MASTER
Water Conditioning Corp.

"OBSOLETE"
6/99

MODEL NUMBER

PURO-25T

REVERSE OSMOSIS DRINKING WATER SYSTEM

Installation, Operating and Service Manual

TESTED AND VALIDATED
Water Quality
S-300
UNDER INDUSTRY STANDARDS

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SECTION I. INTRODUCTION

Your new Reverse Osmosis (R.O.) Drinking Water System uses a combination of filtration technologies to reduce unwanted contaminants in a water supply. The following steps combine to give you the best in clear sparkling drinking water:

MECHANICAL FILTRATION/ACTIVATED CARBON– The sediment prefilter will remove the larger particles such as silt, rust and scale. Its 5 micron (equal to 0.0002 inch) nominal rating helps to give maximum life to the R.O. Membrane. Activated carbon particles contain a vast network of pores. The tremendous surface area of these pores (typically 800–1200 square meters per gram of carbon) gives the carbon very good adsorptive sites for chlorine as well as other substances that contribute to taste and odors.

REVERSE OSMOSIS MEMBRANE – The R.O. Membrane is the heart of the filtration system. It is designed to reduce the dissolved mineral content of the water. Minerals picked up in the environment by the water are measured as Total Dissolved Solids (T.D.S.). In the Reverse Osmosis process, dissolved minerals are separated from the incoming water (Feed Water) to produce the product water (the Permeate). The excess minerals are rinsed to drain (the Reject Water).

The membrane is specially constructed, fully aromatic polyamide film and is classified as a Thin Film Composite (T.F.C.).

The spiral wound construction of the R.O. Membrane provides maximum surface area for water production and is less susceptible to fouling by particulate matter, turbidity and colloidal materials.

ACTIVATED CARBON POST FILTER – The product water from the Holding Tank passes through the Activated Carbon Post Filter Cartridge on the way to the Dispensing Faucet. The Activated Carbon Post Filter Cartridge reduces tastes and odors that may pass through the system. It adds a final "polish" to the water.

AUTOMATIC SHUTOFF VALVE – The A.S.O. Valve senses when the product water tank is full and closes the feed water supply to prevent excess reject water from going to drain when the unit is not producing water.

TYPICAL PURO – 25T INSTALLATION DIAGRAM

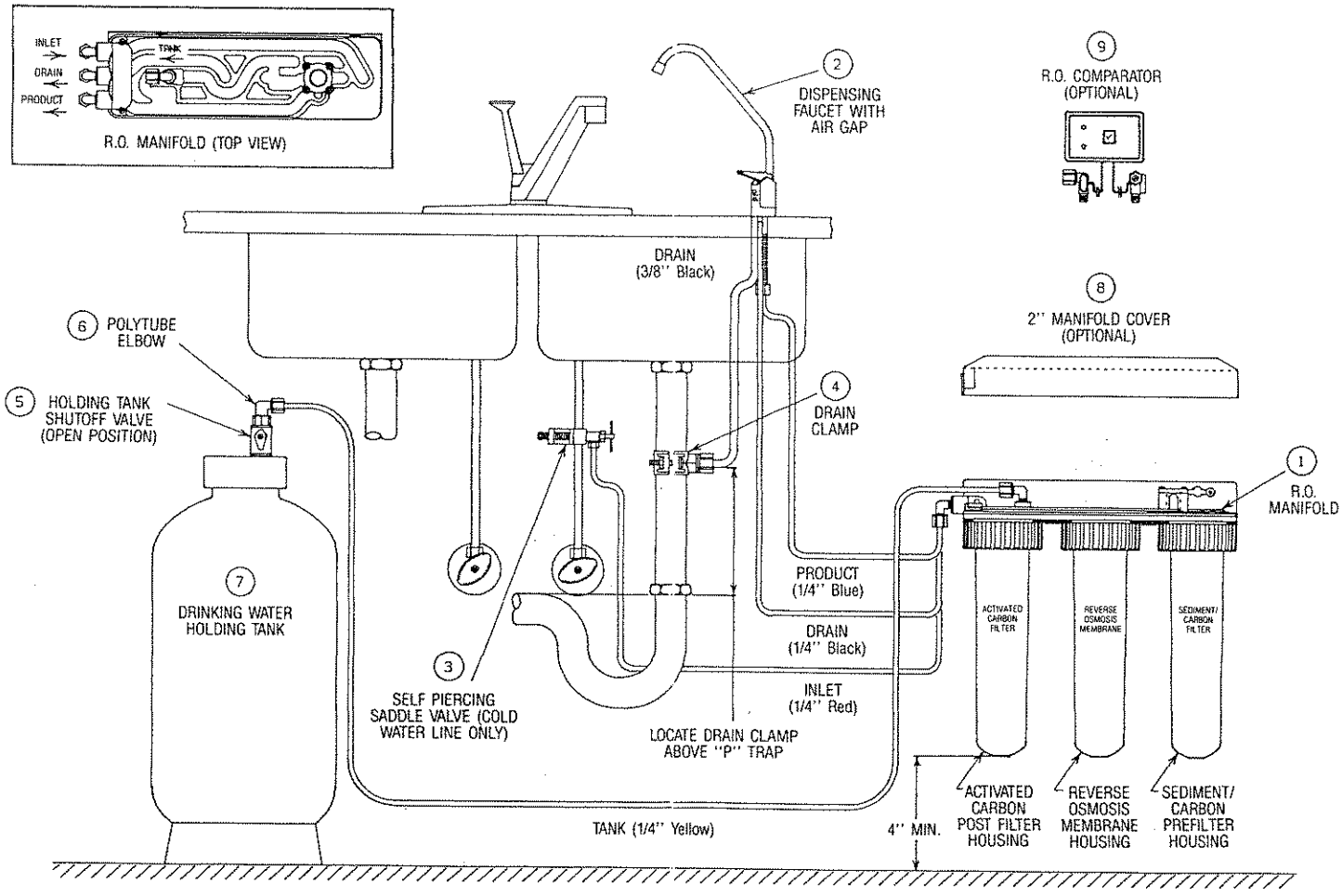


Figure 1

SECTION II. SPECIFICATIONS

TABLE A – QUALIFIED SYSTEM PERFORMANCE:

Because the performance of an R.O. Membrane is highly dependent upon pressure, temperature, T.D.S., the following should be used for comparison purposes only.

MODEL NUMBERS			PURO - 25T
Membrane Rating[1]	Production		25±2 gpd (76–114 lpd)
	T.D.S. Reduction		95% min.
System Rating	Warm Climate[2]	Production	17±4 gpd (49–79 lpd)
		T.D.S. Reduction	90%+ typical
	Cold Climate[3]	Production	9±2 gpd (26–42 lpd)
		T.D.S. Reduction	90%+ typical
Drain (reject water) flow			3–4 × product flow
Percent Recovery			20–25%
Product Storage Capacity (at 5 psi tank precharge and 40 psi water pressure in tank)			RO Mate 4=2 gal.
Empty product storage tank precharge			5–10 psi air
Replacement Sediment/Carbon Prefilter Cartridge			#S7028
Replacement Activated Carbon Post Filter Cartridge			#S7025
Replacement Reverse Osmosis Membrane			#S1227RS

[1] Industry standards measure R.O. Membranes' performance with no back pressure on the product water, at 60 psi (410kPa) and 77°F (25°C). Further conditions on the above are 500 ppm T.D.S. and a 15% recovery rate. For performance conversions from standard conditions to local conditions see Tables C and D on page 14.
Production rate and T.D.S. reduction figures are for a new Membrane that has been rinsed for 24 hours.
The production rate of a new Membrane can decrease by 10% per year or more, depending upon the scaling and fouling tendencies of the Feed Water.

[2] Actual capacity measured at 55 psi, 77°F, and 750 ppm T.D.S. per Industry Standard S-300-91.

[3] Actual capacity measured at 50 psi, 50°F, and 325 ppm T.D.S.

TABLE B – RECOMMENDED OPERATING LIMITS FOR FEED WATER:

SPECIFICATIONS	T.F.C. MEMBRANE
Water Pressure	40–125 psi (275–860 kPa)
T.D.S.	2000 ppm (also mg/l) max.
Temperature	40–110°F (4–43°C)
pH	5–10
Hardness	Less than 10 gpg or soften
Iron	Less than 0.1 ppm (also mg/l)
Manganese	Less than 0.05 ppm (also mg/l)
Hyrogen Sulfide	None
Chlorine	None (see note)
Bacteria	Must be potable**

NOTE: Chlorine will damage a T.F.C. Membrane. The Sediment/Carbon Prefilter Cartridge will remove chlorine from the incoming water. Change cartridge every 6 months, more often if the water contains more than 1 ppm chlorine.

** DO NOT USE THIS SYSTEM WHERE THE FEED WATER IS MICROBIOLOGICALLY UNSAFE OR WITH WATER OF UNKNOWN QUALITY WITHOUT ADEQUATE DISINFECTION BEFORE OR AFTER THE UNIT.

These systems have been tested under Industry Standard S-300-91 for T.D.S. reduction and structural integrity only.

SECTION III. PREPARATION

A. Major System Components

The following components comprise the R.O. Drinking Water System. (Refer to Fig. 1. page 3 for general system layout.)

1. An R.O. Manifold assembly consisting of the manifold, sumps, sump nuts, sump O-ring and mounting bracket.
2. A Drinking Water Holding Tank.
3. An Air Gap Faucet kit.
4. A self-piercing Needle Valve kit.
5. A Drain Clamp kit.
6. Plastic Tubing and tube connectors with brass or plastic insert.
7. A Reverse Osmosis Membrane sealed in a plastic bag.
8. An Activated Carbon Post Filter Cartridge, shrink wrapped.
9. A 5-micron Sediment Prefilter Cartridge, shrink wrapped.
10. A T.D.S. Monitor Kit (optional*) with feed water and product water test cells.
11. Other items necessary for installation may include wood screws or machine screws and nuts for mounting the manifold, or concrete anchors for hanging on basement wall, additional tubing or tube connectors, plastic wire ties for organizing tubing.

* The T.D.S. Monitor may be necessary to conform to state or local codes, check with the local plumbing authority.

B. Tools Recommended for Installation

The following tools will cover most of the installation sites encountered:

1. 3/8″ variable speed electric drill.
2. Extension work light with outlet.
3. Safety glasses.
4. 1-1/4″ porcelain hole cutter kit.
5. 1-1/4″ Greenlee hole punch and 1/8″ and 1/2″ metal drill bits for pilot hole.
6. Center punch and hammer.
7. 1-1/4″ wood bit.
8. Concrete drill bits.
9. Assorted wood and metal drill bits including 7/32″ metal drill bit.
10. Phillips head and flat blade screw drivers.
11. 1/2″, 9/16″ and 5/8″ open end wrenches.
12. 10″ Crescent wrench with jaws taped to hold faucet.
13. Basin wrench or 10″ pipe wrench.
14. Teflon tape.
15. Wide masking tape or duct tape.
16. Plastic tubing cutter.
17. Extra plastic tubing.
18. Low range air pressure gauge.
19. Bicycle hand air pump.
20. Small bottle of liquid chlorine bleach.
21. Graduated measuring cylinder.
22. Paper towels, wisk broom and assorted clean up materials.

C. Site Selection for Major System Components

The R.O. System was designed to fit under a sink, however, because of space limitations or other reasons, the system's flexible design allows for other locations. When determining the locations remember that access to a cold water tap line, the household drain, and ease of filter replacement are important considerations.

All components and tubing should be located in an area that does not see freezing temperatures. If winter temperatures are severe, the area should not see temperatures below the minimum temperature listed in Table B. page 4 for proper performance. Do not expose unit or tubing to direct sunlight.

1. **Air Gap 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″ diameter flat surface is required above and below the mounting site. The thickness of the mounting surface should not exceed 1-1/4″. Watch for strengthening webbing on the underside of cast iron sinks.
2. **Drinking Water Holding Tank** – The holding tank may be placed where it is convenient within 10 feet of the faucet, under the sink or in an adjacent cabinet are best choices. If longer run of tubing is required, the tubing should be the 3/8″ diameter O.D. size to prevent a high pressure drop. Remember, these tanks can weigh up to 30 pounds when full of water, a firm, level area is required.
3. **R.O. Manifold Assembly** – The manifold has a reversible panel mounting bracket that allows mounting on either the right or left side of the under-sink area or a cabinet. Mounting in the basement is also an option, one location is near the laundry/utility sink where cold potable water and drain access is handy. The mounting location should allow adequate clearance and accessibility for cartridge changes.
4. **Feed Water Connection** – The self-piercing feed water shut off 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 R.O. Membrane.

5. **Drain Connection** – The waste water must go to drain through an anti-siphon air gap. The air gap is provided for in the base of the faucet. If discharging into an utility sink or standpipe, an air gap of greater than 1" above the flood rim must be provided.

   Do *NOT* connect the system drain line to the dishwasher drain or near the garbage disposal. Backpressure from these units may cause the air gap to overflow.

SECTION IV. INSTALLATION STEPS

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

NOTE: Some codes may require installation by a licensed plumber; check with the local plumbing authority prior to installation.

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

A. **Faucet Installation** – The faucet contains an anti-siphon air gap. While the system is producing water, the drain water flows from the R.O., through the air gap and then to the household drain. The purpose of the air gap is to prevent water in the drain from backing up into the R.O. Drinking Water System.

NOTE: For proper installation the Air Gap Faucet has a critical level line "CL" marked on its body and should be mounted so that the "CL" line is at least one (1) inch (26mm) above the flood rim of the sink.

The easiest installation is to use an existing spray attachment hole. If the spray faucet hole is not available, then the sink top must be drilled. Choose a convenient location as described in Sec. III.C.1. page 5.

1. Mark the location of the center of the faucet base.

2a. Drilling a stainless steel sink:

- Center punch the hole to provide a starting point for the drill.
- Start with a smaller drill as a pilot, and then drill a 1/2" diameter hole to accept the bolt of a 1-1/4" Greenlee Hole Punch (1-1/4" chassis punch).
- Clean away any chips.
- Install the punch and tighten the nut to cut the hole.
- Deburr any sharp edges.

2b. Drilling a porcelain sink:

It is best to use a special 1-1/4" diameter cutter designed for porcelain. A carbide tipped masonary bit is a second choice.

- Place a piece of tape over the area to be drilled to help prevent chipping.
- Drill a pilot hole for the porcelain cutter. Use the pilot drill supplied with the kit or a carbide tipped drill.
- When drilling the 1-1/4" hole, drill slowly and carefully, the porcelain chips easily.
- After drilling, clean the area well. Iron filings, if left in place, can cause rust stains.

2c. Drilling a counter top:

NOTE: The counter top must be less than 1-1/4" thick. (See Sec. IV.A.2b. page 6.) Treat ceramic tile as porcelain until the tile is penetrated, then use the carbide tipped metal cutter.

Formica counter tops may be drilled with a good 1-1/4" wood bit, drilling a 3/32" pilot hole will help keep the bit going straight.

3. Assemble and attach the Faucet (Refer to Fig. 2. page 6.)

- Assemble the Body and Spout by removing the plastic shipping plug from the Body and then firmly pressing in the Spout. (Some models may require threading the Spout into the Body.)
- In the following order, place the Face Plate (Escutcheon) on the 7/16" stud.

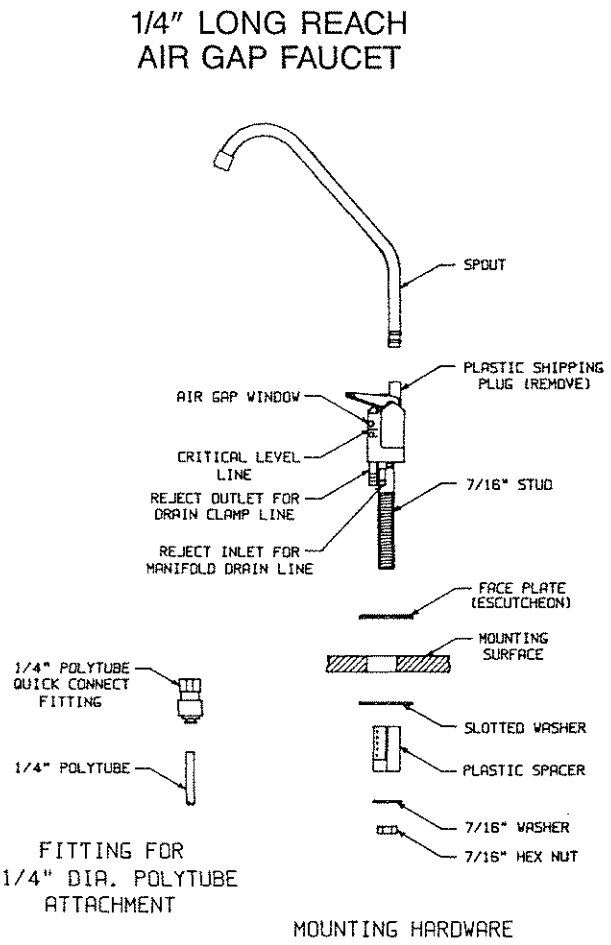


Figure 2

- From the top of the counter place the stud through the mounting hole.
- From the bottom of the counter top in the following order assemble the steel Slotted Washer, the Plastic Spacer (with open end upwards), the small steel 7/16" Washer and the 7/16" Hex Nut.
- Rotate the Spout and Body into position. Align the Split Washer and the Spacer to allow access to the Hose Barbs, and tighten the Hex Nut while holding the faucet in alignment with the padded Crescent wrench. Do not over tighten.

B. **Feed Water "Saddle Tapping" Valve Installation**

Decide on location. Do *NOT* connect to a hot water feed line. If you are not sure of the supply, run the hot water and feel the supply piping. Water over 85°F may cause permanent damage to the R.O. Membrane. (Refer to Fig. 3. page 7.)

1. Shut off the water supply and drain the line.

2a. To install on (soft) Copper Tubing supply line:

- Turn the Handle of the Saddle Valve counter clockwise (outward) until the lance does not protrude from the gasket. It may have to be pushed in.
- Assemble the Saddle Valve on the tubing.
  - –for 3/8" O.D. tubing use the back plate side with small groove to prevent distortion of the tubing.
  - –for larger tubing (up to 5/8" O.D.) use the large groove of the back plate.
- Assemble and tighten the brass screw.
- To pierce the tubing, turn the Valve Handle fully clockwise (inward). A small amount of water may escape from the outlet until you are fully pierced.

When you feel the Valve Handle firmly seated in the clockwise direction, the copper tube is pierced and the valve is closed.

2b. To install on (hard) Steel or Brass Tubing supply line.

- The supply line should now be drained. Use a battery powered or properly grounded drill to avoid shock hazard.
- Drill a 3/16" hole in the supply line; (do not drill through the opposite wall).
- Turn the handle to expose the lance no more than 3/16" beyond the rubber gasket.
- Place the body of the valve over the hole so that the lance fits into the hole.
- Assemble and tighten the brass screw.
- Turn the Valve Handle clockwise (inward) until firmly seated. The valve is closed.

1/4" SELF PIERCING SADDLE VALVE

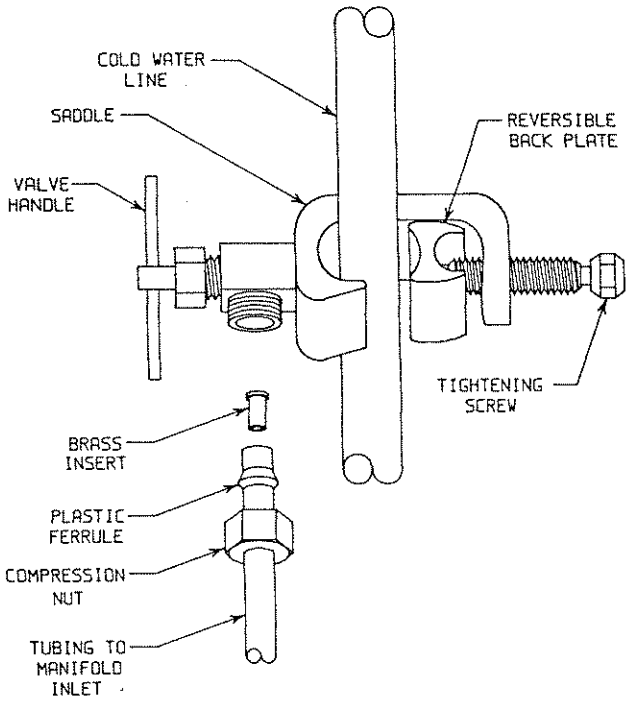


Figure 3

3. With the Saddle Valve closed, open the sink faucet and the water supply and allow the water to run for a few minutes to flush any debris caused by the installation.
   - Close the faucet and check the Saddle Valve for leaks.

C. **Drain Clamp Installation**

Choose the drain outlet location per Sec. III.C.5. page 6.

The following are instructions for discharging into the sink drain pipe. (Refer to Fig. 1. page 3.)

1. Position the Drain Clamp on the sink drain pipe above the drain trap. Allow room for drilling. Tighten securely.
2. Use a battery powered or properly grounded drill. Using the Clamp port as a drill guide, drill a 7/32" hole through the wall of the drain pipe. Do *NOT* penetrate the opposite side of the pipe.
3. Locate the 3/8" Black Drain Tubing which is shipped loose in the box.

   NOTE: When cutting the polytubing make clean, square cuts, failing to do so could result in poor connections and possible leaks.

   NOTE: The lowest point of the line should be the point of connection to the Drain Clamp. There should be no sag in the line as this may cause excessive noise as the reject water is flowing to drain.

Firmly press one end of the tubing over the 3/8" drain outlet hose barb on the Air Gap Faucet. Allow the tubing to relax, then press firmly again to insure proper seating. No connectors are required when attaching hose to the Hose Barbs. Route the tubing to the Drain Clamp and trim to length.

- Refer to Fig. 4. page 8. To connect the Drain Tubing, install the Compression Nut and the large Brass Insert.
- Insert the tubing into the Drain Clamp and tighten the Compression Nut.

D. **R.O. Manifold Assembly Installation**

- Locate the site per Sec. III.C.3. page 5. Various installation sites will require different types of mounting fasteners; be sure the fastener selected will provide a firm, solid mounting. A support panel may be necessary on thin cabinet walls or to span between wall studs on partical board or drywall.
- Do not drill through exterior cabinet walls or leave sharp wood screw points exposed in readily accessible cabinet interiors.

The close proximity of a dishwasher or a trash compactor may require special fabrication of a mounting plate.

1. The mounting bracket will accept either #10 or #12 (5mm) mounting screws spaced on 9-1/2" (24 cm) centers. Allow at least 4" (10 cm) of clearance beneath the filter housings to accommodate cartridge changes. Mark the two locations (the bracket can be used as a template). Install the screws and tighten them until the heads are about 1/8" from the wall.
2. Hang the Manifold Assembly on the mounting screws and tighten. *DO NOT OVER-TIGHTEN.*
3. Locate the 1/4" Red Feed Water Tubing from the "Inlet" port of the R.O. Manifold. (Refer to Fig. 1. page 3.) Run the tubing along its course to the Saddle Tapping Valve, trim to length.

   Refer to Fig. 3. page 7. To the end of the red polytube install the Compression Nut, the small *Plastic* Ferrule, and the small Brass Insert. Connect to the Saddle Tapping Valve.
4. Locate the 1/4" Black Drain Port Tubing that is attached to the "Drain" Port of the R.O. Manifold. Run the tubing along its course to the 1/4" Hose Barb of the Air Gap Faucet, trim to length and connect by firmly pressing over the barb. Allow the tubing to relax, then press firmly again to insure proper seating.
5. Locate the 1/4" Blue Product Water Tube from the "Outlet" Port and run it along its course to the Air Gap Faucet and trim to length.

3/8" DRAIN CLAMP ASSEMBLY

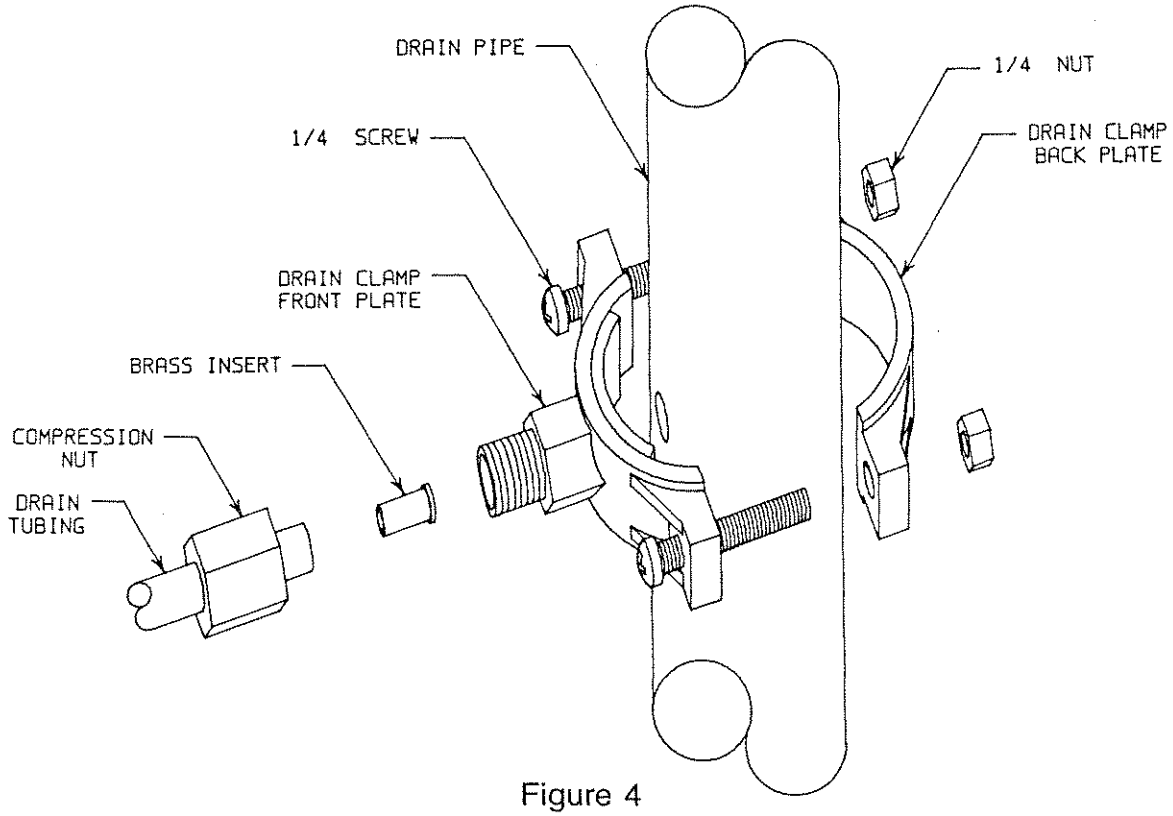


Figure 4

To the end of the 7/16" stud on the faucet screw on the 1/4" Polytube Quick Connect Fitting. Once snug by hand take a pair of pliers and tighten the fitting an additional half turn. Don't over tighten.

Insert the product water tubing into the fitting. The fitting will grab the tubing and hold and seal it in place.

NOTE: If you want to pull the tubing out for some reason, push the ring around the tubing up and pull the tubing out.

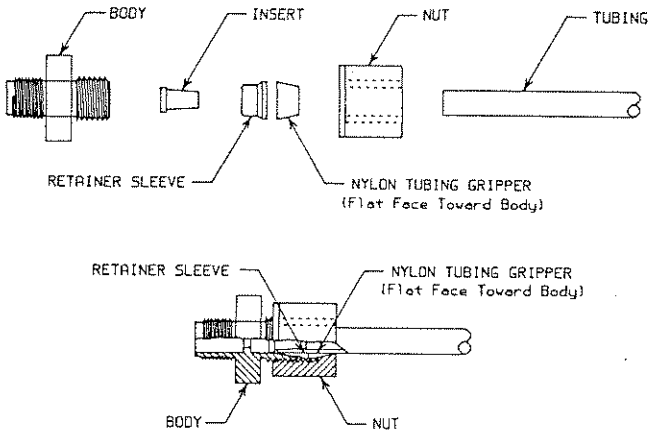
E. **Position the Drinking Water Holding Tank, and Make the Final Hose Connections.**

1. Check the tank precharge pressure, if less than 5 psi, use a bicycle hand pump or other pump to bring the pressure up to the 5 to 10 psi range.

2. Wrap the white teflon tape, included in the box, three times around the 1/4" male outlet thread, in the direction of the threads (clockwise, when looking down on the holding tank). The tape will act as a thread sealant. Assemble the holding tank Shut Off Valve and the Polytube Elbow. (Refer to Fig. 1. page 3.)

   CAUTION: The plastic tubing connectors supplied must be assembled correctly to assure a pressure tight connection. Please read Fig. 5 and become familiar with their assembly.

POLYTUBE COMPRESSION FITTING



This filtration system uses a standard series of plastic fittings. The nut, gripper and retainer sleeve is a 3 piece assembly that can come apart if removed from the body. Parts must be reassembled exactly as shown to function properly.

When connecting tubing to these plastic fittings, it is first necessary to assemble the nut, gripper and retainer sleeve on the tubing before inserting the brass or nylon inserts. If the nut should slip up the tube, the gripper may prevent it from being slipped back down the tube to make a connection. The gripper can be released by holding the tube horizontally and spinning the nut vigorously with a finger.

Figure 5

3. Locate the length of 1/4" Yellow Tubing connected (refer to Fig. 1. page 3) to the "Tank Port" of the R.O. Manifold. Run it along its course and trim to length. Referring to Fig. 5, connect it to the Polytube Elbow.

   NOTE: If the optional T.D.S. Monitor is used, its location and the location of its test cells should be determined at this time, before the final polytubing is run. Refer to the instruction sheet included with the monitor.

   The "In" Cell should be located in the Feed Water Tubing line before the R.O. Membrane.

   The "Out" Cell should be located at the Product Water Tubing Line, between the "Outlet" Port and the Dispensing Faucet.

F. **Start Up**

At time of start up and each time the filters are changed the system should be sanitized (also see Maintenance Sec. V.B.1–4. page 10).

1. Sanitizing the system. Use a drip pan to aid clean-up.

   NOTE: The system should be sanitized *BEFORE* installing the Sediment/Carbon Prefilter Cartridge, the Activated Carbon Post Filter Cartridge or the R.O. Membrane.

   - Use a good quality unscented 5-1/4% liquid chlorine bleach such as Clorox.
   - Open the dispensing faucet by lifting the black handle and open the Holding Tank shut off valve (the handle should be parallel with the valve body).
   - Remove the Sediment/Carbon Filter Housing, on the R.O. Manifold–it is the farthest of the three from the in-out ports. Add one capful of bleach (this is approximately 2 tsp. or 10 ml). Check the Housing O-ring for proper position in its groove, engage and tighten the Housing Nut hand tight only.
   - Remove the other two Housings and to each, add a capful of bleach, check the Housing O-rings and tighten the Housing Nuts hand tight only.
   - Slowly open the Saddle Tapping Valve on the Feed Water Line (turning counter clockwise).
   - As soon as the water begins to come out of the Dispensing Faucet, close the Faucet.
   - Let stand for 15 minutes.

   NOTE: During this time, check the system carefully for leaks.

   - At the end of 15 minutes, *CLOSE* the Saddle Tapping Valve and open the dispensing faucet.
   - Allow the Holding Tank to completely drain, then remove the Sediment/Carbon Filter Housing (the farthest of the three

from the in-out ports), empty, and install the Sediment/Carbon Prefilter Cartridge.

- Remove the Activated Carbon Filter Housing (the closest of the three to the in-out ports), empty and install the Activated Carbon Post Filter Cartridge.

2. Installing the R.O. Membrane:
   - Remove the R.O. Membrane Housing and empty.
   - Insert the Membrane up into the manifold. (The O-rings should be up toward the manifold.) Check the Housing O-ring for proper position in its groove, engage and tighten the Housing Nut hand tight only.
3. Rinsing the system:
   - Slowly open the Saddle Tapping Valve fully counter clockwise.
   - The Holding Tank Valve should be open.
   - Check the Air Gap Module to be sure that the drain water is flowing.

   The R.O. System is now making water.
   - Do not open the Faucet for at least 6 hours.
   - Do not use the first two full tanks of water.

   When the Faucet is first opened, expect air and carbon fines (very fine black powder) from the Carbon Filter to be rinsed out. This is normal for the first tank of water or after the Carbon Filter is changed.

   CAUTION: The R.O. Membrane is shipped with a preservative in it (1.0% sodium metabisulfite). This will be rinsed out with the first water produced. Allow the Holding Tank to fill (overnight) and discard the first two full tanks of production. It takes approximately 6 hours to make a tank full.

SECTION V. OPERATION AND MAINTENANCE

A. Normal Operation

1. It is normal for the Total Dissolved Solids (T.D.S.) of the water to be higher than normal during the first 5 gallons of operation, this is due to the sanitizing solution and the new Post Filter. After this water is rinsed to drain, the removal rate should stabilize at a value of greater than 75%. The optional R.O. Comparator measures the T.D.S. reduction and gives an indication of proper performance. Refer to the literature provided with the Comparator for proper installation and use. Water pressure affects the production rate and quality, see Sec. VI, Technical Data, page 11 for more details.
2. R.O. systems produce drinking water at relatively slow rates, it can take up to 6 hours or more to fill the holding tank. Normal operation is to let the Holding Tank fill with water and then draw water as is needed. When the pressure in the Holding Tank falls to a given pressure (as the water is being used) the Automatic Shut Off Valve (A.S.O. Valve) will start water production and the system will refill the Holding Tank. When the Holding Tank is full and no water is being used, the A.S.O. Valve will automatically shut off the feed water to conserve water.

   The more water that is used (up to the capacity of the system) the better the R.O. system will function. Utilize other uses for the water, such as flowers, pets and rinsing glassware.

   After periods of non-use, such as a week's vacation, it is better to empty the holding tank and allow the system to produce fresh water for use. If the system is not used for 3–4 weeks or longer, it is a good idea to re-sanitize the system and to change the Sediment/Carbon Prefilter and the Activated Carbon Post Filter Cartridges.

B. Changing Filters

THIS R.O. SYSTEM CONTAINS FILTERS WHICH MUST BE REPLACED AT REGULAR INTERVALS TO MAINTAIN PROPER PERFORMANCE. USE ONLY FACTORY APPROVED FILTERS.

The recommended interval for changing the filters (not the R.O. Membrane) is every six (6) months. Typical T.F.C. Membrane life expectancy is three years. Local conditions may dictate more frequent changes.

NOTE: If the R.O. Membrane is to be replaced, see Sec. IV.F.1–3. page 9, for the proper procedure.

Use a drip pan to catch any water that may spill when the Filter Housings are removed. Refer to Fig. 1. page 3 for component location.

1. Close the Saddle Tapping Valve by turning fully clockwise and open the Dispensing Faucet by lifting the handle. Allow the Holding Tank to empty.
2. Loosen and remove the Sediment/Carbon Filter and the Activated Carbon Filter Housings. Discard the cartridges.
3. Wash the inside of the Housings using a mild detergent and a soft cloth. Do not use abrasive cleaners or pads. Thoroughly rinse all soap from the housings before reassembly.
4. To sanitize the system and replace the filter cartridges:

   NOTE: The system should be sanitized *before* installing the Sediment/Carbon Prefilter and Activated Carbon Post Filter Cartridges.

- Use a good quality unscented 5-1/4% liquid bleach such as Clorox.
- Add one cap full of bleach (this is 2 tsp. or 10 ml) to the Sediment/Carbon Filter Housing and temporarily install the housing without the Sediment/Carbon Prefilter Cartridge.

  Check the Housing O-ring for proper position in its groove, engage and tighten the Housing Nut hand tight only.
- Add one cap full of bleach to the Activated Carbon Filter Housing. Carefully fill the housing with tap water and temporarily install the housing, without the Activated Carbon Post Filter Cartridge.
- The Dispensing Faucet should be open, slowly open the Saddle Tapping Valve on the Feed Water Line.
- As soon as water begins to drip out of the Dispensing Faucet, close the Faucet.
- Let the system stand for 15 minutes.
- At the end of 15 minutes, in the following order, close the Saddle Tapping Valve, close the Holding Tank Valve and open the Dispensing Faucet to release the pressure.
- Remove the Sediment/Carbon Filter Housing and empty. Remove the wrapping and install the Sediment/Carbon Prefilter Cartridge. Tighten the Housing Nut hand tight only.
- Remove the Activated Carbon Filter Housing and empty. Remove the wrapping and install the Activated Carbon Post Filter Cartridge. Tighten the Housing Nut hand tight only.
- Disconnect the yellow product water tubing that runs from the Holding Tank (see Fig. 1. page 3). Put 50 drops of bleach (this is 1/2 tsp. or 3 ml) into the tubing and reconnect it.
- Slowly open the Saddle Tapping Valve. When water begins dripping out of the Dispensing Faucet, in the following order, close the Faucet and then open the Holding Tank Valve.
- Do not open the Faucet for at least 6 hours.
- Discard the first two full tanks of water produced, they will contain chlorine.
- When the Faucet is first opened, expect air and carbon fines (very fine black powder), from the new Activated Carbon Post Filter to be rinsed out. This is normal for the first tank of water.

SECTION VI. TECHNICAL DATA

A. Water Quality

1. Water quality is normally measured with a special meter that measures the water's ability to conduct electricity. The more dissolved solids in the water, the higher the conductivity. The results are usually reported in **Parts per Million** (ppm) or **Milligrams per Liter** (mg/l) of **Total Dissolved Solids** (T.D.S.). (Although technically they are not exactly equal, in most discussions ppm = mg/l.)
2. R.O. Membranes are rated by the amount of dissolved solids that are rejected. This rating is a ratio of the T.D.S. in the feed water to the T.D.S. in the product water and is reported as **Percent Rejection.** If the feed water contained 100 ppm of T.D.S. and the product water contained 10 ppm of T.D.S., 90 ppm have been rejected and the reject ratio is 90%.

$$\text{Percent Rejection} = \frac{\text{Feed T.D.S.} - \text{Product T.D.S.}}{\text{Feed T.D.S.}} \times 100\%$$

EXAMPLE: Feed water 500 ppm T.D.S.
Product water is 75 ppm T.D.S.

$$\text{Percent Rejection} = \frac{500-75}{500} \times 100\%$$

$$\text{Percent Rejection} = .85 \times 100\% \text{ or } 85\%$$

B. Water Quantity

1. Water quantity is termed **Flux** or **Product Water Rate** and is measured as the amount of water produced in one day. It is reported as **Gallons per Day** (gpd) or **Liters per Day** (lpd).
2. The flow of water to drain is the **Reject Water Rate** and is measured as **Gallons per Day** (gpd) or as **Milliliters per Minute** (ml/min).

   Milliliters per minute × .38 = gallons per day

EXAMPLE: The drain flow will fill a graduated cylinder to the 150 ml mark in one minute.

150 ml/min. × .38 = 57 gpd

If the container available measures ounces, use the following conversion:

Ounces per minute × 11.2 = gallons per day

EXAMPLE: The product flow will fill 2-1/2 ounces in two minutes.

2.5 oz. ÷ 2 min. = 1.25 oz./min.

1.25 oz./min. × 11.2 = 14 gpd

3. The **Reject Ratio** is the amount of water produced compared to the amount of water flowing to drain.

$$\text{Reject Ratio} = \frac{\text{Reject Rate}}{\text{Product Rate}}$$

EXAMPLE: The product rate is 14 gpd
The reject rate is 56 gpd

$$\text{Reject Ratio} = \frac{56}{14}$$

Reject Ratio = 4 or 4-to-1

4. The **Percent Recovery** is another way to measure the amount of water produced as compared to the amount actually used.

$$\% \text{ Recovery} = \frac{\text{Product Rate}}{\text{Feed Rate}} \times 100\%$$

EXAMPLE: The product water rate is 14 gpd
The drain water rate is 56 gpd

NOTE: The total flow or feed water rate into the system is the sum of the product flow and the drain flow.

Feed Rate = 14 gpd + 56 gpd = 70 gpd

$$\% \text{ Recovery} = \frac{14 \text{ gpd}}{70 \text{ gpd}} \times 100\%$$

% Recovery = .20 × 100% or 20%

C. **Water Pressure and Temperature**

Most R.O. Membranes are rated at a standardized condition of 77°F (25°C) and 60 psi (414 kPa) discharging to atmospheric pressure.

1. Product water quality and quantity greatly depend upon the **Net Pressure Differential** (Δp) across the R.O. Membrane. This pressure differential is a summation of the feed water pressure at the Membrane, which tries to push the water through, the pressure in the Holding Tank, which tries to push the water backwards and the osmotic pressure, which also tries to push the water backwards.

   The **Osmotic Pressure** is in proportion to the dissolved minerals in the water and can be approximated by 1 psi for each 100 ppm of T.D.S.

EXAMPLE: A feed water with 1500 ppm of T.D.S. would exert a backward pressure of about 15 psi on the membrane.

Net Pressure Differential = Feed Water Pressure
− Holding Tank Pressure
− Osmotic Pressure

The higher the net pressure differential, the higher the quantity and quality of water produced (refer to Table C. page 14).

Some loss of production when using a pressurized Holding Tank is normal.

EXAMPLE: How does a pressurized Holding Tank affect performance?

Typical Automatic Shut Off Valves stop water production when the tank pressure is 2/3 feed pressure. If the feed pressure is 60 psi, the shut off would be at a tank pressure of 40 psi, or a Δp of 20 psi. In worst case, just before shut off at the highest tank pressure, output would be at .33 of rated flow and 90% rejection (from Table C. page 14).

2. **Feed Water Temperature** also has an affect on water production. The lower the temperature, the lower the quantity of water produced (see Table D. page 14).

Water Production Rate = Rated Flow
× Pressure Correction
× Temperature Correction

EXAMPLE: What should the expected performance of a 15 gpd T.F.C. Membrane be given the following conditions: feed water at 40 psi, 500 ppm T.D.S., 60°F and discharging into an open reservoir (no holding tank pressure)?

Net Pressure Differential = Feed Water Pressure
− Holding Tank Pressure
− Osmotic Pressure

Net Pressure Differential =
40 psi − 0 psi − 5 psi

Net Pressure Differential = 35 psi

Referring to Table C. page 14, percent rejection is 93% or:

$$\text{Percent Rejection} = \frac{\text{Feed T.D.S.} - \text{Product T.D.S.}}{\text{Feed T.D.S.}} \times 100\%$$

Solving the equation for Product T.D.S.

$$\text{Product T.D.S.} = \text{Feed T.D.S.} - \left(\frac{\text{Percent Rejection}}{100\%} \times \text{Feed T.D.S.}\right)$$

$$\text{Product T.D.S.} = 500 \text{ ppm} - \left(\frac{93\%}{100\%} \times 500 \text{ ppm}\right)$$

Product T.D.S. = 500 ppm − (.93 × 500 ppm)

Product T.D.S. = 500 ppm − (465 ppm)

Product T.D.S. = 35 ppm

Referring to Table C and D. page 14, the correction factor for a Δp of 35 psi is .58 and that for a temperature is 60°F is .70.

Water Production Rate = Rated Flow
× Pressure Correction
× Temperature Correction

Water Production Rate = 15 gpd × .58 × .70

Water Production Rate = 6.1 gpd

SECTION VII. TROUBLE SHOOTING GUIDE

Problem	Possible Cause	Solution
Low quantity of Product Water from Holding Tank	Saddle Tapping Valve (feed water) is plugged or closed.	Open Valve or unclog.
	Clogged Sediment/Carbon Prefilter or Activated Carbon Post Filter.	Replace Filters.
	Low water pressure.	Feed Water pressure must be above 40 psi.
	R.O. Membrane fouled.	See Feed Water operating limits. Correct cause of fouling, replace Membrane.
	Air pre-charge pressure in Holding Tank is too high.	Empty water from Holding Tank, and with the faucet open, adjust air pressure to 5–10 psi range.
	Air pre-charge is too low.	
	Air bladder in the Holding Tank is ruptured.	Replace Bladder.
	Holding Tank Valve is closed.	Open Valve.
	No drain flow, the Drain Restrictor is plugged.	Clear or replace Drain Restrictor.
	No drain flow, the drain orifice in the Air Gap Faucet is plugged.	Clear or replace the Air Gap Faucet.
	The Check Valve is stuck.	Free check.
	The A.S.O. Valve is malfunctioning.	Replace A.S.O. Valve components.
Low pressure at the Dispensing Faucet	Activated Carbon Post Filter is plugged.	Replace Post Filter.
	Air pre-charge in the Holding Tank is too low.	Empty water from Holding Tank and with the faucet open, adjust the air pressure to 5–10 psi range.
		Check for leakage at the Air Valve Stem.
	Holding Tank Valve is partially closed.	Open Valve.
	The Dispensing Faucet is out of adjustment or faulty.	Repair or replace Dispensing Faucet.
	Heavy water use, Holding Tank is depleted.	Allow Holding Tank to refill (adding a second Holding Tank will increase storage capacity).
	Low water production.	See Low Quantity of Product Water section.
High Total Dissolved Solids (T.D.S.) in the Product Water	Clogged Sediment/Carbon Prefilter.	Replace Filter.
	Low Water Pressure.	Feed Water Pressure must be above 40 psi.
		Check Saddle Tapping Valve.
	R.O. Membrane O-ring is crimped.	Check O-ring.
	R.O. Membrane brine seal is not sealing up into manifold head.	Check the brine seal.
	R.O. Membrane is expended.	If Membrane life is unusually short, find and correct problem. Replace Membrane.
	The Product Water and Drain Water lines are reversed.	Correct plumbing.

Problem	Possible Cause	Solution
High Total Dissolved Solids (T.D.S.) in the Product Water (continued)	No drain flow, Drain Restrictor is clogged.	Clear or replace Drain Restrictor.
	No drain flow, the drain orifice in the Air Gap Faucet is plugged.	Clear or replace Air Gap Faucet.
	The A.S.O. Valve is not closing.	Repair or replace A.S.O. Valve Components.
	New Activated Carbon Post Filter not rinsed completely.	Flush with several full tanks of Product Water.
	The Feed Water T.D.S. has increased.	An increase in Feed Water T.D.S. will give a corresponding increase in Product Water T.D.S.
Tastes and odors in the Product Water	The Activated Carbon Post Filter is exhausted.	Replace Post Filter.
	There is foreign matter in the Holding Tank.	Clean, flush and sanitize the system. Replace the filters.
	The Product Water and Waste Water lines are reversed.	Correct plumbing.
	Dissolved gasses in the Feed Water.	Pre-treat Feed Water to removed dissolved gasses.
	Increase in Product Water T.D.S.	See high T.D.S. in the Product Water section.
Drain Water overflows at the Air Gap Faucet	Air Gap is blocked.	Clear Air Gap.
		Rinse with vinegar for removal of calcium buildup.
	Drain tubing is clogged.	Clear tubing.
	Drain Clamp hole is misaligned.	Align with hole in the drain pipe.
	Excessive drain flow rate.	Replace Drain Restrictor.
Faucet leaks or drips.	Leaks from spout.	Adjust Faucet by turning the tee bar just below handle to provide a small amount of free play in handle when shut off.
		O-rings are bad, repair or replace faucet.
	Leaks from base of the delivery tube.	O-ring is bad, replace O-ring.
	Leaks from beneath the handle.	O-rings are bad. Repair or replace faucet.
Fitting leaks in general	Close the Saddle Tapping Valve (feed water) and relieve pressure before disconnecting any fitting. Tighten compression nuts or refer to the respective assembly drawing for proper assembly. If pipe threads are leaking, remove and re-tape with Teflon tape.	

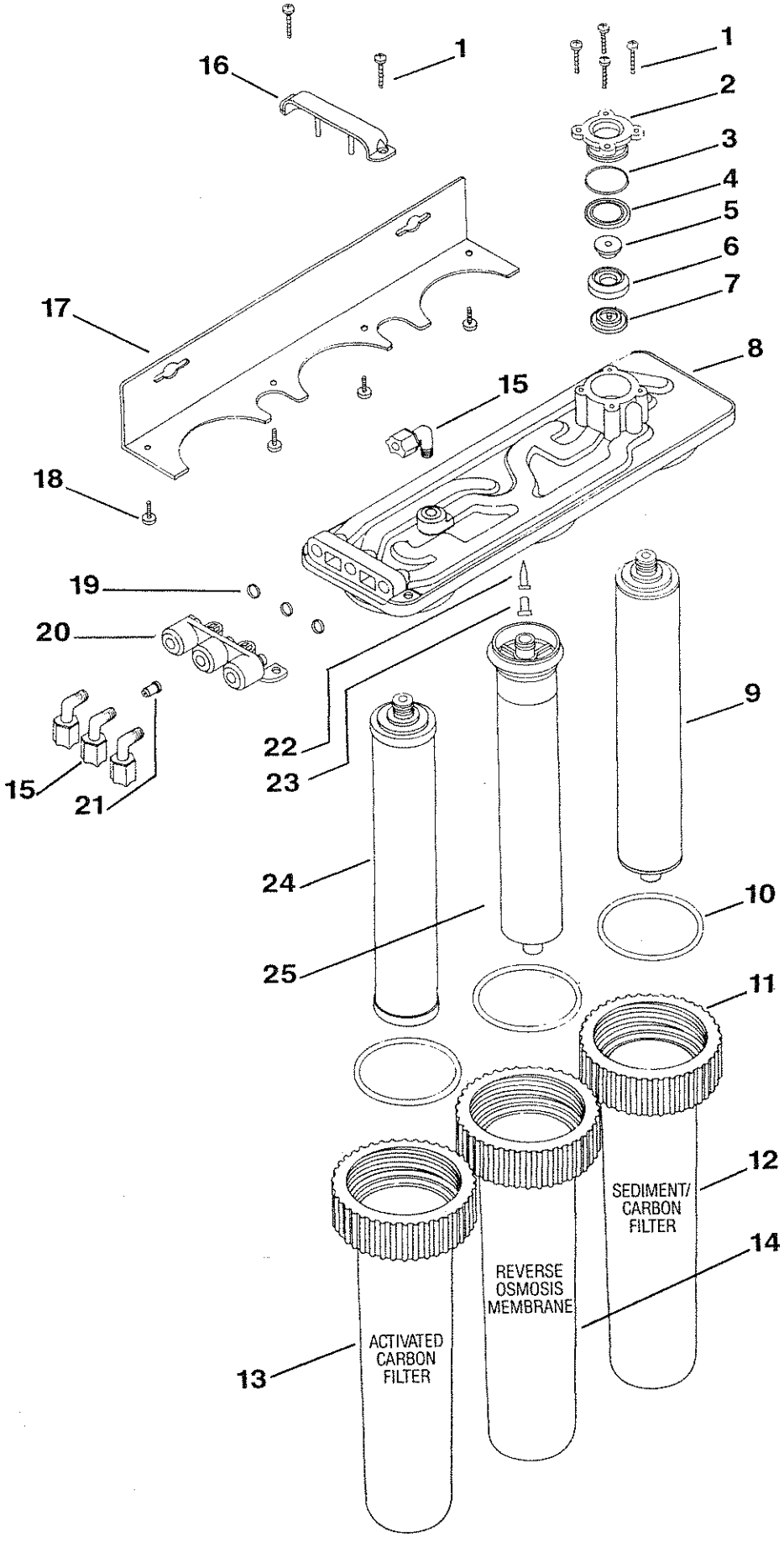
DRAWING NO.	PART NO.	DESCRIPTION
1	M5010	Self Tapping Screw
2	S2005	ASO Cap
3	S2013	ASO Cap O-Ring
4	S2011	ASO Diaphram—Large
5	S2007	ASO Piston
6	S2006	ASO Piston Ring
7	S2010	ASO Diaphram—Small
8	S2028-03RS	Manifold T.F.C. Standard Plate Assembly
9	S7028	Sediment/Carbon Prefilter Cartridge
10	N1021	Sump O-Ring
11	S7022-02	Sump Nut
12	SS7021-05	White Sump labeled Sediment/Carbon Filter
13	SS7021-11	White Sump labeled Activated Carbon Filter
14	SS7021-04RS	White Sump labeled Reverse Osmosis Membrane
15	S1105	1/8″ MPT × 1/4″ Polytube Elbow
16	S2004	Inlet/Outlet Cap
17	S2014	Mounting Bracket
18	N1033	Bracket Screw
19	S2012-01	Inlet/Outlet O-Ring
20	S2003	Inlet/Outlet Block
21	S2016-10	Drain Restrictor 100 gpd
22	S1276	Duckbill Check Valve 1/8″
23	S1277	Duckbill Retainer
24	S7025	Activated Carbon Post Filter Cartridge
25	S1227RS	T.F.C. R.O. Membrane 25 gpd

OTHER COMPONENTS AS SHOWN IN FIGURE 1. PAGE 3.

DRAWING NO.	PART NO.	DESCRIPTION
2	S1089-07	1/4″ Long Reach Air Gap Faucet w/JG
3	S1118-01	1/4″ Self Piercing Saddle Valve
4	S1117-01	3/8″ Drain Clamp Assembly
5	S1221	Holding Tank 1/4″ Shut Off Valve
6	S1103	1/4″ MPT × 1/4″ Polytube Elbow
7	C2233	RO Mate 4 Plastic Holding Tank
8	S2019-S	2″ Manifold Cover with Slot (optional)
9	R7075-01	R.O. Comparator (optional)

R.O. MANIFOLD ASSEMBLY
PURO - 25T

(Exploded View & Parts List)



REVERSE OSMOSIS DRINKING WATER SYSTEM

ONE YEAR LIMITED WARRANTY

Master Water Conditioning Corp. warrants its Reverse Osmosis Drinking Water System to be free from defects in materials and workmanship for a period of one year from the date of purchase when installed and operated within recommended parameters.

Master Water Conditioning Corp. will repair or replace at its discretion any defective component. This warranty does not cover the disposable sediment and carbon cartridges whose service life depends on feed water conditions. The Reverse Osmosis Membrane is warrantied for one year. If the required prefilter conditions to the membrane are not followed the membrane will not be warrantied.

CONDITIONS OF WARRANTY

The above warranty shall not apply to any part of the Master Water Conditioning Corp. Reverse Osmosis Drinking Water System that is damaged because of occurrences including but not limited to neglect, misuse, alteration, accident, misapplication, physical damage, or damage caused by fire, act of God, freezing or hot water. If the unit is altered by anyone other than Master Water Conditioning Corp. the warranty is void.

To obtain warranty service: (A) contact your local dealer who supplied the unit, or (B) contact the factory for the dealer nearest you. It is the obligation of the owner to pay for shipping or travel charges to return the defective part.

This is the sole warranty made by Master Water Conditioning Corp. with respect to the Reverse Osmosis Drinking Water System. No other warranties, expressed or implied, are given including merchantability or fitness for a particular purpose, incidental or consequential damages, or other losses.

This exclusion applies to the extent exclusion is permitted by law.

No person or representative is authorized to assume for Master Water Conditioning Corp. any liability on its behalf, or in its name, except to refer the purchaser to this warranty.

This warranty gives you specific legal rights, you may also have other rights which vary from state to state.

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