

## **Two Year Limited Warranty**

SpectraPure, Inc. warrants each new Reverse Osmosis system to the original owner only to be free of defects in material and workmanship for a period of two years from the date of receipt. SpectraPure's liability under this warranty shall be limited to repairing or replacing on 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 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 printed installation and operating conditions or damage caused by hot water, freezing, flood, fire, or acts of God.

SpectraPure Inc. will not be responsible for any consequential damages arising from installation or use of the product, including any water damage due to flooding which may occur due to malfunction or faulty installation, including, but not limited to failure of installer to tighten all fittings.

SpectraPure warrants (pro-rated) the performance of membrane elements 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 on page 3 of this manual.

\* Most municipal water supplies meet these requirements.

## **Terms and Conditions of Sale**

1. To obtain service under this warranty, the defective system or components must be returned to SpectraPure with proof of purchase, installation date and failure date.
2. Any defective product to be returned to the factory must be sent freight prepaid; documentation supporting the warranty claim and/or a Return Goods Authorization must be included, if so instructed.
3. 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.
4. Some jurisdictions do not allow the exclusion or limitation of incidental or consequential damages and some jurisdictions do not allow limitations on how long implied warranties may last. Therefore, the above limitations or exclusions may not apply to you. This warranty gives you specific legal rights and you may also have other rights which vary jurisdiction to jurisdiction.
5. Method of Payment: All orders will be shipped C.O.D. or require payment in advance.
6. SpectraPure, Inc. reserves the right to change prices without notice when necessary.

### ***SpectraPure® Inc.***

215 S. Industrial Drive, Suite 2A Tempe, Arizona 85281-2941

480.894.5437 Call us toll-free 1.800.685.2783

Fax 480.894.6109 Fax us toll-free 1.877.527.7873

E-mail [spectra@spectrapure.com](mailto:spectra@spectrapure.com) Visit us on the web [www.spectrapure.com](http://www.spectrapure.com)

---

---

---

---

# **SpectraPure®**

## **Eliminator 90**

### **Compact RO System**

#### **Installation and Operating Manual**

#### **Reverse Osmosis Water Purification System**



System Information	
System Specifications	3
Reverse Osmosis Feed Water Requirements	3
Operating Instructions	
System Setup	4
Filter Diagram	4
Checking the Concentrate to Purified Water Ratio	5
Flow Restrictor Removal, Adjustment & Replacement	6-7
System Maintenance:	
Carbon Pre-Filter Replacement	8
RO Membrane Replacement	9-10
Troubleshooting Guide	10
Water Production Rate	
Membrane Output Calculation	11
Temperature Correction Factor Table	11
Membrane Testing	
Testing the Quality of the Membrane	12-13
System Care	
Tips for Long Membrane Life	14
Storage	14
Choosing a Mounting Location	14
Replacement Parts	15
Warranty, Terms and Conditions	16

Copyright © 2001 by **SpectraPure® Inc.**  
**ALL RIGHTS RESERVED**

No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise without the prior written permission of SpectraPure Inc.

**Replacement Parts**

<i>Model</i>	<i>Replacement Part</i>
<b>CF-IN-10</b>	10 inch Inline Carbon Filter
<b>TFCH-90-ENC</b>	90 gpd (340 lpd) Encapsulated TFC Membrane (Membrane and Disposable Housing)
<b>FR-90</b>	Flow Restrictor for 90 gpd (284 lpd) Membrane
<b>GHA-4</b>	1/4" (6.35 mm) Garden Hose Adapter

**Optional Accessories**

<i>Model</i>	<i>Optional Part</i>
<b>PGK</b>	Pressure Gauge Kit
<b>FAU-SMP</b>	Quick Connect Faucet Coupler
<b>TK-CL-25</b>	Total Chlorine Test Kit
<b>VA-FVK-4</b>	Flush Valve Kit
<b>BPHF-MO-115</b>	Hi-Flow Booster Pump
<b>ASOFK</b>	Auto Shut-Off Valve Float Kit
<b>TS-C61</b>	Conductivity Tester

**Tips for Long Membrane Life**

1. Replacement of 1 micron sediment filter once every 6 months. This will prevent membrane fouling due to silt or sediment depositing on the membrane.
2. Replacement of 10 micron carbon block filter at least once every 6 months or when chlorine breakthrough occurs. This will ensure good membrane life and prevent membrane from chlorine damage.
3. Membrane should not be operated at lower than 4:1 concentrate to purified water ratios. If you have a lower ratio, reduce the length of the flow restrictor to adjust the ratio to 4:1.
4. Operating reverse osmosis systems on softened feed water greatly reduces the chances of membrane fouling.
5. Use the optional flush kit valve after each use of the system to extend membrane life up to 6 months.

**Storage**

1. It is recommended that you store your Eliminator RO System in a cool place when not being used.
2. Your Eliminator RO System must be protected from freezing or temperatures above 110° F (43°C).

**Choosing a Mounting Location**

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

**Light Sources**

1. Most of the components of this system are plastic and are subject to damage by ultra-violet 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 110° F (43° 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.

**System Specifications**

Carbon Filter	10 inch inline granulated activated carbon filter
RO Membrane Type	Encapsulated thin-film composite
Rejection Rate	98% average
Production Rate	Rated 90 gpd (340 lpd) ± 15% at 500 ppm TDS
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)

**Reverse Osmosis Feed Water Requirements**

Operating Pressure	40 – 80 psi (2.75 – 5.5 bar)
pH Range	3 – 11
Maximum Temperature	110° F (43° C)
Maximum Turbidity	1.0 NTU
Maximum Silt Density Index	5.0 (based on 15 min. test time)
Maximum Chlorine	less than 0.1 ppm
Maximum TDS	2000 ppm
Maximum Hardness	10 grains (170 ppm as CaCO <sub>3</sub> )
Maximum Iron	less than 0.1 ppm
Maximum Manganese	less than 0.1 ppm
Maximum Hydrogen Sulfide	0 ppm
Langlier Saturation Index	LSI must be negative

**System Setup**

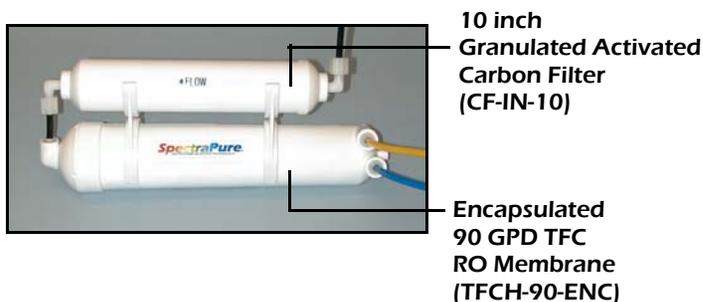
1. Attach the garden hose adapter to your cold water source. Never run hot water (greater than 110° F or 43° F ) through the system.
2. Place the yellow concentrate tubing into drain. Do not restrict flow from this line.
3. Place the blue purified water tubing into your storage container.
4. Open the cold water supply valve half-way. You may use pressure up to 80 psi (5.5 bar).

**Check the system to ensure that all fittings are tight and leak-free before leaving the system unattended.**

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.

**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.

**Filter Diagram**



**Testing the Quality of the Membrane**

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

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

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

**Membrane Output  
Calculation Example**

What is the expected GPD from a 50 GPD MPRO-C System at 40 psi pressure and 60°F water temperature?

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

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

$$\text{Expected GPD} = 50 \times 0.666 \times 0.754 = 25.1 \text{ GPD} \pm 15\%$$

**Testing the Quality of the Membrane**

The performance of a RO membrane is measured in terms of its rejection characteristics.

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

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

**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.\* (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 % P Membrane OK

**Checking the  
Concentrate to Purified Water Ratio**

This procedure will be the most important factor in insuring that you get the best possible results from your new system.

**Failure to perform this procedure 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 can concentrate and precipitate on the membrane surface, effectively clogging the encapsulated RO Membrane. To keep this from happening, the Concentrate to Purified Water Ratio should be checked and adjusted at the highest temperature and pressure the system will be operated at.

**Procedure:**

1. Open the cold water supply valve half-way and let the system run for 1/2 hour.
2. Using two measuring cups, simultaneously place the yellow concentrate tubing into one cup and the blue purified water tubing into the other cup.
3. When the blue tubing cup has collected 2 oz. (or 100 ml.) of water, simultaneously remove the tubing from both measuring cups.
4. Note how many oz. (or ml.) of water the yellow tubing cup has collected.
5. To calculate the Concentrate to Purified Water Ratio, divide the number of oz. (or ml.) of concentrate by the number of oz. (or ml.) of purified water.

**Formula: Concentrate ÷ Purified = Concentrate to Purified Ratio**

Examples: 8 oz (400 ml) ÷ 2 oz (100 ml) = 4:1 Ratio - Acceptable  
 10 oz (500 ml) ÷ 2 oz (100 ml) = 5:1 Ratio - Acceptable  
 6 oz (300 ml) ÷ 2 oz (100 ml) = 3:1 Ratio - Not Acceptable

If the ratio is less than 4:1 (as in the third example), the system must be adjusted by reducing the length of the flow restrictor capillary tubing as described on the next page. After modifying the flow restrictor, repeat the above test and recalculate the Concentrate to Purified Water Ratio.

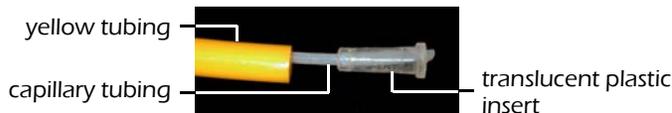
**Flow Restrictor  
Removal, Adjustment, and Replacement**

1. Turn off system water supply.
2. Remove the yellow tubing from its gray push-fitting at the encapsulated membrane as follows:
  - a.) With one hand, grasp the yellow tubing near the membrane.
  - b.) With the thumbnail of your other hand, firmly depress and hold the gray push-fitting down.
  - c.) While the gray push-fitting is depressed, pull the yellow tubing straight out of the push-fitting. Once the tubing is removed, release the gray push-fitting .
3. Carefully remove the flow restrictor assembly, now visible as a translucent plastic insert in the end of the yellow tubing. 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 length of flow restrictor (consisting of the insert plug and thin capillary tubing attached) may then be gently extracted.

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

4. To adjust the flow restrictor, the length of the capillary tubing must be reduced. With a new single-edge razor blade, carefully cut off approximately 1 inch (25.4 mm) of capillary tubing from the flow restrictor assembly.
5. Re-insert the flow restrictor assembly into the yellow tubing and firmly re-seat the restrictor plug into the end of the yellow tubing by carefully pressing on the plug 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 plug.

**Flow Restrictor Assembly**



**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

10. Turn off the water supply to the system. Remove the yellow tubing from the membrane housing and replace the flow restrictor assembly as described in the Removal, Adjustment, and Replacement section on page 6, line 5. Re-insert the flow restrictor end of the yellow tubing into its push-fitting at the encapsulated membrane.
11. Turn on the water supply to the system and check for leaks.
12. Check, and if necessary adjust, the Concentrate to Purified Water Ratio per the procedures described on page 5.

**Troubleshooting Guide for RO System**

**Product Water - Low Production Rate**

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

6. Re-insert the yellow tubing to its gray push-fitting in the encapsulated 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 gray 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.) Now 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 gray push-fitting far enough to seal the tubing against the o-ring. Turn off the system water supply and reseat the tubing as described above.
8. Repeat the Concentrate to Purified Water Ratio test on page 5. If the ratio is within the acceptable (4:1 or greater) limits, the system is ready for use. If the ratio is still below the 4:1 limit, repeat the flow restrictor adjustment process, removing another 1 inch (25.4 mm) of capillary tubing from the flow restrictor, reassembling the concentrate line, and re-testing the Concentrate to Purified Water Ratio.
9. Repeat the above testing and adjustment procedure until the Concentrate to Purified Water Ratio is 4:1 or greater.

**Reverse Osmosis Assembly**



## Carbon Pre-Filter Replacement

**Maintenance Regime:** At least once in 6 months or when  
\*Chlorine Breakthrough greater than 0.1 ppm occurs in  
concentrate from the yellow line.

**Materials Required:** 10 micron Carbon Block Filter (CF-10-10)

**Procedure:**

1. Turn off water supply to system.
2. Unscrew the hex-nut from the carbon pre-filter input fitting. See photo on page 7.
3. Unscrew the hex-nut from the output port on the carbon pre-filter housing. This is the black line that runs between the carbon pre-filter and the RO membrane housing.
4. Separate the RO membrane assembly from the holding clips.
5. Unscrew the input and output elbow-fittings from the carbon pre-filter. Remove the old teflon tape from the threads of the fittings and apply new teflon tape.
6. Screw the teflon-taped elbow-fittings into the pre-filter.
7. Re-attach the black tubing with the attached hex-nut to the carbon pre-filter input and attach the short black tubing between the membrane feed and the output of the carbon filter.
8. Turn on system water supply and check for leaks.

Note: Position the arrow on the pre-filter towards the short black tubing attached to the RO membrane.

\*Collect a 10 ml sample of the concentrate from the yellow tubing and test the chlorine concentration using test kit TK-CL-25. If the chlorine concentration is above 0.1 ppm, replace the carbon pre-filter.

## RO Membrane Replacement

**Maintenance Regime:** As needed. Refer to the procedure for testing membrane quality on page 12.

**Materials Required:** Replacement Encapsulated TFC Membrane

**Procedure:**

1. Turn off water supply to the system.
2. Mark, or otherwise note, the locations of the yellow, blue, and black tubing connected to the encapsulated membrane. See photo on page 7.
3. Unscrew the hex-nut from the output port on the carbon pre-filter housing. This is the black line that runs between the carbon pre-filter and the RO membrane housing.
4. Separate the RO membrane assembly from the holding clips.
5. Remove the yellow, blue, and black tubing from the encapsulated membrane by depressing their gray push-fittings with your thumbnail and pulling the tubing from the fittings.
6. Remove the flow restrictor assembly from the end of the yellow tubing as described in the Removal, Adjustment, and Replacement of Flow Restrictor Assembly section on page 6, line 3.

Place the flow restrictor in a safe location where it will not be accidentally crushed or damaged.

7. Re-insert the blue, black and yellow tubing into the push fittings of their respective ports on your replacement encapsulated membrane, as described in the Removal, Adjustment, and Replacement section on page 7, line 6, a-c. See photo on page 7. Snap the membrane assembly back into its holding clips.

Note: The flow restrictor assembly should remain uninstalled at this point in the process.

8. Reconnect the short black tube with the attached hex-nut to the output port on the carbon pre-filter housing.
9. Put the yellow concentrate tubing in the drain and turn on the system water supply. Allow the system to flush for 5 minutes to remove any loose particles.