



# MaxCap<sup>®</sup> MC-RODI-MF, -AF

(Single (-90) or Dual (-180) Membrane Models)

## Reverse Osmosis/De-Ionization Water Purification Systems



### INSTALLATION AND OPERATING MANUAL

#### **WARNING**

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

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**SpectraPure<sup>®</sup>Inc.** 480.894.5437 Call us toll-free 1.800.685.2783

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This MaxCap<sup>®</sup> RO/DI System comes complete with:

- High-rejection SpectraPure<sup>®</sup> advanced thin-film membrane (2 membranes in -180GPD system)
- 2:1 waste-to-product ratio produces 50% less waste water (3:1 for hard water areas)
- Long-life high-efficiency 0.5 micron Sediment pre-Filter
- High-capacity 0.5 micron Carbon Block pre-Filter eliminates chlorine, herbicides and other organic pollutants
- MaxCap<sup>®</sup> Super DI<sup>™</sup> Cartridge (DI-MC-10HC)
- SilicaBuster<sup>™</sup> Super DI<sup>™</sup> Cartridge (DI-SB-10HC)
- Dual-probe TDS Meter to monitor pre-/post-membrane
- Dual-probe TDS Meter to monitor post-DI performance
- Automatic **or** Manual Flush Valve for longer membrane life
- Automatic Shut-Off Valve saves water
- In-line feed-water Ball Valve for manual system shut off
- Float Valve for filling a reservoir
- Tri-color custom pressure gauge indicates when to change prefilters
- Durable, no rust mounting bracket & clear filter housings
- 6-foot feed tubing, 8-foot product and waste tubing included
- Housing wrench for easy filter removal
- Garden hose adapter for feed water hookup
- 3-year warranty

***Thank You for your purchase of a SpectraPure<sup>®</sup> System. With proper installation and maintenance, this system will provide you with high quality water for years to come. All SpectraPure<sup>®</sup> products are rigorously tested by us for safety and reliability. However, SpectraPure<sup>®</sup>Inc. Assumes No Responsibility for water damage due to leaks. It is the user's responsibility to determine that the system is leak-free. If you have any questions or concerns, please contact our customer service department at 1.800.685.2783.***

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## **SYSTEM SPECIFICATIONS:**

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Sediment Pre-Filter	0.5 micron MicroTec™ Sediment Pre-Filter (SF-MT-0.5-10)
Carbon Filter	0.5 micron Carbon Block Pre-Filter (CF-0.5-10)
RO Membrane Type	Thin-Film Composite (TFC) (MEM-XXXX)
DI Cartridges	MAXCAP® SUPER DI™ Cartridge (DI-MC-10HC) SilicaBuster™ SUPER DI™ Cartridge (DI-SB-10HC)
Rejection Rate	98% average
Input Water Pressure	60 psi (4.15 bar) line pressure*
Input Water Temp	77°F (25°C)
Recovery Rate	33% (i.e. 33% of the water will be collected as pure water)

### Dimensions:

MaxCap MC-RODI-180-MF (-AF)	20" W x 18" H x 7" D (Two Membranes)
MaxCap MC-RODI-90-MF (-AF)	20" W x 16" H x 7" D (One Membrane)

### Nominal Membrane Flow Rates @ 60 psi, 77° F, & 500 ppm TDS :

GPD	Product Water Flow Rate	Concentrate Flow Rate (2:1)
90	234 ml/min	468 ml/min
180	468 ml/min	936 ml/min

Permeate flow and TDS rejection is based on the following test conditions: 250 ppm tap water, 77° F (25° C), 33% recovery and 60 psi.

Higher TDS, harder tap water, higher temperature, greater recovery rate, or lower operating pressure may contribute to reduced permeate flow and/or lower TDS rejection.

### Reverse Osmosis Operating Limits:

Operating Pressure*	40 – 80 psi (2.75 – 5.5 bar)
pH Range	2 – 11
Maximum Temperature	113° F (45° C)
Maximum Turbidity	1.0 NTU
Maximum Silt Density Index	5.0 (based on 15 min. test time)
Free Chlorine Tolerance	less than 0.1 ppm
Maximum Iron	less than 0.1 ppm
Maximum Manganese	less than 0.1 ppm
Maximum Hydrogen Sulfide	0 ppm

\*Operating pressure less than 40 psi may require a booster pump:

Operating pressure greater than 80 psi may require a pressure regulator.

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## ***GENERAL SYSTEM DESCRIPTION:***

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This SpectraPure<sup>®</sup> RODI System gives you a continuous supply of sparkling clear water. The reliability with the SpectraPure<sup>®</sup> Water Treatment System is greatly improved over other systems. Costly maintenance can be avoided, providing high quality water at your fingertips.

The incoming feed water from a cold water source is directed through BLACK tubing with an inline ball valve and is first passed through a sediment pre-filter. This filter is used to remove excessive turbidity, sand, dust, silt, etc., that would otherwise cause the carbon filter to plug up. The next stage of filtration is the carbon block pre-filter. This filter is used to remove organics and chlorine from the feed water that can damage the membrane. The next stage of the system is the RO membrane.

Household water pressure is used to force tap water through the semipermeable RO membrane. The membrane only allows the purest of water molecules to pass through it while over 98% of most inorganic salts, all micro-organisms and almost all high molecular weight organics in the water are rejected by the membrane and sent down the drain.

These RODI systems have two stages of De-Ionization that polish the RO water to less-than-one-ppm purity. The fourth and fifth stage filters are our MAXCAP<sup>®</sup> Super DI<sup>™</sup> cartridge and our SilicaBuster<sup>™</sup> Super DI<sup>™</sup> cartridge.

The MaxCap<sup>®</sup> Super DI<sup>™</sup> is used as a “roughing” cartridge and is followed by our SilicaBuster<sup>™</sup> Super DI<sup>™</sup>. Typically, if the RO water has 25 ppm TDS (Total Dissolved Solids) entering a SilicaBuster<sup>™</sup> DI cartridge alone, it might process about 266 gallons of pure DI water. By placing a MaxCap<sup>®</sup> DI cartridge in front of the SilicaBuster<sup>™</sup> cartridge, 800 gallons of water will pass through both cartridges before the Max Cap<sup>®</sup> DI is exhausted. The SilicaBuster<sup>™</sup> DI cartridge will be only one-third exhausted. A second Max Cap<sup>®</sup> DI will process another 800 gallons and the SilicaBuster<sup>™</sup> DI cartridge will now be two-thirds exhausted. Only after a third Max Cap<sup>®</sup> DI cartridge processes another 800 gallons will the SilicaBuster<sup>™</sup> DI cartridge finally become fully exhausted.

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This example illustrates that three MaxCap<sup>®</sup> Super DI cartridges plus the original SilcaBuster Super DI cartridge will process 2400 gallons of pure DI water. It would have taken as many as ten standard mixed-bed cartridges to produce the same amount of pure DI water.

The MAXCAP<sup>®</sup> RODI system comes equipped with two Dual Inline TDS monitors. The two TDS meters can monitor every step in the purification process. The IN probe of the left-side meter shows the tap water TDS. The OUT probe of the left-side meter shows the RO water TDS. The IN probe of the right-side meter shows the TDS coming out of the MaxCap DI and the OUT probe of the right-side meter shows the TDS of the final product water (out of the SilcaBuster DI).

A pressure-operated Shut-Off Valve and a Float Valve are provided for convenient filling of a storage reservoir.

A Manual Flush Valve (-MF) can be used to periodically rinse the accumulated impurities and concentrated waste water from the surface of the RO membrane to help increase the life of the membrane.

An Automatic Flush System (-AF) can be used to periodically rinse the accumulated impurities and concentrated waste water from the surface of the RO membrane to help increase the life of the membrane.

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## **WORKING WITH PUSH-FITTINGS:**

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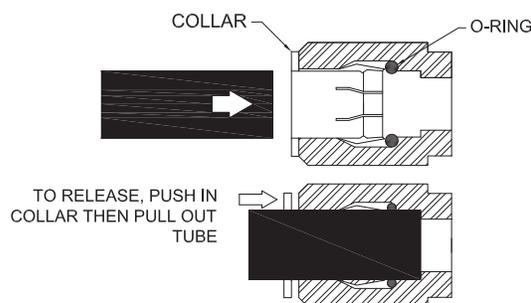
Push-fittings are very reliable and convenient tubing connectors.

To remove the tubing from its push-fitting:

1. Firmly depress and hold the push-fitting collar down with your thumbnail.
2. While the push-fitting collar is depressed, pull the tubing straight out of the push-fitting. Once the tubing is removed, release the collar.

To re-insert the tubing into its push-fitting:

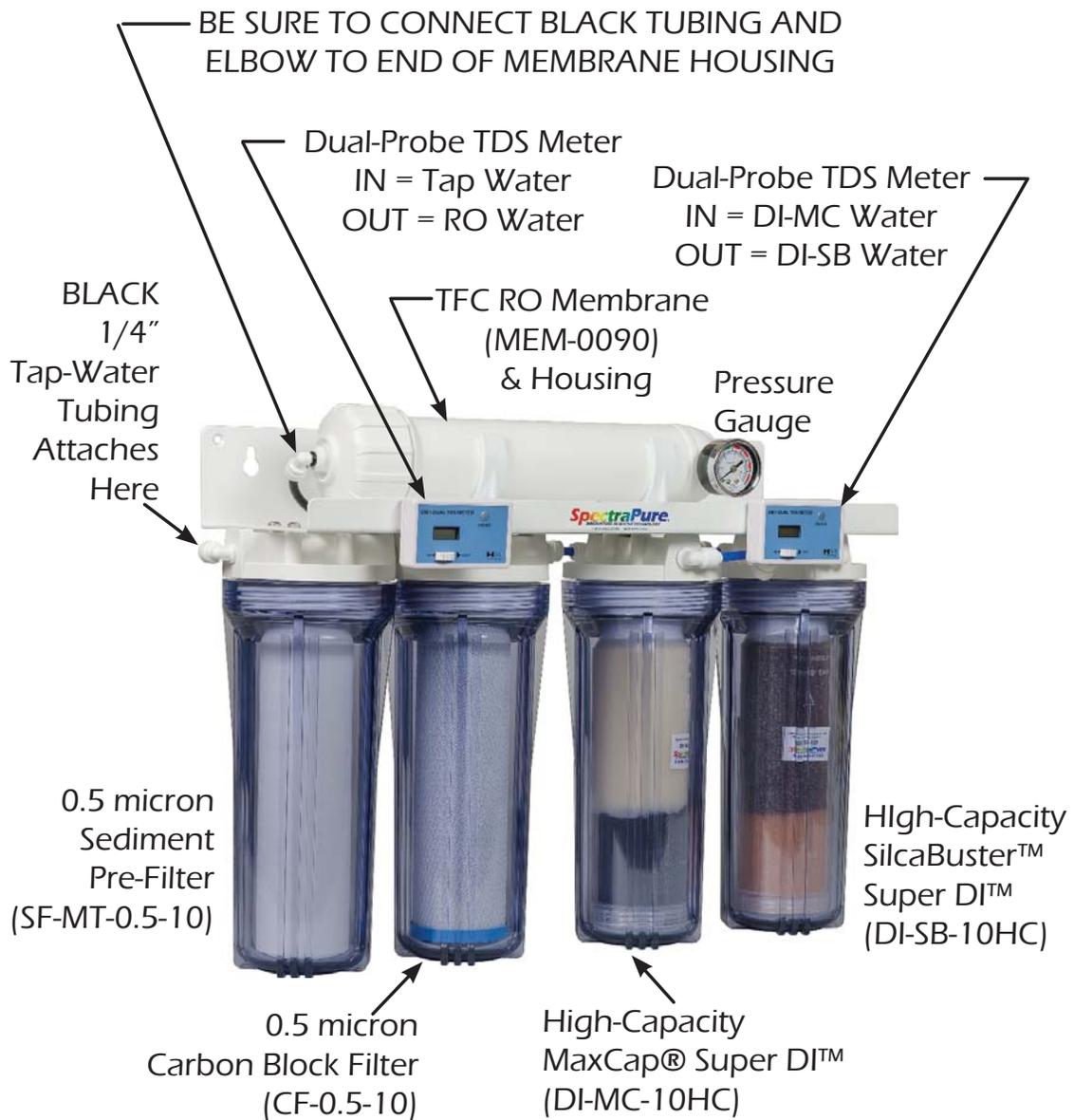
1. Moisten the O-ring seal inside the push-fitting by dripping a few drops of clean water into the fitting.
2. Grasp the tubing near the end, and insert the tubing into the push-fitting.
3. Push the tubing into the fitting until resistance is felt, approximately 1/2 inch (12.7 mm). The tubing is now resting on the O-ring seal inside the fitting.
4. 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 past the O-ring seal.
5. 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 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.



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## SINGLE MEMBRANE, DUAL-DI RO/DI SYSTEM

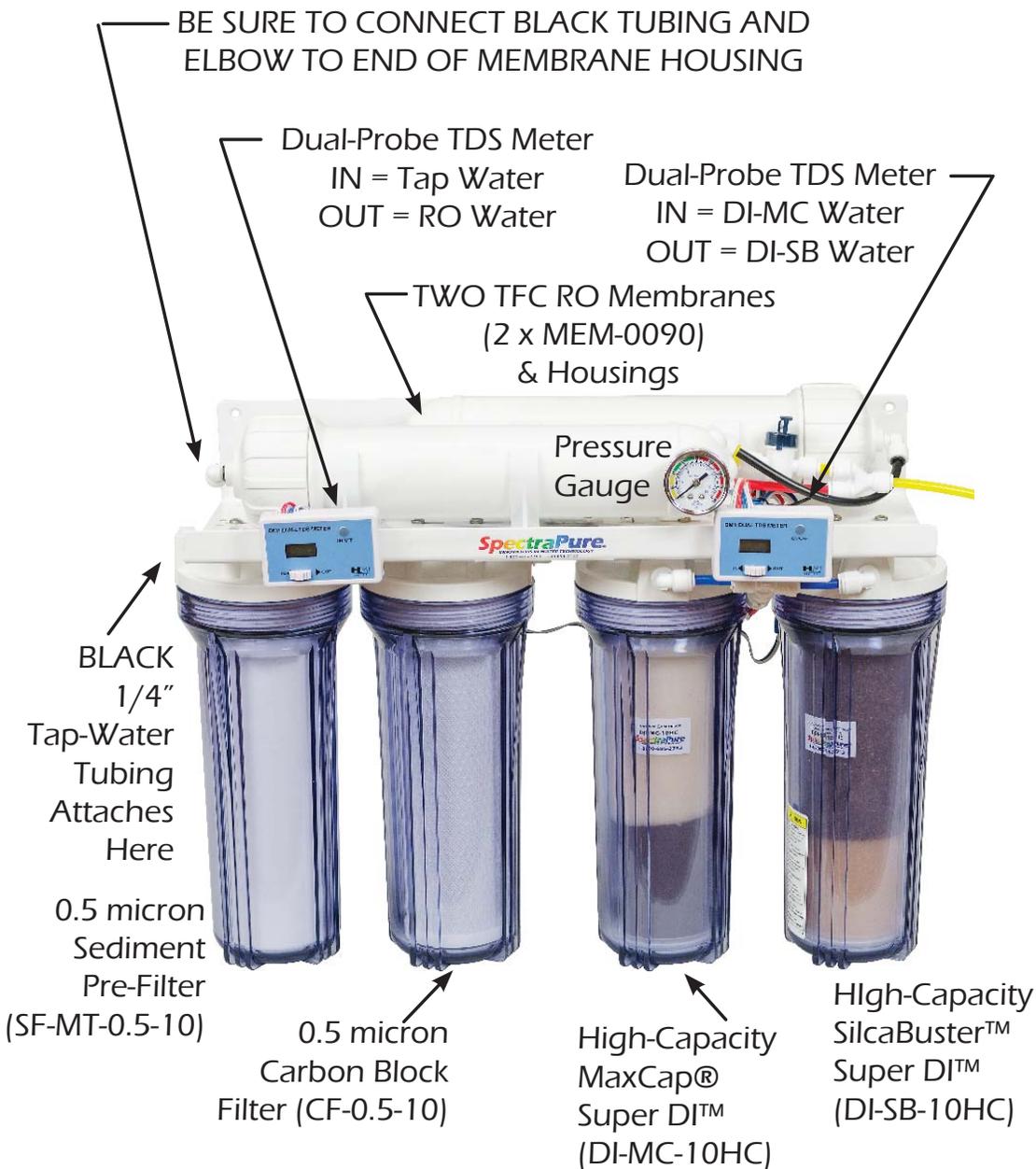
### MaxCap® MC-RODI-90 :



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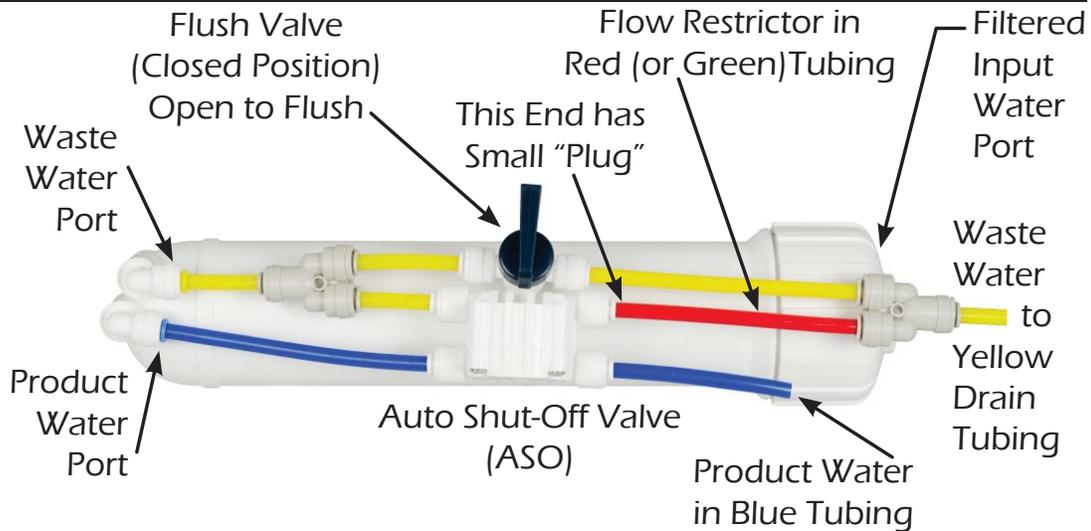
## DUAL MEMBRANE, DUAL-DI RO/DI SYSTEM

### MaxCap® MC- RODI -180 :

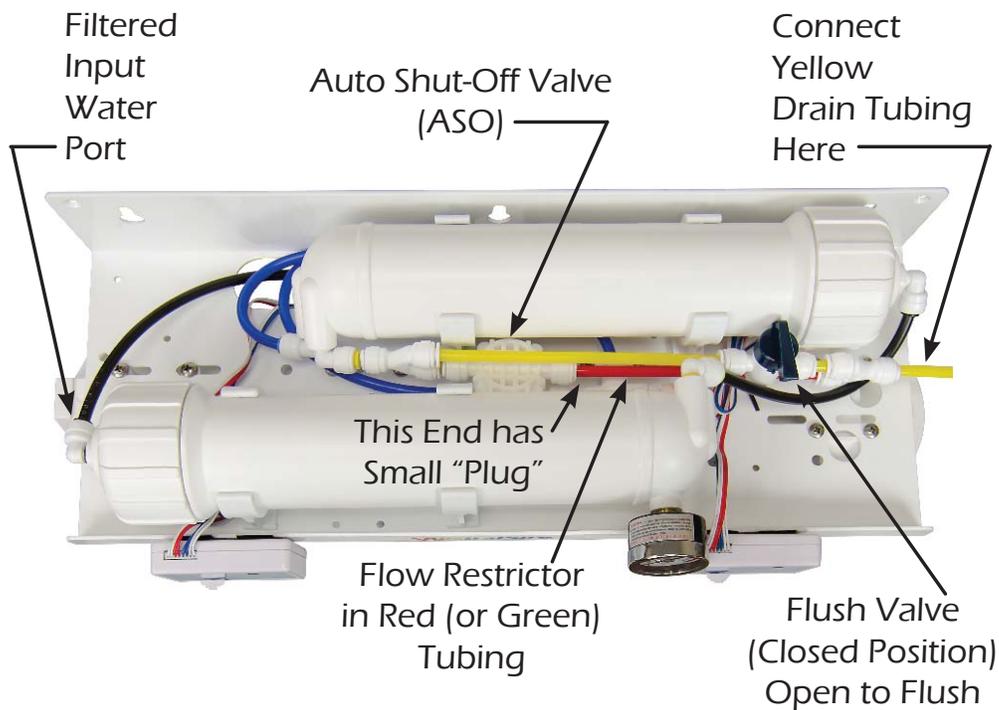


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## REAR VIEWS for - MF SYSTEMS:



### SINGLE MEMBRANE SYSTEM



### DUAL MEMBRANE SYSTEM

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2167 East Fifth St, Tempe, Arizona 85281

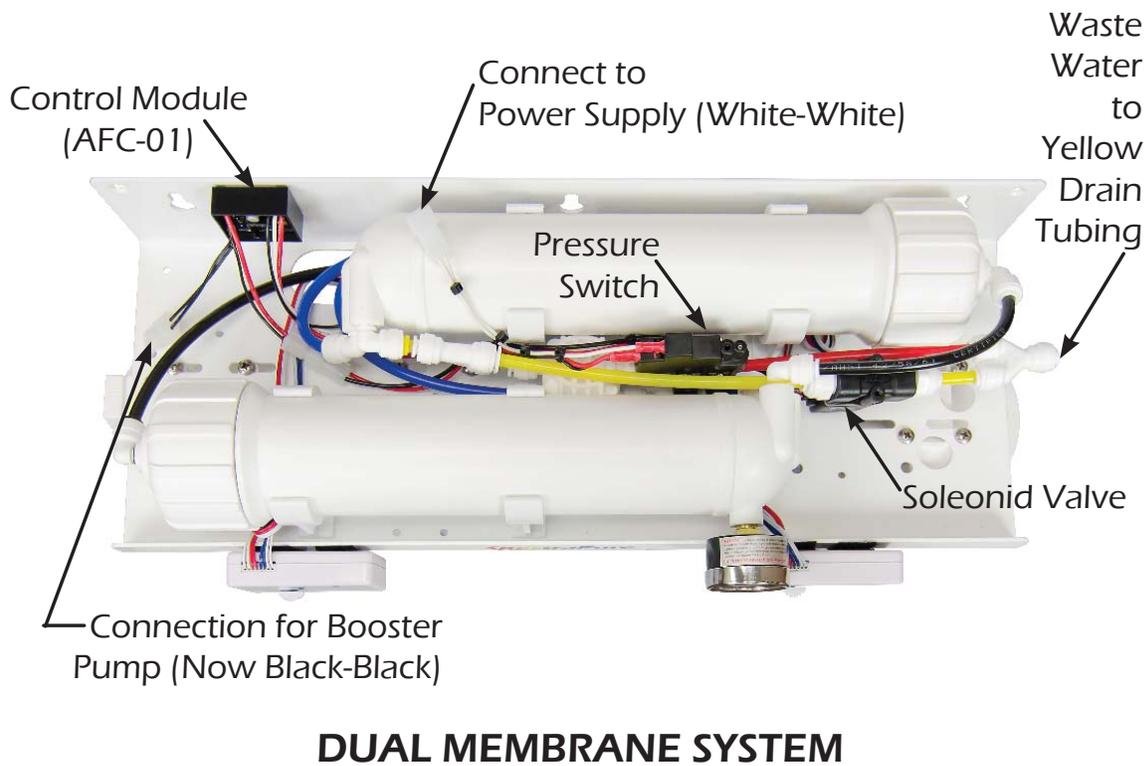
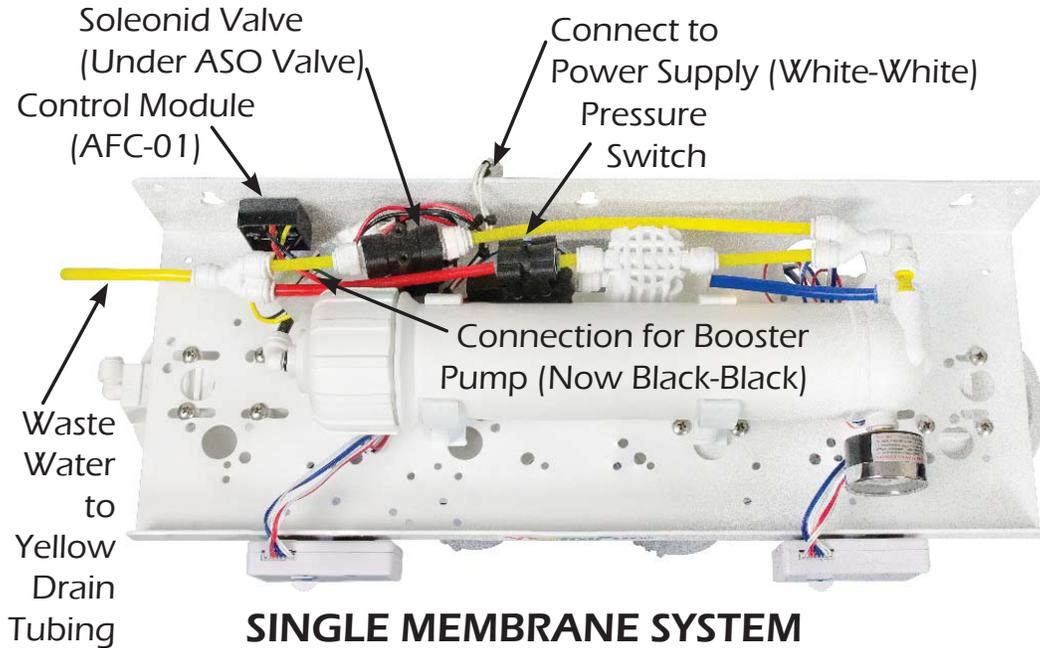
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## REAR VIEWS for - AF SYSTEMS:

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## **SYSTEM INSTALLATION & INITIALIZATION:**

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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. Avoid installing this unit in an area where it may be subjected to bright light or direct sunlight, as algae is more likely to thrive inside the clear filter housings when exposed to bright light. The unit must be kept out of areas that are subject to freezing temperatures.
3. 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.
4. Attach the black tap water tubing to the left side of the Sediment Filter Housing (See page 8 or 9).
5. Attach the yellow drain line to the “Y”-connector at the rear of the system. This “Y”-connector already has a yellow and red tube attached to it.
6. Attach the blue product line to the open port of the ASO Valve (see page 10).
7. Attach the black tubing and elbow(s) to the membrane housing cap(s).
8. 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.
9. A provided ball valve can be located at a convenient place on the black tap water line. Cut the black tubing in two and reconnect the two cut ends with the ball valve.
10. Place the **yellow concentrate (waste) tubing** and the **blue purified (product) water tubing** temporarily into a drain. Do not restrict flow from these lines.
11. There are two groups of red, white, and blue sensor wires. At the end of the wires, you will find a white connector. Just insert the connector into the receptacle on the top of each TDS monitor. You can then use the Velcro on the back to mount the meters where ever it's convenient. For example, even on a wall for easier viewing.
12. Open the cold water supply valve. The pressure should not exceed 80 psi.
13. 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.)
14. 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

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the DI system. However, when you later install the Float Valve for automatic operation, all air must be kept purged from the housings by slightly unscrewing the housing(s) and letting the running water displace the air until the housings are full of water.

15. Set the right-side meter to "OUT" and run the system until the right-side meter reads zero. The water is now ready to use. **You can set either meter to read either probe at any time.**
16. Close the cold water supply valve.
17. Finish the installation by directing or connecting the yellow line to a permanent drain.
18. Install the included Float Valve onto a collection reservoir. See below.
19. Attach the blue line to the Float Valve.
20. (For -AF Systems) Connect the supplied power supply to the white connector with the white-white wires.
21. NOTE: It may take several days of normal operation for the membrane to reach its full production rate.

## ***INSTALL THE FLOAT VALVE:***

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1. Drill a 1/2" hole near the top of your reservoir:
2. NOTE: If you are installing the Float Valve onto an acrylic tank we recommend using a new Fostner Bit to reduce the chance of cracking the acrylic.
3. (Refer to Diagram on next page) Remove the Compression Nut from the float body.
4. Insert the 1/4" Blue Tubing into the 1/2" Compression Nut with the threads towards the end of the tube.
5. Unscrew and remove the remaining nut from the float body.
6. Insert the float body and washer into the 1/2" hole and tighten the nut, which securely tightens the float to the tank wall.
7. Push the Compression Nut towards the end of the tubing and screw the Compression Nut back onto the float body.
8. To tighten, use one 1/2" wrench on the flats of the plastic threads and another 1/2" wrench on the Compression Nut.

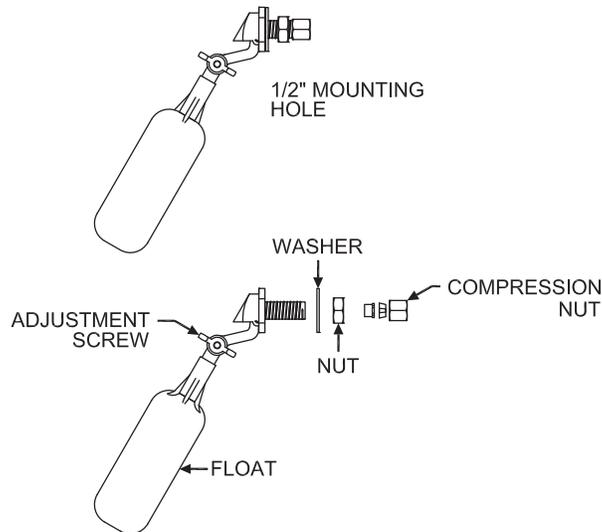
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## FLOAT VALVE ILLUSTRATION:

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## HOW IT WORKS:

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The increasing water level raises the Float Valve in the reservoir and stops the flow of water. Pressure builds up in the product line and ASO Valve until the ASO Valve shuts off the flow of waste water to drain. This "OFF" condition will be maintained until the reservoir needs more water and the Float Valve drops, allowing both product and waste water to flow again.

NOTE: This configuration maintains house pressure in the pre-filters, membrane, and pressure gauge when in the "OFF" condition. Also, this system WILL NOT WORK with any kind of "bladder tank" attached to the product line.

An optional float kit can be used for filling an additional sump or reservoir. Our Float Kit (SPFK) includes a Float Valve and 1/4" Union Tee.

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## ***FLOW RESTRICTORS AND TEST STRIPS:***

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These systems are supplied with TWO Flow Restrictors (FR) - GREEN and RED. See Page 6 or 7. The GREEN FR (pre-installed) produces a pre-set waste-to-product ratio of 2:1 and the optional RED FR has a 3:1 ratio.

Two Test Strips are provided to determine the Total Hardness (this is NOT TDS) of your tap water. To test: Dip the colored end into a small tap water sample for 3 seconds. Remove and do not shake. Wait for 20 seconds and then match with the closest color block on the back of the package. Color is stable for 1 minute.

If the Total Hardness is less than 180, you can keep the GREEN FR installed. If the Total Hardness is 180 or greater, you should replace the GREEN FR with the RED FR (see "Working with Push-Fittings"). Be sure to note the orientation of the small "plug" in the end of the removed FR and install the new FR with the same orientation.

The RED FR has a waste-to-product ratio of 3:1, which will increase the amount of water used, but also increase the lifetime of the RO membrane. In hard water conditions, you can leave the GREEN FR in-place to save water, but the RO membrane will not last as long, as it will plug-up with hardness much more quickly.

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## ***THE MANUAL FLUSH VALVE (-MF Versions):***

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The Manual Flush Valve is located in parallel with the flow restrictor (see page 12) and, when opened, provides a high flow by-pass of waste water used to purge concentrated brine from the membrane housing and rapidly flush any particulates from the membrane surface. This is especially useful in hard-water conditions. The valve can be turned ON for 30 seconds at the start of a fill cycle and/or at the end of a fill cycle. BE SURE to turn the Flush Valve OFF before making product water.

An optional Booster Pump can be added for installations with less than 40 psi tap water pressure.

## ***THE AUTOMATIC FLUSH VALVE (-AF Versions):***

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The Automatic Flush Valve is located in parallel with the flow restrictor and, when electrically activated, provides a high flow by-pass of waste water used to purge concentrated brine from the membrane housing and rapidly flush any particulates from the membrane surface. This is especially useful in hard-water conditions. A Pressure Switch and Flush Control Module (AFC) will activate the Flush Valve at the start of a fill cycle, at the end of a fill cycle, and for a short time every hour during the fill cycle. This module is powered by a 24VDC power supply. An optional Booster Pump can be added for installations with less than 40 psi tap water pressure. Replace the original power supply with the power supply that comes with the Booster Pump. Connect the Pump to the black/black wires on the AFC Module.

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## **METERING AND DIAGNOSTICS:**

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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 pre-filters. 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 ("IN") and the RO water conductivity ("OUT").

The difference between the two meter readings can 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 rise above zero, the operator will be alerted to the possibility that the DI system may have deteriorated past the exhaustion point and that the DI cartridge(s) may need to be replaced. *(See page 21 for DI exhaustion details.)*

### **DM-1 METER Specifications:**

<b>Range</b>	0-1999 PPM
<b>Resolution</b>	1PPM (1-999 PPM)
<b>Accuracy</b>	2%
<b>Probe</b>	0.25 inches
<b>Power Source</b>	(2) 1.5V button batteries (A357 or equiv.)
<b>Battery life</b>	Approx 1000 hours

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

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

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## ***USING THE PRESSURE GAUGE:***

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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” tap water input 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 pre-filters by their color, always use the pressure gauge to determine the condition of the pre-filters.

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

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A Sediment Filter will usually last approx. 4-6 months, depending on the quality of the tap water and quantity of water being produced. (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 monitor the Pressure Gauge. When you have a drop in pressure of 15-20% below your normal gauge pressure, replace the filter. To verify this, run water through the system without the filter in its housing. If the pressure returns to your normal house pressure without the filter, you will know the filter you just took out was plugged up and causing the pressure drop.

**\*\*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. 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.

### Sediment Pre-Filter Replacement

**Materials Required:** Sediment pre-Filter (SF-MT-0.5-10),  
Filter Wrench (WR-UNIV)

#### **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 clockwise as viewed from the top.
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. Insert the new pre-filter into the housing, Screw the housing back onto the assembly and hand-tighten **only**.
6. **NOTE: Do not use filter wrench to tighten housings. Over-tightening will damage housings and void your warranty.**
7. Proceed with carbon block filter replacement.

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

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A Carbon Filter will usually lasts 4-6 months ,depending on the chlorine (or chloramine) content of your tap water and quantity of water being produced. 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-5-KIT. If the chlorine concentration is above 0.1ppm, 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 decrease production if it's 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:** Carbon Block pre-Filter (CF-0.5-10),  
Filter Wrench, Chlorine Test Kit (TK-CL-5-KIT)

#### **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 clockwise as viewed from the top.
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. Insert the new carbon block filter into the housing, Screw the housing back onto the assembly and hand-tighten **only**.
6. **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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## ***MAXCAP SUPER DI MAINTENANCE AND REPLACEMENT:***

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1. When the reading on the right-hand TDS meter (set to "IN") displays 50% of the reading on the left-hand TDS meter (set to "OUT"), it is time to replace the *MaxCap*<sup>®</sup> Super DI <sup>™</sup> cartridge (DI-MC-10HC).
2. Turn the system off and remove the cartridge housing by rotating it counter-clockwise until it is free of the threaded head on the bracket.
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.

## ***SILICA-BUSTER SUPER DI MAINTENANCE AND REPLACEMENT:***

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1. When the reading on the right-hand TDS meter (set to "OUT") displays "001", it is time to replace the *SilicaBuster* <sup>™</sup> Super DI <sup>™</sup> cartridge (DI-SB-10HC).
2. Turn the system off and remove the cartridge housing by rotating it counter-clockwise until it is free of the threaded head on the bracket.
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.

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## ***RO MEMBRANE REPLACEMENT:***

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1. Turn off the water supply to the RO system. Place the system where the membrane housing(s) can be easily accessed.
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. You should not have to remove the blue and yellow tubes.
3. Lift the membrane housing from the retention clips and unscrew the membrane housing cap. This may require two people.
4. Use a pair of pliers to grasp the membrane stem and pull the membrane from the housing.
5. Remove the black housing O-ring. Wash the empty housing with soapy water. Rinse thoroughly with hot, clean water.
6. Insert the new membrane into the housing, with the double o-ring end first. The o-rings and tube must fit into the recess at the bottom of the membrane housing. When the membrane is aligned with the recess, firmly push the membrane into the recess until it bottoms out.
7. Place the black housing O-ring on the housing rim and carefully screw the lid back on to the base. Hand-tighten.
8. Reconnect the black tubing to the membrane feed push-fitting.
9. If you have a dual-membrane system (-180), perform steps 2 thru 8 on the second membrane.
10. Open the Flush Valve and allow the system to flush for several minutes to remove any loose particles.
11. Close the Flush Valve and turn on the water supply to the system.
12. Check for leaks.

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

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

You may also use an alkalinity test kit (on softened water sources) or a hardness test kit (on non-softened water sources).

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

## ***TESTING THE QUALITY OF THE MEMBRANE:***

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The performance of a RO membrane is measured by its ability to reject salts or TDS (Total Dissolved Solids). This procedure will require a TDS Meter. SpectraPure offers several models:

MTR-TDS-EZ    HM Digital Hand-held TDS Meter  
MTR-TDS-DM1    HM Digital In-Line Dual Probe TDS Meter

### **Procedure:**

1. Measure tap water TDS. (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 TDS directly from the blue product water line. (Call it Y).
5. Subtract RO water TDS from tap water TDS. (X - Y)
6. Divide this quantity by tap water TDS.  $(X - Y) \div X$
7. Rejection =  $[(X - Y) \div X] \times 100$

TDS in the above procedure is measured in ppm or mg/l.

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

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## Rejection of the RO Membrane Calculation Example

1. Tap water TDS = 150 ppm (X)
2. RO water TDS = 15 ppm (Y)
3.  $X - Y = 135$  ppm
4.  $(X - Y) \div X = 135 \div 150 = 0.90$
5. Rejection =  $[(X - Y) \div X] \times 100 = 0.90 \times 100 = 90\%$

Rejection rates less than 95% may indicate that the membrane should be replaced.

## ***MEMBRANE PRODUCTION 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 with no more than 500 ppm total dissolved solids.

Membrane output gallons per day (GPD) depends on operating pressure, water temperature and the 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) decreases with a decrease in temperature. This is due to water viscosity increasing with a decrease in water temperature.

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## 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 100 GPD System at 40 psi pressure and 60°F water temperature?

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

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

$$\text{Expected GPD} = 100 \times 0.666 \times 0.754 = 50.2 \text{ GPD} \pm 15\%$$

50.2 GPD would be the Actual Production Rate

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

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1. Replacement of sediment filter at least once every 6 months. This will prevent membrane fouling due to silt or sediment depositing on the membrane.
2. Replacement of 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 minimum 2:1 concentrate to purified water ratio.
4. Operating reverse osmosis systems on softened feed water greatly reduces the chances of membrane fouling.

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## - SANITIZING SYSTEM -

(It is recommended that you sanitize the system once a year.)

1. Turn tap water source off and remove all filters from the system, including the RO membrane
2. Mix together hot water, soap and a little bleach.
3. Scrub filter housings and rinse with clean tap water to remove soap and bleach.
4. Place filters back into housings and reconnect lines.

## - STORAGE -

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

## ***TROUBLESHOOTING GUIDE:***

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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 95% ?	No - Replace Membrane Yes - Membrane OK
Hardness Test Kit**	Measure feed water (X) RO product water (Y) for Hardness	Is Rejection greater than 95%?	No - Replace Membrane Yes - Membrane OK

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

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1. Low production rate:
  - a. plugged pre-filters.                      i. Replace pre-filters.
  - b. low water temperature.                ii. Warm 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. Replace membrane to restore flux.
  - f. plugged flow restrictor.                vi. Replace flow restrictor & membrane.
  
2. Zero production rate:
  - a. Missing flow restrictor.                i. Install 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.
  - d. Flush Valve is open.                    iv. Close Flush Valve.
  
3. Extremely high production rate:
  - a. Ruptured membrane.                    i. Replace membrane.
  - b. Very high line pressure (> 80 psi).    ii. Use a pressure regulator.
  
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-half turn and re-test.
  - 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.
  - d. High TDS in feed water (> 1000 ppm).    iv. NO EASY SOLUTION.
  - e. Bad or faulty DI cartridge.            v. Replace DI cartridge.
  - f. High pH tap water (> 9.0).              vi. Acidify feed water to the RO membrane to improve its rejection.
  - g. Faulty monitor/probe.                    vii. Test and Replace if required.

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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**.
11. 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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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.

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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.**

## ***OPTIONAL ACCESSORIES:***

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*PIGGY-BACK UPGRADE KITS (PBK-90)*, - This add-on kit contains everything you need to double the output (gallons per day) of your existing 90 GPD RO or RODI System. All necessary fittings, tubing, adapters and flow restrictors are included.

*UV PURIFIER KIT (UV-1GPM-KIT)* - Are you on a private well or other potentially unreliable source of water? You may require a UV kit to destroy harmful bacteria, viruses and other contaminants. Ultraviolet kills up to 99% of all viruses and bacteria for the safest water. This kit contains everything you need to add UV to your Reverse Osmosis System.

*BOOSTER PUMP KITS (BPHF-MO-115)* - SpectraPure<sup>®</sup> Booster Pump Kits are ideal for use on water sources with pressures below 40 psi such as private wells, gravity feed water systems and high-rise apartments. A pressure gauge is used to monitor the booster pump pressure.

*ADDITIONAL FLOAT VALVE KIT (SPFK)* - Add a second or multiple float valves to your existing system.

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## REPLACEMENT PARTS:

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Part Number	Description
SF-MT-0.5-10	Hi-Performance 0.5 micron Sediment Filter
CF-0.5-10	Hi-Performance 0.5 micron Carbon Filter
MEM-0025	25 gpd TFC Membrane
MEM-0040	40 gpd TFC Membrane
MEM-0060	60 gpd TFC Membrane
MEM-0090	90 god TFC Membrane (Use 2 for 180 gpd systems)
MEM-S-0025	25 gpd TESTED SpectraSelect TFC Membrane
MEM-S-0040	40 gpd TESTED SpectraSelect TFC Membrane
MEM-S-0060	60 gpd TESTED SpectraSelect TFC Membrane
MEM-S-0090	90 gpd TESTED SpectraSelect TFC Membrane (Use 2 for 180 gpd systems)
FR-25-RED, -GRN -to-	Flow Restrictors for 25gpd System
FR-180-RED, -GRN	Flow Restrictors for 180 gpd System
DI-MC-10HC	Super DI™ MaxCap® DI
DI-SB-10HC	Super DI™ SilicaBuster DI
GHA-4	1/4" Garden Hose Adapter
PGK	Pressure Gauge Kit
BV-4JG	1/4" Ball Valve
BV-6JG	3/8" Ball Valve
WR-UNIV	Filter Wrench

## OTHER ACCESSORIES:

Part Number	Description
MTR-TDS-EZ	Hand-held TDS Meter
MTR-TDS-DM1	In-Line Dual-Probe TDS Meter
MTR-PH80	Hand-held pH Meter
FAU-SNP	Quick Connect Faucet Adapter
TK-CL-5-KIT	Total Chlorine Test Kit
TK-CL-10TABS	10 Replacement Tabs for Chlorine Test Kit

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