



MaxPure MPDI™ RO/DI System Reverse Osmosis/Ion Exchange 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.*

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2167 East Fifth St, Tempe, Arizona 85281

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THREE YEAR LIMITED WARRANTY:

Effective on products purchased after March 10, 2005.

All standard water purification products manufactured by SpectraPure have a 3 year limited warranty, except the Eliminators™, MarinePro™, Industrial, Laboratory, Custom Systems, Commercial and electrical products which have a 1 year limited warranty. LiterMeters™ & UPLC™ has a 5 year limited warranty. OEM equipment resold by SpectraPure (pumps and monitors) carry the original manufacturer's warranty.

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 (RMA) 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 three 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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SYSTEM SPECIFICATIONS:

| | |
|----------------------|---|
| Sediment Pre-Filter | 0.5 micron MicroTec™ sediment pre-filter |
| Carbon Filter | 0.5 micron carbon block pre-filter |
| RO Membrane Type | SpectraPure Thin-Film Composite (TFC) |
| DI Cartridge | Color Indicating SilicaBuster™ |
| 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 Membrane Feed Water Requirements

For the 1 year SpectraSelect 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 ₃) |
| 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:

The SpectraPure MPDI system is a four stage reverse osmosis de-ionization system.

1. First, the incoming feed water is passed through a 1 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 1 micron carbon block pre-filter. This filter removes organics and chlorine from the feed water that can damage the membrane. (9,000 gal of Chlorine removal)
3. The third filtration stage of the system is a high rejection, thin film composite (TFC) reverse osmosis membrane. It removes over 95% of most inorganic salts, all micro-organisms and almost all high molecular weight organics in the water.
4. The fourth stage moves water through a Mixed-Bed Multi-Layer Deionization Cartridge. Mixed-Bed Multi-Layer Deionization Cartridges are fabricated with color-indicating resins for highest possible purity water. They are capable of producing 18 meg-ohm-cm resistivity water. They are the first DI cartridges designed to reduce silica, nitrates and phosphate levels in the low ppb range. These newly formulated cartridges far exceed the performance of previous cartridges, offering enhanced contaminant removal, longer life and higher purity.

Caution: The deionization cartridge life is greatly reduced when operated on low pH waters, or water with high CO₂ (carbon dioxide) levels. The exact cartridge life will vary greatly with pH, carbon dioxide levels, and TDS etc. in your RO water or the feed water supplying the RO system. Aeration or de-gassification of RO product water is recommended for such waters for removal of carbon dioxide.



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Fig. B: Single-Membrane Assembly
Top/Rear View

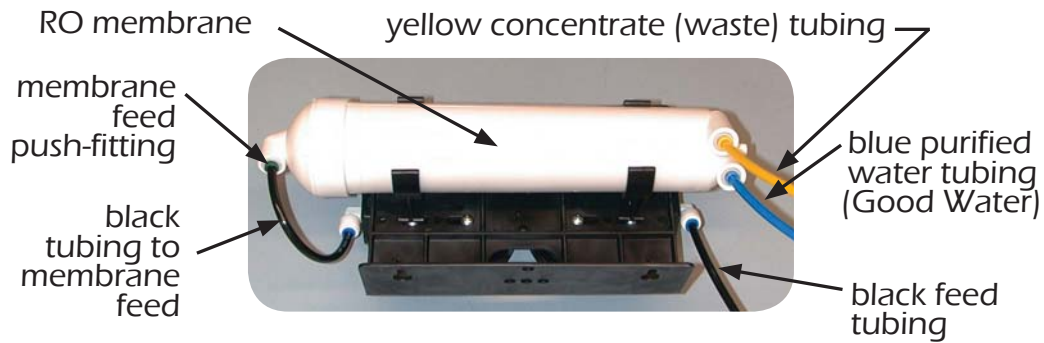
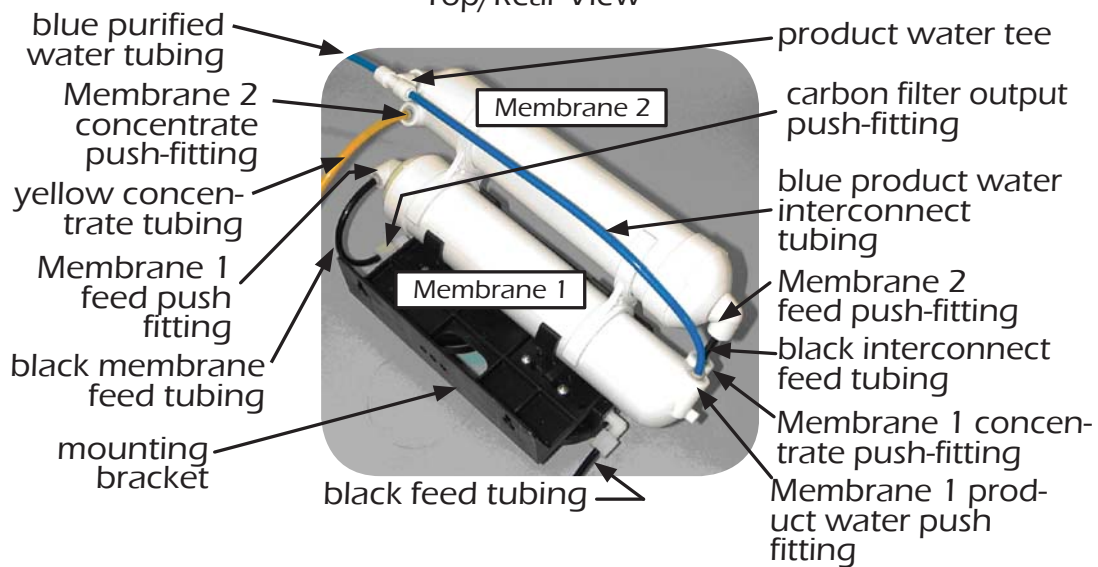
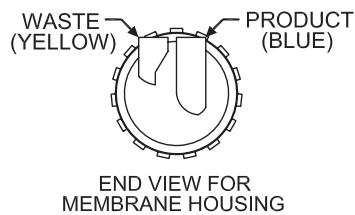


Fig. C: Dual-Membrane Assembly
Top/Rear View



1/4" BLACK LINE: Tap Water
 1/4" BLUE LINE: Product Water
 1/4" YELLOW LINE: Waste Water
 (Flow Restrictor is inside the Waste line)



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SYSTEM INITIALIZATION:

Maintenance and trouble-shooting procedures have been made easy and effective with a built-in pressure gauge. It is recommended that you keep a replacement DI cartridge on hand, ready to install as soon as the monitor indicates that the cartridge in use is exhausted

If you are setting up your system for the first time or replacing the membrane with a different size, please follow the “Checking the concentrate to purified Water Ratio” procedure on page 8 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 8-12 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 wastewater (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. 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 |

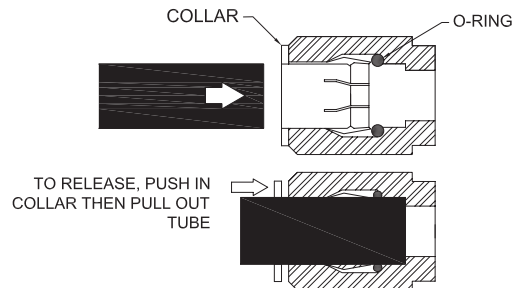
FR-180 (GREEN)

| 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 |

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FLOW RESTRICTOR REMOVAL, ADJUSTMENT AND REPLACEMENT

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



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SEDIMENT PRE-FILTER REPLACEMENT:

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 use 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 its 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. 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.

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CARBON BLOCK FILTER REPLACEMENT:

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. 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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DEIONIZATION CARTRIDGE REPLACEMENT:

(right-most housing)

The DI stage is the *SilicaBuster™* Mixed-Bed Multi-Layer Deionization Cartridge, DI-SB-CI-10. The condition of this cartridge should be judged by observing color change.

When 75% of the cartridge has changed in color, replace cartridge.

DEIONIZATION CARTRIDGE REPLACEMENT

Materials Needed: One DI-SB-CI-10 Deionization cartridge,
filter wrench.

Procedure:

1. Remove the filter housing from its cap by unscrewing it counter clockwise as viewed from the bottom.
2. Remove and discard the old cartridge from the housing.
3. Thoroughly wash out the housings with hot soapy water to which a few teaspoons of household bleach have been added. Rinse well with clean hot water.
4. Install the new deionization cartridge. Make sure the cartridge is installed in the correct direction as marked on the filter housing and that the top seal is securely attached to the top of the cartridge
5. Re-install the bottom housing onto the cap by rotating it clockwise and hand tighten only.

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RO MEMBRANE DIAGNOSTIC:

In order to accurately determine the condition of the RO Membrane, a TDS Meter is required.

(Before performing the following membrane test with a TDS Meter, the waste to product water ratio must be 4 to 1 or greater (see page 8-9)).

Procedure:

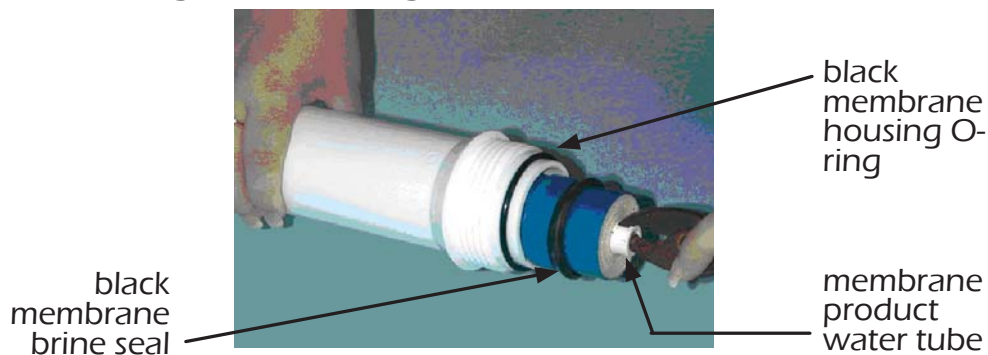
1. Follow the blue line as it leaves the RO membrane and disconnect it from the third (most right) housing.
2. Test the quality of the water. This is your RO water purity. *See page 10 for removal of push fittings on tee.*
- RO WATER TDS READING: _____
3. Once you obtain the RO water TDS reading, reconnect the blue line back to its original location
4. Now, test the quality of the TAP water.
- TAP WATER TDS READING: _____
7. Follow the calculation located on pages 19-20 to determine your membranes impurity rejection.

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 receive the most accurate measurement for determining the condition of the RO membrane.

RO MEMBRANE REPLACEMENT

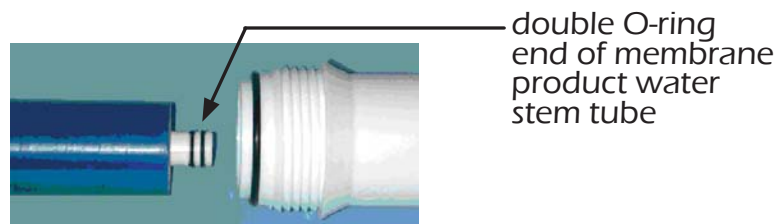
1. Turn off the water supply to the RO system. Place the system where the membrane housing is easily accessible.
2. Remove the black tubing from the membrane feed push-fitting by depressing the collar on the fitting with your thumb and pulling the tubing from the push-fitting (Page 10).
3. Lift the membrane 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. F).

Fig. F: Removing the Membrane Element



6. Remove the black housing O-ring (Fig. F). 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.

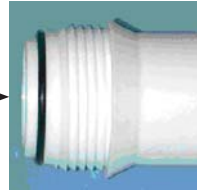
Fig. G: Inserting the New Membrane Element



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8. Place the black housing O-ring on the housing rim and carefully screw the lid back on to the base.

Housing O-Ring →



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.

**** If the new replacement membrane is different in gallons per day than the original membrane, you will need to remove the old flow restrictor, replace it with the correctly matched one and follow this procedure for adjustment:***

1. Disconnect the yellow concentrate tubing (page 10) from the membrane housing. Remove and discard the flow restrictor (Fig. E).
2. Reconnect yellow concentrate tubing back to the membrane housing and run water through system for at least 2 gallons. (This step will flush out membrane preservatives.)
3. Disconnect the yellow tubing again and insert the new flow restrictor. Follow procedure on page 8-9 for measuring waste to product water ratio.
4. Check for leaks.

**** If the replacement membrane is identical in gallons per day to the original membrane:***

1. Disconnect the yellow concentrate tubing (page 10) from the membrane housing. Remove flow restrictor and set aside.
2. Reconnect yellow concentrate tubing back to membrane housing and run water through system for at least 2 gallons. (This step will flush out membrane preservatives.)
3. Re-insert flow restrictor and check for leaks.

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TROUBLESHOOTING GUIDE FOR RO/DI SYSTEMS:

1. Low production rate:
 - a. Plugged pre-filters.
 - b. low water temperature.
 - c. low line pressure.
 - d. high TDS content.
 - e. fouled membrane.
 - f. plugged flow restrictor.
 - i. Replace pre-filters.
 - ii. Heat feed water OR use higher GPD membrane.
 - iii. Use booster pump OR use higher GPD membrane.
 - iv. Use booster pump OR use higher GPD membrane.
 - v. Clean or replace membrane to restore flux.
 - vi. Replace flow restrictor & membrane.

2. Zero production rate:
 - a. Missing flow restrictor.
 - b. Dried membrane.
 - c. Plugged flow restrictor.
 - i. Put flow restrictor in the yellow line.
 - ii. Try to restore flux using rubbing alcohol OR replace membrane.
 - iii. Replace flow restrictor and clean/replace membrane.

3. Extremely high production rate:
 - a. Ruptured membrane.
 - b. Very high line pressure (> 90 psi).
 - i. Replace it.
 - ii. Use a pressure reducing valve.

4. Red light on purity monitor comes on:
 - a. Exhausted deionization cartridge.
 - b. Bad membrane & exhausted cartridge.
 - c. Faulty monitor/probe.
 - i. Replace cartridge.
 - ii. Replace membrane & deionization cartridge.
 - iii. Replace monitor/probe.

5. Pressure gauge does not register anything:
 - a. Missing flow restrictor.
 - b. Pressure gauge screwed in too far.
 - c. Plugged pressure gauge orifice.
 - d. Defective pressure gauge.
 - i. Put flow restrictor in the yellow line.
 - ii. Unscrew pressure gauge one turn and retest.
 - iii. Clean orifice with a needle.
 - iv. Replace it.

6. Low deionization cartridge life:
 - a. Defective membrane.
 - b. Low pressure (< 40 psi).
 - c. High CO2 levels in water (> 5 ppm).
 - d. High TDS in feed water (> 1000 ppm).
 - e. High levels of silica, nitrates, phosphates etc. in tap water.
 - f. High pH tap water (> 9.0).
 - i. Replace it.
 - ii. Use booster pump.
 - iii. Aerate RO product water or use a straight anion cartridge ahead of DI cartridge.
 - iv. NO EASY SOLUTION.
 - v. Use straight anion cartridge ahead of mixed bed cartridge.
 - vi. Acidify feed water to the RO membrane to improve its rejection.

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TESTING THE QUALITY OF THE MEMBRANE:

Membrane Output Calculation

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 |

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Membrane Output Calculation Example

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

$$\text{PCF} = 40 \div 60 = 0.666$$

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

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

37.7 GPD would be the Actual Production Rate

Performance Test

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.

Procedure:

1. Measure tap water TDS. (Call it X)
2. Run the system for 15-20 minutes.
3. Measure RO water's TDS. (Call it Y).
4. Subtract RO water TDS from tap water TDS. (X - Y)
5. Divide this quantity by tap water TDS. (X - Y) ÷ X
6. Rejection = [(X - Y) ÷ X] × 100

Rejection of the RO Membrane Calculation Example

1. Tap water TDS = 150 ppm (X)
2. RO water TDS = 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 TDS Rejection = 95.3 % : Rejection rates less than 95% may indicate that the membrane should be replaced.

** IF YOU NEED HELP WITH THIS PROCEEDURE, PLEASE CONTACT SPECTRAPURE**

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2167 East Fifth St, Tempe, Arizona 85281

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TROUBLESHOOTING GUIDE FOR MEMBRANE:

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 and RO product water TDS/ Conductivity | Is Rejection greater than 95% ? | No - Replace Membrane Yes - Membrane OK |
| Alkalinity Test Kit | Measure feed water and RO product water Alkalinity | Is Rejection greater than 90% ? | No - Replace Membrane Yes - Membrane OK |
| Hardness Test Kit | *Measure feed water and RO product water Hardness | Is Rejection greater than 90%? | No - Replace Membrane Yes - Membrane OK |

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

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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TIPS FOR LONG MEMBRANE LIFE:

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 8.
4. Operating reverse osmosis systems on softened feed water greatly reduces the chances of membrane fouling.

STORAGE:

1. It is recommended that you store your RO System in a cool place when not being used.
2. If your system is exposed to sunlight you will grow algae in the housing and it may damage your system.
3. Your RO System must be protected from freezing or temperatures above 100° F (38°C).
4. **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)**

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REPLACEMENT PARTS:

| Model | Replacement Part |
|--------------|---|
| 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 |
| DI-SB-CI-10 | Color-Indicating SilicaBuster™ Mixed-Bed DI Cartridge |
| GHA-4 | 1/4" (6.35 mm) Garden Hose Adapter |
| WR-UNIV | Filter Wrench |

Optional Accessories

| Model | Optional Part |
|-------------|---------------------------------------|
| FAU-SMP | Quick Connect Faucet Coupler |
| DM-1 | Dual-probe Inline TDS Meter |
| COM-100 | Hand-held TDS/Conductivity Meter |
| 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 | High-Flow (>65GPD) Booster Pump, 115V |
| BPHF-MO-230 | High-Flow (>65GPD) Booster Pump, 230V |

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

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