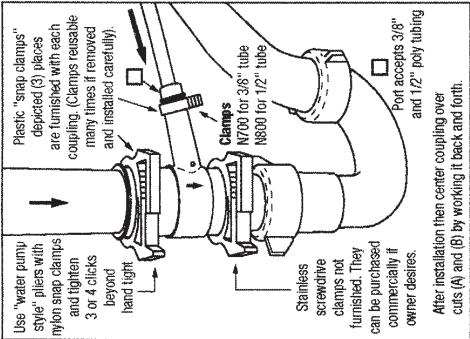


Fig. 3
Typical view of (Fig. 2) plastic tailpiece after installing the Drain-BOA™ Rubber Coupling
 [Polyethylene drain tubing from air gap properly inserted to inner stop and clamped.]
 [Note: Wet tubing only with water before installation.]

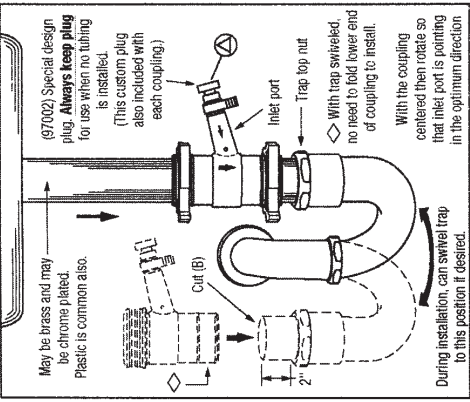


Fig. 4
Depicts metal 1.5" kitchen sink tailpiece with Drain-BOA™ properly installed.
 [Solid plug depicted here in lieu of the typical 3/8" O.D. Polyethylene tubing as if the "R.O." system has been removed.]
 Solid plug (97002) must be installed at all times when tubing is not installed.

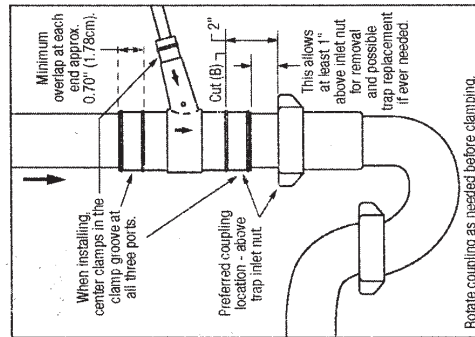


Fig. 5
This coupling depicted before the clamps are installed.
 [If large stainless screw drive clamps are used (ref. Fig. 6), their width must be 0.50" (preferred).]

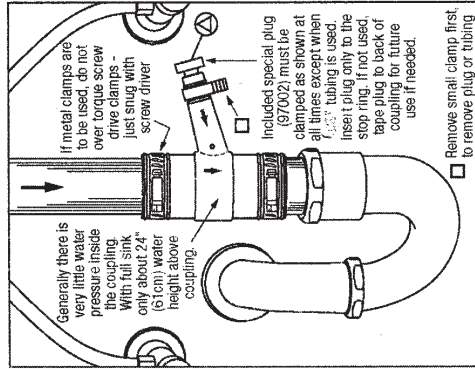


Fig. 6
Depicts Drain-BOA™ coupling installed with stainless steel screwdrive clamps on the large ports.
 [Either tubing or solid plug (97002) must be installed at all times, otherwise leakage will occur out this port.]

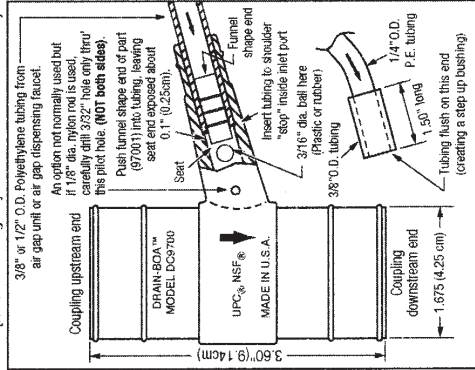


Fig. 7
[Depicts certain dimensions and marking Cut 3/8" or 1/2" poly tubing square and wet only with water before inserting to "stop".
 [Above Fig. shows partial cutaway of inlet port for illustration purposes. Nylon rod, ball and seat (Kit DC97) may be a possible option later.]

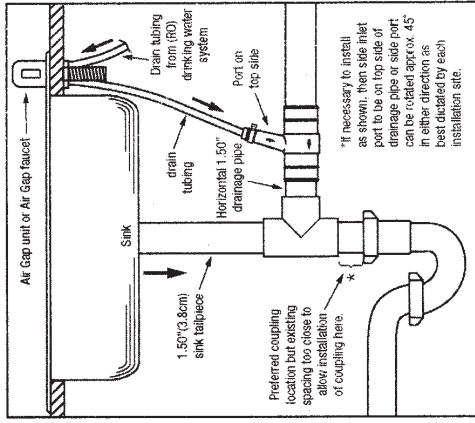


Fig. 8
Depicts Drain-BOA™ coupling installed in a horizontal branch below kitchen sink, due to space limitations at the preferred installation site.
 [Always install unit according to flow arrows.]



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