



CSPDI Manual Flush

Reverse Osmosis/Deionization Water Purification Systems

Single (90 or 150 GPD) and Dual (300 GPD) Membrane Models



CSPDI-90-MF

CSPDI-150-MF



CSPDI-300-MF

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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This CSPDI RO/DI System comes complete with:

- Available in 3 models: Single Membrane (90 or 150 GPD); Dual Membrane (300 GPD)
- SpectraSelectPlus™ 99% rejection TFC membrane in 150 & 300 GPD models (2 membranes in 300GPD 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 prefilter
- High-capacity 0.5 micron Carbon Block prefilter eliminates chlorine, herbicides and other organic pollutants
- SilicaBuster™ Extended Life Super DI Cartridge (DI-SB-10HC)
- Three-probe TDS Meter to monitor tap water, membrane and DI performance.
- Manual Membrane Flush Valve for longer membrane life
- Automatic ShutOff Valve saves water
- Inline feedwater Ball Valve for manual system shutoff
- Float Valve included for overflow protection
- Included pressure gauge indicates when to change prefilters
- Durable, no rust mounting bracket and clear filter housings
- 6-foot feed, product and waste tubing included
- Housing wrench for easy filter removal
- Garden hose adapter for feed water hookup
- One-year warranty



Warning: SpectraPure does not recommend drinking deionized water.

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. However, 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. If you have any questions or concerns, please contact our customer service department at 1.800.685.2783.

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SYSTEM SPECIFICATIONS:

| | |
|----------------------|---|
| Sediment Prefilter | 0.5 micron MicroTec™ sediment prefilter (SF-MT-0.5-10) |
| Carbon Filter | 0.5 micron carbon block prefilter (CF-0.5-10) |
| RO Membrane Type | SpectraSelectPlus 99% rejection membrane (TFC) |
| DI Cartridge | SilicaBuster™ SUPER DI™ Cartridge (DI-SB-10HC) |
| Rejection Rate | Minimum 98%; 99% typical |
| 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:

| | |
|--------------|--------------------------------------|
| CSPDI-90-MF | 15" W x 16" H x 7" D (One Membrane) |
| CSPDI-150-MF | 15" W x 16" H x 7" D (One Membrane) |
| CSPDI-300-MF | 15" W x 18" H x 7" D (Two Membranes) |

Nominal Membrane Flow Rates @ 60 psi, 77° F, & 250 ppm TDS :

| <u>GPD</u> | <u>Product Water Flow Rate</u> | <u>Concentrate Flow Rate (2:1)</u> |
|------------|--------------------------------|------------------------------------|
| 90 | 237 ml/min | 473 ml/min |
| 150 | 394 ml/min | 789 ml/min |
| 300 | 789 ml/min | 1577 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 – 10 |
| 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 |
| Langelier Saturation Index | LSI must be negative |

*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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INCLUDED ITEMS

TUBING

Each system comes with 6 feet each of BLACK feed water tubing; BLUE product water tubing; and YELLOW waste water tubing. The BLACK tubing has a feed water elbow on one end and a garden hose adapter on the other.



Remove the garden hose adapter if you are not using a hose as the feed water source.

In order to protect against damage during shipping, the feed water elbow is not installed at the factory. It has teflon tape preinstalled. Remove the elbow from the tubing and install it on the left side of the system. (See Page 8) Screw the elbow fitting into the top of the filter housing until it is hand-tight. **Be careful not to cross-thread the elbow during the installation.**

CAUTION: When first installing the system, be sure to monitor it for leaks before allowing it to run unattended.

BALL VALVE

The include ball valve may be installed in the feed water line upstream of the RO/DI system. This allows the user to easily shut off the water supply to the system when performing system maintenance.



FLOAT

Use the included float to automate filling of reservoir. **DO NOT USE** to top off tanks as frequent on/off cycles result in much higher TDS coming out of RO system.



FILTER HOUSING WRENCH

Use the wrench to help remove filter housings. **DO NOT USE** to tighten housings as this may result in damage to the housing.

GENERAL SYSTEM DESCRIPTION:

This SpectraPure® RODI System gives you a continuous supply of sparkling clear water. The reliability of the SpectraPure® 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 prefilter. 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 prefilter. 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 microorganisms and almost all high molecular weight organics in the water are rejected by the membrane and sent down the drain.

This RODI system has a single-stage Deionization cartridge that polishes the RO water to less-than-one ppm purity. This is our SilcaBuster™ Extended Life Super DI cartridge.

The CSPDI RODI system comes equipped with a three-probe Inline TDS meter. The TDS meter can monitor three steps in the purification process. Line 1 of the meter shows the tap water TDS. Line 2 of the meter shows the TDS of the RO water. Line 3 of the meter shows the TDS of the final product water (out of the SilcaBuster DI).

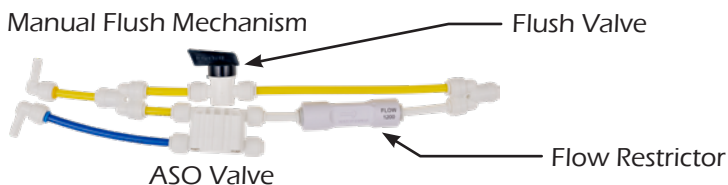
A pressure-operated Shutoff Valve and a Float Valve are provided for convenient filling of a storage reservoir.

A Manual Flush Valve 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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SYSTEM PARTS AND CONNECTIONS

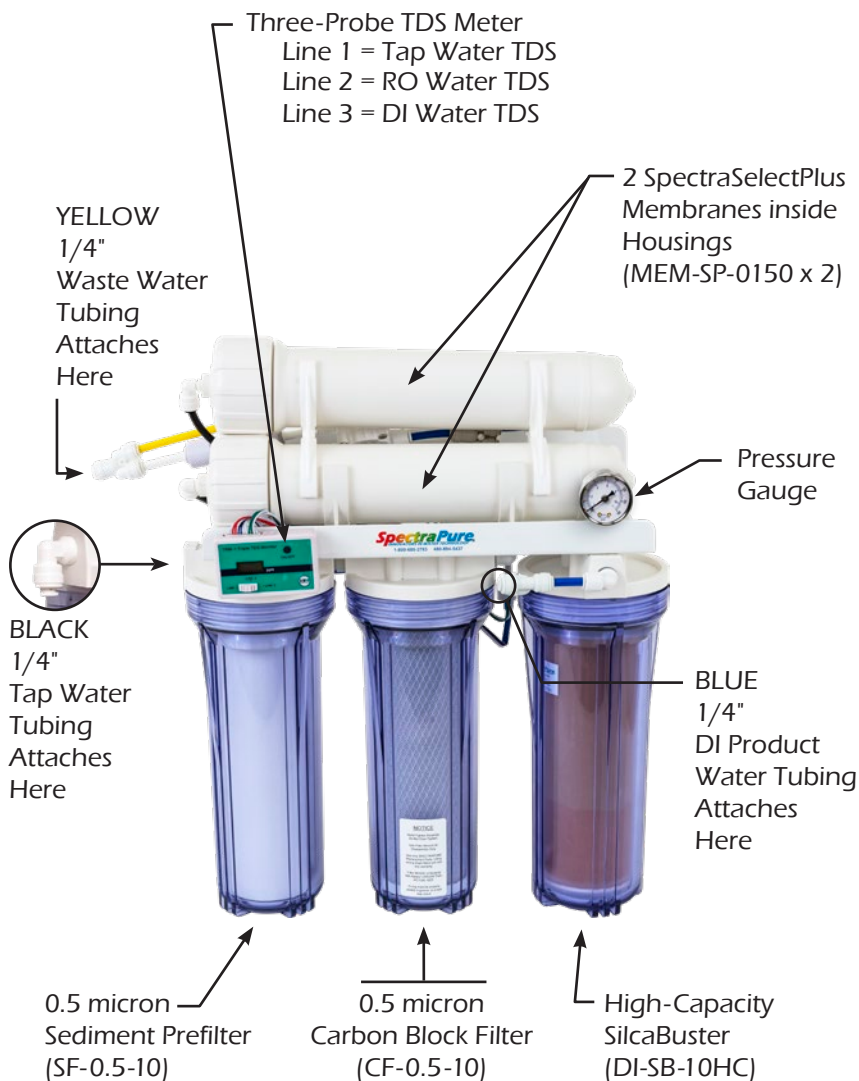
CSPDI - 90 GPD and CSPDI - 150 GPD



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SYSTEM PARTS AND CONNECTIONS

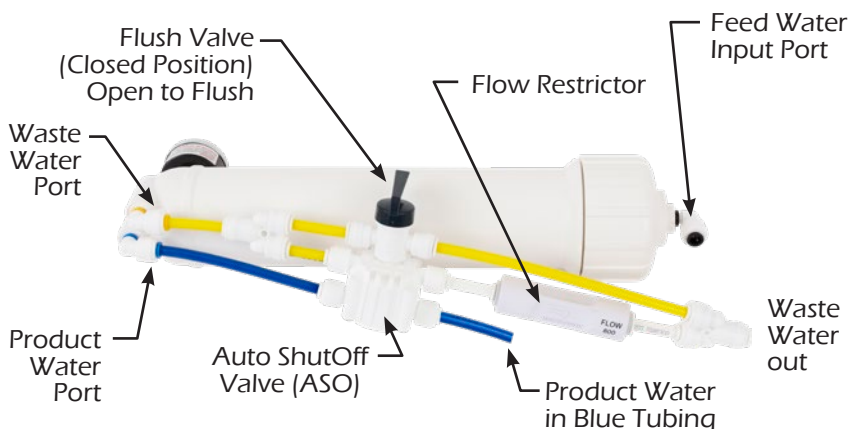
CSPDI - 300 GPD:



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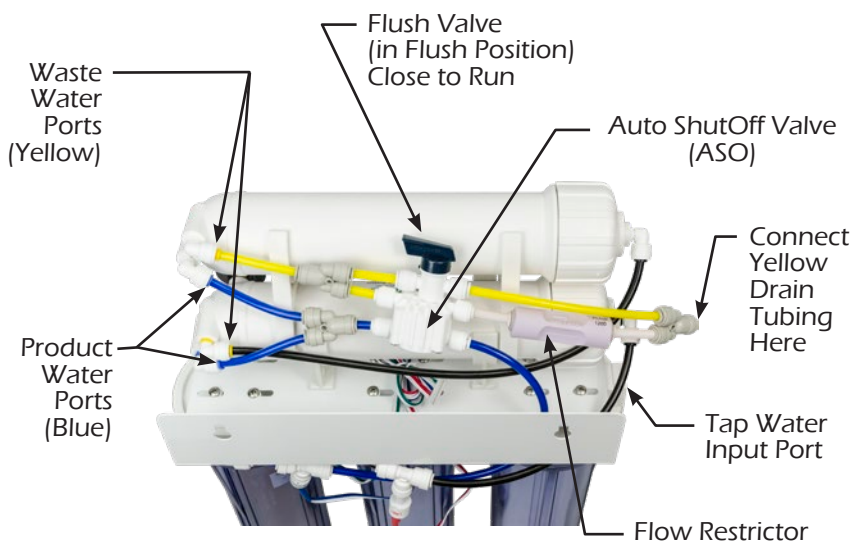
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REAR VIEWS of -MF SYSTEMS:



NOTE: If Flush Valve is OPEN, product water cannot be produced.

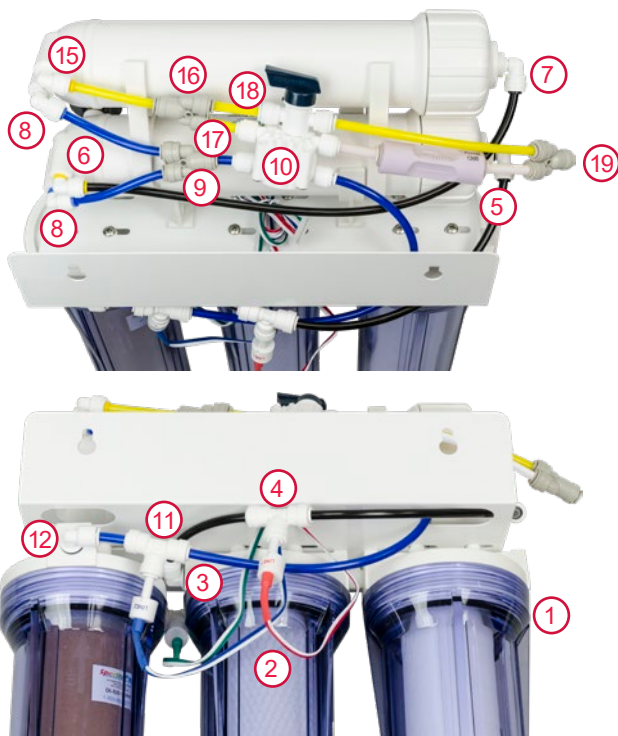
SINGLE MEMBRANE SYSTEM



DUAL MEMBRANE SYSTEM

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FLOW OF WATER THROUGH CSPDI 180 SYSTEM:



Tap Water enters Sediment Filter Housing (1), then passes through Carbon Filter Housing (2), exits Carbon Filter (3), passes Tap Water TDS probe (4), enters lower Membrane Housing (5), exits Waste Water Port of Lower Membrane Housing (6) and enters upper Membrane Housing (7). RO Water exits Membrane Housings (8), passes through "Y" Fitting (9), then passes through ASO Valve (10) and passes RO Water TDS Probe (11) and enters final DI Stage (12). Purified Water exits front of DI Stage (12), passes DI (product) Water TDS probe (13) and exits final "T" Fitting (14) to Reservoir.

Waste Water exits upper Membrane Housing (15), enters "Y" Fitting (16) and either passes through "IN" port of ASO Valve (17), or Flush Valve (18) if in "Flush" mode, and exits final "Y" (19) to drain.



WORKING WITH PUSH FITTINGS:

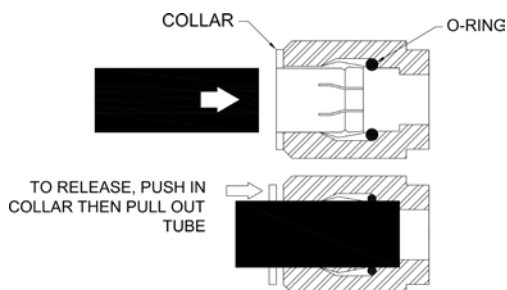
Push fittings are very reliable and convenient tubing connectors.

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 reinsert 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 reseal the tubing as described above.



SAFETY PRECAUTIONS:

Failure to follow the listed precautions may result in bodily injury, equipment damage, and/or loss of warranty coverage.



WARNING

- Do not mount your water purification system above an electrical outlet. Leakage may cause the outlet to short circuit and could possibly result in bodily injury.
- This system is meant for use with potable water sources. Do not use with water that is microbiologically unsafe.

CAUTION

- Install in compliance with state and local electrical and plumbing codes.
- Do not install where system will be exposed to direct sunlight.
- Protect against freezing temperatures and temperatures over 113 °F/45 °C which may damage components.
- When using in conjunction with an open reservoir, user should install bulkhead fitting and tube to drain at highest point of reservoir to avoid catastrophic flooding.

SYSTEM INSTALLATION & INITIALIZATION:

(See Pages 7 and 8 for tubing connections.)

1. Remove the elbow fitting from the black tap water tubing and screw it into the left side of the Sediment Filter Housing. (See Page 7)

CAUTION: The fitting only needs to be hand-tight. Be careful not to cross-thread the fitting while installing it.

2. Attach the yellow drain line to the “Y”-connector at the rear of the system and run it to a permanent drain. (See Pages 8-9)

NOTE: If installing under a sink use a drain saddle (SpectraPure Part No. DS-4T) to tie the drain line into sink drain.

3. Attach the blue product line to the front port of the right-hand DI housing. (See Page 8.)
4. Unscrew the right DI housing and remove the DI cartridge. Reconnect the empty housing to the threaded cap. Hand tighten.
5. Connect the black feed water line to a cold water source using the included garden hose adapter or an optional feed water adapter (SpectraPure Part No. VA-FD-4).

(continued on next page)

SYSTEM INSTALLATION & INITIALIZATION: (cont.)

6. 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.
7. Place the **yellow concentrate (waste) tubing** and the **blue purified (product) water tubing** temporarily into a drain. Do not restrict flow from these lines.
8. There is a group of red, white, green and blue sensor wires. At the end of the wires, you will find a small white connector. Just insert the connector into the receptacle on the top of the TDS meter. You can then use the Velcro on the back to mount the meter wherever it's convenient. For example, you may even mount it on a wall for easier viewing.
9. Open the cold water supply valve. The pressure should not exceed 80 psi.
10. **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.)**
11. **Run both the blue and yellow tubings down the drain for an hour, then reinstall the DI cartridge. Hand tighten.**
12. Upon startup, air may be trapped in the DI cartridge (housing may not appear full). This is a normal condition and it will not affect the operation of the DI section, however, when you later install the Float Valve for automatic operation, all air must be kept purged from the housing by slightly unscrewing the housing and letting the running water displace the air until the housing is full of water. Hand tighten housing once air has been purged.
13. Set the meter to "Line 3" and run the system until the meter reads zero. The water is now ready to use. **You can set the meter to monitor either of the 3 probes at any time.**
14. Close the cold water supply valve.
15. Finish the installation by directing or connecting the yellow line to a permanent drain.
16. Install the included Float Valve onto a collection reservoir. (See "Install The Float Valve" on Page 14)
17. Attach the blue line to the Float Valve.

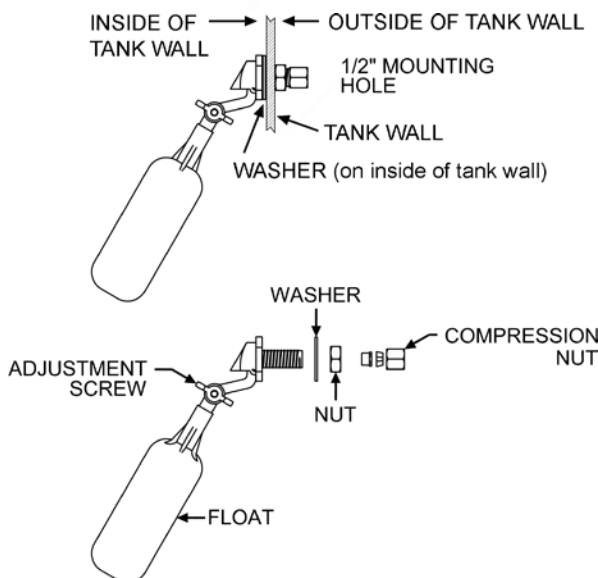
NOTE: It may take several days of normal operation for the membrane to reach its full production rate.

INSTALL THE FLOAT VALVE:

1. Drill a 1/2" hole near the top of your reservoir:

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.

2. (Refer to Diagram on next page) Remove the Compression Nut from the float body.
3. Insert the 1/4" Blue Tubing into the 1/2" Compression Nut with the threads towards the end of the tube.
4. Unscrew and remove the remaining nut from the float body.
5. Insert the float body and washer into the 1/2" hole and tighten the nut, which securely tightens the float to the tank wall.
6. Push the Compression Nut towards the end of the tubing and screw the Compression Nut back onto the float body.
7. To tighten, use one 1/2" wrench on the flats of the plastic threads and another 1/2" wrench on the Compression Nut.



HOW THE FLOAT VALVE WORKS:

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 prefilters, 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.

USING THE PRESSURE GAUGE

The pressure gauge is used to monitor the condition of the Sediment and Carbon Prefilters. 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 prefilters need to be replaced.

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.

USING THE TDS METER:

The digital TDS meter will provide a reliable means of evaluating the efficiency of the RO membrane. This meter will indicate the amount of Total Dissolved Solids (TDS) in the tap water when set to "Line 1" and the TDS of the RO water when set to "Line 2". The difference between the two meter readings will be used to calculate the percentage of rejection of the RO membrane. (See "Testing The Quality Of The Membrane" on Page 22.)

When set to "Line 3", the meter shows the TDS of the DI (product) water. When this shows 1 PPM (001), it is time to replace the DI cartridge.

It is important that you replace the DI cartridge in a timely manner. Unlike carbon and sediment filters, DI stages use an ion exchange process to remove contaminants from the water. Once the DI resins have been exhausted, they release the ions with the weakest bonds in order to bind with the ions in the water that have the strongest bonds. These weakly bonded ions include phosphates and silicates. Continuing to run water through an exhausted DI cartridge results in what is referred to as phosphate and silicate dumping. This can actually result in a higher TDS in the water exiting the DI stage than was initially in the RO water and may have disastrous results for your reef tank.

Warning!!:

The DM1 TDS Meter does not detect the presence of CO₂, silica, organic contaminants or microorganisms, nor should it be used as a medical or scientific instrument. It should be used as an indicator or guide only, and does not imply water safe for human consumption. No application other than monitoring the electrical conductivity of water is expressed or implied.

TRM-1 METER Specifications:

| | |
|--------------------------|---|
| Range | 0-9990 PPM |
| Resolution | 1 PPM (0-999 PPM) 10 PPM (1000-9990 PPM) |
| Accuracy | ± 2% |
| Conversion Factor | NaCL |
| Power Source | (2) 1.5V button batteries (LR44 or equiv.) |
| Battery life | Approx 1000 hours |

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THE MANUAL FLUSH VALVE :

The Manual Flush Valve is located in parallel with the flow restrictor and, when opened, provides a high flow bypass 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 should be turned ON for 30 seconds at the start of a fill cycle and at the end of a fill cycle. BE SURE to turn the Flush Valve OFF before making product water.

NORMAL USE

The handle on the flush valve needs to be perpendicular to the yellow tubing to produce purified water. In this configuration, the waste water is forced through the opposite side of the "Y" fitting and through the flow restrictor (blue arrows). This creates a backpressure in the membrane housing which forces the water through the membrane and out the pure water port (red arrows).



FLUSH POSITION

When the handle on the flush valve is parallel to the yellow tubing, the water bypasses the flow restrictor and the membrane is being flushed. We recommend that you flush the membrane for 30 seconds before and after using your RO system.

NOTE: Due to resistance in the waste water tubing, a small amount of product water will still be produced when flushing the system.



SEDIMENT PREFILTER REPLACEMENT:

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 Prefilter 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 prefilters may require more frequent changes to maintain adequate production rate and extended membrane life.

Sediment Prefilter Replacement

Materials Required: Sediment prefilter (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 by rotating it to the left.
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 prefilter 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:

A Carbon Filter will usually last 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 Prefilter 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-10-KIT. If the chlorine concentration is above 0.1 ppm, replace the carbon prefilter.

****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 may 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 prefilter (CF-0.5-10), Filter Wrench, Chlorine Test Kit (TK-CL-10-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 by rotating it to the left.
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**.

NOTE: Do not use filter wrench to tighten housings. Over-tightening will damage housings and void your warranty.

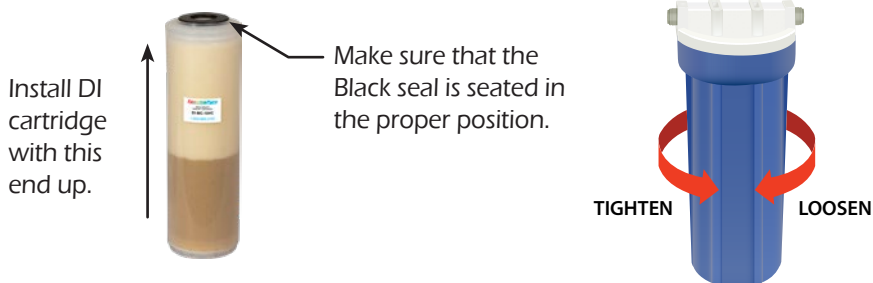
6. Turn on system water supply and check for leaks.

DI CARTRIDGE REPLACEMENT:

When the reading on the TDS meter (set to "Line 3") displays "001", it is time to replace the SilicaBuster™ Extended Life Super DI cartridge.

Materials Required: SilicaBuster™ SUPER DI™ Cartridge (DI-SB-10HC), Filter Wrench

1. Turn the system off and remove the cartridge housing by rotating it to the left until it is free of the threaded head on the bracket.
2. Remove the old DI cartridge and discard.
3. Thoroughly wash the housing with a mixture of hot soapy water and a few teaspoons of household bleach. Rinse well with clean hot water.
4. Make sure the new 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.
5. Tighten the cartridge housing by rotating it to the right and hand tighten.
6. Turn on system and check for leaks.



RO MEMBRANE REPLACEMENT:

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.

Proper Orientation of New Membrane in Relation to Housing



RO MEMBRANE DIAGNOSTICS:

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. The CSPDI system comes equipped with such a device.

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:

The performance of a RO membrane is measured by its ability to reject salts or TDS (Total Dissolved Solids). This test may be done using the TRM-1 meter that comes factory-installed on the CSPDI system.

General Procedure:

1. Before doing this test, make sure that the system has been running for at least 10 minutes.
2. Set the switch on the meter to "Line 1". This will give you the tap water TDS. Call it X.
3. Set the switch on the meter to "Line 2". This will give you the TDS of the RO water. Call it Y.
4. Subtract RO water TDS from tap water TDS. $(X - Y)$
5. Divide this quantity by tap water TDS. $(X - Y) \div X$
6. 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.

Rejection of the RO Membrane Calculation Example

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

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

MEMBRANE PRODUCTION CALCULATION:

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 250 ppm total dissolved solids.

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

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

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. Locate your water temperature in the table on the following page. The correct TCF will be just to the right of it. Use this figure to calculate the expected membrane output.

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?

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

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

$$\text{Expected GPD} = 100 \times 0.666 \times 0.754 = 50.2 \text{ GPD} \pm 20\%^*$$

50.2 GPD would be the Actual Production Rate

* Membrane manufacturers state that permeate flows may vary by $\pm 20\%$ from the stated flow rate.

TIPS FOR LONG MEMBRANE LIFE:

1. Replace the sediment filter at least once every 6 months. This will prevent membrane fouling due to silt or sediment depositing on the membrane.
2. Replace the 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.

SYSTEM TROUBLESHOOTING GUIDE

1. Low production rate:
 - a. plugged prefilters.
 - b. low water temperature
 - c. low line pressure.
 - d. fouled membrane.
 - e. plugged flow restrictor.
 - i. Replace prefilters.
 - ii. Warm feed water OR use higher GPD membrane.
 - iii. Use booster pump OR use higher GPD membrane.
 - iv. Replace membrane to restore flux.
 - v. Replace flow restrictor & membrane.
2. Zero production rate:
 - a. Missing flow restrictor.
 - b. Dried RO membrane.
 - c. Plugged flow restrictor.
 - d. Flush Valve is open.
 - i. Install flow restrictor in the yellow line.
 - ii. Try to restore flux by soaking in rubbing alcohol OR replace the membrane.
 - iii. Replace flow restrictor and replace the membrane.
 - iv. Close Flush Valve.
3. Extremely high production rate:
 - a. Ruptured membrane.
 - b. Very high line pressure (> 80 psi).
 - i. Replace membrane.
 - ii. Use a pressure regulator.
4. Pressure gauge does not register pressure when the system is "ON"
 - a. Missing flow restrictor.
 - b. Pressure gauge screwed in too far.
 - c. Plugged pressure gauge orifice.
 - d. Defective pressure gauge.
 - i. Install new flow restrictor in waste water line.
 - ii. Unscrew pressure gauge one-half turn and retest.
 - iii. Clean orifice with a needle.
 - iv. Replace it.
5. 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 (>1500 ppm).
 - e. Bad or faulty DI cartridge.
 - f. High pH tap water (>9.0).
 - g. Faulty monitor/probe.
 - i. Replace it.
 - ii. Use booster pump.
 - iii. Aerate RO product water.
 - iv. NO EASY SOLUTION.
 - v. Replace DI cartridge.
 - vi. Acidify feed water to the RO membrane to improve its rejection.
 - vii. Test and Replace if required.

SpectraPure®

ONE-YEAR LIMITED WARRANTY:

SpectraPure, Inc.® warrants the product to the original owner only to be free of defects in material and workmanship for a period of one year 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 prefilters and membranes are not covered under the one year 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 Merchandise 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 byproduct 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 one year limited warranty does not apply to consumable items, including but not limited to, filters and cartridges unless specifically stated above.**

TERMS AND CONDITIONS:

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 basis. In the interim period during which credit references are being evaluated, all orders must be prepaid until approved.
10. All returned checks (due to insufficient funds or closed accounts) will be subjected to a **\$35 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).

SpectraPure® Inc. 480.894.5437 Call us toll-free 1.800.685.2783

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OPTIONAL ACCESSORIES:

PIGGYBACK UPGRADE KITS (PBK-90-SEL or PBK-150-SEL) — This add-on kit contains everything you need to double the output (gallons per day) of your existing RODI System. All necessary fittings, tubing, adapters and flow restrictors are included.

BOOSTER PUMP KITS (BPHF-MF-115) — SpectraPure® 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.

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 113° F (45°C).



Warning: SpectraPure does not recommend drinking deionized water.

REPLACEMENT PARTS:

| <u>Part Number</u> | <u>Description</u> |
|--------------------|--|
| SF-MT-0.5-10 | High Performance 0.5 micron Sediment Filter |
| CF-0.5-10 | High Performance 0.5 micron Carbon Filter |
| MEM-SP-0090 | 90 gpd/340 lpd SpectraSelectPlus™ 99% Membrane |
| MEM-SP-0150 | 150 gpd SpectraSelectPlus™ TFC Membrane (Use 2 for 300 gpd systems) |
| FR-300ML-4 | 2:1 Flow Restrictor for 90 gpd System |
| FR-420ML-4 | 3:1 Flow Restrictor for 90 gpd System |
| FR-550ML-4 | 2:1 Flow Restrictor for 150 gpd System |
| FR-800ML-4 | 3:1 Flow Restrictor for 150 gpd System |
| FR-1200ML-4 | 2:1 Flow Restrictor for 300 gpd System |
| FR-1600ML-4 | 3:1 Flow Restrictor for 300 gpd System |

* The ratio denotes waste water to product water. (e.g. 2:1 equals 2 gallons of waste water for every gallon of pure water produced.) All SpectraPure Manual Flush systems ship with 2:1 flow restrictors. Replacing the 2:1 flow restrictor with a 3:1 flow restrictor will increase the lifespan of the RO membrane.

| | |
|---------------|--|
| DI-SB-10HC | Extended Life Super DI SilicaBuster DI |
| GHA-4 | 1/4" Garden Hose Adapter |
| V-BALL-2W-4JG | 1/4" Ball Valve |
| WR-UNIV | Filter Wrench |

ACCESSORIES:

| <u>Part Number</u> | <u>Description</u> |
|--------------------|---|
| BPHF-MF-115 | Booster Pump Kit for -MF Systems |
| MTR-PH80 | Handheld pH Meter |
| FAU-SNP | Quick Connect Faucet Adapter |
| TK-CL-10-KIT | Total Chlorine Test Kit |
| TK-CL-10TABS | 10 Replacement Tabs for Chlorine Test Kit |