

REPLACEMENT PARTS

Model	Replacement Part
SF-MT-0.5-10	.5 micron MicroTec™ Sediment Filter
CF-0.5-10	.5 micron Carbon Block Pre-Filter
MEM-90,150	90 or 150 gpd Membrane (2) 150gpd membranes make 300 GPD
FR-90	Flow Restrictor for 90 gpd System
FR-150	Flow Restrictor for 150 gpd System
FR-300	Flow Restrictor for 300 gpd System
DI-MC-10	MAXCAP DI™ Cartridge
DI-SB-10	SilicaBuster™ DI Cartridge
GHA-4	1/4" (6.35 mm) Garden Hose Adapter
XWR-UNIV	Filter Wrench

Optional Accessories

Model	Optional Part
FAU-SMP	Quick Connect Faucet Coupler
TK-CL-10	Total Chlorine Test Kit
VA-FVK-4	Flush Valve Kit
BPLF-MO-115	Low-Flow Booster Pump, 115V
BPLF-MO-230	Low-Flow Booster Pump, 230V
BPHF-MO-115	Hi-Flow Booster Pump, 115V
BPHF-MO-230	Hi-Flow Booster Pump, 230V

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

SpectraPure®
INNOVATORS IN WATER TECHNOLOGY

The MAXCAP RO/DI™ System Reverse Osmosis/Ion Exchange Water Purification System

(Single or Dual Membrane Model)



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.

REV 01-08-2007

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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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SpectraPure® Inc. 480.894.5437 Call us toll-free 1.800.685.2783
2167 East Fifth St, Tempe, Arizona 85281

THREE YEAR MANUFACTURERS WARRANTY

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 manufacture'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 two 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 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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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

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.

Note: This procedure will require a Conductivity Meter (TS-C61) or TDS Meter (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. $(X - Y) \div X$
7. Rejection = $[(X - Y) \div X] \times 100$

* 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. $X - Y = 143 \text{ ppm}$
4. $(X - Y) \div X = 143 \div 150 = 0.953$
5. Rejection = $[(X - Y) \div X] \times 100 = 0.953 \times 100 = 95.3$

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

TERMS AND CONDITIONS OF SALE

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 service 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).

SYSTEM SPECIFICATIONS

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)
DI Cartridges	MAXCAP DI™ SilicaBuster™ DI
Rejection Rate	Greater than 98% 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
90 (340)	235ml/min	940 ml/min
150 (340)	235ml/min	940 ml/min
300 (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 CaCO3)
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.

TESTING THE PERFORMANCE 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.

$$\text{Expected GPD} = \text{Rated GPD} \times \text{PCF} \times \text{TCF}$$

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.

$$\text{PCF} = \text{Line Pressure (in psi)} \div 60$$

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

CHOOSING A MOUNTING LOCATION

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.

TIPS FOR LONG MEMBRANE LIFE

1. Replacement of .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 .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 9-10.
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 help extend membrane life.

SYSTEM DESCRIPTION

The *MAXCAP DI*™ system is a five stage reverse osmosis de-ionization 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 carbon block filter 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 98% of most inorganic salts, all micro-organisms and organics above 100 daltons molecular weight.
4. The fourth and fifth stage filter is our *MAXCAP DI*™ cartridge followed by SpectraPure's SilicaBuster™ cartridge.

The *MAXCAP DI*™ system comes equipped with two Dual Inline TDS monitors. The first monitor shows TDS levels of pre-and post- RO membrane water. The second monitor helps detect the exhaustion points of the DI stages.

The *MaxCap DI*™ is used as a "roughing" cartridge followed by our original SilicaBuster™. For example, if the RO water has 25 ppm TDS (Total Dissolved Solids) entering a SilicaBuster™ cartridge alone, it may only process about 200 gallons of pure DI water. By placing a *MaxCap DI*™ cartridge in front of the SilicaBuster™ cartridge, **600 gallons** of water will pass through both cartridges before the *Max Cap DI*™ is exhausted. The SilicaBuster™ DI cartridge will be only one-third exhausted. A second *Max Cap DI*™ will process another **600 gallons** and the SilicaBuster™ cartridge will now be two-thirds exhausted. Only after a third *Max Cap DI*™ cartridge processes another **600 gallons** will the SilicaBuster™ cartridge finally become fully exhausted.

This example illustrates that **three Max Cap DI™ cartridges plus the original mixed-bed cartridge** will process 1800 gallons of pure DI water. It would have taken **nine** original mixed-bed cartridges to produce the same amount of pure DI water.

IMPORTANT NOTE: If you are starting up this system for the first time, or replacing either DI cartridge, it is very important that you follow the directions on page 8, "System Initialization".

Fig. A: System Components



METERING AND DIAGNOSTICS

This SpectraPure purification system has been fully equipped with sufficient instrumentation to make monitoring and troubleshooting an easy process. The provided pressure gauge is used to determine the tap water pressure and to evaluate the condition of the sediment and carbon prefilters.

(The pressure will drop as the pre-filters become clogged by dirt [turbidity] from the tap water).

The digital TDS meter (left side) will provide a reliable means of evaluating the efficiency of the RO membrane. This meter will indicate the tap water conductivity and the RO water conductivity. The difference between the two meter readings will be used to calculate the percentage of rejection of the (TFC) RO membrane.

The Digital TDS meter (right side) will be used to determine the condition of the two stages of the DI system. As the reading on the meter begin to increase, the operator will be alerted to the possibility that the DI system may have deteriorated past the exhaustion point and that the DI cartridges may need to be replaced.

USING THE PRESSURE GAUGE

The pressure gauge is used to monitor the condition of the Sediment and Carbon Pre-Filters. With the Sediment and Carbon filters removed, the gauge will indicate the "actual" input water tap water pressure. When the prefilters are "new", the pressure shown on the gauge will be slightly less than the actual tap water pressure and as the filters age the pressure will drop due to the dirt that will collect in the prefilters. When the pressure on the gauge drops below 40-PSI or as the filters collect particulates and the pressure drop is greater than 15% to 20% of the normal water pressure, the pre-filters are in need of replacement.

NOTE: When the pressure on the pressure gauge drops below the normal readings; do not "assume" that the sediment filter is the only cause. In some geographical areas where the input water contains a high percentage of very small micron particulates, the carbon filter may become clogged before the sediment filter. (The filters may look "new" but still cause the water pressure to drop). Do not judge the condition of the prefilters by their color, always use the pressure gauge to determine the condition of the prefilters.

MAINTENANCE

The maintenance and trouble-shooting procedures have been made easy and effective with a combination of the Pressure gauge and two dual Inline TDS meters.

- When there is a pressure drop of 15% of your normal house pressure that is an indication that your pre-filters need to be replaced.
- The TDS monitors will let you know when the TDS level rises. All our membranes have a 98% rejection. When the TDS level starts to rise the % rejection will decrease. You should replace the membrane before the % rejection gets to 90%.

It is highly recommended that one set of Sediment and Carbon replacement filters should be on hand and ready for installation as soon as the first monitor indicates that a cartridge change or replacement is required. We do not recommend that you have a replacement membrane and DI because they do have a shelf life.

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).

TROUBLESHOOTING GUIDE FOR RO/DI SYSTEMS

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

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

3. Extremely high production rate:
 - a. Ruptured membrane. i. Replace
 - b. Very high line pressure (> 80 psi). ii. Use a pressure reducing valve.

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

5. Low deionization cartridge life:
 - a. Defective membrane. i. Replace it.
 - b. Low pressure (< 40 psi). ii. Use booster pump.
 - c. High CO2 levels in water (> 5 ppm). iii. Aerate RO product water or use a straight anion cartridge ahead of DI cartridge. [Call Technical Support]
 - d. High TDS in feed water (> 1000 ppm). iv. NO EASY SOLUTION.
 - e. High levels of silica, nitrates, v. Use straight anion cartridge ahead of mixed-bed for phosphates etc. in tap water.
 - f. Bad or faulty DI cartridge.
 - g. High pH tap water (> 9.0). vi. Acidify feed water to the RO membrane to improve its rejection.
 - h. Faulty monitor/probe. Test and Replace if required.

DM-1 Specifications:

Range 0-1999 PPM	Resolution 1PPM (1-999 PPM)
Accuracy 2%	Probe ¼"
Power Source (2) 1.5V button batteries	Battery life Approx 1000 hours

For service or repair of these monitors, please send to:

HM DIGITAL, INC
5819 Uplander Way
Culver City, CA 90230

TESTING THE RO MEMBRANE REJECTION RATE

Procedure:

1. First, make sure that the system has been turned on and producing water (filling the tank) for 15-20 minutes. (The pressure gauge should be reading > 40-PSI during this time).
2. Turn on the meter by depressing the "ON" switch then locate the slide switch on the front of the meter.
 - A. Measure the tap water conductivity by sliding the switch to the Left. (Call it X)
 - B. Measure RO water conductivity by sliding the switch to the Right. (Call it Y).
 - C. Subtract RO water conductivity from tap water conductivity. (X - Y)
 - D. Divide this quantity by tap water conductivity. $(X - Y) \div X$
 - E. Rejection = $[(X - Y) \div X] \times 100$

* **Conductivity in the above procedure could be caused by hardness, alkalinity, nitrate, phosphate, silica etc. (The measurement is 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. $(X - Y) \div X = 143 \div 150 = 0.953$
5. Rejection = $[(X - Y) \div X] \times 100 = 0.953 \times 100 = 95.3$

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

As a general rule; the RO membrane would be considered to be in good condition when the rejection rate is = to or > 95%.

NOTE: There are many variables in the input (Tap) water chemistry that may affect the rejection rate of the RO membrane. (If, after testing the membrane, there are questions regarding its condition, please call our Technical Support staff for assistance).

SYSTEM INITIALIZATION

If you are setting up your system for the first time or replacing the RO membrane, please see the "Checking the Concentrate to Purified Water Ratio".

1. **IMPORTANT:** During the initial rinse-up of the MAXCAP RO/DI™, a large ionic load is presented to the downstream DI cartridges. **Be sure to rinse up all new MAXCAP DI™ with the downstream cartridge removed.** This rinsing step will ensure that the MAXCAP DI™ cartridge is initially rinsed up to produce high quality water before connecting your downstream cartridge. Failure to rinse this upstream MAXCAP DI™ cartridge may reduce the lifetime of your downstream DI cartridge.
2. Remove the SilicaBuster™ DI cartridge from the right-most housing and re-install the empty housing on the system. Attach garden hose adapter to your cold water source. **Never run hot water (greater than 100 F (38 C)) through the system.**
3. Place the yellow concentrate tubing and the blue purified water tubing into a drain or bucket. Do not restrict flow from these lines.
4. Slowly open the cold water supply valve and allow the housings to fill. You may use pressure up to 80 psi (5.5 bar). If the pressure is less than 40-PSI, a booster pump will be required. If the pressure is greater than 80-PSI, a pressure regulator will be required. (See "Optional Items" for the part numbers).
5. Turn on both TDS meters. Set the left-side meter to "OUT" (Post-RO and Pre-MAXCAP DI™). Set the right-side meter to "IN" (Post-MAXCAP DI™).
6. When the right-side meter reads zero, turn the cold water feed off and place the SilicaBuster™ DI cartridge back into its housing.
7. Turn the cold water feed back on and run the system until the "OUT" probe of the right-hand meter reads zero.
8. Now test the concentrate to purified water ratio on page 9-12.

CHECK:

- Ensure that all fittings are tight and leak-free before leaving the system unattended.
- The concentrate line (yellow) includes a smaller capillary tube (flow restrictor) that is located "inside" of the tubing. Do not remove or discard this restrictor; the system will not produce permeate water without the flow restrictor.
- All of the following conditions must be met before water will flow through the system. The water source must be turned "ON" and the water level in the reservoir tank must be below the low level float, if present.

Note: It is recommended that at least 2 gallons (7.57 liters) of purified water be discarded before collecting purified water for use. If the unit is not used for several days, run the system for at least 15 minutes before collecting any water.

Upon start-up, air may be trapped in the DI cartridges (housing may not appear full), this is a normal condition and it will not affect the operation of the DI system.

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.
12. Turn off the water supply to the system. Remove the yellow tubing from the membrane housing and replace the flow restrictor.
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.

Fig. F: Removing the Membrane Element

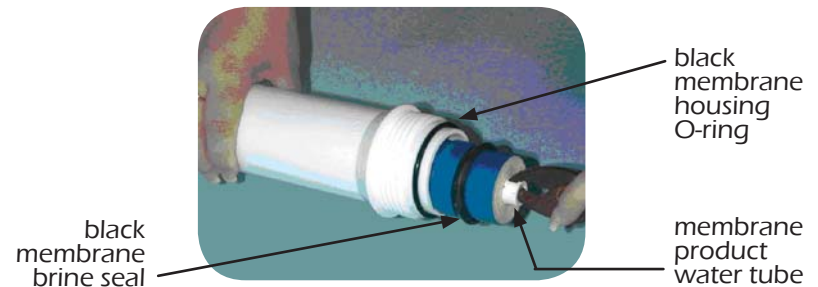
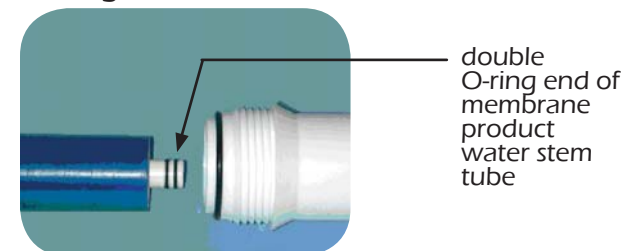


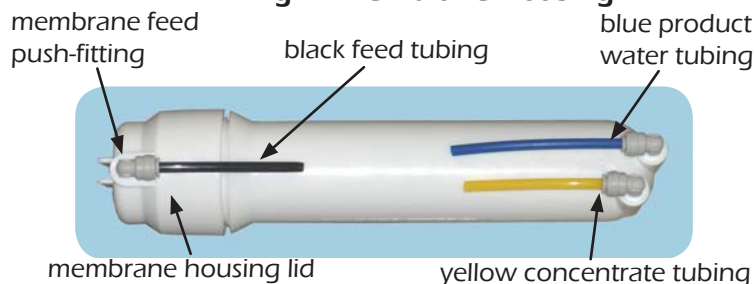
Fig. G: Inserting the New Membrane Element



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 (Fig E).
 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).
 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.
 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.C) from the membrane housing and remove the flow restrictor (Fig. D) from the yellow tubing (Refer to the procedure on page 11-12).

Fig. E: Membrane Housing



CHECKING THE CONCENTRATE TO PURIFIED 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 the pro-rated Membrane 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. Open the cold water supply valve and let the system run for 15 minutes. Direct both tube down the drain.
2. Collect product water from the blue tubing into a measuring cup for one minute. Measure the collected amount in milli-liters. Do the same with the waste water from the yellow line.

WASTE (YELLOW) IN MILILITERS _____

DIVIDED BY

PRODUCT (BLUE) IN MILILITERS _____

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).

3. If ratio is less than 4:1

Disconnect yellow drain line from the membrane housing and then remove flow restrictor. Use the appropriate Flow Restrictor Chart to determine how long to cut the flow restrictor in order to obtain a 4:1 ratio. (Figure B)

* Please refer to pages 11-12 for Flow Restrictor Removal, Adjustment, and Replacement. *

4. If ratio is greater than 6:1, flow restrictor requires replacement (Please contact SpectraPure Inc).

5. Turn on feed supply.
6. Check for Leaks.
7. This completes the procedure.

NOTE: WHEN TESTING AND ADJUSTING THE RATIO THE WATER PRESSURE SHOULD BE BETWEEN 40-80 PSI.

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

FR-90 (YELLOW or WHITE)

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

RO MEMBRANE DIAGNOSTICS

Although RO membranes are capable of maintaining high water quality over extended periods of time they eventually will begin to deteriorate. Normally, the conductivity of the permeate water will increase as the membranes age. By comparing the difference in TDS readings between the Tap water conductivity and the RO water conductivity, the percentage of rejection of the RO membrane may be calculated and the resultant number may then be used to determine the condition of the membrane and thus the operator will know when the membrane needs to be replaced. Membrane failure will be indicated by a reduction of the percentage of rejection which will be determined by calculating the differential between the input and output numbers.

In order to accurately determine the condition of the RO Membrane, a conductivity tester (TDS meter) capable of reading the tap water conductivity and the permeate water conductivity has been provided with this system. With the assistance of the TDS meter you will be able to easily determine the RO membrane's condition. (see page 7)

Before performing the diagnostic test on the RO membrane, make sure that the RO system has been "ON" and producing pure water for a minimum of 10 minutes. Also check the brine (yellow) line to make sure that water is flowing and that the flow ratio between the permeate water and the brine water is at a ratio that is > 4 to 1. (See Page 9). (NOTE: The pressure gauge should indicate a pressure reading of > 40 PSI during this 15-20 minute test period.

Procedure:

1. Turn on the meter 1 by depressing the on switch.
2. Locate the meter slide switch on the front of the DM-1 TDS meter.
3. Slide the switch to the "Left" and read the Tap water conductivity then record the reading _____ .
4. Next, slide the switch the to "Right" and read the permeate water conductivity then record the reading _____.
5. See page 7 on "TESTING THE RO MEMBRANE REJECTION RATE "

MAXCAP RO/DI™ MAINTENANCE AND REPLACEMENT

Procedure:

1. When the reading on the right-hand TDS meter (set to "IN") displays 75% of the reading on the left-hand TDS meter (set to "OUT"), it is time to replace the MAXCAP DI™ cartridge.
2. Follow the directions on page 8 to replace the MAXCAP DI™ cartridge.
3. Make sure the DI cartridge is installed in the correct direction as marked on the cartridge shell and be sure that the top seal is securely attached to the top of the cartridge.
4. Tighten the cartridge housing by rotating it clockwise and hand tighten.
5. Turn on system and check for leaks.

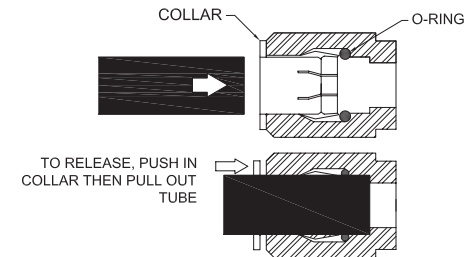
SilicaBuster™ MAINTENANCE AND REPLACEMENT

Procedure:

1. When the reading on the right-hand TDS meter (set to "OUT") displays "001", it is time to replace the SilicaBuster™ DI cartridge.
2. Follow the directions on page 8 to replace the SilicaBuster™ DI cartridge.
3. Make sure the DI cartridge is installed in the correct direction as marked on the cartridge shell and be sure that the top seal is securely attached to the top of the cartridge.
4. Tighten the cartridge housing by rotating it clockwise and hand tighten.
5. Turn on system and check for leaks.

FLOW RESTRICTOR REMOVAL, ADJUSTMENT AND REPLACEMENT

1. Locate the yellow concentrate tubing (Fig. C). 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. D). 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. B). Find the table that represents the Flow Restrictor Assembly for the system that you have. Find the **product flow rate** in the left-most column and the **length of the flow restrictor** in the right-most column.

Example: If your Flow Restrictor Assembly is for a 150 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.
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 reseal the tubing as described above.

Fig. C: Reverse Osmosis Assembly

Top/Rear View

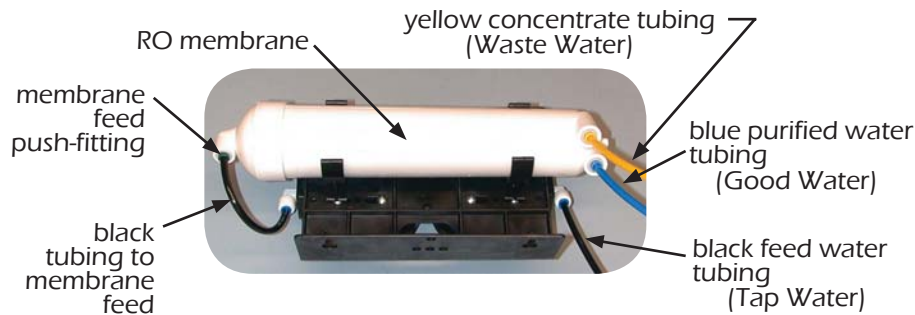
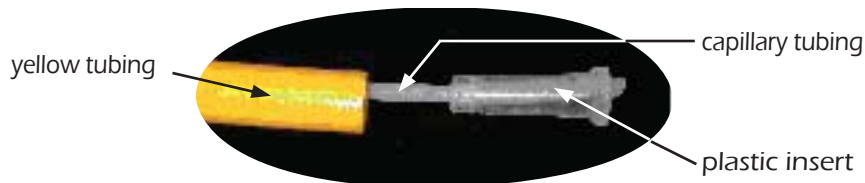


Fig. D: Flow Restrictor Assembly



SEDIMENT PRE-FILTER REPLACEMENT

For maximum contaminant removal and long membrane life, the sediment pre-filter must be changed when a 15-20% drop in pressure is observed OR at least 6-month intervals. If your water contains a great deal of sediment the pre-filter may require more frequent changes to maintain adequate production rate and extended membrane life.

Sediment Pre-Filter Replacement

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

Procedure: (FIRST FILTER ON LEFT)

1. Turn off water supply to the system.
2. Refer to photo on page 6. Using the provided filter 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 into 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.

CARBON BLOCK FILTER REPLACEMENT

For maximum contaminant removal and long membrane life, the carbon pre-filter must be changed at least ever 6-month or when chlorine breakthrough greater than 0.1 ppm occurs in the yellow concentrate line. Test for chlorine breakthrough by collecting a 10 ml sample of the concentrate from the yellow tubing and test the chlorine concentration using test kit TK-CL-10. If the chlorine concentration is above 0.1 ppm, replace the carbon pre-filter.

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

Procedure: (SECOND FILTER ON LEFT WHEN FACING SYSTEM)

1. Perform steps 1-5 listed above
2. Turn on system water supply and check for leaks.

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