



# The MPRO™ RO System

## Reverse Osmosis Water Purification System

(Single and Dual Membrane Models)



### INSTALLATION AND OPERATING MANUAL

#### **WARNING**

**Please read carefully before proceeding with installation. Failure to follow any attached instructions or operating parameter may lead to the product's failure and possible damage to property.**

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Thank You for your purchase of a SpectraPure® System. With proper installation and maintenance, this system will provide you with high quality water for years to come. All SpectraPure® products are rigorously tested by us for safety and reliability. If you have any questions or concerns, please contact our customer service department at 1.800.685.2783 or refer to our online troubleshooting at [www.spectrapure.com](http://www.spectrapure.com).

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## ***TERMS AND CONDITIONS:***

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1. Shipping charges on units or parts submitted to our facility for repair or replacement must be borne by the registered purchaser. After repair or replacement, the factory will return the unit or part freight prepaid to the customer.
2. We assume no warranty liability in connection with our equipment other than as herein specified.
3. This warranty is in lieu of all other warranties expressed or implied, including warranties of fitness for a particular purpose.
4. We do not authorize any person or representative to assume for us any other obligation on the sale of our equipment. This is the exclusive remedy and liability for consequential damages under any and all warranties which are excluded to the extent exclusion is permitted by law.
5. Proof of original purchase date must accompany all warranty claims.
6. SpectraPure, Inc. Reserves the right to change prices without notice when necessary. All prices in the catalog are quoted in US dollars.
7. Claims for error in quantity or condition must be made within 10 days of receipt of material. SpectraPure, Inc. Will not be responsible for any claimed shortages not reported within 10 days. Returns other than warranty claims may be subject to 20% restocking fee.
8. SpectraPure, Inc. Cannot be held liable for damage or loss to a shipment by a freight carrier. Check shipment for damage before acceptance or note on freight bill subject to inspection for concealed damage. Consignee must file claim. SpectraPure, Inc. Will offer as much assistance as possible.
9. A complete credit check is required prior to shipping on a Net 30 or "C.O.D. - CUSTOMER CHECK ACCEPTABLE" basis. In the interim period during which credit references are being evaluated, all orders must be shipped "C.O.D. - CERTIFIED FUNDS" (cash, cashiers check or money order).
10. All returned checks (due to insufficient funds or closed accounts) will be subjected to a **\$25 penalty charge**.

Invoices on Net 30 accounts not paid within 30 days of shipment will be considered delinquent and will accrue Finance charges at the rate of 1.5% per month (18% per annum).

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## ***THREE YEAR LIMITED WARRANTY:***

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Effective on products purchased after March 10, 2005.

SpectraPure, Inc.® warrants the product to the original owner only to be free of defects in material and workmanship for a period of three years from the date of receipt. SpectraPure's liability under this warranty shall be limited to repairing or replacing at SpectraPure's option, without charge, F.O.B. SpectraPure's factory, any product of SpectraPure's manufacture. SpectraPure will not be liable for any cost of removal, installation, transportation or any other charges which may arise in connection with a warranty claim. Products which are sold but not manufactured by SpectraPure are subject to the warranty provided by the manufacturer of said products and not by SpectraPure's warranty. SpectraPure will not be liable for damage or wear to products caused by abnormal operating conditions, accident, abuse, misuse, unauthorized alteration or repair or, if the product was not installed in accordance with SpectraPure's or other manufacturer's printed installation and operating conditions, or damage caused by hot water, freezing, flood, fire or acts of God.

SpectraPure will not be responsible for any consequential damages arising from installation or use of the product, including any water or mold damage due to flooding which may occur due to malfunction or faulty installation, including, but not limited to failure by installer to over- or under-tighten fittings, housings, and/or push-style fittings, or improper installation of push-style fittings. Consumable items such as pre filters and membranes are not covered under the 3 year warranty.

SpectraPure warrants (pro-rated) the performance of tested SpectraSelect™ RO membrane elements only, for one year from date of receipt by the buyer, providing that the loss of performance was not caused by fouling, neglect or water conditions exceeding the feed water parameters listed in the applicable product manual (refer to detailed membrane warranty information). SpectraPure will, on confirmation of loss of performance during the warranty period, credit the pro-rated amount of the current catalog price of the element. The disposable filters and cartridges are not covered under the warranty.

To obtain service under this warranty, the defective system or components must be returned to SpectraPure with proof of purchase, installation date, failure date and supporting installation data. Any defective product to be returned to the factory must be sent freight prepaid; documentation supporting the warranty claim and a Return Goods Authorization (RGA) number must be included. SpectraPure will not be liable for shipping damages due to the improper packaging of the returned equipment and all returned goods must also have adequate insurance coverage and a tracking number.

SpectraPure will not pay for loss or damage caused directly or indirectly by the presence, growth, proliferation, spread or any activity of "fungus", wet or dry rot or bacteria. Such loss or damage is excluded regardless of any other cause or event that contributes concurrently or in any sequence to the loss. We will not pay for loss or damage caused by or resulting from continuous or repeated seepage or leakage of water, or the presence or condensation of humidity, moisture or vapor, that occurs over a period of 14 days or more. "Fungus" and "fungi" mean any type or form of fungus or Mycota or any by-product or type of infestation produced by such fungus or Mycota, including but not limited to, mold, mildew, mycotoxins, spores, scents or any biogenic aerosols.

SpectraPure will not be liable for any incidental or consequential damages, losses or expenses arising from installation, use, or any other causes. There are no expressed or implied warranties, including merchantability or fitness for a particular purpose, which extend beyond those warranties described or referred to above.

**\* The thee year limited warranty does not apply to consumable items, including but not limited to, filters and cartridges unless specifically stated above**

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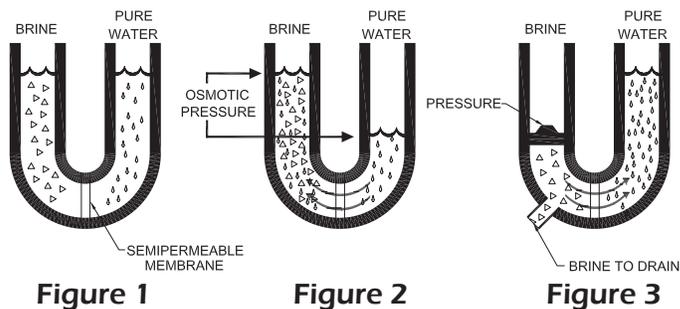
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## WHAT IS REVERSE OSMOSIS?

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Osmosis is a process in nature that allows fluid of a lower concentration to pass through a semi-permeable membrane into a fluid of a higher concentration (See Figure 1). Because of the difference in salt concentration, pure water flows through the membrane as though a pressure were being applied to it (Figure 2). The effective driving force is called the osmotic pressure. As a rough guide, the osmotic pressure is equal to about 1 psi (pounds per square inch) per 100 ppm Total Dissolved Solids (TDS). When enough pressure is applied to the solution with a higher concentration it can then pass through the membrane into the solution of lower concentration. (See Figure 3). This is the basis of Reverse Osmosis.



Household water pressure is used to force tap water through the semipermeable R.O. membrane. The membrane only allows the purest of water molecules to pass through it while over 98% of most salts and other impurities are rejected and automatically rinsed from the membrane down the drain.

## WHAT DOES THE SYSTEM DO?

SpectraPure's MPRO™ RO System uses household water pressure to reverse a natural physical process called osmosis. Water, under pressure is forced through a semi-permeable membrane where minerals and impurities are screened out and sent down the drain with waste water. These minerals and impurities are measured as total dissolved solids (TDS).

The system connects to a house COLD water pipe for a water supply. The system includes replaceable sediment, carbon pre-filters and a membrane. The sediment pre-filter removes sand, dirt, rust particles and other particulates while the carbon pre-filter takes chlorine and organics out of the feed water. The water then passes through the RO membrane.

The MPRO™ System gives you a continuous supply of sparkling clear, delicious water for drinking, cooking, hydroponics etc. Foods will look better and taste better too. The reliability with the MPRO™ Water Treatment System is greatly improved over other systems and costly maintenance is avoided. The system eliminates the need to buy bottled water. Instead, it puts high quality water at your fingertips.

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## SYSTEM SPECIFICATIONS:

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Sediment Pre-Filter	0.5 micron MicroTec™ sediment pre-filter
Carbon Filter	0.5 micron carbon block pre-filter
RO Membrane Type	Thin-Film Composite (TFC)
Rejection Rate	Greater than 96% average
Input Water Pressure	60 psi (4.15 bar) line pressure*
Input Water Temp	77°F (25°C)
Recovery Rate	20% (i.e. 20% of the water will be collected as pure water)

Nominal Membrane Flow Rates @ 60 psi & 77° F :

GPD (lpd)	Product Water Flow Rate	Concentrate Flow Rate
25 (95)	66 ml/min	264 ml/min
40 (151)	105ml/min	420 ml/min
60 (228)	158 ml/min	632 ml/min
90 (340)	235ml/min	940 ml/min
180 (680)	470ml/min	1880 ml/min

## Reverse Osmosis Feed Water Requirements

*For the 1 year TFC membrane pro-rated warranty to be honored, the following conditions must be met:*

Operating Pressure*	40 – 80 psi (2.75 – 5.5 bar)
pH Range	3 – 11
Maximum Temperature	100° F (38° C)
Maximum Turbidity	1.0 NTU
Maximum Silt Density Index	5.0 (based on 15 min. test time)
Maximum Chlorine	less than 0.1 ppm
Maximum TDS	2000 ppm
Maximum Hardness	10 grains (170 ppm as CaCO <sub>3</sub> )
Maximum Iron	less than 0.1 ppm
Maximum Manganese	less than 0.1 ppm
Maximum Hydrogen Sulfide	0 ppm
Langlier Saturation Index	LSI must be negative

\*Operating pressure less than 40 psi will require a booster pump:  
less than 49 GPD use BPLF-MO-115(-230),  
more than 49 GPD use BPHF-MO-115(-230).

\*Operating pressure greater than 80 psi will require a pressure reducing valve.

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## **SYSTEM DESCRIPTION:**

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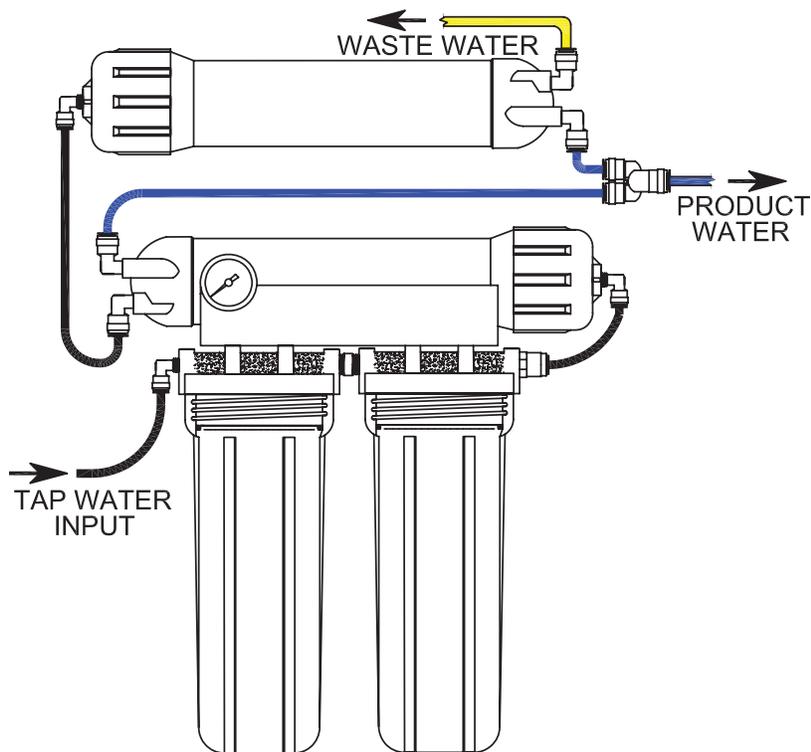
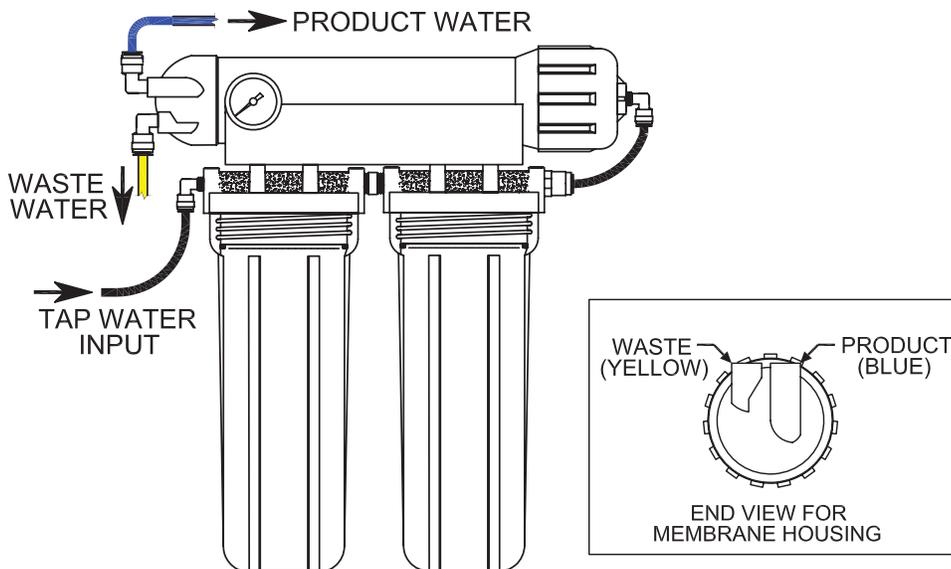
The MPRO™ RO System is a three stage reverse osmosis system.

1. First, the incoming feed water is passed through a 0.5 micron Micro-Tec sediment pre filter. This filter is required to remove excess turbidity (particulate matter) that may cause the membrane to plug.
2. The second stage of filtration is a 0.5 micron carbon block pre-filter. This filter removes organics and chlorine from the feed water that can damage the membrane.
3. The third filtration stage of the system is a high rejection thin film composite (TFC) reverse osmosis membrane. It removes over 96% of most inorganic salts, all micro-organisms and almost all high molecular weight organics in the water.

**Fig. A: System Diagram**



## SINGLE MEMBRANE SYSTEM- FIGURE B



## DUAL MEMBRANE SYSTEM- FIGURE C

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## **SYSTEM INITIALIZATION:**

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If you are setting up your system for the first time or replacing the membrane with a different size, please follow the “Measuring Waste to Product Water Ratio” procedure on page 10 after you do system hook-up below.

### System Hook-Up

1. Attach the garden hose adapter (**connected to the black tubing**) to your cold water source. Never run hot water (greater than 100° F (38° C)) through the system.
2. Place the **yellow concentrate (waste) tubing** and the **blue purified (product) water tubing** into a drain. Do not restrict flow from these lines.
3. Open the cold water supply valve. You may use pressure up to 80 psi (5.5 bar).

**Check the system to ensure that all fittings are tight and leak-free before leaving the system unattended. (If anything is leaking, contact SpectraPure for assistance.)**

Note: It is recommended that at least 2 gallons (7.57 liters) of purified water be discarded now before collecting purified water for use. If the unit is not used for several days, run the system for at least 10 minutes before collecting any water. This will flush out any stale water in the system.

4. Now follow procedure on page 10 to adjust the Flow Restrictor.
5. Finish the installation by connecting the yellow line to a drain. The blue line can be placed into a Rubber Maid™ trash can or set up to become automatic using a Liquid Level Controller (LLC-S-115), (LLC-M-115) or the Auto Shut-Off Kit (ASOFK).

**SpectraPure@Inc.** Assumes no responsibility for water damage due to leaks. It is the user’s responsibility to determine that the system is leak-free.

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## MEASURING WASTE TO PRODUCT WATER RATIO.

This procedure will assure you of maximum life and reliability of your SpectraPure System. *Failure to perform this procedure can permanently damage the membrane and will void Warranty.*

In order to maximize the life of your SpectraPure RO Membrane, you may need to adjust the ratio of the concentrate to purified water. If not enough concentrate is allowed to flow past the membrane during operation, the impurities will precipitate out on the membrane surface, clogging the RO Membrane. To keep this from happening, the Concentrate to Purified Water Ratio must be checked and adjusted in order to compensate for pressure and temperature variations that exist in all water supplies. The flow rate of the concentrate must be a minimum of 4X the product flow rate. (4X to 6X is an acceptable concentrate flow rate.)

### Procedure:

1. Collect product water (blue tubing) into a measuring cup for one minute. (Measure the collected amount in milli-liters). Do the same with the waste water (yellow tubing):

WASTE (YELLOW) IN MILLILITERS \_\_\_\_\_

DIVIDED BY

PRODUCT (BLUE) IN MILLILITERS \_\_\_\_\_

The resultant is the Concentrate to Product Ratio

(Although not needed in this procedure, the daily product flow rate in Gallons per Day (GPD) can be calculated to be equal to the product flow rate times 0.38 ).

2. **If ratio is less than 4/1:**  
Disconnect yellow drain line from the membrane housing and remove flow restrictor (page 12-13). Use the appropriate Waste to Product ratio chart (Fig D) to determine how long to cut the flow restrictor in order to obtain a 4:1 ratio.  
*EXAMPLE: If you have a 90 GPD unit (FR-90), and your product flow is 175 ml/.min, than the flow restrictor needs to be cut to a total length of 6 inches (15.2 cm).*
3. **If ratio is greater than 6:1**, flow restrictor requires replacement (Please contact SpectraPure Inc).

This completes the procedure.

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Fig. D: Flow Restrictor Tables  
(For 4:1 Concentrate to Product Ratio)

## FR-25 & FR-40 (RED)

PRODUCT RATE		CUT TO LENGTH	
ml./min.	gpd	in.	cm.
110	42	1	2.5
84	32	2	5.1
75	29	3	7.6
69	26	4	10.2
63	24	5	12.7
60	23	6	15.2
55	21	7	17.8
51	19	8	20.3
47	18	9	22.9
45	17	10	25.4
44	17	11	27.9
42	16	12	30.5
40	15	13	33.0
39	15	14	35.6
38	14	15	38.1
37	14	16	40.6

## FR-60 (ORANGE)

PRODUCT RATE		CUT TO LENGTH	
ml./min.	gpd	in.	cm.
158	60	1	2.5
130	49	2	5.1
123	47	3	7.6
110	42	4	10.2
99	38	5	12.7
94	36	6	15.2
93	35	7	17.8
88	33	8	20.3
84	32	9	22.9
79	30	10	25.4
76	29	11	27.9
74	28	12	30.5
71	27	13	33.0
68	26	14	35.6
66	25	15	38.1
66	25	16	40.6

## FR-90 (YELLOW)

PRODUCT RATE		CUT TO LENGTH	
ml./min.	gpd	in.	cm.
269	102	1	2.5
233	88	2	5.1
213	81	3	7.6
198	75	4	10.2
183	69	5	12.7
175	67	6	15.2
164	62	7	17.8
154	58	8	20.3
148	56	9	22.9
141	54	10	25.4
136	52	11	27.9
133	50	12	30.5
129	49	13	33.0
128	48	14	35.6
124	47	15	38.1
124	47	16	40.6

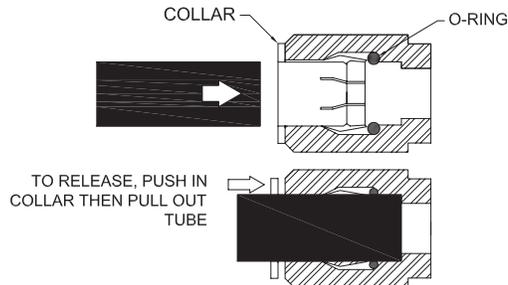
## FR-180 (GREEN)

PRODUCT RATE		CUT TO LENGTH	
ml./min.	gpd	in.	cm.
490	186	1	2.5
460	175	2	5.1
430	163	3	7.6
400	152	4	10.2
379	144	5	12.7
356	135	6	15.2
344	131	7	17.8
326	124	8	20.3
311	118	9	22.9
300	114	10	25.4
289	110	11	27.9
281	107	12	30.5
270	103	13	33.0
263	100	14	35.6
259	98	15	38.1
256	97	16	40.6

## **FLOW RESTRICTOR REMOVAL, ADJUSTMENT AND REPLACEMENT**

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1. Locate the yellow concentrate tubing (Fig. B for Single-Membrane System or Fig. C) for Dual-Membrane System). Remove the tubing from its push-fitting at the membrane as follows:
  - a.) Firmly depress and hold the push-fitting collar down with your thumbnail.
  - b.) While the push-fitting collar is depressed, pull the tubing straight out of the push-fitting. Once the tubing is removed, release the collar.



2. Carefully remove the flow restrictor assembly, now visible as a plastic insert in the end of the yellow tubing (Fig. E). You may use an object such as a dull knife to help pry the flow restrictor insert from the end of the tubing. The entire flow restrictor (consisting of the insert collar and thin capillary tubing) may then be gently extracted.

**Note: Take care not to crush or otherwise damage the delicate capillary tubing.**

3. Refer to the Flow Restrictor Tables (Fig. D). Find the table that represents the Flow Restrictor Assembly for the system that you have. Find the **product flow rate** in the left-hand column and the **length of the flow restrictor** in the right-hand column.

Example: If your Flow Restrictor Assembly is for a 90 GPD Membrane and the **product flow rate** is 170 mL/Min, then the flow restrictor length should be cut to 6.5 inches (16.5 mm). 170 is about halfway between 164 (7 in.) and 175 (6 in.).

4. Using a new single-edge razor blade, carefully measure and then cut the flow restrictor to the total length indicated.

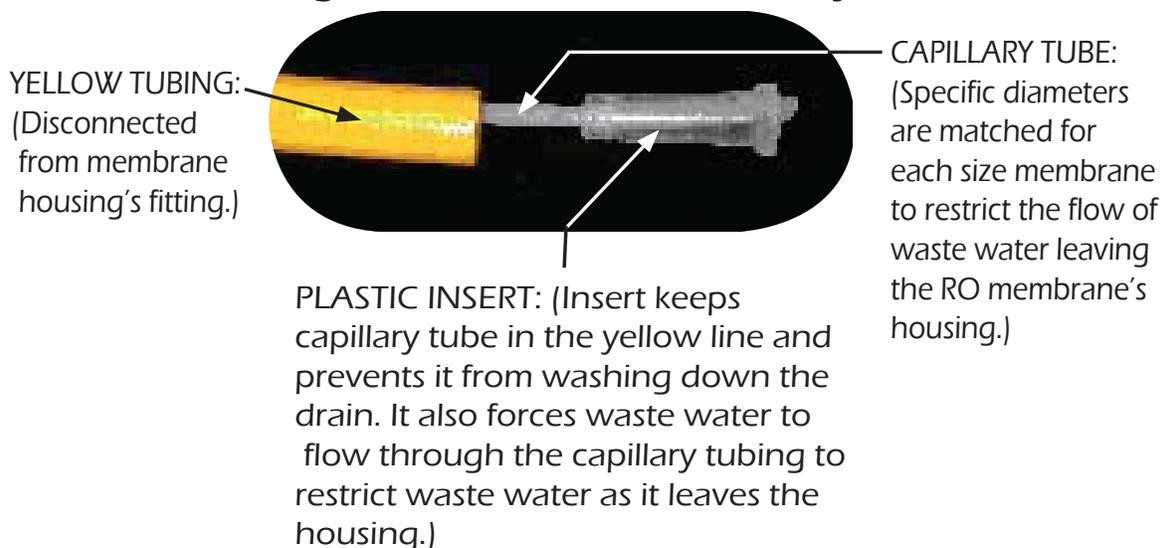
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5. Re-insert the flow restrictor assembly into the yellow tubing and firmly re-seat the insert into the end of the yellow tubing by carefully pressing on the insert with your thumbnail. Care should be taken not to crush or otherwise damage the end of the capillary tubing protruding from the end of the insert.
6. Re-insert the yellow tubing into its push-fitting in the RO membrane as follows:
  - a.) Moisten the O-ring seal inside the concentrate outlet fitting by dripping a few drops of clean water into the fitting.
  - b.) Grasp the yellow tubing near the flow restrictor end, and insert the tubing into the push-fitting. Push the tubing into the fitting until resistance is felt, approximately 1/2 inch (12.7 mm). The tubing is now resting on the O-ring seal inside the fitting.
  - c.) Firmly push the tubing approximately an additional 1/4 inch (6.35 mm) further into the fitting to completely seat the line into the fitting and O-ring seal.
7. Turn on the system water supply and check for leaks prior to further use or testing. If a leak is observed, you may not have pushed the yellow tubing into the push-fitting far enough to seal the tubing against the O-ring. Turn off the system water supply and re-seat the tubing as described above.

**Fig. E: Flow Restrictor Assembly**



## ***SEDIMENT PRE-FILTER REPLACEMENT:***

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A Sediment Filter will usually last approx. 4-6 months, depending on micron rating and quality of water. (The life span of the filter is determined by the turbidity, iron content, organics, and total particulate volume in your water source). The best way to determine when your Sediment Pre-Filter needs replacement is to the a Pressure Gauge. When you have a drop in pressure between 15-20% from where your normal house pressure is, replace filter. To check this, run water through the system without the filter in it's housing. If the pressure jumps back to your normal house pressure without the filter, you know the filter you just took out was plugged up.

\*\*NOTE: A drop in the system's production is "in most cases" an indication that the sediment filter has become saturated with contaminants and will need to be replaced. If you remove the sediment and the pressure does not return to normal, the carbon filter may be plugged.

## Sediment Pre-Filter Replacement

**Materials Required:** 0.5-micron MicroTec™ Sediment Filter (SF-MT-0.5-10),  
Filter Wrench

### **Procedure:**

1. Turn off water supply to the system.
2. Refer to Fig. A (System Diagram). Using the provided filter housing wrench, remove the first housing on the left. Unscrew it counterclockwise as viewed from the bottom.
3. Remove the old filter and discard.
4. Thoroughly wash the housing with a mixture of hot soapy water and a few teaspoons of household bleach. Rinse well with clean hot water.
5. Install the new pre-filter onto the round port in the head of the housing, Screw the housing back onto the assembly, and hand tighten **only**. **NOTE: Do not use filter wrench to tighten housings. Over-tightening will damage housings and void your warranty.**
6. Proceed with carbon block filter replacement.

\*\* If your water contains a great deal of sediment or chlorine, the pre-filters may require more frequent changes to maintain adequate production rate and extended membrane life.

## ***CARBON BLOCK FILTER REPLACEMENT:***

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A Carbon Filter will usually last approx. 4-6 months, depending on micron rating for the filters, usage and the quality of your tap water. The best way to determine when your Carbon Block Pre-Filter needs replacement is to use a chlorine test kit.

Any chlorine level above 0.1 ppm will cause damage to the membrane and indicates that the carbon block filter must be changed. To test for chlorine breakthrough, collect a 10 ml sample of the concentrate from the yellow tubing and test the chlorine concentration using test kit TK-CL-25. If the chlorine concentration is above 0.1 ppm, replace the carbon pre-filter.

**\*\*NOTE:** A drop in the system's production is "in most cases" an indication that the sediment filter has become saturated with contaminants, but a carbon filter can also drop production, if its covered with extremely fine sediment. If the carbon becomes plugged with sediment, it will no longer be able to remove chlorine.

## Carbon Block Filter Replacement

**Materials Required:** 0.5 micron Carbon Block Filter (CF-0.5-10),  
Filter Wrench, Chlorine Test Kit (TK-CL-25)

### **Procedure:**

1. Turn off water supply to the system.
2. Refer to Fig. A (System Diagram). Using the provided filter housing wrench, remove the second housing from the left. Unscrew it counterclockwise as viewed from the bottom.
3. Remove the old filter and discard.
4. Thoroughly wash the housing with a mixture of hot soapy water and a few teaspoons of household bleach. Rinse well with clean hot water.
5. Install the new carbon block filter, making sure that the black gaskets on both ends of the filter are firmly seated in the gasket recesses.
6. Screw the housing back onto the assembly, and hand tighten **only**. **NOTE: Do not use filter wrench to tighten housings. Over-tightening will damage housings and void your warranty.**
7. Turn on system water supply and check for leaks.

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## ***RO MEMBRANE DIAGNOSTICS:***

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In order to accurately determine the condition of the RO Membrane, a conductivity tester capable of reading the tap water conductivity and the product water conductivity would typically be required.

You may also use an alkalinity test kit (on softened water sources) or a hardness test kit (cannot be used on softened water sources).

Before performing any membrane test, the waste -to-product water ratio must be 4 to 1 or greater.

Note: All water sources are different and are subject to changes in conductivity from season to season which could affect the monitor reading depending on the time of the year. For this reason we recommend the use of a conductivity tester in order to register the most accurate measurement for determining the condition of the RO membrane.

**MEMBRANE WARNING: All SpectraPure RO membranes, except for encapsulated membranes, must remain moist at all times. It is the customer's responsibility to inspect the membrane upon receipt and maintain adequate moisture.**

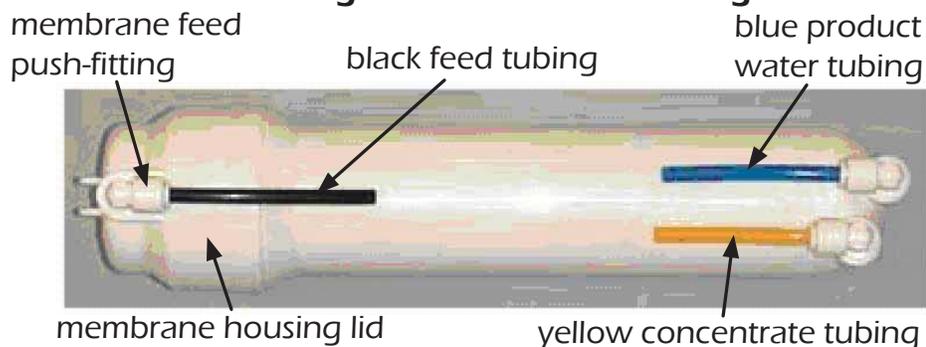
**Replacement membranes should be kept in the sealed non-permeable shipping bag and in a refrigerator until use. The membrane can be kept there for up to 1 year. (DO NOT FREEZE)**

## **RO MEMBRANE REPLACEMENT:**

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1. Turn off the water supply to the RO system. Place the system where the membrane housing is easily accessible.
  2. Remove the black tubing from the membrane feed push-fitting by depressing the collar on the fitting with your thumb and pulling the tubing from the push-fitting (Page 12).
  3. Lift the membrane housing from the retention clips.
  4. Unscrew the membrane housing lid. This may require two people.
  5. Use a pair of pliers to grasp the membrane stem and pull the membrane from the housing (Fig. G).
  6. Remove the black housing O-ring (Fig. G). Wash the empty housing with soapy water. Rinse thoroughly with hot, clean water.
  7. Insert new membrane into the housing, with the double O-ring end first (Fig.G). The tube must fit into the recess at the bottom of the membrane housing. When the membrane is aligned with the hole, firmly push the membrane into the hole until it bottoms out.
  8. Place the black housing O-ring on the housing rim and carefully screw the lid back on to the base.
  9. Reconnect the black tubing to the membrane feed push-fitting.
- Note: If you have a dual-membrane system, perform steps 2 thru 9 on the second membrane now.
10. Disconnect the yellow concentrate tubing (Fig. F) from the membrane housing and remove the flow restrictor (Fig. E)

**Fig. F: Membrane Housing**



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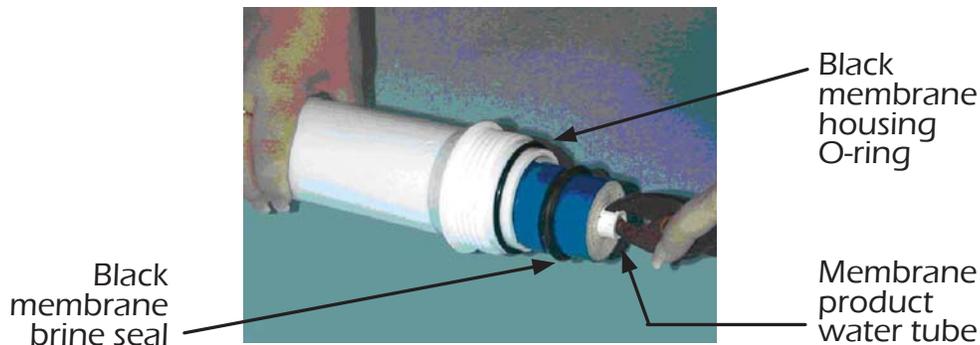
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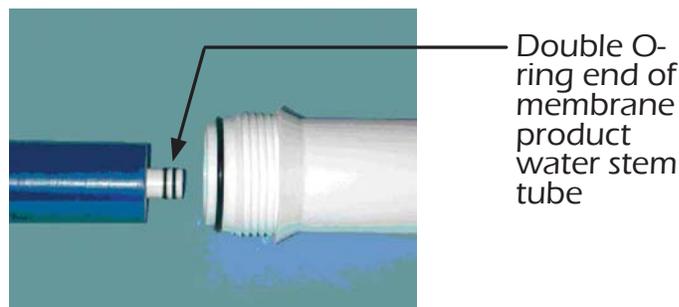
from the yellow tubing (see Flow Restrictor Removal, Adjustment, and Replacement). Reconnect the tubing to the membrane housing. Place the flow restrictor in a safe location where it will not be accidentally crushed or damaged.

11. Put the yellow concentrate tubing and the blue product water tubing in the drain and turn on the system water supply. Allow the system to flush for several minutes to remove any loose particles.
12. Turn off the water supply to the system. Remove the yellow tubing from the membrane tubing from the membrane housing and replace the flow restrictor assembly as described on page 12-13.
13. Re-insert the flow restrictor end of the yellow tubing into its push-fitting at the RO membrane and reconnect the yellow concentrate tubing to the membrane housing.
14. Turn on the water supply to the system and check for leaks. Check, and if necessary adjust, the Concentrate to Purified Water Ratio per the procedures described in that section.

**Fig. G: Removing the Membrane Element**



**Fig. H: Inserting the New Membrane Element**



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## **MEMBRANE OUTPUT CALCULATION:**

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Membranes produce the rated gallons per day (GPD) at 60 psi (4.1 bars) operating pressure, 77°F (25°C) operating temperature and 500 ppm total dissolved solids.

Membrane output gallons per day (GPD) depends on operating pressure, water temperature and the ppm TDS in the feed water.

Expected GPD = Rated GPD × PCF × TCF

**PCF** is the pressure correction factor

**TCF** is the temperature correction factor

**Calculation of Pressure Correction Factor (PCF):** The output (GPD) from the membrane is directly proportional to the applied pressure.

Note: The membrane is rated to produce the rated GPD at 60 psi. For any pressure other than 60 psi the output GPD is multiplied by the PCF.

PCF = Line Pressure (in psi) ÷ 60

**Calculation of Temperature Correction Factor (TCF):** The output (GPD) also decreases with decrease in temperature. This is because water viscosity increases with decrease in water temperature.

### **Temperature Correction Factor Table (TCF)**

°F / °C	TCF	°F / °C	TCF	°F / °C	TCF
41.0 / 5	0.521	59.0 / 15	0.730	77.0 / 25	1.000
42.8 / 6	0.540	60.8 / 16	0.754	78.8 / 26	1.031
44.6 / 7	0.560	62.6 / 17	0.779	80.6 / 27	1.063
46.4 / 8	0.578	64.4 / 18	0.804	82.4 / 28	1.094
48.2 / 9	0.598	66.2 / 19	0.830	84.2 / 29	1.127
50.0 / 10	0.620	68.0 / 20	0.857	86.0 / 30	1.161
51.8 / 11	0.640	69.8 / 21	0.884	87.8 / 31	1.196
53.6 / 12	0.661	71.6 / 22	0.912	89.6 / 32	1.232
55.4 / 13	0.684	73.4 / 23	0.941	91.4 / 33	1.267
57.2 / 14	0.707	75.2 / 24	0.970	93.2 / 34	1.304

## Membrane Output Calculation Example

What is the expected GPD from a 75 GPD System at 40 psi pressure and 60°F water temperature?

$$PCF = 40 \div 60 = 0.666$$

$$TCF = 0.754 \text{ (from Table 1)}$$

$$\text{Expected GPD} = 75 \times 0.666 \times 0.754 = 37.7 \text{ GPD} \pm 15\%$$

37.7 GPD would be the Actual Production Rate

## TESTING THE QUALITY OF THE MEMBRANE

The performance of a RO membrane is measured by its ability to reject salts (or TDS (Total Dissolved Solids)).

**Important: Test the quality of the membrane once every 6 months.**

Note: This procedure will require a Conductivity Meter (TS-C61) or (TS-T71).

### Procedure:

1. Measure tap water conductivity. (Call it X)
2. Run the system for 15-20 minutes.
3. Rinse test instrument cell 2-3 times with RO water.
4. Measure RO water conductivity directly from the blue product water line. (Call it Y).
5. Subtract RO water conductivity from tap water conductivity. (X - Y)
6. Divide this quantity by tap water conductivity. (X - Y) ÷ X
7. Rejection = [(X - Y) ÷ X] × 100

\* Conductivity in the above procedure could be replaced by hardness, alkalinity, nitrate, phosphate, silica etc. (Measured in ppm or mg/l).

## Rejection of the RO Membrane Calculation Example

1. Tap water hardness = 150 ppm (X)
2. RO water hardness = 7 ppm (Y)
3. X - Y = 143 ppm
4. (X - Y) ÷ X = 143 ÷ 150 = 0.953
5. Rejection = [(X - Y) ÷ X] × 100 = 0.953 × 100 = 95.3

Membrane Hardness Rejection = 95.3 % : Rejection rates less than 95% may indicate that the membrane should be replaced.

## ***TROUBLESHOOTING GUIDE:***

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### **Product Water - Low Production Rate**

Cause	Corrective Action
Plugged pre-filters	Replace pre-filters
Low water temperature	Heat feed water or use higher GPD membrane
Low water pressure	Use booster pump or use higher GPD membrane
Fouled membrane	Replace membrane

## **MEMBRANE TROUBLESHOOTING GUIDE**

The following chart illustrates the procedure for determination of RO membrane performance. However, the chart represents only rough guidelines for determining performance of RO membrane. Depending on your tap water chemistry, the rejection characteristics of the membrane may vary significantly.

Method of Testing	Calculate % Rejection	Test Results	Conclusion
TDS/ Conductivity Tester	Measure feed water (X) RO product water (Y) for TDS/Conductivity	Is Rejection greater than 95% ?	No - Replace Membrane Yes - Membrane OK
Alkalinity Test Kit	Measure feed water (X) RO product water (Y) for Alkalinity	Is Rejection greater than 90% ?	No - Replace Membrane Yes - Membrane OK
Hardness Test Kit**	Measure feed water (X) RO product water (Y) for Hardness	Is Rejection greater than 90%?	No - Replace Membrane Yes - Membrane OK

\*\*Caution: This test is not to be used on softened water sources.

## ***TIPS FOR LONG MEMBRANE LIFE:***

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1. Replacement of 0.5 micron sediment filter once every 6 months. This will prevent membrane fouling due to silt or sediment depositing on the membrane.
2. Replacement of 0.5 micron carbon block filter at least once every 6 months or when chlorine breakthrough occurs. This will ensure good membrane life and protect the membrane from chlorine damage.
3. Membrane should not be operated at lower than the recommended concentrate to purified water ratios, as described on page 10-11.
4. Operating reverse osmosis systems on softened feed water greatly reduces the chances of membrane fouling.
5. Use the optional flush valve kit after each use of the system to extend membrane life up to 6 months.

## STORAGE

1. It is recommended that you store your RO System in a cool place when not being used.
2. Your RO System must be protected from freezing or temperatures above 100° F (38°C).

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## ***CHOOSING A MOUNTING LOCATION:***

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When considering a location for the installation of the RO System, consider the following factors:

### Light Sources

1. Most of the components of this system are plastic and are subject to damage by ultraviolet light from the sun and other sources such as metal halide lighting.
2. Algae is more likely to thrive inside the clear filter housings when exposed to bright light.
3. Avoid installing this unit in bright light or direct sunlight.

### Temperature Extremes

1. The unit must be kept out of areas that are subject to freezing temperatures.
2. High temperatures greater than 100° F (38° C) must be avoided. If the unit is used outside, avoid putting the system in direct sunlight or connecting it to a garden hose that may be exposed to sunlight.

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## **REPLACEMENT PARTS:**

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<u>Model</u>	<u>Replacement Part</u>
SF-MT-0.5-10	0.5 micron MicroTec™ Sediment Filter
CF-0.5-10	0.5 micron Carbon Block Pre-Filter
MEM-0025	25 gpd (95 lpd) TFC Membrane
MEM-0040	40 gpd (151 lpd) TFC Membrane
MEM-0060	60 gpd (228 lpd) TFC Membrane
MEM-0090	90 gpd (340 lpd) TFC Membrane (Use 2 for 180 gpd (680 lpd) System)
FR-25	Flow Restrictor for 25 gpd (95 lpd) System
FR-40	Flow Restrictor for 40 gpd (151 lpd) System
FR-60	Flow Restrictor for 60 gpd (228 lpd) System
FR-90	Flow Restrictor for 90 gpd (340 lpd) System
FR-180	Flow Restrictor for 180 gpd (680 lpd) System
GHA-4	1/4" (6.35 mm) Garden Hose Adapter
XWR-UNIV	Filter Wrench

## **Optional Accessories**

<u>Model</u>	<u>Optional Part</u>
FAU-SMP	Quick Connect Faucet Coupler
TK-CL-25	Total Chlorine Test Kit
TS-C61	Conductivity (micro-Siemens) Tester
TS-T71	TDS (Total Dissolved Solids) Tester
VA-FVK-4	Flush Valve Kit
BPLF-MO-115	Low-Flow (<60GPD) Booster Pump, 115V
BPLF-MO-230	Low-Flow (<60GPD) Booster Pump, 230V
BPHF-MO-115	Hi-Flow (>65GPD) Booster Pump, 115V
BPHF-MO-230	Hi-Flow (>65GPD) Booster Pump, 230V
COM-100	Handheld TDS Meter

See our Catalog or our Web Site for Liquid Level Controls and other Optional Accessories

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**SpectraPure® Inc.** 480.894.5437 Call us toll-free 1.800.685.2783