Installation and Operation Guide

MRS-600HE-II High Efficiency Reverse Osmosis System

Mineral Reduction System For Foodservice Applications

INTRODUCTION

The Everpure MRS-600HE-II Mineral Reduction System is a pre-engineered, pre-assembled Reverse Osmosis (RO) system designed to provide high purity water for multiple applications, such as premium espresso, coffee, blended beverages and steam, to name a few. It combines a number of water treatment technologies into one easy to install package. The system provides superior protection against taste and odor causing contaminants† while removing dirt†, particulates† and dissolved solids that can foul or scale equipment.

Initial System Production

Water production depends on supply water pressure and temperature. See PERFORMANCE section (page 9) for normalized production.

Influent Water Characteristics

The following table lists the allowable operating range of various water properties within which the MRS-600HE-II will function properly.

Total Dissolved Solids (TDS)	0-1,000 ppm (0-1,000 mg/l)
pH	5-10
Chlorine[1]	0-3 ppm (0-3 mg/l)
Chloramines	0-3 ppm (0-3 mg/l)
Turbidity	0-1 NTU
Iron	0-1 ppm (0-1 mg/l)

1 Reverse osmosis membrane filter used in this system will be damaged by chlorine. An activated carbon filter has been be provided with this system to protect the reverse osmosis membrane from chlorine attack. Influent chlorine should not exceed 3 mg/l.

The system consists of 6 major components:

1. 7FS-BW Water Filtration Cartridges
2. Inlet Booster Pump
3. MR-600 Reverse Osmosis (RO) Membrane Cartridge.
4. Permeate Pump
5. MC^2 or 7F Water Filtration Cartridges
6. Control System with Power Supply

The 7FS-BW water filtration cartridges contains multiple medias. These medias filter out dirt and particles, reduce chlorine and provides scale control, which extends RO membrane life.†

The inlet booster pump increases the inlet pressure to maintain consistent permeate production.

The MR-600 RO membrane cartridge contains a semi-permeable reverse osmosis membrane. Here, most dissolved impurities are separated from the water and flushed down the drain. The water that is able to pass through the membrane, which is very low in dissolved impurities, is referred to as permeate, RO water, or product water.

The permeate pump minimizes backpressure on the permeate produced by the MR-600 cartridge. This virtual elimination of back-pressure provides consistent permeate production and maximizes system efficiency.

See MRS-600HE-II Installation Addendum - Excerpt 1.

The MC^2 or 7F cartridges act as post-filters, filtering the RO water, and any tap water added via the blending system.*

OPERATING SPECIFICATIONS

- Dynamic Operating Pressure: 25-80 psi (1.7-5.5 bar)
  [Pressure below 65 psi (4.5 bar) may affect blend system* performance]
- Maximum Static Pressure: 100 psi (6.9 bar)
- Operating Temperature: 40-100°F (4.4-37.8°C)
- Plumbing Connections:
  Inlet/Outlet: 3/8" (9.5 mm) OD tube ("push-in" quick-connect), 3/8" (9.5 mm) barb or 1/2" (12.7 mm) barb
  Reject: 3/8" (9.5 mm) OD tube ("push-in" quick-connect)
  See MRS-600HE-II Installation Addendum - Excerpt 2.
- Electrical:
  Rated Voltage & Power Cord Plug Type:
  Sys. Part No. EV997054 & EV997046:
  100-120VAC/50-60Hz - NEMA 5-15P
  Sys. Part No. EV997071 & EV997049:
  220-240VAC/50-60Hz - GB 2099
  Sys. Part No. EV997070 & EV997048:
  220-240VAC/50-60Hz - CEE 7/7 CE
  Sys. Part No. EV997072 & EV997052:
  220-240VAC/50-60Hz - AS 3112
  Watts:
  Stand-by: 25 // Flush: 60 // Run/Fill: 320
  Branch Circuit Protection:
  10 AMP Minimum. To minimize personnel shock hazards, install on a GFI, RCD, or equivalent protected circuit.

Pre-Installation Checklist

1. Can the unit be mounted within a reasonable distance of the water supply and drain facilities?
2. Is there an un-switched receptacle available for powering the system?
3. Is there adequate clearance and support to install the unit and permit access for maintenance? See specification table for approximate operating weights.
4. Does the inlet water supply meet the requirements listed in the table under "Influent Water Characteristics"?
5. Is there a minimum of 25 psi (1.7 bar) pressure on a consistent basis?

* Blend system not performance tested or certified by NSF.

† Protection against taste and odor causing contaminants and removal of dirt and particulates not performance tested or certified by NSF. 7FS-BW water filtration cartridge not performance tested or certified by NSF.

Tools Required Materials & Special Equipment

In most cases, common hand tools and plumbing materials suitable for use with RO water are all that is needed for installing the system. The system set-up and calibration requires special equipment which are outlined in the table below:

Compressed Air Supply [60 psi (4.1 bar) minimum] with "Schrader" style air chuck and pressure gauge	
2 - 32-ounce or 1,000 ml graduated containers	
Stopwatch	TDS Meter
Utility knife	Eyedropper
5.25% Household bleach or equivalent disinfectant	

NOTES:

- Please read this entire manual prior to installing and operating the system.
- Incoming water supplies that do not meet the influent water characteristics requirements will require the addition of pre-treatment equipment prior to the MRS-600HE-II system. Do not connect the MRS-600HE-II system after any other water filtration system, unless specifically provided or specified. System performance may be affected if requirements are not met, including system output and cartridge change-out frequency.
- Consult with your local building inspector for approval and required permits to install this system. Additional equipment, such as back-flow prevention devices, seismic restraint equipment, air gaps, etc., may be required. Completed installation must meet all local and national codes.

UNPACKING AND INSPECTION

The MRS-600HE-II includes all the necessary fittings for installation. Lengths of 3/8" (9.5 mm) tubing have been provided for connecting to the wastewater/drain connection. Supply lines and distribution piping/tubing are not included.

The MRS-600HE-II system is packaged as a complete unit in one carton. At a minimum, you should have the following:

1. Plate mounted processor assembly including:
   - Dual pumps
   - Cartridge heads
   - Controller & power supply
2. Wall mount bracket
3. MR-600 RO cartridge
4. 7FS-BW cartridges (3 total)
5. MC^2 cartridges or 7F cartridges (2 total)
6. Parts Kit

Inspect the carton for damage. Report any damage to freight carrier immediately and retain all packaging materials. Carefully unpack and inspect each item.

SYSTEM ASSEMBLY

Locate the system in an area that is convenient to the inlet water supply and drain facilities, with access for routing the product water tubing/piping to the equipment. Install in a dry location, away from all forms of corrosive and/or flammable materials. Consider ease of access for servicing when selecting a location. Evaluate the mounting surface for its ability to properly support the weight of the processor when in operation [Approximately 110 lbs. (49.9 kg.)].

⚠ WARNING Do not use screws smaller than #12 (5.5 mm) for mounting the processor.

⚠ WARNING Mounting surface may require reinforcement to support processor safely. Hollow walls, drywall and other non-structural surfaces are not suitable unless reinforced.

Processor Assembly Mounting

1. The MRS-600HE-II system has been provided with a wall mount bracket to allow greater installation flexibility and ease of processor placement. If the wall mount bracket is not suitable for this specific application, the processor backplate has 4 mounting holes (2 keyhole slots, 2 standard) on 16" (406.4 mm) centers for securing it directly to a vertical surface.
2. Refer to **Figure 9** (page 14) for dimensional information. Use this as your guide to determine the wall mount bracket and/or processor location. If NOT installing the wall mount bracket go to step 5.

Figure 1. Wall mount bracket.

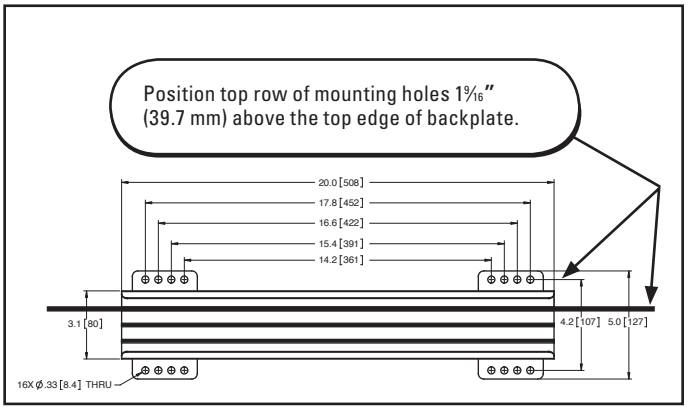
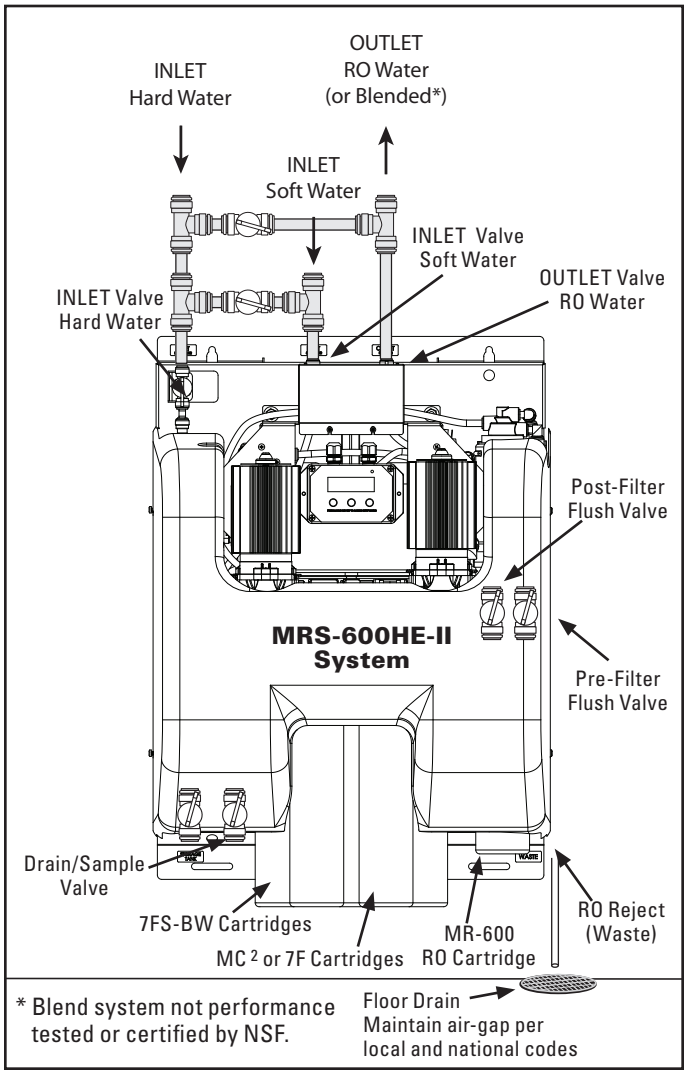


Figure 2. MRS-600HE-II Assembly.



3. Refer to **Figure 1** for mounting bracket details. Position the top row of holes 1 5/16 " (39.7 mm) above the top of the processor when installed. Install the wall mount bracket to a suitable vertical surface. Use no less than 4 - #12 (5.5 mm) fasteners to secure the bracket to the surface.
4. Prepare to attach the processor to the wall mount bracket. Lift the processor and "hook" the metal lip of the processor backplate over the lower lip of channel on the wall mount bracket. Go to step 6.
5. Measure and install 2 - #12 (5.5 mm) minimum fasteners on 16" (406.4 mm) centers to engage the top edge of the processor backplate, leaving a 1/4" (6.4 mm) gap. Lift the processor and "hook" the key-hole slots on the processor backplate. Tighten the 2 fasteners.
6. Install 2 - #12 (5.5 mm) minimum fasteners in the 2" (50.8 mm) wide slots along the bottom edge of the processor backplate.

Piping/Tubing Connections

1. Refer to **Figure 2 and 10** for general arrangement views of the piping, with a description of major components and connection points. These major components and connections will be referred to in the following steps.
2. A parts kit has been provided, which includes valves and tees to configure a system by-pass.
   - If both hard water and soft water are available, assemble the parts to the system using the example shown in **Figure 2**.
   - If only hard water is available, assemble the parts to the system using the example shown in **Figure 3**.
3. Prepare the plumbing to accept the RO system.

NOTE: The product water tubing/piping and associated fittings connecting the RO product outlet to the equipment being serviced should be food grade material that meets NSF Standard 51, 61 or similar, with a minimum pressure rating of 100-psi (6.9 bar). The product water may react with metal piping, creating a corrosive condition, in addition to imparting an objectionable taste. Plastic pipe or reinforced beverage tubing are generally very good choices for RO water distribution materials. The size of the product water tubing/piping should be 3/8" (9.5 mm) ID minimum. Distances of 25 feet (7.6 m) or greater from the RO to the equipment being serviced should be 1/2" (12.7 mm) ID minimum.

4. Locate an appropriate point in the hard water plumbing to tie-in a new section of tubing/piping that can be routed to the RO system. Close the nearest shut-off valve that is upstream from the tie-in point and relieve the pressure in the line. Tie-in the new tubing/piping section and connect it to the INLET - Hard Water fitting. See **Figure 2 or 3**.
5. If soft water is available, complete step 6. If not, go to step 7.
6. Locate an appropriate point in the soft water plumbing to tie-in a new section of tubing/piping that can be routed to the RO system. Close the nearest shut-off valve that is upstream from the tie-in point and relieve the pressure in the line. Tie-in the new tubing/piping section and connect it to the INLET - Soft Water fitting. See **Figure 2**.
7. Connect the appropriate size and type of tubing/piping and associated fittings to the MRS-600HE-II outlet connection. Route the line(s) to the equipment being serviced (i.e.; steam, espresso, coffee, etc.). Close the hard and soft inlet, outlet and by-pass valves on the RO system. Re-apply pressure to the hard water and soft water distribution plumbing by slowly opening the shut-off valves that were closed in the previous steps.
8. See MRS-600HE-II Installation Addendum - Excerpt 3.
9. Connect a 3/8" (9.5 mm) OD tube to the reject Y-connector (labeled WASTE) located in the lower right corner of the processor. Route the other end of the tubing to a drain nearby, securing it properly. Allow an air gap at the drain, following any applicable local and national codes. See **Figures 2, 4 and 10**.

⚠ WARNING Refer to "*Reject to Drain, Maximum*" under *RO Production* in the Performance Table (page 9) to determine the maximum reject (waste) flow rate. Verify the drain has ample capacity for this waste flow, plus all other sources of waste flow sharing this drain.

CONTROL SYSTEM OPERATION

The MRS-600HE-II system includes a micro-processor based control system that monitors system conditions and controls the system operation. A digital display panel provides operational information and 3 buttons provide operator access. To follow is a list of modes and a description of each function. Use this as a guide during startup, normal operation and when service is required.

Figure 3. Hard water to both inlets.

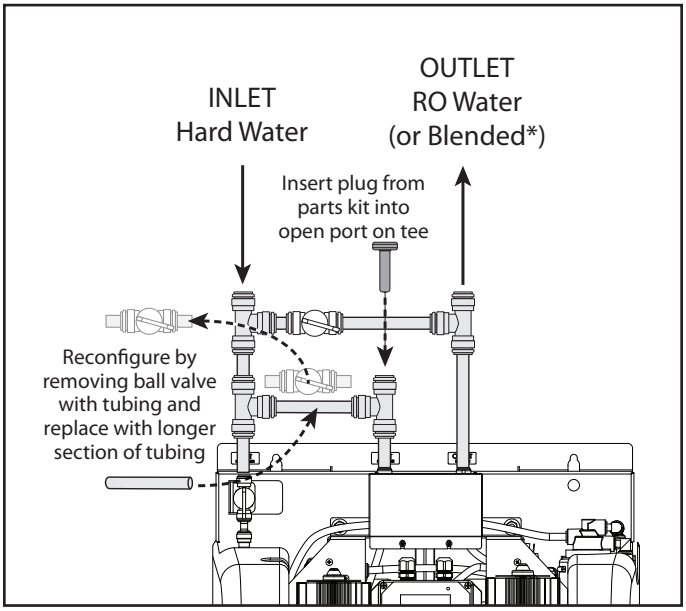
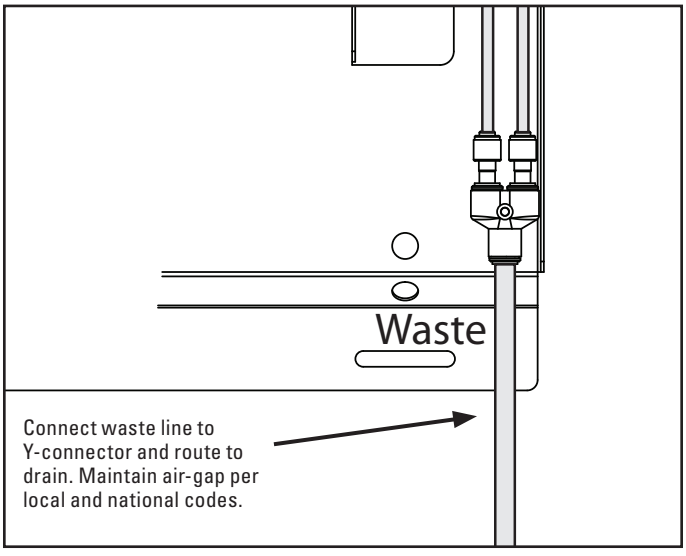


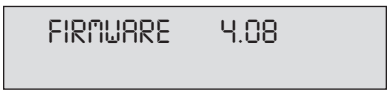
Figure 4. Reject Y-Connector Detail



* Blend system not performance tested or certified by NSF.

Operational Mode

- **INITIAL POWER-UP -** When power is first applied to the system, the panel will display the software version. After several seconds, it will automatically transition to the MAIN SCREEN VIEW.



- **MAIN SCREEN VIEW -** When the system is in normal operation and not operating in any of the following operational modes, the panel will display the RO water pressure.

- **PRESSURIZE -** When the RO water pressure drops below the pressure "on" setting, the system will start processing water. Once the RO water pressure rises above the pressure "off" setting, the system will stop. RO water pressure will be displayed.

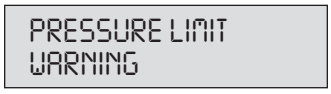
- **DEEP FLUSHING -** If the MRS-600HE-II System remains idle for the programmed length of time, the control system will automatically go into DEEP FLUSHING mode. During this time, there will be flow to drain (reject). Remaining flush time in seconds and RO water pressure will be displayed.

- **RE-PRESSURIZE -** At the start of the DEEP FLUSHING operation, the system will re-pressurize to the normal "off" pressure, then begin DEEP FLUSHING. RO water pressure will be displayed.

  Under normal conditions, the RO water pressure will remain above the minimum allowable flush pressure throughout the DEEP FLUSHING operation. Once the DEEP FLUSHING operation ends, the system returns to normal operation, but will not PRESSURIZE until the RO water pressure drops below the minimum allowable flush pressure. Once it runs and fills, the system returns to operating within the normal "on" and "off" pressure settings.

  If the RO water pressure drops below the minimum allowable pressure setting during DEEP FLUSHING, the control will enter PRESSURIZE mode and then resume normal operation as described in "PRESSURIZE" mode above.

- **PRESSURE LIMIT WARNING** – This message indicates a fault with the pressure sensing circuit or the detection of pressure exceeding 114 PSI (7.9 bar). See Troubleshooting Guide on page 11 for guidance on how to correct this condition.



Programming Mode

The controller has several user accessible menu's. This menu "loop" allows for adjustment of several variable parameters. The Controller has 3 buttons below the display for these adjustments. In most cases, a description of the button function is shown in the digital display area.

Once you enter the programming mode, the controller will save your last entry upon pressing ENTER. If an adjustment is made without pressing ENTER, and the controller returns to the main screen and the adjustment will not be saved. If a key is not depressed for about 25 seconds, the controller exits programming mode and returns to the operational mode.

- **Press and hold any key for 3 seconds to enter programming mode.**
- **II – Press the middle key to advance to "FLUSH TIME: XXX S" screen. Press left or right key to advance to "PRESSURE UOM: XXX" screen.**
- **PRESSURE UOM: XXX -** This parameter determines whether PSI or BAR will be the unit of measure used to display the RO water pressure. Use the +/- keys to adjust this value. Press ENTER to save the selected value and advance to the next screen.
- **See MRS-600HE-II Installation Addendum - Excerpt 4A.**
- **START DIFF.: XXX -** This parameter determines the pressure differential between the RO water production start ("on") pressure and stop ("off") pressure. This setting is normally 20 PSI (1.4 bar). Range is 10-25 PSI (0.7-1.7 bar) in 5 PSI (0.3-0.4 bar) increments. Use the +/- keys to adjust this value. Press ENTER to save the selected value and advance to the next screen.
- **FLUSH DIFF.: XXX -** This parameter determines the pressure differential between the RO water production start ("on") pressure and minimum allowable flush pressure. This setting is normally 0 PSI (0.0 bar). Range is 0-25 PSI (0.0- 1.7 bar) in 5 PSI (0.3-0.4 bar) increments. Use the +/- keys to adjust this value. Press ENTER to save the selected value and advance to the next screen.
- **FLUSH TIME: XXX S -** This parameter determines the flush duration. Upon determining the recovery and reject flow (see "RECOVERY ADJUSTMENT/CALIBRATION" section) a time value in seconds is entered for this setting. Range is 0-990 seconds in 5 second increments. Use the +/- keys to adjust this value. Press ENTER to save the selected value and advance to the next screen.
- **FLUSH INT: X.X H -** This parameter determines the flush interval. If the system does not process water for the time value selected, the system will enter DEEP FLUSHING mode. Range is 0.0 - 9.5 hours in 0.5 hour increments. Use the +/- keys to adjust this value.

  The factory default setting of 1.5 hours is adequate in most applications. Press ENTER to save the selected value and advance to the next screen.
- **COFFEE SETUP? -** This parameter allows viewing the TDS reading in the RO water outlet line, but with a more frequent up-date rate than in Operational Mode. Use this mode when adjusting the blend* valves (See "BLEND* ADJUSTMENT" section). Select YES to enter this mode, or NO to advance.
- **COFFEE TDS: -** This is a view only screen. The value displayed is the TDS level of the water in the RO water outlet line. The most accurate readings are attained by having flow on this line. Press any key TWICE to advance to the next screen.

* Blend system not performance tested or certified by NSF.

- **SAVING DATA ... -** This is a view only screen. The controller is saving the settings and returning to the MAIN SCREEN VIEW. If desired, press and hold the middle key for 3 seconds to enter TDS Calibration mode.
- **TDS CAL -** This parameter allows adjustment of the TDS value (in ppm) the controller will display. Make adjustments if the TDS level displayed by the controller does not match within ± 5 units of the TDS value registered on a second calibrated TDS meter. Use the +/- keys to adjust this value until it matches the value of the second calibrated TDS meter. Press ENTER to save and return to the MAIN SCREEN VIEW.

ELECTRICAL CONNECTIONS

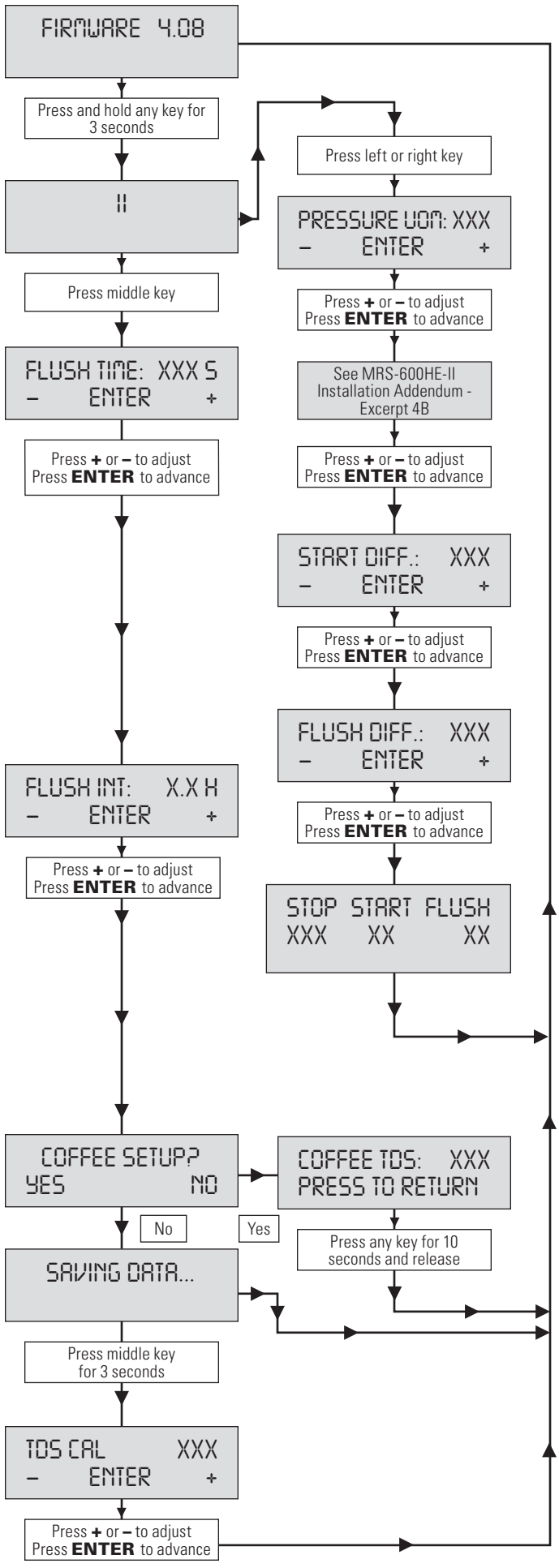
The RO system is pre-wired at the factory. Verify that the supply voltage matches the RO system operating voltage. Also verify that the supply is a GFI, RCD, or equivalent protected circuit rated at 10 amps minimum. Plug-in power cord when instructed to do so in the following sections.

CARTRIDGE INSTALLATION AND ACTIVATION

1. Remove the outer shrink-wrap and protective caps from all of the cartridges.
2. Align the lugs on the 7FS-BW cartridges with the slots in the cartridge ports on the triple pre-filter header. Holding the head/ bracket and cartridge firmly, press the cartridge upward into the head fully, and then turn the cartridge to the right until it stops. Install second and third cartridge in the same manner.
3. The system was shipped with plugs in the twin post-filter header and RO head. Verify they are present and fully rotated to the right position.
4. Route a temporary line from open port of pre-filter flush valve to a bucket or drain. Open pre-filter flush valve. See **Figure 2**.
5. Slowly open the SOFT water inlet valve. Once a solid flow of water has been established, flush 1 gallon (3.8 l) through pre-filter flush valve. Close pre-filter flush valve and remove temporary line.
6. Remove the plug from RO cartridge head. Align the lugs on the MR-600 cartridge with the slots in the head. Holding the head and cartridge firmly, press the cartridge upward into the head fully, and then turn the cartridge to the right until it stops.
7. Route a temporary BLUE line from the open port of the drain/ sample valve to a bucket or drain. Open drain/sample valve. Apply power to the system by plugging the power cord into the receptacle. Within moments, controller display should illuminate and the system will go into PRESSURIZE mode.
8. Once a solid flow of water has been established from the drain/ sample valve, allow the system to process water (in PRESSURIZE mode) for 24 hours. A continuous stream of water should be present at both the drain/sample valve and the waste (reject) line. After 24 hours has elapsed, unplug the power cord.

⚠ WARNING Do not use this product water! It may contain a preservative solution from the RO cartridge and should not be consumed!

9. Installation and activation of MC^2 or 7F cartridges will occur after system sanitization.



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RECOVERY ADJUSTMENT/CALIBRATION

1. Carefully remove and RETAIN the factory installed capillary tubes (restrictors) from the end of the two 1/4" (6.4 mm) OD tubes connected to the upper Y-connector on the reject line, then re-connect the lines. Store these restrictors with the other restrictors in the parts kit for possible re-use in the following steps. See **Figures 5 and 6**.
2. Locate the needle valve from the parts kit. Attach a section of 3/8" (9.5 mm) OD tubing to this valve. Open valve partially.

NOTE: The needle valve will be used to adjust/calibrate the system recovery. Once calibration is complete, it is removed.

3. Remove the 3/8" (9.5 mm) OD tube from the reject Y-connector and install the needle valve assembly. Connect a section of BLACK 3/8" (9.5 mm) OD tubing to the outlet of this valve. See **Figure 5** for details on the calibration set-up.
4. Measure the raw water hardness and TDS. Refer to **Table 1** on page 7. Find the hardness and TDS range in the columns labeled "Raw Water TDS" that corresponds to your hardness and TDS measurement. Read across that row to determine maximum recovery, permeate to reject ratio and permeate/reject volumes.
5. Using two 32 oz. or 1,000 ml graduated containers, apply power to the system and collect the permeate flow (blue line from drain/sample valve) in one container and the reject (black line from reject needle valve) flow in the second container. Compare the ratio of volume collected to the data shown in **Table 1**. Adjust the reject needle valve as needed to match the ratio specified. Empty the containers and collect additional samples after each adjustment of the reject needle valve.
6. Once the ratio of Permeate-to-Reject closely matches the data in **Table 1**, the Reject ONLY volume requires measurement. Using only 1 graduated cylinder, collect the Reject ONLY (black line) flow for 1 minute and record this volume.

NOTE: Reject volume in 1 minute may exceed 32 oz./1,000 ml. If so, use a larger container, or collect samples in multiple containers and add all of the collected volumes together.

7. Unplug power cord. Close drain/sample valve.
8. Return to page 7, **Table 2**. Find the volume range in the column labeled "Reject Volume per Minute" that corresponds to the volume collected in Step 6. Read across that same row to identify the correct capillary tube combination, located under the columns labeled "Capillary Tube #1 & #2".
9. Locate the correct capillary tubes (restrictors) from the parts kit. Remove the two 1/4" (6.4 mm) OD tubes from the upper Y-connector. Insert the capillary tubes into each line and re-assemble to the Y-connector. See **Figures 5 and 6**.

NOTE: In some cases, the capillary tube requires trimming. Use a SHARP utility knife to cut the tube cleanly without tearing or crushing the tube.

10. Remove the reject needle valve assembly and reconnect the 3/8" (9.5 mm) tube that is routed to drain.
11. Refer to **Table 2** again and locate the column labeled "Flush Time in Seconds". The correct value for this setting can be found in the same row of data used to determine the capillary combination in the previous steps. Enter this value in the controller under "FLUSH TIME XXX".
12. Adjust "FLUSH INT X.X H" to 1.5 H.

Figure 5. Permeate to Reject Calibration Set-Up

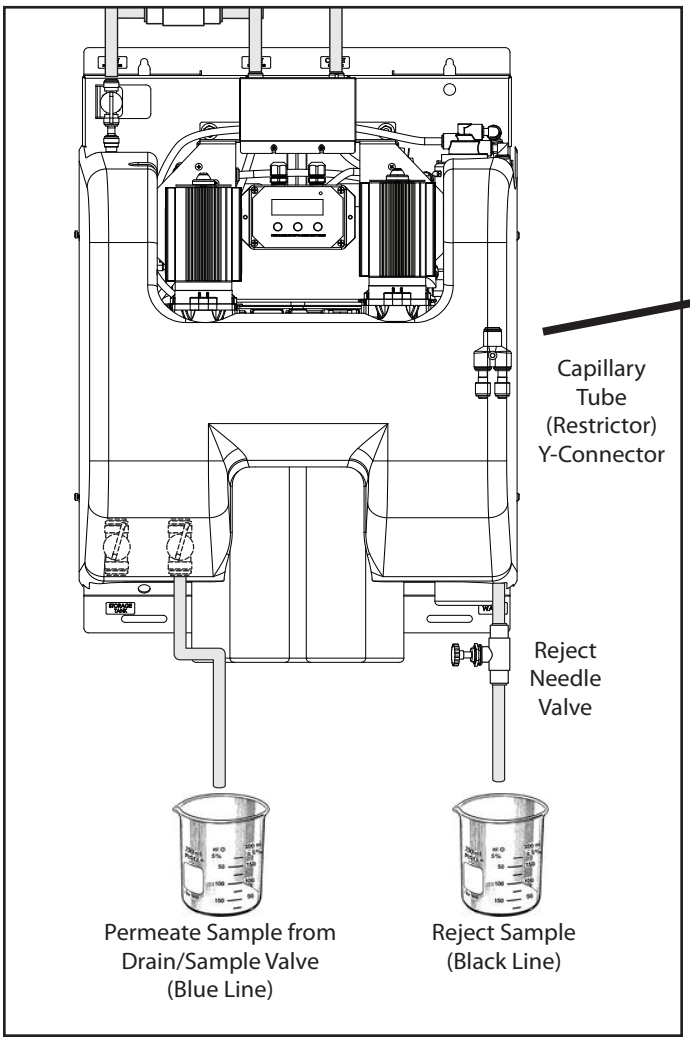


Figure 6. Capillary Tube (Restrictor) Y-Connector Detail

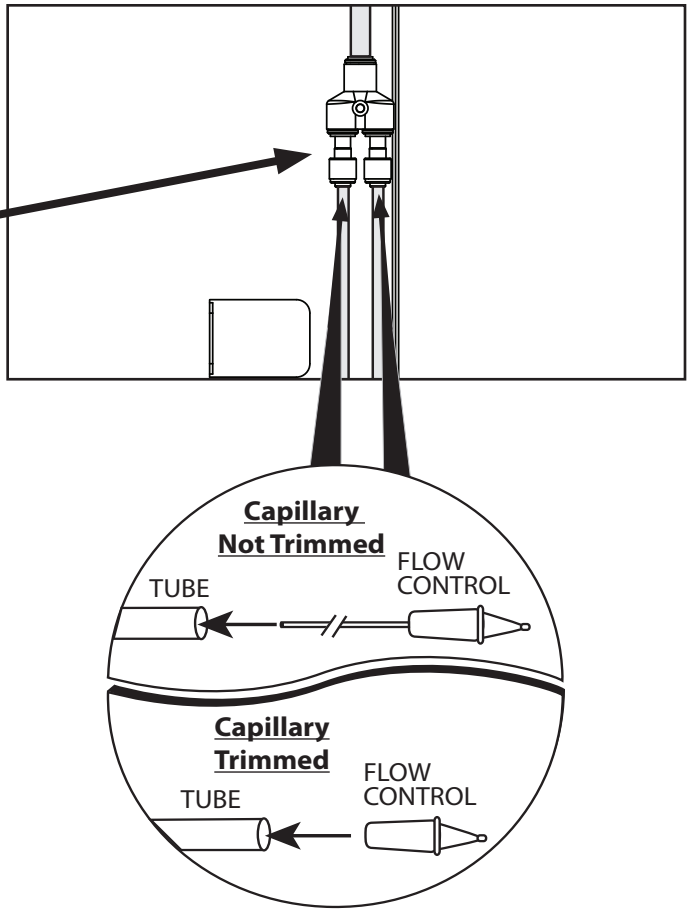


Table 1 - Recovery & Permeate to Reject Ratio

Raw (Feed) Water TDS		Maximum Recovery	Ratio	Permeate & Reject Volumes at Specified Recovery*			
				Permeate (Blue Line)		Reject (Black Line)	
Soft Water (less than 1 gpg/17.1 ppm)	Hard Water (1 gpg/17.1 ppm or greater)		Permeate to Reject	Ounces	Milliliters	Ounces	Milliliters
0-1,000	0 - 200	80.0%	1 to 0.25	80.0	800	20.0	200
	201 - 250	77.4%	1 to 0.29	77.4	774	22.6	226
	251 - 300	72.8%	1 to 0.37	72.8	728	27.2	272
	301 - 350	68.3%	1 to 0.46	68.3	683	31.7	317
	351 - 400	63.8%	1 to 0.57	63.8	638	36.2	362
	401 - 450	59.3%	1 to 0.69	59.3	593	40.7	407
	451 - 500	54.7%	1 to 0.83	54.7	547	45.3	453
	501 - 550	50.2%	1 to 0.99	50.2	502	49.8	498
	551 - 600	45.7%	1 to 1.19	45.7	457	54.3	543
	601 - 650	41.2%	1 to 1.43	41.2	412	58.8	588
	651 - 700	36.7%	1 to 1.73	36.7	367	63.3	633
	701 - 750	32.1%	1 to 2.11	32.1	321	67.9	679
	751 - 1,000	30.0%	1 to 2.33	30.0	300	70.0	700

*Measure in either Ounces or Milliliters and use that same unit of measure for both the Permeate and Reject volumes.

Table 2 - Capillary Tube and Flush Time Selector

Reject Volume per Minute		Capillary Tube		Flush Time in Seconds
Ounces	Milliliters	#1	#2	
0.0 - 6.1	0 - 179	Red	PLUG	840
6.1 - 14.0	180 - 414	Brown - Trimmed	PLUG	360
14.0 - 20.1	415 - 593	Brown - Trimmed	Red	255
20.1 - 25.9	594 - 766	Green	PLUG	200
25.9 - 31.9	767 - 945	Green	Red	160
31.9 - 40.1	946 - 1186	Blue - Trimmed	PLUG	125
40.1 - 46.2	1187 - 1365	Blue - Trimmed	Red	110
46.2 - 51.6	1366 - 1525	White - Trimmed	PLUG	100
51.6 - 57.6	1526 - 1703	White - Trimmed	Red	90
57.6 - 65.5	1704 - 1938	White - Trimmed	Brown - Trimmed	80
65.6 - 72.9	1939 - 2155	Grey	Red	70
72.9 - 77.4	2156 - 2290	White - Trimmed	Green	65
77.4 - 83.7	2291 - 2475	White	Blue - Trimmed	60
83.7 - 91.6	2476 - 2709	White - Trimmed	Blue - Trimmed	55
91.6 - 97.5	2710 - 2883	White	White	50
97.5 - 103.1	2884 - 3048	White - Trimmed	White - Trimmed	50
103.1 - 116.5	3049 - 3444	Grey	White	45
116.5 - 135.5	3445 - 4006	Grey	Grey	40

DISINFECTION

After completing the activation of the 7FS-BW cartridges and MR-600 cartridge and adjusting the recovery, the system and associated piping must be disinfected, then completely flushed. The steps for this are outlined in the MRS-600HE-II Installation Addendum - Excerpt 5.

PLACING THE MRS-600HE-II INTO SERVICE

Once the cartridges have been activated, the system and distribution piping sanitized, the MRS-600HE-II can be placed into service.

During normal operation, the valves on the MRS-600HE-II should be in the following positions:

A. System inlet and outlet valves – open.
B. System by-pass valves – closed.

Once the system been started-up initially, it is a good idea to measure the outlet water flow rate and quality to verify the system's performance. The initial values should be recorded for future comparison to detect any changes in performance. A Performance Log has been provided on Page 10 to record this information.

OPERATION

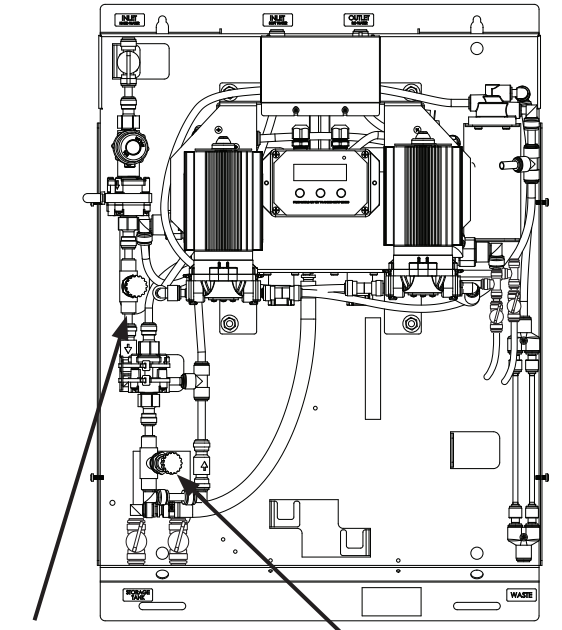
1. During normal operation, a continuous supply of water must be available to the system.
2. The system inlet and outlet valves must be open, the sample outlet and flushing valves must be closed and the drain line must be unrestricted.

BLEND ADJUSTMENT*

The MRS-600HE-II system includes a blend system that can produce a wide range of water qualities. It combines or "blends" two sources of water; 1) directly from the RO Membrane and, 2) water containing the same level on mineral content as the raw (tap) hard water. The following text describes the adjustment of this feature.

1. Open the tap water blend valve (TWBV) and dilution water blend valve (DWBV) fully. See **Figure 7** for location of these valves.
2. Demand flow on the "OUTLET - RO Water" line. The flow rate should equal the maximum expected demand of all connected equipment.
3. Access the "COFFEE TDS: XXX" view screen on the controller to observe a real-time reading of the TDS quantity in the water flowing to the "COFFEE" line.
4. Compare TDS value on controller to application requirement. If controller reading is higher than requirement, slowly close TWBV until TDS value is met. If controller reading is lower than requirement, slowly close DWBV until TDS value is met.

Figure 7. RO Blend* Valve Locations



* Blend system not performance tested or certified by NSF.

PERFORMANCE* SECTION

RO Production†	MRS-600HE-II
Gallons/Liters per Day	763/2,888
Gallons/Liters per Hour	31.8/120.3
Gallons/Liters per Minute	0.53/2.01
Ounces/Milliliters per Minute	67.8/2,006
Inlet Supply Requirements, Minimum GPM/LPM	1.5/5.7
Reject to Drain, Maximum GPM/LPM	1.1/4.2
Salt Rejection	90% minimum
Recovery	Varies based on water conditions - 30-80%. NSF Certified Recovery Rating is 76.43%

†Production rates based on the following:
750 ppm TDS Soft Water @ 50 psi (3.4 bar), 77°F (25°C), to Atmosphere, Recovery = 76.43%, SDI = <3,

See the MRS-600HE-II Installation Addendum - Excerpt 6.

DIMENSIONS AND OPERATING WEIGHTS

System Only	MRS-600HE-II
Dimensions	32" H x 23" W x 13.6" D (813 mm H x 584 mm W x 345 mm D) [Add 3" (76 mm) on all 4 sides for cover removal and service access]
Operating Weight	90 lbs. (40.8 Kg) (Processor only)

Cartridges and Elements

Reverse Osmosis	X-size 24" (610 mm) Thin film composite (TFC)
Pre-Filter Cartridge	7-size 20" (508 mm) Combination carbon/particulate/scale control
Post-Filter Cartridge	Standard: 7-size 20" (508 mm) 0.5 micron carbon/particulate Special Applications: 7-size 20" (508 mm) 5 micron carbon/particulate

*Specifications Subject To Change Without Notice.

Recovery rating means the percentage of the influent water to the membrane portion of the system that is available to the user as reverse osmosis treated water when the system is operated without a storage tank or when the storage tank is bypassed.

MAINTENANCE SECTION

Performance Log

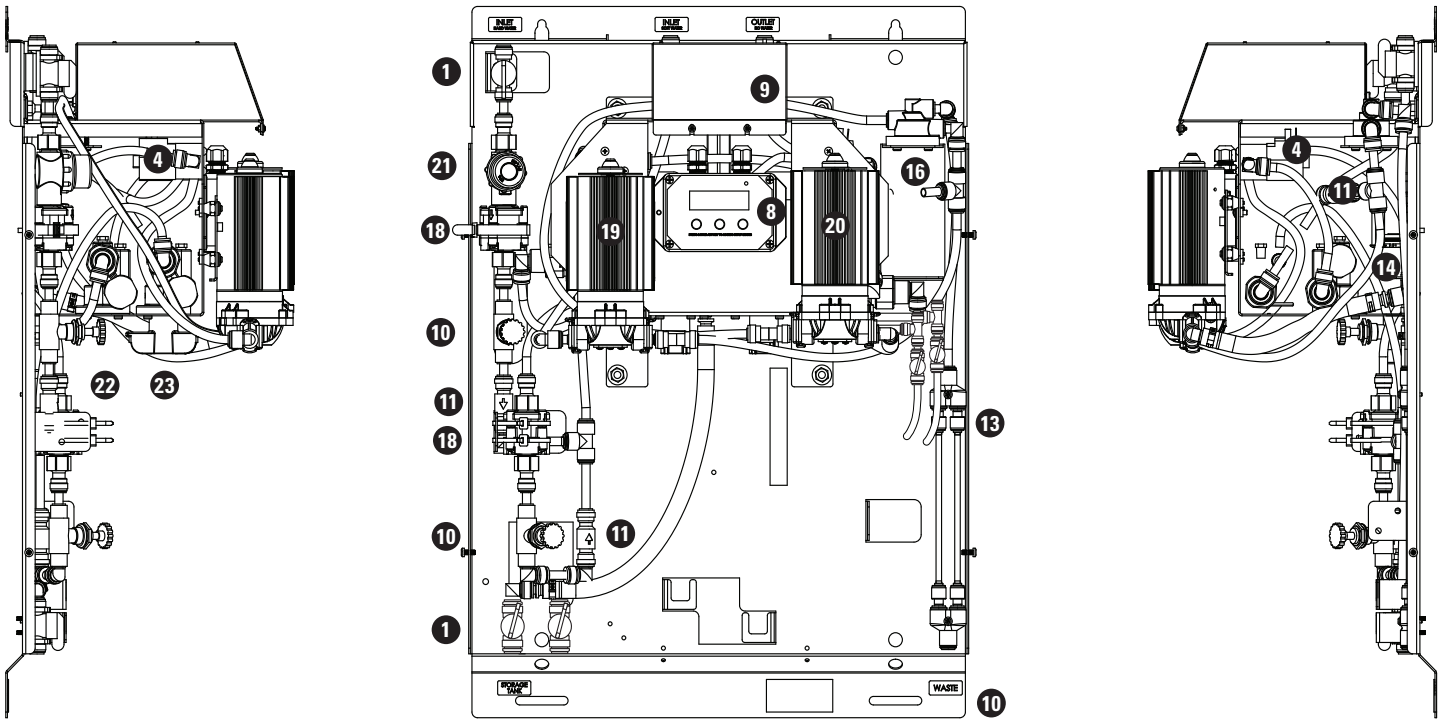
Test Date	Run Hours	Outlet Flow RO Water Only ounce/min or ml/min	Reject Flow ounce/min or ml/min	Inlet Pressure/ Temp psi/°F or bar/°C	Hard Water TDS mg/l	RO Outlet TDS mg/l	Percent TDS Reduction

NOTES:

TROUBLESHOOTING GUIDE

Problem	Possible Cause	Remedy
1. Insufficient product water during normal operating periods.	a. 7FS-BW cartridge(s) plugged.	a. Replace 7FS-BW cartridge(s).
	b. RO cartridge plugged.	b. Replace RO cartridge.
	c. Insufficient system inlet pressure.	c. Check/repair booster pump and inlet line.
	d. See MRS-600HE-II Installation Addendum - Excerpt 7 - Problem 1.	
2. Insufficient product water volume during peak periods.	a. Refer to problem 1.	a. Refer to problem 1.
	b. System rated output too low for application.	b. Verify system output. If output is within specification, increase output if applicable.
	c. See MRS-600HE-II Installation Addendum - Excerpt 7 - Problem 2.	
3. Low quality RO water.	a. Refer to problem 1.	a. Refer to problem 1.
	b. RO cartridge failure.	b. Replace RO cartridge.
4. Low water pressure at water using equipment.	a. Tubing/piping run to equipment restrictive.	a. Increase tubing/piping diameter. Refer to "System Installation" section for recommendations.
	b. See MRS-600HE-II Installation Addendum - Excerpt 7 - Problem 4	
5. Objectionable product water odor.	a. Post-filtration cartridge(s) exhausted.	a. Replace post-filtration cartridge(s).
	b. See MRS-600HE-II Installation Addendum - Excerpt 7 - Problem 5.	
6. Wastewater flow too low or decreases over time.	a. Drain line restricted.	a. Check/correct any restrictions in drain line tubing. Make sure to allow an air gap at the drain. Disconnect reject line at quick connect fitting and inspect for obstruction or damage. Remove obstruction. Replace if required.
	b. Insufficient system inlet pressure.	b. Check/repair booster pump and inlet line.
7. Reject (waste) flow too high or increases over time.	a. Drain line restrictors missing or incorrect size.	a. Check restrictor Y-connector for presence of restrictors. • If present, measure reject flow rate for 1 minute and compare to flow rate shown in table 2 for the restrictor combination currently installed Flow should be within +/- 5% of value. If not, replace restrictors and re-test or complete the "RECOVERY ADJUSTMENT/CALIBRATION" procedure. • If not present, complete the "RECOVERY ADJUSTMENT/ CALIBRATION" procedure.
	b. Drain line restrictors worn.	b. Measure reject flow rate for 1 minute and compare to flow rate shown in table 2 for the restrictor combination currently installed. Flow should be within +/- 5% of value. If not, replace restrictors and re-test or complete "RECOVERY ADJUSTMENT/ CALIBRATION" procedure.
8. Pressure limit warning error.	a. Electrical connector at the pressure transducer not fully engaged.	a. Check electrical connector engagement with pressure transducer, then press any key on controller to clear the fault. If the fault re-appears, after returning to normal operation go to 8b.
	b. RO permeate pressure exceeds 114 PSI (7.9 bar).	b. Check for restriction/blockage in permeate line causing abnormally high pressure. Relieve pressure in permeate line and correct restriction/blockage condition, then press any key on controller to clear the fault. If the fault re-appears after returning to normal operation, go to 8c.
	c. RO cartridge by-passing.	c. Measure RO permeate flow and TDS and compare to previously recorded values, or system specifications. High permeate flow and/or poor TDS reduction indicate excessive passage of water around or within the RO cartridge. Remove the RO cartridge and check the integrity of all three O-ring seals and correct as needed. If seals appear OK, replace the RO cartridge. After making the repairs, press any key on controller to clear the fault, then re-check RO permeate flows and TDS and compare to previously recorded values, or system specifications. If the fault re-appears after returning to normal operation, replace controller and/or pressure transducer or contact Technical Support for further assistance.

Figure 8. Parts Diagram



REPLACEMENT PARTS

KEY	PART NO.	DESCRIPTION
1	EV311192	Valve, Ball, 3/8" PI x 3/8" PI
4	EV312808	Valve, Solenoid (metal body)
	EV313304	Valve, Solenoid (plastic body)
8	EV313144	Controller
9	EV312815	Power Supply - Non Switching (Only non-CE compliant systems mfg. on or before 4/2012)
	EV313034	Power Supply - Switching (All CE compliant models and only non-CE compliant models mfg. 5/2012 to present)
10	EV311161	Valve, 3/8" Needle - TWBV, DWBV & Reject Calibration
11	EV310391	Check Valve, 3/8"

KEY	PART NO.	DESCRIPTION
13	EV312827	Restrictor, Blue, 735 ml/min
	EV312828	Restrictor, White, 1052 ml/min
	EV312829	Restrictor, Grey, 1577 ml/min
	EV312830	Restrictor, Red, 125 ml/min
	EV312831	Restrictor, Brown, 189 ml/min
	EV312832	Restrictor, Green, 525 ml/min
	EV312833	Plug, 1/4" OD
14	EV312952	Pressure Transducer
18	183-165-PG	Pressure Reducing Valve
19	EV313152	Pump, Inlet
20	EV313151	Pump, Permeate
21	CY255-213	Strainer
—	EV313786	Pressure Relief Valve (not shown)

REPLACEMENT CARTRIDGES

KEY	PART NO.	DESCRIPTION
16	EV962713	Cartridge, MR-600 - 1 pack
22	EV962716	Cartridge, 7FS-BW - 1 pack (3 required)
23	EV961256	Cartridge, MC^2 - 1 pack (2 required) (Standard model)
	EV965410	Cartridge, 7F - 1 pack (2 required) (Special applications)

Contact your local Everpure Dealer for replacement and spare parts.

MAINTENANCE

The MRS-600HE-II requires very little maintenance. Regular cartridge replacement, system recovery verification, See MRS-600HE-II Installation Addendum - Excerpt 8,and sanitization are the only normal requirements. In typical service, the schedules are as listed below.

Every 6 months

– Replace the MC^2 cartridges:

- Open both by-pass valves.
- Remove power from system by unplugging power cord.
- Close HARD water inlet valve, SOFT water inlet valve, RO water outlet valve and See MRS-600HE-II Installation Addendum - Excerpt 9.
- Route a temporary line from open port of post-filter flush valve to a bucket or drain. Open post-filter flush valve. See **Figure 2**.
- Place a bucket under exhausted MC^2 cartridge to catch any excess water that may spill from head. Remove exhausted cartridge by turning cartridge to the left until it stops and pulling downward until it is free from head. Remove second cartridge in the same manner.
- Remove outer shrink-wrap and protective cap from the new MC^2 cartridges.
- Align lugs on new cartridge with slots in head.
- Holding head and cartridge firmly, press cartridge upward into head fully, then turn the cartridge to right until it stops. Install second cartridge in the same manner.
- Open HARD water inlet valve and flush for 5 minutes or until water is clear. Close post-filter flush valve and remove temporary line.
- Open SOFT water inlet valve, RO water outlet valve and See MRS-600HE-II Installation Addendum - Excerpt 9.
- Plug-in power cord.
- Close both by-pass valves.

– See MRS-600HE-II Installation Addendum - Excerpt 10.

Every 12 months

– Sanitize the RO system and plumbing:

Refer to “DISINFECTION” section for sanitization procedure.

– Verify system recovery:

- Route a temporary line from drain/sample valve to a bucket or drain. Open drain/sample valve and allow to remain open until system starts processing water. Close drain/sample valve and remove temporary line.
- Using only 1 graduated cylinder, collect the Reject ONLY flow for 1 minute and record this volume.
- Compare this volume to the volume of reject flow recorded previously. If the volume varies more than +/- 5% from the previous recorded volume, see troubleshooting section for possible cause and remedy. If the correct flow cannot be attained , see “RECOVERY ADJUSTMENT/CALIBRATION” section and perform all steps to re-calibrate system.

– Replace the 7FS-BW Cartridges:

- Open both by-pass valves.
- Remove power from system by unplugging power cord.
- Close HARD water inlet valve, SOFT water inlet valve and RO water outlet valve.
- Route a temporary line from pre-filter flush valve to a bucket or drain. Open pre-filter flush valve. See **Figure 2**.
- Place a bucket under exhausted 7FS-BW cartridge to catch any excess water that may spill from head. Remove exhausted cartridge by turning cartridge to the left until it stops and pulling it downward until it is free from head. Remove second and third cartridge in the same manner.
- Remove outer shrink-wrap and protective cap from the new 7FS-BW cartridges.
- Align lugs on new cartridge with slots in head. Holding head and cartridge firmly, press cartridge upward into the head fully, then turn cartridge to the right until it stops. Install second and third cartridge in the same manner.
- Slowly open SOFT water inlet valve. Once a solid flow of water has been established, flush 1 gallon (3.8 l) through pre-filter flush valve. Unplug power cord. Close pre-filter flush valve and remove temporary line.
- Open HARD water inlet valve and RO water outlet valve.
- Close both by-pass valves.
- Plug-in power cord.

– Replace the MR-600 RO cartridge:

- Open both by-pass valves.
- Remove power from system by unplugging power cord.
- Close the HARD water inlet valve, SOFT water inlet valve, RO water outlet valve and See MRS-600HE-II Installation Addendum - Excerpt 9.
- Place a bucket under the MR-600 cartridge to catch any excess water that may spill from the head. Remove the old cartridge by turning the cartridge to the left until it stops and pulling it downward until it is free from its head.
- Remove the outer shrink-wrap and protective cap from the new MR-600 cartridge.
- Align the lugs on the new cartridge with the slots in the head.
- Holding the head and cartridge firmly, press the cartridge upward into the head fully, and then turn the cartridge to the right until it stops.
- Remove both capillary restrictors temporarily. Install 2 gray restrictors or needle valve set to 116.5 - 135.5 ounce per minute flow (3445 - 4006 ml min.).
- Route a temporary line from the drain/sample valve to drain. Open HARD water inlet valve, SOFT water inlet valve and drain/sample valve.
- Apply power to the system by plugging the power cord into the receptacle. Within moments, controller display should illuminate and the system will go into PRESSURIZE mode. Once a solid flow of water has been established from the drain/sample valve, allow the system to process water (in pressurize mode) for 24 hours. A continuous stream of water should be present at both the drain/sample valve and the waste (reject) line. After 24 hours has elapsed, unplug power cord.

⚠ WARNING DO NOT USE THIS PRODUCT WATER! It may contain a preservative solution from the RO cartridge and should not be consumed!

- Close drain/sample valve and remove temporary line. Remove the 2 gray capillary restrictors or needle valve and re-install capillary restrictors removed in the previous step.
- Open RO water outlet valve and See MRS-600HE-II Installation Addendum - Excerpt 9. Close both by-pass valves.
- Plug in power cord.

– **Replace the 7F cartridges:**

- Open both by-pass valves.
- Remove power from system by unplugging power cord.
- Close HARD water inlet valve, SOFT water inlet valve, RO water outlet valve and See MRS-600HE-II Installation Addendum - Excerpt 9.
- Route a temporary line from open port of post-filter flush valve to a bucket or drain. Open post-filter flush valve. See **Figure 2**.
- Place a bucket under exhausted 7F cartridge to catch any excess water that may spill from head. Remove exhausted cartridge by turning cartridge to the left until it stops and pulling downward until it is free from head. Remove second cartridge in the same manner.
- Remove outer shrink-wrap and protective cap from the new 7F cartridges.
- Align lugs on new cartridge with slots in head.
- Holding head and cartridge firmly, press cartridge upward into head fully, then turn the cartridge to right until it stops. Install second cartridge in the same manner.
- Open HARD water inlet valve and flush for 5 minutes or until water is clear. Close post-filter flush valve and remove temporary line.
- Open SOFT water inlet valve, RO water outlet valve and See MRS-600HE-II Installation Addendum - Excerpt 9.
- Plug-in power cord.
- Close both by-pass valves.

Figure 9. Dimensional Drawing

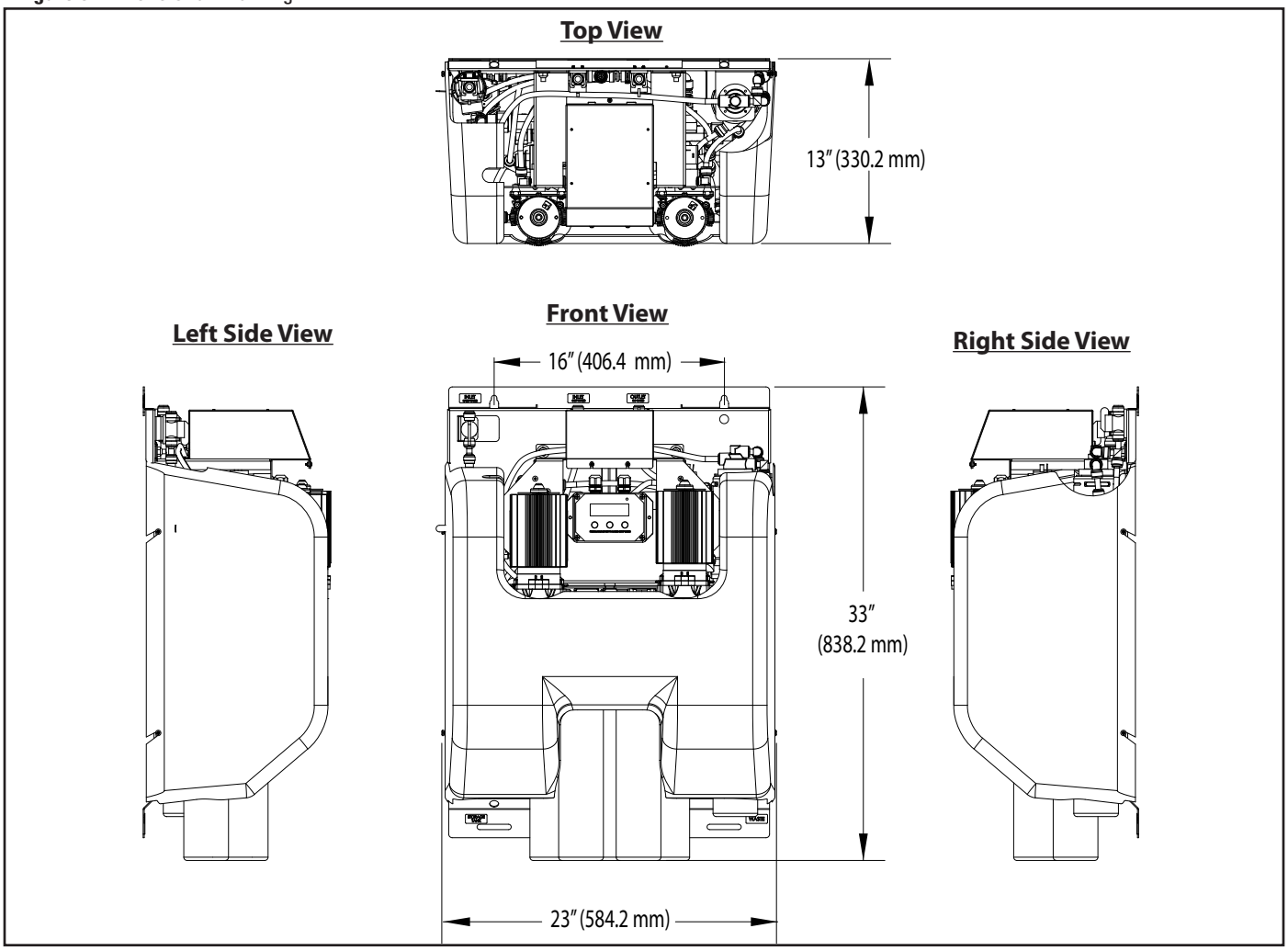
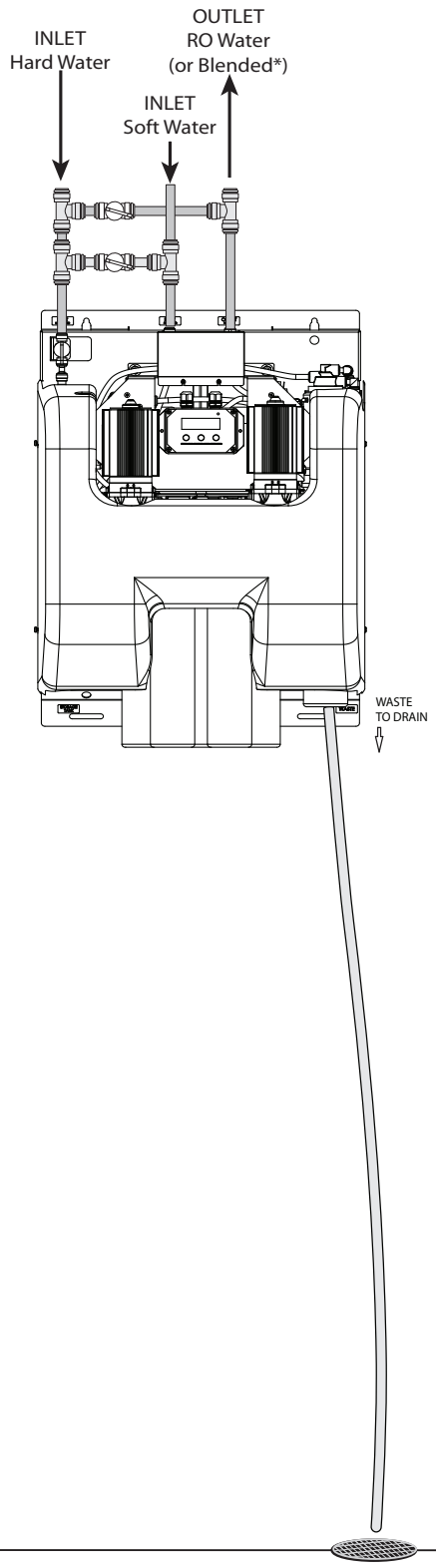
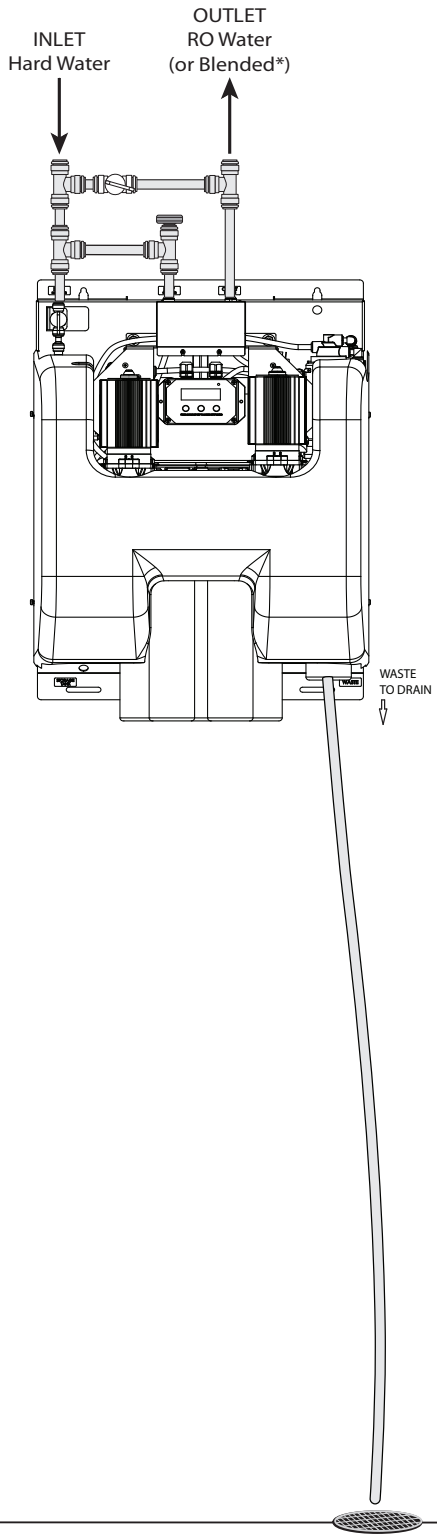


Figure 10. General Arrangement - Also see Figure 10A in the MRS-600HE-II Installation Addendum (EV3136-62)

TWO SOURCES OF WATER
HARD AND SOFT



ONE SOURCE OF WATER
HARD ONLY



Consult with your local building inspector for approval and required permits to install this system. Additional equipment, such as back-flow prevention devices, seismic restraint equipment, air gaps, etc., may be required. Completed installation must meet all local and national codes.

* Blend system not performance tested or certified by NSF.

Check for compliance with state and local laws and regulations.

Do not use with water that is microbiologically unsafe, or of unknown quality without adequate disinfection before or after the system.

Substances reduced are not necessarily in your water. System must be maintained according to manufacturer's instruction, including replacement of filter cartridges.

This system contains a replaceable mineral reduction (RO) module critical for the effective reduction of total dissolved solids.

Product water should be tested periodically to verify that the system is working properly.

This reverse osmosis system contains a replaceable component critical to the efficiency of the system. Replacement of the reverse osmosis component should be with one of identical specifications, as defined by the manufacturer, to assure the same efficiency and containment reduction performance.

Recovery rating means the percentage of the influent water to the membrane portion of the system that is available to the user as reverse osmosis treated water when the system is operated without a storage tank or when the storage tank is bypassed.

System Tested and Certified by NSF International against NSF/ANSI Standards 58 for the reduction of:
Total Dissolved Solids (TDS)

For sales, service or replacement components, contact your local Everpure dealer or the nearest regional office listed below:

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Mohan Co-operative Industrial Estate
Mathura Road
New Dehli, 110 044
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