

Better Water LLC



# Commercial RO CRO Series 2020 & 2436

## Operator Manual



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Visit our website to see our complete product line of  
water purification products!

[www.betterwater.com](http://www.betterwater.com)



## Our Company

Better Water LLC is a leading integrated manufacturer of water treatment equipment and components for the industrial, commercial and institutional markets.



Located in Smyrna, Tennessee, Better Water LLC continues its history of manufacturing and distribution of equipment specifically designed for the renal dialysis market.

Founded in 1971, Better Water LLC has built a reputation for solving our customers' toughest problems with high quality products and unmatched service.

## Contact Us

**Better Water LLC**  
698 Swan Dr  
Smyrna, TN 37167

**Phone (615) 355-6063**  
**Fax (615) 355-6065**

**Technical Support:**  
Phone (615) 355-6063, press "1"  
Email [support@betterwater.com](mailto:support@betterwater.com)

**Customer Service:**  
Phone (615) 355-6063, press "3"  
Email [customerservice@betterwater.com](mailto:customerservice@betterwater.com)

## Technical Phone Support

Support is available regarding all Better Water LLC systems,  
**24 hours a day, 7 days a week.**

- Normal business hours are **Monday through Friday** from 8:00 am until 3:30 pm, Central Standard Time (*excluding holidays*)

**Call (615) 355-6063, press "1" for Technical Support**

**Emergency assistance** is available after normal business hours (*including holidays*) by calling **(615) 708-8627.**

**BEFORE calling for emergency assistance:**

- Check the Troubleshooting guide in this manual
- Check the electrical-power connections, fuses/circuit breakers (*if applicable*)
- Check all valves to ensure each is in the correct position (*if applicable*)

## Technical Support Info Online

Our website, **[www.betterwater.com](http://www.betterwater.com)**, which is updated frequently, contains a wealth of technical support information on the **SUPPORT** tab and includes:

- Operator and Service Manuals
- Consumables and Accessories Lists
- Technical Service Bulletins

For your convenience there are also online forms for placing **Orders** and requesting **Returned Goods Authorization**. These are Adobe forms that can be downloaded and either faxed or emailed to us.



## Specific Contacts

Technical Support	Phone (615) 355-6063, option "1" Email <a href="mailto:support@betterwater.com">support@betterwater.com</a>
To Place an Order (purchase orders)	Fax (615) 355-6065 Email <a href="mailto:orders@betterwater.com">orders@betterwater.com</a> Phone (615) 355-6063
Customer Service (returns)	Phone (615) 355-6063, option "2" Fax (615) 355-6065 Email <a href="mailto:customerservice@betterwater.com">customerservice@betterwater.com</a>

### Website [www.betterwater.com](http://www.betterwater.com)

Helpful information and forms that can be found on our website:

- Operator & Service Manuals
- Technical Service Bulletins
- Consumables and Replacement Parts List
- Brochures
- Order Form
- Return Goods Authorization Request Form

## Introduction

The Better Water LLC **Commercial RO** is custom built, and manufactured to the utmost quality. With proper care, preventative maintenance, and proper use, it should provide you with a very effective means of treating water.

Before starting you should first read and have a thorough understanding of this entire Operator Manual. It describes in detail the steps and procedures for safe usage of the **Commercial RO (CRO Series)**.

The RO cannot do the job alone. It is important to understand and monitor the changing tap water conditions, which include contaminants, temperature, pH, pressure and flow-rates, which have a direct impact on the quality and quantity of the RO's output. This RO was designed to your specifications and requirements. Since municipal water conditions are constantly changing, good two-way communications with your municipal water supplier coupled with routine testing of the tap water is vital to the safe and effective operation of this device.



### NOTE concerning pictures in this manual:

Pictures of devices and components may vary slightly due to product changes, and therefore should be for general reference only. Information concerning their use, functionality, or replacement will not differ unless noted.

## WARNINGS



1. It is unsafe to operate or service this device without first reading and understanding the entire Operator and Service Manuals. Keep this manual and other associated documentation for future reference.
2. Misuse, improper operation, and/or improper monitoring of this system could result in serious injury, death, or other serious reactions to patients undergoing hemodialysis treatment.
3. Misuse, improper use or handling of disinfectants and chemical cleaning solutions could result in serious injury or even death. You must comply with the information contained in the Material Safety Data Sheet (MSDS) for the chemical being used.
4. To avoid electrical shock hazard, do not operate this device when the covers or panels are removed.
5.  **ELECTROMAGNETIC INTERFERENCE: This device can create and radiate radio frequency energy and may cause harmful interference if not installed according to the manufacturer's instructions.**

## CAUTIONS



1. This device is NOT DESIGNED FOR MEDICAL USE.
2. Improper operation of this device could result in a low-flow or no-flow situation to the distribution loop.
3. Misuse or improper operation of this device will void any warranty.
4. Where water is mentioned, unless otherwise noted, it must be AAMI standard quality water.
5. Electrical and plumbing connections must adhere to local statutes and any facility codes. Connect this device to a proper ground connection in accordance with the National Electrical Code. Do not remove the ground wire or ground plug. Do not use an extension cord with this device.
6. Do not remove any Caution, Warning or any other descriptive labels from the device.
7. Do not operate this device in an explosive environment or in the presence of flammable materials. Do not use this device to store, mix or transfer flammable liquids.
8. Movement or vibrations during shipment may cause connections to loosen.
9. Do not operate this unit in an environment where temperatures may be below 50° F or above 90° F.
10. This device should not be used for purposes outside the device's stated applications, specifications or limitations.

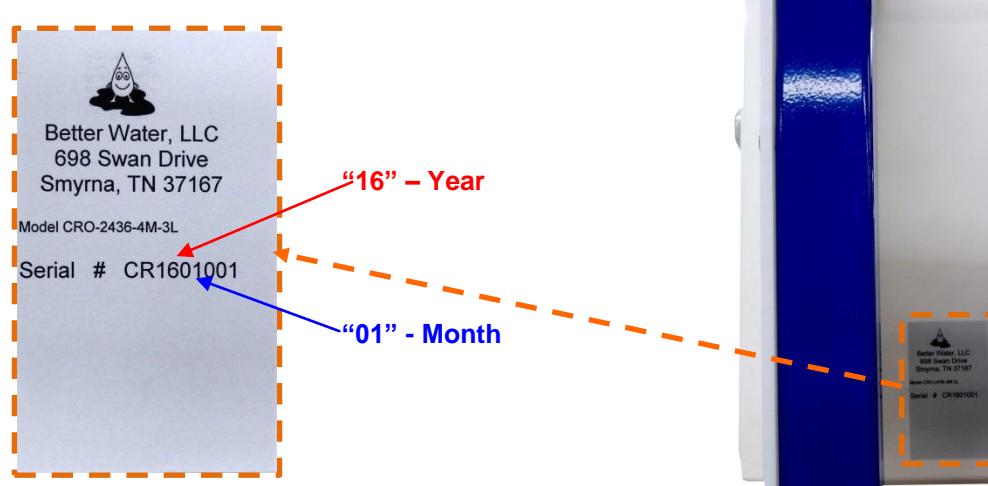
## MODELS

There are several models of the Commercial RO, based on the number of membranes and electrical requirements. The operation, service, and replacement parts of these two units are basically the same with the only difference being some electrical components and number of membranes. Each of these models is available in Single Phase (220V) and Three Phase (208V).

Series	Membranes	Gallons per Day	Phase
CRO-2020-1M-1H	1	1800 gpd	Single Phase
CRO-2020-1M-3L	1	1800 gpd	Three Phase
CRO-2020-2M-1H	2	3600 gpd	Single Phase
CRO-2020-2M-3L	2	3600 gpd	Three Phase
CRO-2020-3M-1H	3	5400 gpd	Single Phase
CRO-2020-3M-3L	3	5400 gpd	Three Phase
CRO-2436-4M-1H	4	7200 gpd	Single Phase
CRO-2436-4M-3L	4	7200 gpd	Three Phase
CRO-2436-5M-1H	5	9000 gpd	Single Phase
CRO-2436-5M-3L	5	9000 gpd	Three Phase
CRO-2436-6M-1H	6	10800 gpd	Single Phase
CRO-2436-6M-3L	6	10800 gpd	Three Phase
CRO-2436-7M-1H	7	12600 gpd	Single Phase
CRO-2436-7M-3L	7	12600 gpd	Three Phase

## IMPORTANT INFORMATION FOR SUPPORT

Adhered to the side of the control box of each Commercial RO is a label containing important information relating to the specific unit, and details both the **Model** and **Serial Number**. Both of these pieces of information are very important in obtaining support, determining warranty, and properly servicing the unit. Please have this information available if you contact Technical Support.



The first four numbers in the serial number denote the year and month the device was manufactured. *In the example above the RO was produced in 2015, in the month of December.*

## PRODUCT DESCRIPTION

The Commercial RO has been designed and built to meet the specific needs for your water system in a minimal amount of floor space, adding a neat and clean look to your water room. Based on the number of membranes it is designed to produce RO water and can be used for both Tank-Feed and Direct-Feed applications.

### BASIC COMPONENTS

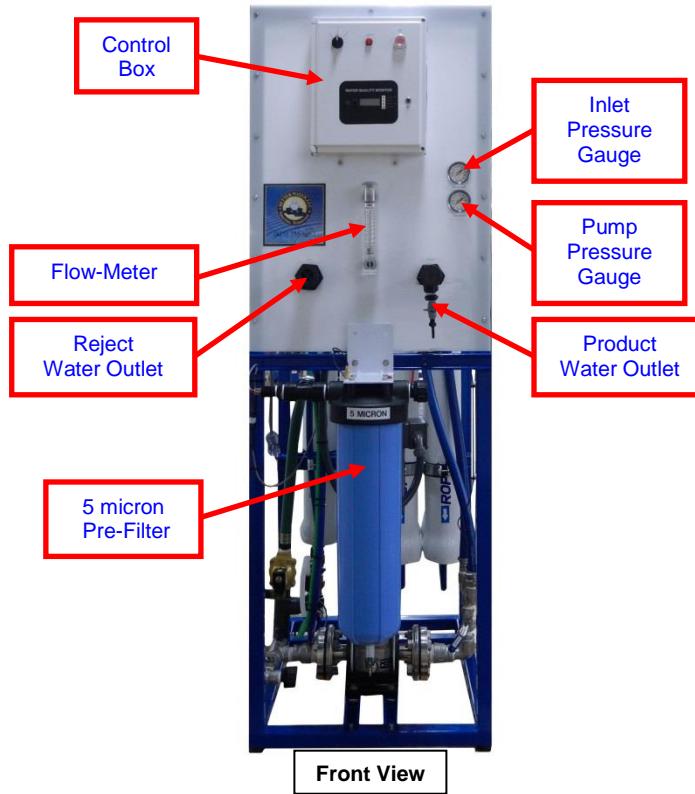
1. The **Control Box** contains the electronic components for operational control, monitoring, and alarms.
2. Mounted on the front of the unit there are **Flow-Meters** and **Gauges** for monitoring operational status.
3. This RO uses semi-permeable **Membranes** to solids, organics, pyrogens, and submicron colloidal matter from the water to produce safe, pure water.
4. There is also a **5 micron Pre-Filter** installed on the water inlet for additional particulate filtration. The 2020 RO is equipped with a 10" filter, and the 2436 RO is equipped with a 20" filter.
5. The **RO Pump** is designed for continuous service which will automatically shut-down in a no-water condition to prevent damage.
6. The **Frame** is constructed of steel, with a baked on powder-coated finish.
7. The RO utilizes a separate **Disinfect Tank** for cleaning and disinfecting procedures.

### REVERSE OSMOSIS PROCESS

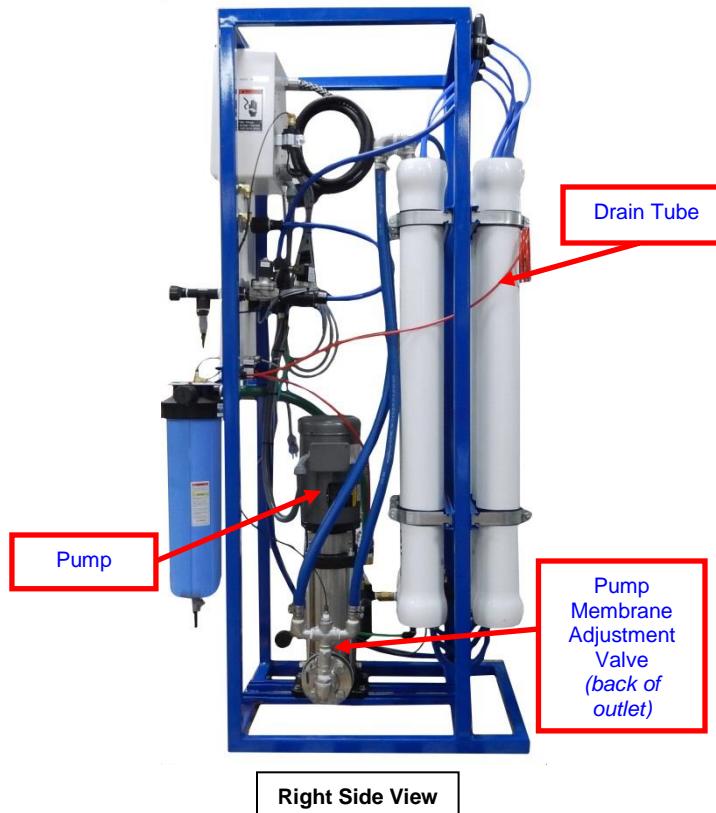
In order to use reverse osmosis as a water purification process, the feed (tap) water is pressurized on one side of a semi permeable membrane. The pressure must be high enough to exceed the osmotic pressure to cause reverse osmotic flow of water. If the membrane is highly permeable to water, but essentially impermeable to dissolved solutes (contaminants), pure water crosses the membrane and is known as **product water**. As product water crosses the membrane, the concentration of dissolved impurities increases in the remaining feed water (a condition known as concentration polarization) and, as a consequence, the osmotic pressure increases. A point is reached at which the applied pressure is no longer able to overcome the osmotic pressure and no further flow of water occurs. Moreover, if the applied pressure is increased in an attempt to gain more product water, a point is reached at which the membrane becomes fouled by precipitated salts and other undissolved material from the water. Therefore, there is a limit to the fraction of feed water which can be recovered as pure water and reverse osmosis units are operated in a configuration where only a portion of the feed water passes through the membrane with the remainder being directed to drain (cross-flow configuration).

The water flowing to drain contains concentrated solutes and other insoluble materials, such as bacteria, endotoxin and particles, and is referred to as the **reject stream**. Typically, the product water to feed water ratio is of the order of 25-50% for purification of water.

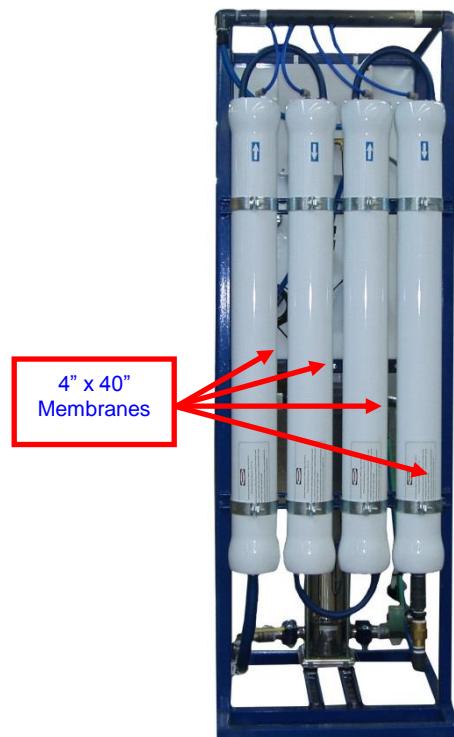
## DETAILED VIEW



Front View



Right Side View



Back View



Left Side View

## MONITOR and CONTROL SYSTEM

The **Control Box** is a water-tight, chemical resistant box, containing the electronic components needed to operate the RO. It includes a multi-position switch, a push-button, alarm light, and conductivity monitor for operational control. It also contains a piezo for audible alarms.



The CRO series RO is equipped with 2 separate modes of operation; **Tank/Stand-By Mode** and **Direct Mode** which is controlled by a switch which is located on the front of the Control Box.

### TANK/STAND-BY MODE

The Tank/Stand-By mode will be used when a reservoir (holding tank) is used. This reservoir is equipped with a float switch that will be connected to the RO via a "pig-tail" quick disconnect cable. There are two float switches located in the side of the reservoir, one near the top, and one in the center which send a signal to the RO to stop when the reservoir is full, and start when the level in the reservoir drops. When the level in the reservoir reaches and activates the float switches, the RO will stop and go into a "Stand-By" mode. If the level in the reservoir stays at this level, the RO will automatically flush for 15 minutes every 2 hours.

When the level drops below and activates the float switch, the RO will delay for 90 seconds and then go into its 30 second purge before starting again. Normally, the RO will be left in this (Tank/Stand-By) mode. This will allow the RO to run and refill the reservoir as needed, and will flush when the reservoir is full.

### DIRECT MODE

When the RO is in Direct Mode, the float switch in the reservoir will be by-passed and the RO will run continuously. It is important to remember that the RO will not automatically turn off when the reservoir is full when in Direct Mode. If your system is equipped with a reservoir, the Direct Mode will be used during the cleaning/disinfecting procedures, but otherwise will not be used.

The **Conductivity Monitor** will monitor the conductivity of the product water and will digitally display this in microsiemens.

## RO UNIT

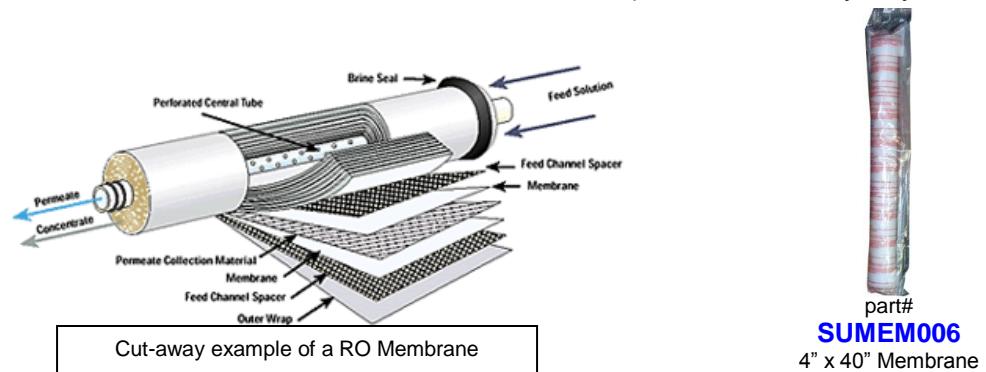
The RO unit is built on a steel, powder-coated frame, and contains a variety of components. The components include the membranes, filters, pump, electrical, and plumbing parts required for the reverse osmosis process as well as distribution.

The **Product Flow-Meter** is located on the front of the RO, and will monitor the flow in gallons per minute of the product water from the RO.

There are two gauges for monitoring RO pressures. The Inlet Feed **Pressure Gauge**, and the **Membrane Pressure Gauge**.

The **Membranes** are at the heart of the reverse osmosis process, and the number in use will vary based on the RO model. These membranes are semi-permeable, allowing water that is being purified to pass through it, while rejecting the contaminants that remain. The reverse osmosis process uses these membranes to separate and remove dissolved solids, organics, pyrogens, and submicron colloidal matter from the water. The process is called "reverse" osmosis since it requires pressure to force water across the membranes, leaving the impurities behind. Reverse osmosis is capable of removing 95% to 99% of the total dissolved solids (TDS), thereby providing safe, and pure water.

The membranes used in the CRO Series Reverse Osmosis Machine are ACM-LP Fully Aromatic Polyamide Low Pressure Advanced Composite membranes that have a permeate flow rated at 2,500 GPD / membrane. (Permeate flow is clean water flux at standard conditions. Not applicable for all feed water conditions. Individual element's permeate flow may vary +/- 15%)



<b>RO SINGLE MEMBRANE SPECIFICATION (equivalent or better)</b>	
Membrane Type	4" x 40" Polyamide
Configuration	Spiral wound
Recommended Applied Pressure	40-300 psi
Max. Applied Pressure	600 psi
Max. Operating Temperature	113° F (45°C)
Feed Water PH Operating Range	2.0 - 11.0 continuous
Optimum PH Range for Optimum % Rejection	5.0 - 8.5
Chlorine Tolerance	<0 .1 ppm
Maximum. Feed Flow	20 gpm
Minimum Brine Flow / Permeate Flow Ratio	5:1
Maximum SDI (15 minutes)	5
Max. Turbidity	< 1 NTU
Average Salt Rejection (%)	98.5 %
Minimum Salt Rejection (%)	97.5%

#### Nominal Rejection Characteristics of Reverse Osmosis Membranes

Ion	% Rejection*	Ion	% Rejection*	Ion	% Rejection*
Sodium	90-95	Lead	94-96	Cadmium	95-97
Calcium	92-95	Chloride	90-95	Silver	90-95
Magnesium	94-97	Bicarbonate	85-95	Mercury	94-96
Potassium	85-95	Nitrate	50-70	Barium	94-96
Iron	92-96	Fluoride	85-90	Chromium	94-96
Manganese	92-96	Silicate	80-90	Bromide	85-90
Aluminum	95-98	Phosphate	95-97	Borate	25-50
Ammonium	85-90	Chromate	80-90	Sulfate	96-98
Copper	96-98	Cyanide	80-90	Arsenic	90-95
Nickel	96-98	Sulfite	94-96	Selenium	90-95
Zinc	96-98	Thiosulfate	94-97	Ferrocyanide	96-98
Strontium	95-97				

A **5 Micron, Pre-Filter** is also used to help reduce contaminants from the feed water to the RO. This filter is located on the front of the RO on the Feed Line. This filter should be changed every 30 days or if the ΔP reaches or exceeds 15 psi, and removed during the disinfect and cleaning procedures. The 2020 RO is equipped with a 10" filter, and the 2436 RO is equipped with a 20" filter.

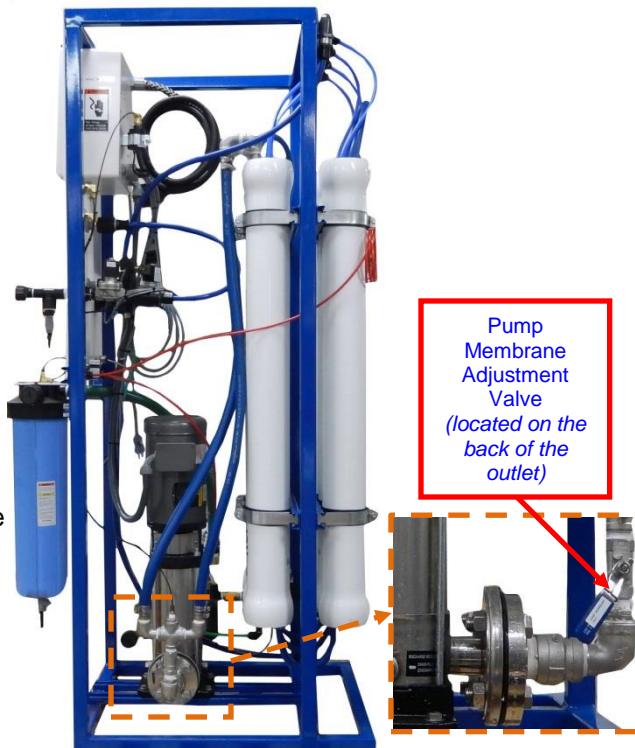


The **RO Pump** is a stainless-steel, multi-stage, centrifugal, air-cooled pump which will automatically shut-off in a no water condition. This is a heavy-duty pump designed for years of service with proper operation. It is a vertical pump, mounted in the center of the RO rack. There are two models of pumps used at this time, based on the electrical phase of the RO.



The CRO Series RO is equipped with an **Interlock System**. This interlock will be connected to the interlock system of any pre-treatment equipment that you may have. When a Carbon Filter goes into its normal backwash, or when a Softener goes into its normal regeneration cycle, the interlock sends a signal to the RO to shut down. Typically there is not enough supply water to allow a good carbon backwash and run the RO at the same time, so this system will stop the RO during this time. This system also protects the RO while the softener is in its regeneration cycle. During this cycle, softeners will draw a brine solution into the softener resin bed for regeneration. If the RO is running at this time, some of the brine solution can be drawn into the RO and have adverse effects on the membrane and the product water quality. In short, the interlock system is in place to protect the RO and help extend the life of the membranes.

The **Pump Membrane Adjustment Valve** is a stainless steel, valve located on the discharge side of the pump. This valve will regulate the pump pressure and membrane pressure. By closing this valve, the Membrane Pressure will drop, and you will see a lower flow rate on the Product Flow Meter. This valve is adjusted by qualified installers at the time of installation. The RO is a finely tuned instrument and is adjusted at the factory to achieve maximum results with the least wear and tear on the system. If you feel that your RO needs to be adjusted, please call and speak to a qualified technician. Adjustments by unqualified persons can result in irreversible damage to the membranes, pump, or other parts of the RO.



## REMOTE ALARM BOX (optional)

The RO Remote Alarm Box is a molded plastic box, usually located in a position where it can be easily seen by personnel during normal work duties. The box is equipped with audible and visual alarms that monitor the RO and Reservoir water level.

The Remote Alarm Monitoring Box requires no external power supply, but receives 24vac power and signals from the RO which it is monitoring. This box has 2 RED lights; one that will illuminate when the RO goes into an alarm condition and one when the water level in the reservoir falls below the low-level sensor. The AMBER light will illuminate when and flash when the RO is in Disinfect Mode.

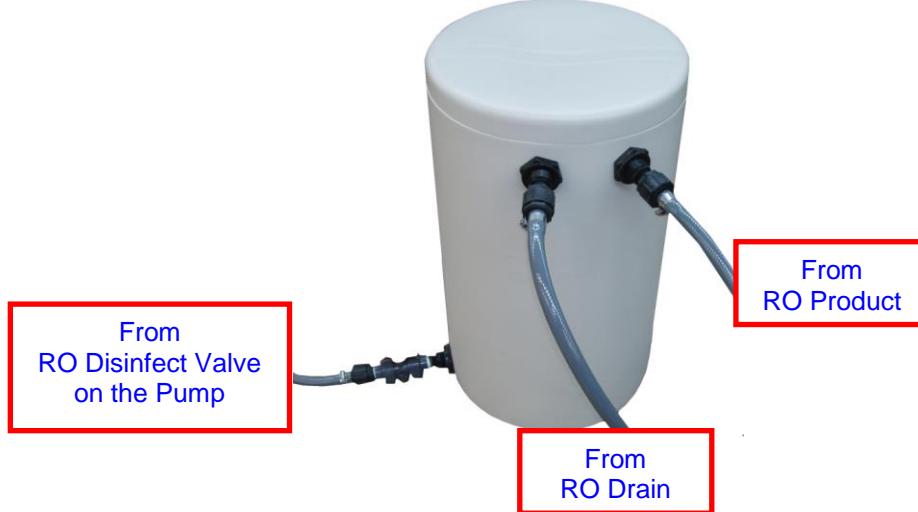


part#

**EQASSYNSMB01601**  
RO Remote Alarm Box

## DISINFECT TANK (optional)

The Disinfect Tank is made of a non-corrosive, molded plastic with a lid, and is used for manual cleaning and disinfecting. The tank is equipped with 2 ports on the top (side) and a single port on the bottom (side), and all the necessary hoses, valves and fittings (*some assembly required*).



part#  
**EQASSYDISTANK**  
Clean/Disinfect Tank

## GENERAL REQUIREMENTS & SPECIFICATIONS

<b>1. Floor Space:</b>	Level floor, minimum 48" x 48". Sufficient space for installation, operation, and service
<b>2. Water Connections:</b>	1" female NPT threaded water connection with an adjacent shut-off valve
<b>3. Drain Requirements:</b>	Sanitary drain capable of discharging 20 gallons per minute or better
<b>4. Electrical Requirements:</b>	
a. 208V – 230V models	3 phase, 30 amp, 60 Hz (3 hots, 1 neutral, 1 ground)
b. 230V models	1 phase, 50 amp, 60 Hz (2 hots, 1 neutral, 1 ground)
<b>5. Operating Weight:</b>	450-600 lbs
<b>6. Loop:</b>	The maximum distribution loop length for direct-feed systems should not exceed 700 feet.
<b>7. Pressure</b>	The importance of monitoring and controlling the feed water cannot be underestimated. Feed water pressure should be a minimum of 20 psi and no greater than 90 psi maximum. The minimum pressure must be maintained with the water flowing at the maximum required flow-rate.
<b>8. Flow Rate</b>	The minimum flow-rate in gallons per minute is based on the incoming pre-treatment equipment.
<b>9. Chlorine / Chloramines</b>	Chlorine is commonly used as a disinfecting agent in municipal water systems. Disinfection by-products can form when disinfectants, such as chlorine, react with naturally present compounds in the water. Chlorine/Chloramines in the feed water must be less than 0.1 ppm.
<b>10. Silt Density Index</b>	Silt Density Index (SDI) is a measure of the amount of suspended solids and colloidal materials in the feed water. High SDI values can lead to membrane fouling. A SDI of less than 3 SDI units is considered acceptable.
<b>11. Turbidity</b>	Turbidity in water is caused by suspended and colloidal matter such as clay, silt, finely divided organic matter, inorganic matter, plankton, and other microscopic organisms. Feed water turbidity must be less than 1 nephelometric turbidity units.
<b>12. Hardness</b>	Hardness is characteristic of feed water due to the presence of dissolved calcium and magnesium. Water hardness is responsible for most scale formation and can form insoluble residue in pipes and other water contact surfaces. Hardness is usually expressed in

grains per gallon, parts per million, or milligrams per liter, all as calcium carbonate equivalent. Hardness level in the feed water must be less than 3 grains per gallon, or 51.3 parts per million.

**13. Temperature**

Feed water temperature must be between 50° F and 92° F. The optimum temperature is 77° F.

## FAMILIARIZATION WITH THE CONTROL BOX

The control box is the user's primary means of controlling and monitoring the RO. The switch, push-button, and indicators are described in detail below to familiarize yourself with these and their interrelation with one another.

### TANK-STANDBY-DIRECT Switch

This is a three position switch which determines the operation mode:

- **TANK**; Sets the RO for TANK-FEED MODE which works with a reservoir.
- **STANDBY**; RO in stand-by mode, but still powered on. Every 8 hours the RO will turn ON, and flush for 15 minutes to drain.
- **DIRECT**; Sets the RO for DIRECT-FEED MODE which feeds the loop directly.



### ALARM RESET Button

Pressing this button will turn all alarm lights off, and silence any audible alarms. This does not correct the problem, but simply temporarily mutes the alarm.

### LOW PRESSURE ALARM Indicator

If lit, this alarm indicates a low-pressure condition (*pressure below 10 psi*), where the water supply to the RO is insufficient for operation.

### WATER QUALITY MONITOR Controls

\* See the Myron L Water Quality Monitor User Manual for details concerning this device. Changes should only be made by trained personnel.

### OPERATE Switch (on-off)

Inside the control box there is a switch which basically turns power OFF to the RO.

- **OFF**; Turns the RO OFF
- **ON**; Turns the RO ON

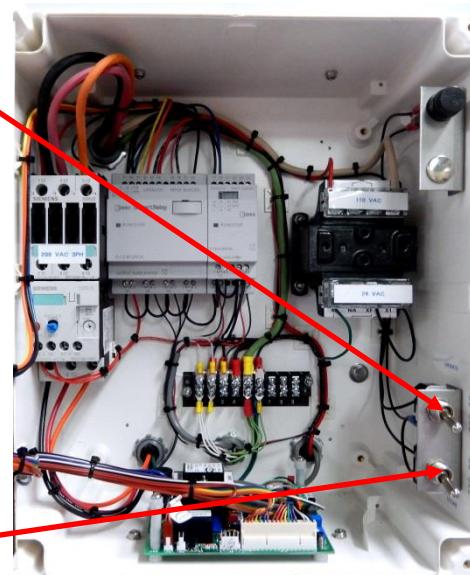
Operate Switch  
(on-off)

### CLEAN Switch (on-off)

Inside the control box there is a switch which places the RO in clean/disinfect mode.

- **OFF**; Turns OFF the clean/disinfect mode.
- **ON**; Places the RO in clean/disinfect mode during these procedures, which will run the pump to drain and bypass the Low-Pressure Alarm.

Clean Switch  
(on-off)



View inside Control Box

## INITIAL START-UP

The following should be done when starting the Commercial RO...

- ... For the first time, *assuming installation is complete*
- ... After a membrane change
- ... After proper storage

### NOTICE

RO's and new membranes are shipped from the factory, packed in a preservative solution. The preservative must be removed by flushing to drain for a minimum of 2 hours, on initial start-up and when the membranes are changed. The 3-way valve at the reservoir must be turned to the drain position to ensure all membrane preservative is rinsed from the system.

1. Open the Control Box and...
  - ...Verify the **CLEAN Switch** is in the **OFF** position
  - ... Turn the **OPERATE Switch** to the **OFF** position
2. Verify that the **TANK-STANDBY-DIRECT Switch** is in the **DIRECT** position.
3. Plug the RO into an appropriate power source.
4. Verify that the 1/8" Red Purge Line is routed to drain.
5. Verify that the Product Hose is routed to drain, to the reservoir, or to the direct feed loop depending upon the setup.
6. Verify that the Drain Hose is routed to drain.
7. Verify that there is a 5 micron filter installed in the Big Blue Filter Housing on the RO.
8. Verify that the water supply is connected to the incoming water connection and the water supply is turned on.
9. Open the Control Box and turn the **OPERATE Switch** to the **ON** position.
  - This will purge water and air through the red purge line for 30 seconds.
  - After 30 seconds, the RO will turn ON and begin producing water.
10. If any alarm lights are lit or audible alarm sounding, then press the **ALARM RESET Button**. All alarm lights should go out and audible alarms should be silenced.
11. Let run for a minimum of 2 hours.
12. Check for alarms:
  - All alarm lights should be OFF and NO audible alarm should be sounding
  - If any alarm lights are ON and/or an audible alarm is sounding, then press the **ALARM RESET Button**. All alarm lights should go out and audible alarms should be silenced.
13. Turn the **TANK-STANDBY-DIRECT Switch** to the **TANK** position.
14. The RO is now ready for normal start-up and daily use.

## DAILY OPERATION

**Before you start using this device**, operators must read and understand this manual in its entirety. This manual of Operator's Instructions describes in considerable detail all of the steps and procedures required to **safely** operate this device. With proper operation, maintenance, and care, this device should give you years of reliable service.

It is **unsafe** to operate this device without a basic understanding of water treatment and a thorough understanding of the contents of this manual. Inadequately treated water could have an adverse effect on your specific application. Education and training of the staff in these facilities is critical given the technically complex subject of water treatment.

Incoming tap water contaminants, temperature, pH, pressure, and flow-rates have a direct impact on the quality and quantity of the RO output. The operator must be aware of changing tap water conditions. This can be easily accomplished with good, two-way communications with the local municipal water supplier and with routine testing of the tap water.

### If the RO has been turned OFF...

1. Verify that the **TANK-STANDBY-DIRECT Switch** is in the **TANK** position.
2. Open the Control Box and turn the **OPERATE Switch** to the **ON** position.
  - This will purge water and air through the red purge line for 30 seconds.
  - After 30 seconds, the RO will turn ON and begin producing water.
3. If any alarm lights are lit or audible alarm sounding, then press the **ALARM RESET Button**. All alarm lights should go out and audible alarms should be silenced.

## END-OF-DAY PROCEDURE (Shut-down)

1. If the **TANK-STANDBY-DIRECT Switch** is not in the **TANK** position, then turn it to that position.
  - When the Tank (reservoir) is full, the RO will go into its STAND-BY Mode, flushing every 8 hours for 15 minutes.
2. If the RO is to be turned OFF rather than left in the **TANK** mode for flushing, then open the Control Box and turn the **OPERATE Switch** to the **OFF** position.

## GENERAL CLEANING and DISINFECTING INFORMATION

To perform at peak efficiency the RO system must periodically be cleaned and disinfected.

The **Cleaning Process** is designed to remove mineral deposits that may build-up on internal surfaces.

The **Disinfecting Process** is designed to significantly reduce bacteria and endotoxins that may build-up in the water and on the internal surfaces in the form of bio-film. The importance of regular and frequent disinfection cannot be minimized due to the risk associated with bacteria proliferation.

### CLEANING and DISINFECTING FREQUENCY

As the manufacturer, Better Water LLC recommends that the RO be...

- ... Disinfected and Cleaned when membrane fouling is indicated
- ... Disinfected monthly
- ... Cleaned quarterly (*Low pH cleaning, High pH cleaning*)

Facilities may require more or less frequent cleaning and disinfecting, which is ultimately the Facility Manager's responsibility to determine and is typically based on water testing and the application.

Membrane fouling should be the primary trigger for performing this procedure indicated by the following signs:

1. The Flow **decreases** or **increases**, and cannot be adjusted to design specifications.
2. The Conductivity Monitor indicates a **continuous decline** in water quality.

Changes in the tap water pH, TDS, temperature, or pressure, can also cause significant changes in the overall performance of the RO.

### OUTSOURCED WATER TESTING

A laboratory should perform chemical and microbial to determine the current compatibility of the system with the feed water and the suitability of the system for providing product water meeting the customer requirements. This should be performed periodically and is ultimately at the discretion of the Facilities Manager.

### WATER SAMPLING

This RO is but a part of a total system designed to create quality water. As such, it is recommended that the water samples be drawn not only from the RO, but also from the other components in order to capture a complete view of the bio-burden impacting the system. Here are a few examples of these other sample points:

- Municipal Feed Water
- Pre-Treatment Water to the RO
- Product Water from the RO prior to cleaning and disinfecting
- Product Water from the RO after cleaning and disinfecting
- Within the Distribution Loop
- From the Reservoir

The user should draw samples from the RO before and after the cleaning and disinfecting procedure in order to measure the effectiveness of the cleaning and disinfecting process. Copies of the test results should be filed and available for review.

### TESTING FREQUENCY

Better Water LLC recommends bacterial testing should be performed periodically on the RO product water by a qualified microbiological laboratory. Testing should be performed if the system

has undergone repair or if the results of the cultures exhibit higher than allowable counts. The feed water should be tested for chlorine and hardness daily.

### RESIDUAL CHEMICAL TESTING

Users should refer to the chemical agent manufacturer to determine the appropriate method for testing for residual chemical substances in the water after cleaning and disinfecting. The water must be clear of detectable levels of cleaning and disinfecting agents prior to use with patients

#### **WARNING**

**Chemical cleaners and disinfectants can cause serious injury or death.**

**Proper protective equipment must be used.**

**The preparation of these chemical solutions must be done in accordance with the specifications established for the particular chemical.**

**These chemical solutions must be handled in accordance with their Material Safety Data Sheet (MSDS).**

**These procedures should be performed by trained and qualified technicians.**

#### **WARNING**

**Do not disinfect or clean the RO system or distribution loop while product water is being used for the purpose intended.**

### GENERAL INFORMATION

The cleaning process for the Commercial RO is designed to remove calcium and other mineral deposits or scale by using a 1% to 5% acidic solution. The RO was built with components that will tolerate Peracetic acid type disinfectants.

#### **CAUTION**

**The membranes will not tolerate sodium hypochlorite (bleach).**

Facilities that have more than one distribution loop may have to clean, disinfect, and rinse each loop separately.

The unit must be thoroughly rinsed prior to initiating a cleaning/disinfecting cycle.

#### **CAUTION**

**It is recommended that you routinely disinfect the membranes every 30 days with an approved disinfectant that will not degrade the membranes or the components of the RO.**

## CLEANING and DISINFECTING PROCEDURE

### **WARNING**

Chemical cleaners and disinfectants can cause serious injury or death.

Proper protective equipment must be used.

The preparation of these chemical solutions must be done in accordance with the specifications established for the particular chemical.

These chemical solutions must be handled in accordance with their Material Safety Data Sheet (MSDS).

These procedures should be performed by trained and qualified technicians.

### **WARNING**

Do not disinfect or clean the RO system or distribution loop while product water is being used for the purpose intended.

## REQUIRED MATERIALS

Part#	Description	Notes/Usage
EQASSYDISTANK	Clean/Disinfect Tank	- Used to mix water and chemicals for the cleaning and disinfecting procedure.
SUMCOO00572	 <b>BW-1000, Acid Cleaner, low pH</b> <b>For CLEANING - scale removal</b>	<ul style="list-style-type: none"> <li>- Replaces MinnClean AC</li> <li>- <b>Application:</b> For removing mineral scale in membrane applications.</li> <li>- Acid Cleaner 1000 must be used before Alkaline Cleaner 2000, MemStore, or MinnCare.</li> <li>- It can be used on brass.</li> <li>- Measure 14" inside the disinfect tank with a tape measure = 15 gallons.</li> <li>- <b>Dilution:</b> 1 lb (454 grams) of Acid Cleaner 1000 to 15 gallons of RO water.</li> <li>- <b>Duration:</b> Circulate for 15 minutes and then flush completely.</li> </ul>
SUMCOO00571	 <b>BW-2000, Alkaline Cleaner, high pH</b> <b>For CLEANING - organic removal</b>	<ul style="list-style-type: none"> <li>- Replaces MinnClean TF</li> <li>- <b>Application:</b> For removing grime, grease, oil, and biological matter on thin film composite membranes. Mineral deposits can inhibit the Alkaline Cleaner, so the Acid Cleaner 1000 should be used first to remove these deposits.</li> <li>- It can be used on brass.</li> <li>- Measure 14" inside the disinfect tank with a tape measure = 15 gallons.</li> <li>- <b>Dilution:</b> 1 lb (454 grams) of Alkaline Cleaner 2000 to 15 gallons of water.</li> <li>- <b>Duration:</b> Circulate 15 minutes and then flush completely.</li> </ul>

<b>SUMCOO00575</b> 	<b>MinnCare Cold Sterilant</b> <b>For DISINFECTING</b>	<ul style="list-style-type: none"> <li>- Application: MinnCare Cold Sterilant is an oxidant that stops organism growth by oxidizing microbial cell proteins and enzyme systems, and effectively removes biofilm.</li> <li>- It can be used on units with stainless steel fittings only.</li> <li>- Measure 18" inside the disinfect tank with a tape measure = 20 gallons.</li> <li>- Dilution: 750 cc of MinnCare Cold Sterilant to 20 gallons of water. Use MinnCare 1% Test Strips to ensure proper solution concentration.</li> <li>- Duration: Circulate 15 minutes then test with MinnCare 1% Test Strips to ensure proper solution concentration. Allow to dwell for 2 hours (minimum), up to 4 hours (recommended), then flush completely. Use MinnCare Residual Test Strips during rinsing to ensure complete removal of Sterilant from the system.</li> </ul>
<b>SUMCOO00577</b> 	<b>MinnCare 1% Test Strips</b> <b>For DISINFECTING</b>	<ul style="list-style-type: none"> <li>- Used to verify the proper dilution of the Sterilant solution.</li> <li>- Follow manufacturer's instructions for proper use.</li> </ul>
<b>SUMCOO00576</b> 	<b>MinnCare Residual Test Strips</b> <b>For DISINFECTING</b>	<ul style="list-style-type: none"> <li>- Used to verify no residual Sterilant is present after flushing and rinsing.</li> <li>- Follow manufacturer's instructions for proper use.</li> </ul>

## SUMMARY of CLEANING and DISINFECTION

- If **DISINFECTION**... use **MinnCare Cold Sterilant**
- If **CLEANING**... use **BWI-1000 Acid Cleaner (low pH) and BWI-2000 Alkaline Cleaner (high pH)**

### NOTICE

Better Water LLC does not recommend hydrochloric acid based products to clean the membranes, as these could potentially reduce the lifespan of the membrane, and are not compatible with stainless-steel components.

## PROCEDURE

The following procedure is basically the same for both Cleaning and Disinfecting, with the exception being the chemical used, amount of water required, dwell times, and verification of rinse methods.

### PREPARATION

1. Turn the **TANK-STANDBY-DIRECT Switch** to the **STANDBY** position.
2. Disconnect the RO's Product Hose from the end opposite the RO, and hold over the Disinfect Tank.
3. Turn the **TANK-STANDBY-DIRECT Switch** to the **DIRECT** position, and rinse the Disinfect Tank with RO water, then allow it to thoroughly drain.

- Turn the **TANK-STANDBY-DIRECT Switch** to the **STANDBY** position.
- Close the Disinfect Tank's Drain Valve when complete.

4. Position the Disinfect Tank in position in front of the RO.

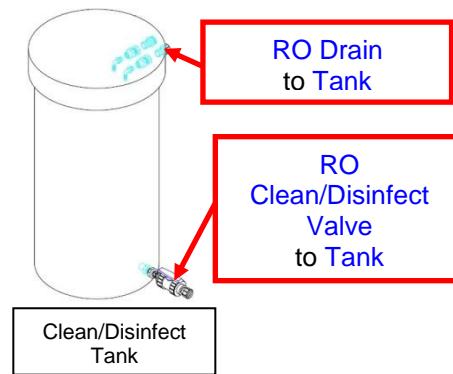
5. Fill the Disinfect Tank with RO water...

- Hold the RO's Product Hose over the Disinfect Tank
- Turn the **TANK-STANDBY-DIRECT Switch** to the **DIRECT** position and fill to desired level according to the disinfect/cleaner manufacturer's recommendations.
- Turn the **TANK-STANDBY-DIRECT Switch** to the **STANDBY** position to stop filling

6. Turn the RO's Water Inlet Valve OFF, which will turn the water supply OFF to the RO.

7. Attach hoses...

- Disconnect the Drain Hose that connects the RO and the Drain from the drain end and connect it to one of the connections on top of the Disinfect Tank.
- Attach a Hose from the Disinfect Tank's Drain Valve to the RO's Clean/Disinfect Valve.
- **NOTE:** *The Product Hose does not need to be connected to the Disinfect Tank since all product water will be diverted through the Drain Hose during these procedures.*



8. Open the Disinfect Tank's Drain Valve and loosen the fitting connecting the Hose to the RO's Clean/Disinfect Valve to allow air to vent until water begins flowing from the fitting, then retighten the fitting.

9. Open the RO's Clean/Disinfect Valve.

10. Open the Control Box and turn the **CLEAN Switch** to the **ON** position.

- Press the **ALARM RESET Button** if any alarm sounds.
- The RO will turn on and begin recirculating water from the Disinfect Tank through the RO and back to the Disinfect Tank.
- **IMPORTANT:** *Do not attempt to operate the RO in clean mode without water being supplied to the inlet of the pump. When the RO is in clean mode the low inlet pressure shutoff is overridden and the pump will be damaged if ran dry without water.*

10. Once the water is recirculating through the RO and Disinfect Tank, proceed with either the Cleaning or Disinfecting sections below.

#### **IF CLEANING...**

1. Add 1 lb or 454 grams of either Low pH or High pH Cleaner to the Disinfect Tank.

- **Follow the disinfect/cleaner manufacturer's recommendations.**
- There is no dwell time for cleaners.

2. During circulation the operator should verify the pH of the cleaner used by water flowing back into the Disinfect Tank.

- For Low pH Cleaner the pH should read less than 3 pH units.
- For High pH Cleaners the pH should read greater than 9 pH units.

3. Allow recirculation to continue for 15 minutes, turn the **CLEAN Switch** to the **OFF** position.

- The Low Pressure Alarm will alert, so press the **ALARM RESET Button**.

4. After 15 minutes begin rinse procedure...
  - Close the RO's Clean/Disinfect Valve
  - Disconnect the RO Drain Hose from the Disinfect Tank and run to drain.
  - Turn the RO's Water Inlet Valve ON, which will turn the water supply ON to the RO.
5. Turn the **CLEAN Switch** to the **ON** position.
  - The RO will start-up and send all water to drain.
6. Continue the rinse to drain procedure until the pH of the water going to drain has reached the baseline pH that was observed prior to cleaning.

**WARNING**

**It is critically important that no residual chemicals are present before proceeding.**

7. Turn the **CLEAN Switch** to the **OFF** position.

**WARNING**

**When performing the following instructions, the lines from the Clean/Disinfect Tank to the RO will contain chemical solution. When each line is disconnected, the solution will drain from the line. Use either a disposable container to collect the solution as it drains, or hold the end of each line in an elevated position which will cause the solution to drain to the Disinfect Tank.**

**Take appropriate safety measures to avoid injury from splash and spills.**

8. Disconnect the Hoses...
  - Disconnect the Hose between the Disinfect Tank's Drain Valve and the RO's Clean/Disinfect Valve
  - Disconnect the Drain Hose from the Disinfect Tank and run to Drain
9. Drain and rinse the Disinfect Tank...
  - Open the Disinfect Tank's Drain Valve and allow to drain
  - Hold the RO's Product Hose over the Disinfect Tank
  - Turn the **TANK-STANDBY-DIRECT Switch** to the **DIRECT** position and rinse thoroughly
  - Allow Disinfect Tank to drain completely then close its Drain Valve
10. Reconnect the loose end of the RO's Product Hose to loop or reservoir.
11. Turn the **TANK-STANDBY-DIRECT Switch** to the **TANK** position.
  - The RO will start-up, and once the product water quality is below the set-point, the RO will begin supplying water to the loop or reservoir.

**IF DISINFECTION...**

1. Add 750 mls of Disinfectant to the Disinfect Tank.
  - **Follow the disinfect/cleaner manufacturer's recommendations.**
2. Allow to recirculate for 15 minutes
3. During this recirculation, a 1% Peracetic Acid Test Strip should be used to verify that the disinfectant is returning back to the Disinfect Tank at the desired dilution strength.
4. After recirculating for 15 minutes, turn the **CLEAN Switch** to the **OFF** position.
  - The Low Pressure Alarm will alert, so press the **ALARM RESET Button**.

5. Allow the disinfectant solution to dwell for 2 hours.
6. After 2 hours dwell time begin rinse procedure...
  - Close the RO's Clean/Disinfect Valve
  - Disconnect the RO Drain Hose from the Disinfect Tank and run to drain.
  - Turn the RO's Water Inlet Valve ON, which will turn the water supply ON to the RO.
7. Turn the **CLEAN Switch** to the **ON** position.
  - The RO will start-up and send all water to drain.
8. Continue the rinse to drain procedure until the disinfectant has been completely rinsed from the RO.
  - To verify this, a residual Peracetic Acid Test Strip should be used. If the test strip shows a positive reading for disinfectant, then continue rinsing to drain until a negative reading is obtained.
9. Once a negative reading is obtained on the test strip, turn the RO **CLEAN Switch** to the **OFF** position for a 15 minute Rebound Break.
  - Residual disinfectant can still be present in the membranes, even if a negative reading was obtained on the test strip after rinsing.
10. After the 15 minute Rebound Break, turn the RO **CLEAN Switch** to the **ON** position and recheck for residual disinfectant using a test strip.
  - Continue rinsing until a negative reading is obtained.

**WARNING**

**It is critically important that no residual chemicals are present before proceeding.**

11. Turn the **CLEAN Switch** to the **OFF** position.

**WARNING**

**When performing the following instructions, the lines from the Clean/Disinfect Tank to the RO will contain chemical solution. When each line is disconnected, the solution will drain from the line. Use either a disposable container to collect the solution as it drains, or hold the end of each line in an elevated position which will cause the solution to drain to the Disinfect Tank.**

**Take appropriate safety measures to avoid injury from splash and spills.**

12. Disconnect the Hoses...
  - Disconnect the Hose between the Disinfect Tank's Drain Valve and the RO's Clean/Disinfect Valve
  - Disconnect the Drain Hose from the Disinfect Tank and run to Drain
13. Drain and rinse the Disinfect Tank...
  - Open the Disinfect Tank's Drain Valve and allow to drain
  - Hold the RO's Product Hose over the Disinfect Tank
  - Turn the **TANK-STANDBY-DIRECT Switch** to the **DIRECT** position and rinse thoroughly
  - Allow Disinfect Tank to drain completely then close its Drain Valve
14. Reconnect the loose end of the RO's Product Hose to loop or reservoir.
15. Turn the **TANK-STANDBY-DIRECT Switch** to the **TANK** position.
  - The RO will start-up, and once the product water quality is below the set-point, the RO will begin supplying water to the loop or reservoir.

## USER ADJUSTMENTS

On occasion, the RO may require adjustments that can be performed by **qualified operators**. There are many factors that can affect the performance of the RO. If minor adjustments to the RO do not produce the desired results, investigate changes in the tap water feeding the RO.

Tap water pH, temperature, pressure, TDS, and flow changes can cause a reduction in the RO performance. **In worst case situations**, changes to the tap water can create conditions the RO cannot handle without supplemental water treatment.

### CAUTION

**Only qualified RO operators should make adjustments to the unit.**

**Before making any adjustments, read this entire section and pay close attention to cautions, notes, and items marked important.**

**While making adjustments, the RO must be running with no alarm conditions indicated.**

**The inlet water temperature must be 70-92°F with 77°F being optimum. The temperature must be measured while the RO is in normal operation. The RO inlet water pressure must be >40 psi while flowing at the rate specified for this unit. See Unit Specification Sheet.**

## USER ADJUSTMENTS: PUMP MEMBRANE ADJUSTMENT VALVE

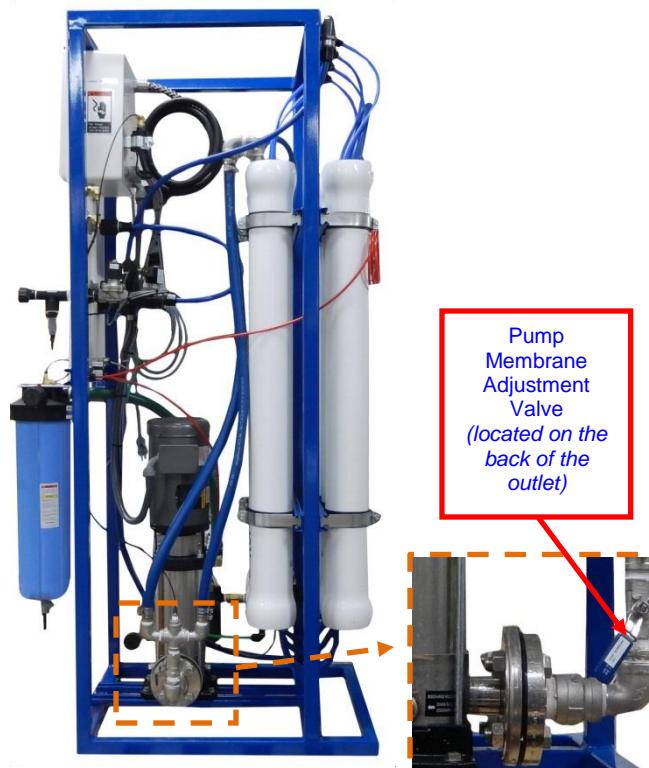
The **Pump Membrane Adjustment Valve** is a stainless steel, valve located on the discharge side of the pump. This valve will regulate the pump pressure and membrane pressure.

Depending on the type of adjustment either...

... Close this valve in small increments, for the Membrane Pressure to drop, for a lower flow rate on the Flow Meter.

- OR -

... Open this valve in small increments, for the Membrane Pressure to increase, for a higher flow rate on the Flow Meter.

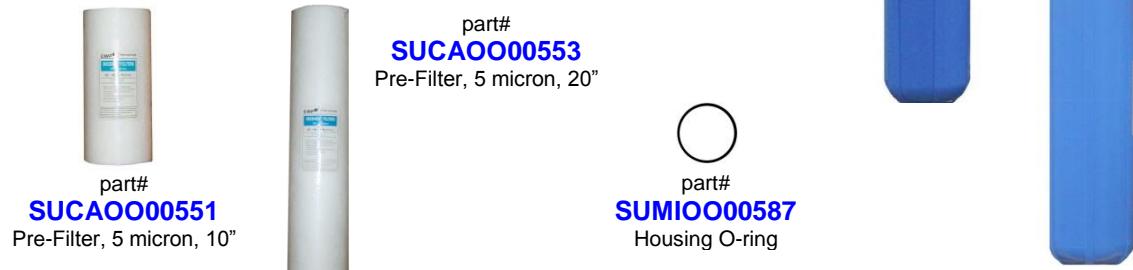


## SYSTEM MAINTENANCE, General

Maintenance Task	Frequency (more often if needed)	Notes
Check the system for leaks	Daily	Visual Inspection
Monitor the system for unusual sounds	Daily	Auditory Inspection
Clean external surfaces	Weekly	Use a soft, damp towel or sponge. <b>(DO NOT USE BLEACH)</b>
Change 5 Micron Pre-Filter	Every 30 days or when the ΔP reaches or exceeds 15 psi	See the Change 5 micron, Pre-Filter section
Disinfect the Membranes	Every 30 days	See Cleaning & Disinfecting Procedure section
Calibrate Conductivity Sensor and Board	Annually	See Water Quality Conductivity Board Calibration section
Change Membranes	Every 3 – 5 years, or when low flow rates are experienced, or percent rejection drops below operational parameters	See Change Membranes section
Perform Chemical, Microbial, and Endotoxin Testing on feed and product water as per AAMI requirements	Periodically	Submit samples to a qualified testing laboratory
Feed water tests for chlorine and hardness	Daily	

## SYSTEM MAINTENANCE, Change 5 micron, Pre-Filter

Better Water LLC, recommends that the 5 micron filter be changed monthly or when the  $\Delta P$  reaches or exceeds 15 psi. The housing O-Ring should be examined and replaced if necessary.



1. Start with all valves, sample ports, and drain ports closed, and the RO OFF.
2. Close the valve from the Pre-Treatment to the RO Pre-Filter to stop water flow to the RO.
3. Either place a bucket under the Pre-Filter Housing Lab-Cock or attach a drain-tube from the Hose Barb on the Lab-Cock on the Pre-Filter Housing to a container or drain.
4. Slowly open the Lab-Cock to allow water to begin to drain from the filter housing.
5. Using a filter wrench, loosen the filter housing just enough to allow air to enter the housing which will result in a greater flow of water draining from the housing.
6. Allow all the water to drain from the housing.
7. Unscrew the filter housing to remove it.
8. Remove the old filter and replace with a new filter.
9. Carefully re-seat the filter housing to the mount, and screw in to tighten, making sure the O-Ring is properly seated.  
- Use the filter wrench to tighten, but do not over tighten.
10. Close the Lab-Cock on the bottom of the Pre-Filter Housing.
11. Slowly open the valve from the Pre-Treatment to the RO Pre-Filter to allow water flow to the RO.
12. Slowly open the Lab-Cock for several seconds to verify water is flowing into the housing and purge some of the trapped air.
13. Close the Lab-Cock and check for leaks, tightening the housing with the wrench if necessary.
14. Remove the bucket from under the housing or the drain-tube from the Lab-Cock.
15. Turn the 3-Way Valve on the Reservoir to DRAIN.
16. Start the RO and allow to run for a few minutes to verify water flow and check for leaks around the Pre-Filter Housing, then turn the RO OFF.
17. If no leaks, return the RO to normal operation.

## SYSTEM MAINTENANCE, Change Membranes and O-Rings

Better Water LLC, recommends that the membranes be changed if low flow rates or percent of rejection fall below operational parameters after cleaning.

The life of an RO membrane is dependent on many factors such as feed water quality, properly operating pre-treatment and routine maintenance such as membrane cleanings and disinfections.

Normally, you can expect the membranes to last from 3-5 years or more. Eventually, you will need to replace membranes and the following should be used as a guide for this procedure.

### **CAUTION**

Failure to follow these instructions can result in voiding the membrane warranty.

### **NOTE**

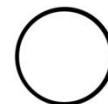
It is recommended that the O-Rings be replaced when the membranes are replaced, and that medical grade glycerin be used as a lubricate because of its water-solubility.



part#  
**SUMEM006**  
4" x 40" Membrane



part#  
**EQFHOO00911**  
Inner End-Cap O-ring



part#  
**EQFHOO01587**  
Outer End-Cap O-ring

### **WARNING**

Membranes are packed in a chemical preservative which must be handled in accordance with their Material Safety Data Sheet (MSDS) available on our website.

Proper protective equipment must be used.

These procedures should be performed by trained and qualified technicians.

### **PREPARATION**

1. Make sure that there are no requirements for RO water.
2. Turn the RO OFF and unplug or disconnect from the main power source.
3. Turn OFF the **RO Inlet Valve from the Pre-treatment**.
4. Depress the red pressure relief button on the Big Blue Pre-Filter to the RO to relieve the pressure.

## UNPACK MEMBRANES

- Open and unpack the membranes from their shipping cartons.

### 6. Verify Correct Membranes

- Before opening the boxes of the new membranes, verify that they are the correct membranes for your RO.
- **If they are not the correct membranes, DO NOT ATTEMPT to install them.**
- A "RO MEMBRANE" label should be adhered to the box. This label will have a received date. Membrane is good for one year from this date.
- Each membrane is also labeled with an individual serial number which should be recorded and also noted in which membrane housing the specific membrane will be installed.

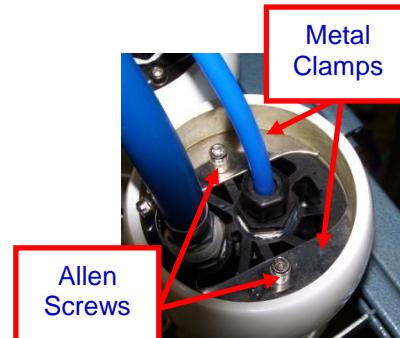
### 7. Open and Unpack the New Membrane

- Open the membrane box.
- If the membrane was ordered with adapters which are required for older model housings, these adapters will be in one end of the box, so don't discard the box without retrieving these.
- Remove the bagged membrane from the box discarding the packing material.
- Do not open the bag containing the membrane

## REPLACE MEMBRANES

### 8. Remove the end-cap clamps

- On the top of the membrane housing, locate the 2 metal clamps that secure the membrane end cap.
- Loosen and/or remove the Allen Screws securing the end cap. There are 2 clamps and Allen screws on each end cap.
- After removing the Allen Screws (or loosening them enough for the clamps to be removed, slide the clamps toward the center of the membrane housing until they are released from the groove in the membrane housing.



### 9. Remove the Compression nut and Blue Tubing.

- Locate and loosen the compression nut on the top of the end cap that secures the blue tubing.
- It is only necessary to remove the outermost nut, and this should only be hand tight.
- It is NOT necessary to remove the entire compression fitting from the end cap.
- Remove the Compression nut, leaving it attached to the blue tubing.
- Move this tubing out of the way.



### 10. Remove the End Cap

- With the metal clamps and smaller blue tubing removed, grasp the larger blue hose and firmly wiggle the hose and end cap back and forth while pulling up to remove the end cap from the housing.
- Move the end cap (*still attached to the blue hose*) out of the way.



- **NOTE:** If the end cap is too tight and will not move, refer to **Alternate Membrane End Cap Removal Procedure**, detailed below.

### 11. Remove the Old Membrane

- Reach into the membrane housing and grasp the membrane by the membrane adapter and gently pull the membrane out of the housing and discard.
- It may be necessary to grasp the membrane adapter or one of the "spokes" with a pair of needle nose pliers to pull it out.



### 12. Install the New Membrane

**- CAUTION: As stated before, the new membrane is packed in a liquid preservative, so take caution in handling to prevent slippage and exposure to prevent injury.**

- This preservative can be drained from the packaging into a suitable container and transferred to a drain, or...
  - This preservative can be poured into the membrane housing as the membrane is being installed.
  - **Install new spacer adapters into each end of the membrane if required, based on the membrane housing.**
  - Hold the membrane, *still in the foil bag*, upright above the membrane housing, with the open end of the foil bag down.
- MEMBRANES HAVE A SPECIFIC DIRECTION OF FLOW, SO INSTALL ACCORDINGLY.**
- **Slowly and gently** allow the membrane to slide through the foil bag and into the membrane housing.
  - **CAUTION: DO NOT allow the membrane to quickly drop into the membrane housing, as this can cause damage to the membrane adapter.**



### 13. Lubricate the End Cap

- Apply lubricant to the outer O-Rings of the end cap.
- Glycerin is recommended, KY Jelly can also be used
- **DO NOT USE VASELINE, PLUMBER'S GREASE OR SILICONE GREASE.**



### 14. Re-Install the End Cap

- Line up the end cap so the membrane adapter fits into the center hole in the end cap.
- Push end cap down until it seats securely and the groove in the membrane housing is visible.



**15. Re-Install the End Cap Clamps**

- Lay the metal clamps in place and slide them toward the outside until they seat in the grooves in the membrane housing.
- Line up the metal clamps so the Allen screws will line up with the brass threaded part in the end cap.
- Tighten the Allen screws securing both metal clamps.

**16. Re-Install the blue tubing and the compression nut**

- Insert the blue tubing into the compression socket and tighten the compression nut.
- Only tighten the compression nut **HAND TIGHTEN - DO NOT USE A WRENCH**, making sure not to cross thread.

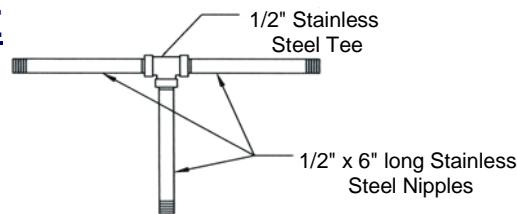
**17. Repeat the preceding steps for each membrane to be replaced.****AFTER REPLACEMENT**

- 18.** After installation of all membranes, the RO should be started and the Product Water flushed to drain for a **minimum of 2 hours**.

## ALTERNATE MEMBRANE END-CAP REMOVAL PROCEDURE, USING "TEE-HANDLE TOOL"

### NOTE

**It is recommended that a "Tee-Handle Removal Tool" be fabricated to facilitate membrane removal.**



After the RO has been in use for several years, you may find it difficult to remove the end cap by just pulling on the blue hose in which case follow the following steps:

1. After removing the metal clamps and the compression nut securing the blue tubing, remove the compression fitting that is threaded into the end cap by using a socket wrench.



2. Remove any excess Teflon tape from the socket that may have been left.



3. Insert a "Tee Handled Removal Tool" into the end cap, where the compression fitting was.

- CAUTION: DO NOT OVERTIGHTEN the stainless steel nipple, as this can crack or split the end cap.
- Only thread the nipple in a few turns or until it is snug.



4. Grasp the Tool and move it back and forth while pulling upward to break the end cap loose and remove it.



5. Clean any old Teflon tape and/or pipe dope from the compression fitting that was removed.

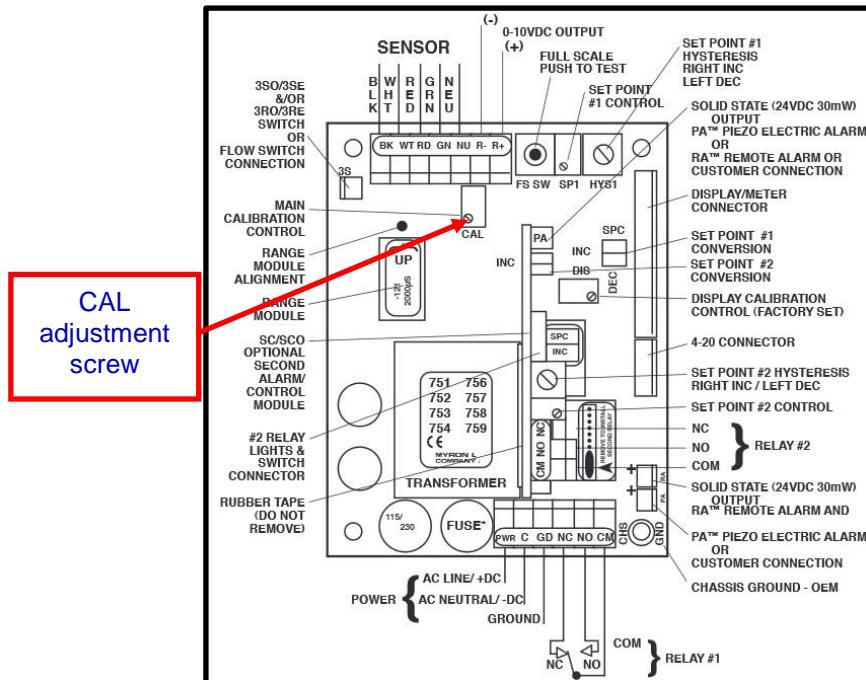
- Wrap only 3-4 wraps of new Teflon tape on the threads of the compression fitting.
- Apply a very small amount of Teflon pipe dope to the threads/tape.
- Re-install compression fitting in the end cap, being extremely careful not to over-tighten as this can crack or split the end cap.

## SYSTEM MAINTENANCE, Conductivity Board Calibration

It is recommended that the Conductivity board be calibrated annually.

The best method of verifying and recalibrating the Conductivity Monitor is with NIST traceable Standard Solution.

1. Using a standard solution which is 60-90% of full scale of the instrument, rinse thoroughly and fill a clean glass beaker with the standard solution.
2. Remove the front cover for the Conductivity Monitor.
3. Place sensor in the beaker of the standard solution. The level of standard solution must be high enough to cover at least 1/2" above cross hole.
4. Slowly shake the sensor to remove air bubbles from the inside of the sensor bore hold.
5. Allow 5-10 minutes for temperature to equilibrate. For the quickest and the best results, both the sensor and solution should be at the same temperature.
6. Turn power ON.
7. If the reading is different from the standard solution, adjust **Main CALibration Control** on the main circuit board, until the reading on the display matches the solution value. Adjust by turning the CAL screw with a small screwdriver, either left or right to get the desired reading.
8. After adjusting, turn the power OFF.
9. Re-install the front panel.
10. To operate, turn the power ON.



## LONG TERM STORAGE: PRESERVE and PACK

During the operation of a RO, organic materials that may be present in the feed water can accumulate on the RO membrane surfaces. The presence of organics also provides an environment conducive to microbiological activity, which over time can lead to microbiological growth. If left unchecked, these organisms can grow to a level that will foul the membrane and thereby make it unusable.

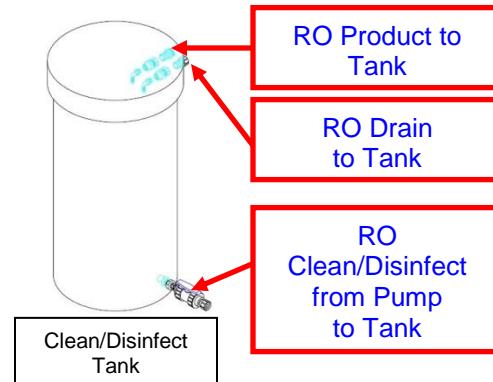
If the facility will not be using the RO for a temporary period of greater than 7 days, it should be Preserved and Packed for storage, which is good for up to 6 months.

### REQUIRED MATERIALS

Part#	Description	Notes/Usage
SUMCOO00574 	BWI-3000, MemStore <b>Preservative</b>	<ul style="list-style-type: none"> <li>- Replaces MinnClean MP</li> <li>- <b>Application:</b> To prevent microbial growth in the RO and Membranes during storage.</li> <li>- It can be used on brass.</li> <li>- <b>Dilution:</b> 2.5 lbs (40 oz, 1130 gr) of BWI-3000 to 15 gallons of water.</li> <li>- <b>Duration:</b> Circulate 15 minutes and then flush completely.</li> </ul>

### PROCEDURE

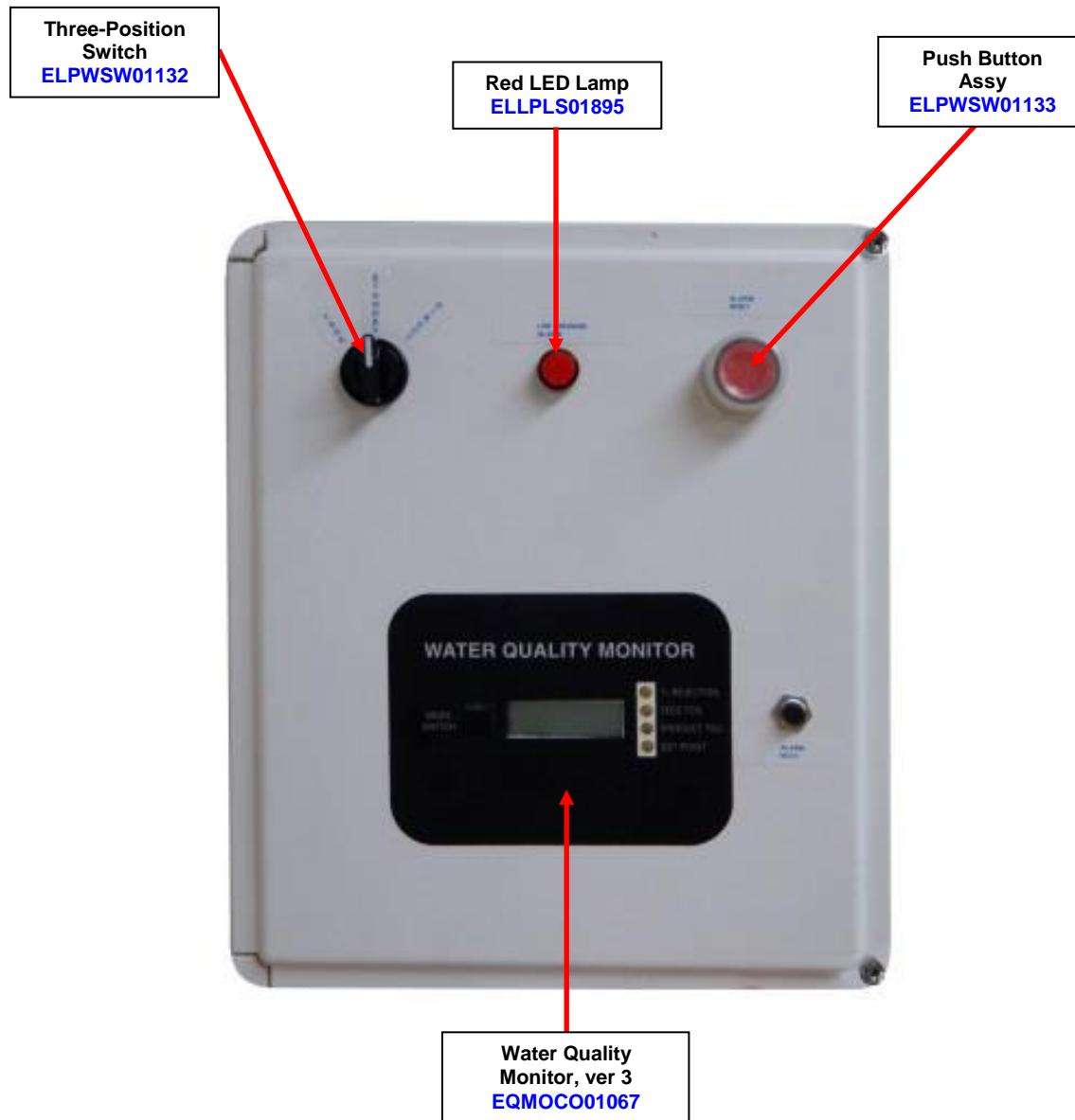
1. Perform a full disinfection procedure per previously detailed procedures.
2. Open the Control Box and turn the **OPERATE Switch** to the **OFF** position.
3. Fill the Clean/Disinfect Tank with 15 gallons of water and the appropriate amount of preservative chemical.
4. Connect hoses for procedure...
  - Locate the hose connecting the RO Product to the Reservoir or Loop.
  - Disconnect the hose from the Reservoir or Loop end and connect to one of the two connections on the top of the Clean/Disinfect Tank.
  - Locate the hose from the RO to the Drain. Disconnect the hose from the Drain end and connect to the other connection on the top of the Clean/Disinfect Tank.
  - Connect hose from the **RO Inlet Feed on the 5 micron Filter** to the connection on the bottom of the Clean/Disinfect Tank.

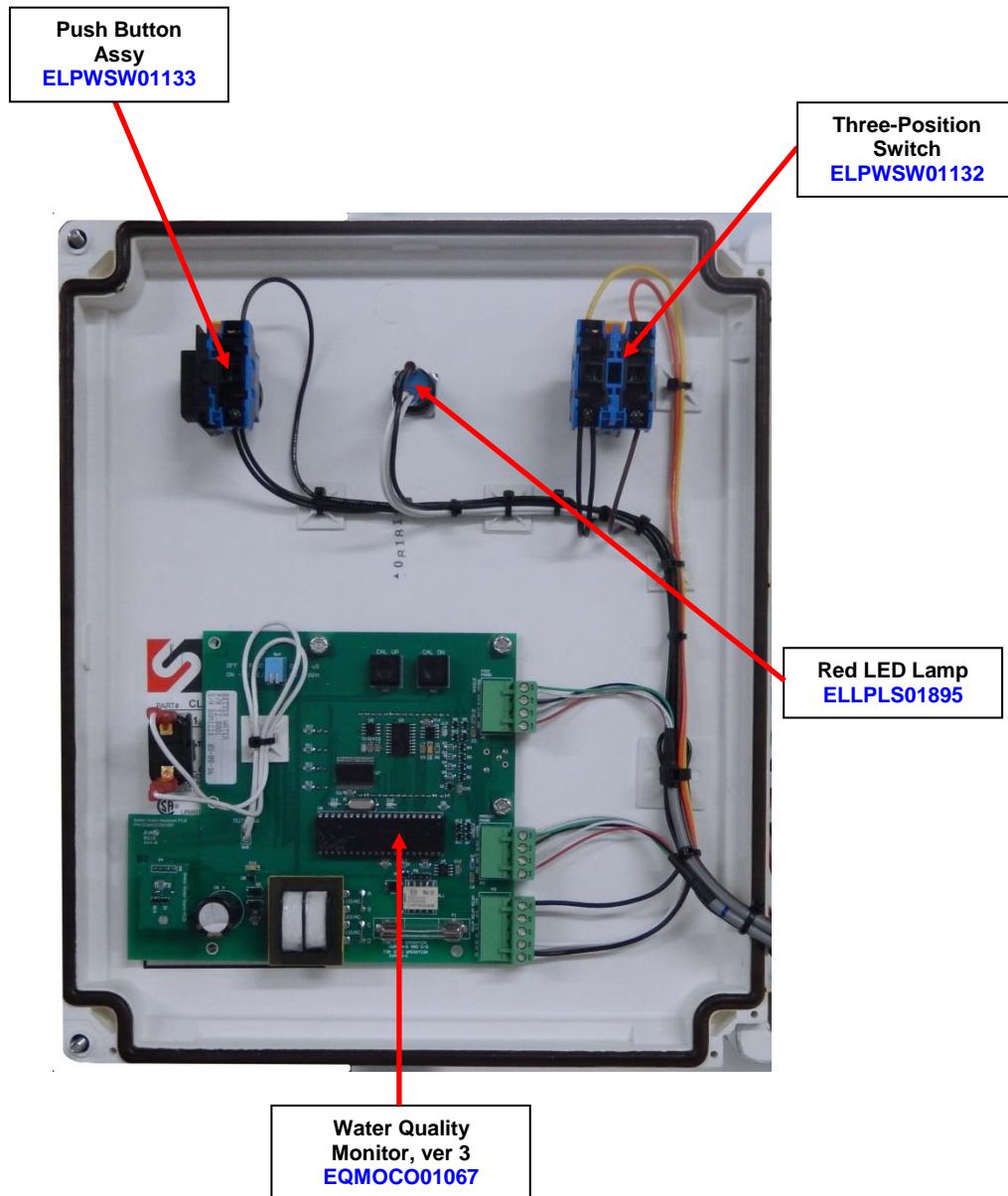


### START PROCEDURE

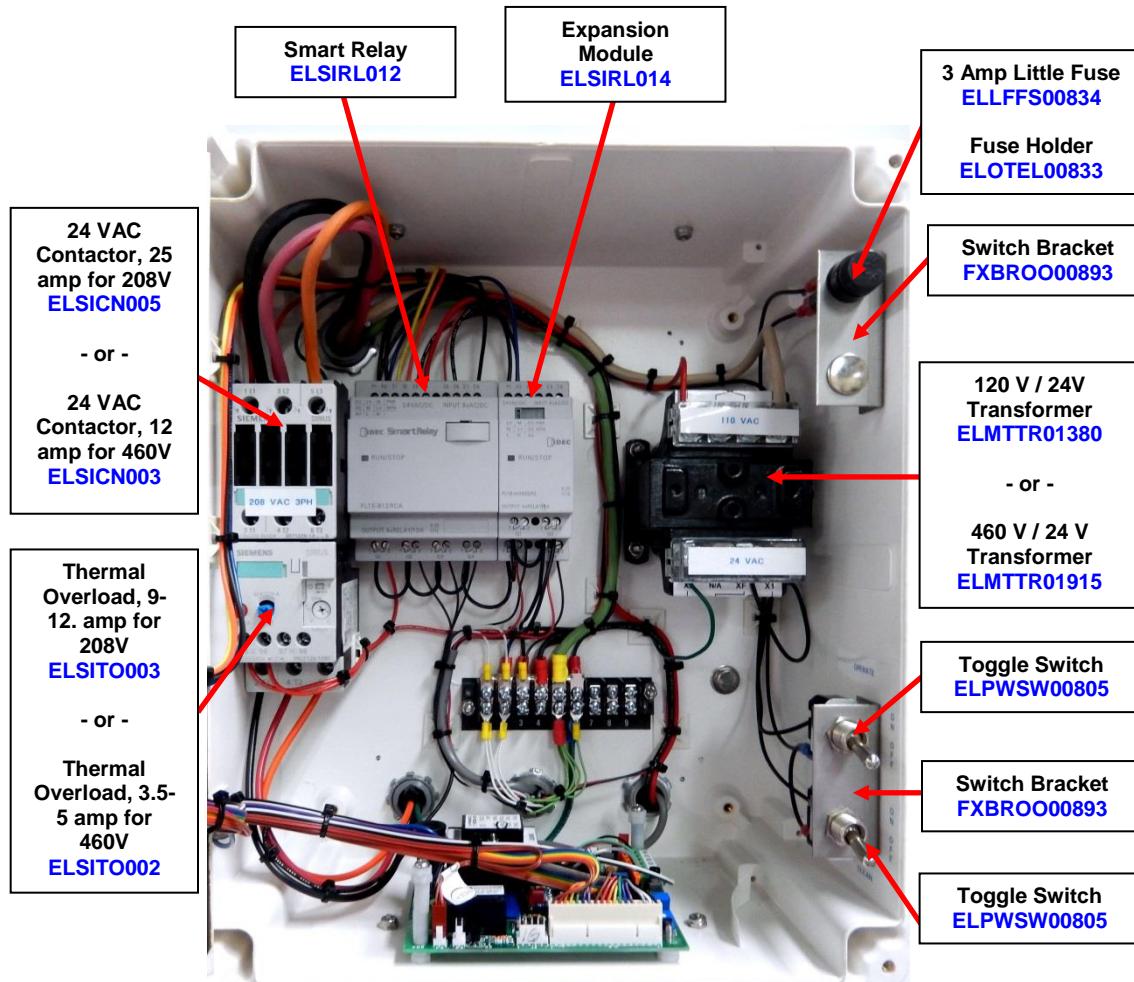
5. Open the Clean/Disinfect Valve on the Clean/Disinfect Tank.
6. To prime, loosen the Park Fitting Connection on the Clean/Disinfect Valve on the Tank.
  - Verify that water drips from the Park Fitting Connection.
  - Re-tighten the Park Fitting Connection.

7. Open the Control Box and turn the **OPERATE Switch** to the **ON** position and the **CLEAN Switch** to the **ON** position.
8. Close the Clean/Disinfect Valve on the Clean/Disinfect Tank.
9. Disconnect the three hoses from the Clean/Disinfect Tank...
  - Disconnect both of the hoses connected to the top of the Clean/Disinfect Tank and place them to Drain.
  - Disconnect the hose from the connection on the bottom of the Clean/Disinfect Tank.
10. The RO may be stored in preservative for a period for up to 6 months. If longer storage is required, perform a low pH and disinfect, then re-pack the RO according to these same instructions.

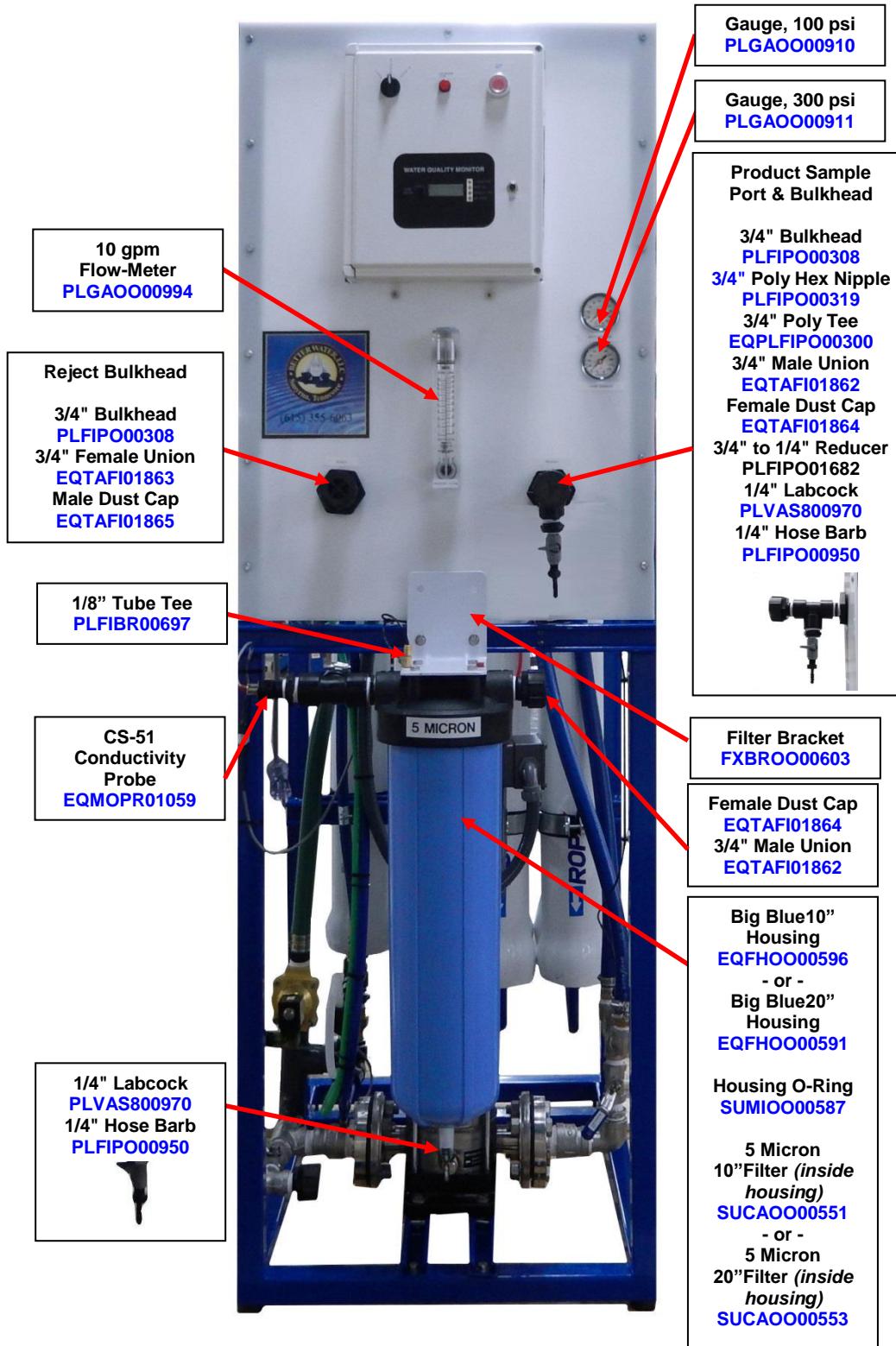
**SERVICE HELP: Control Box-Cover**

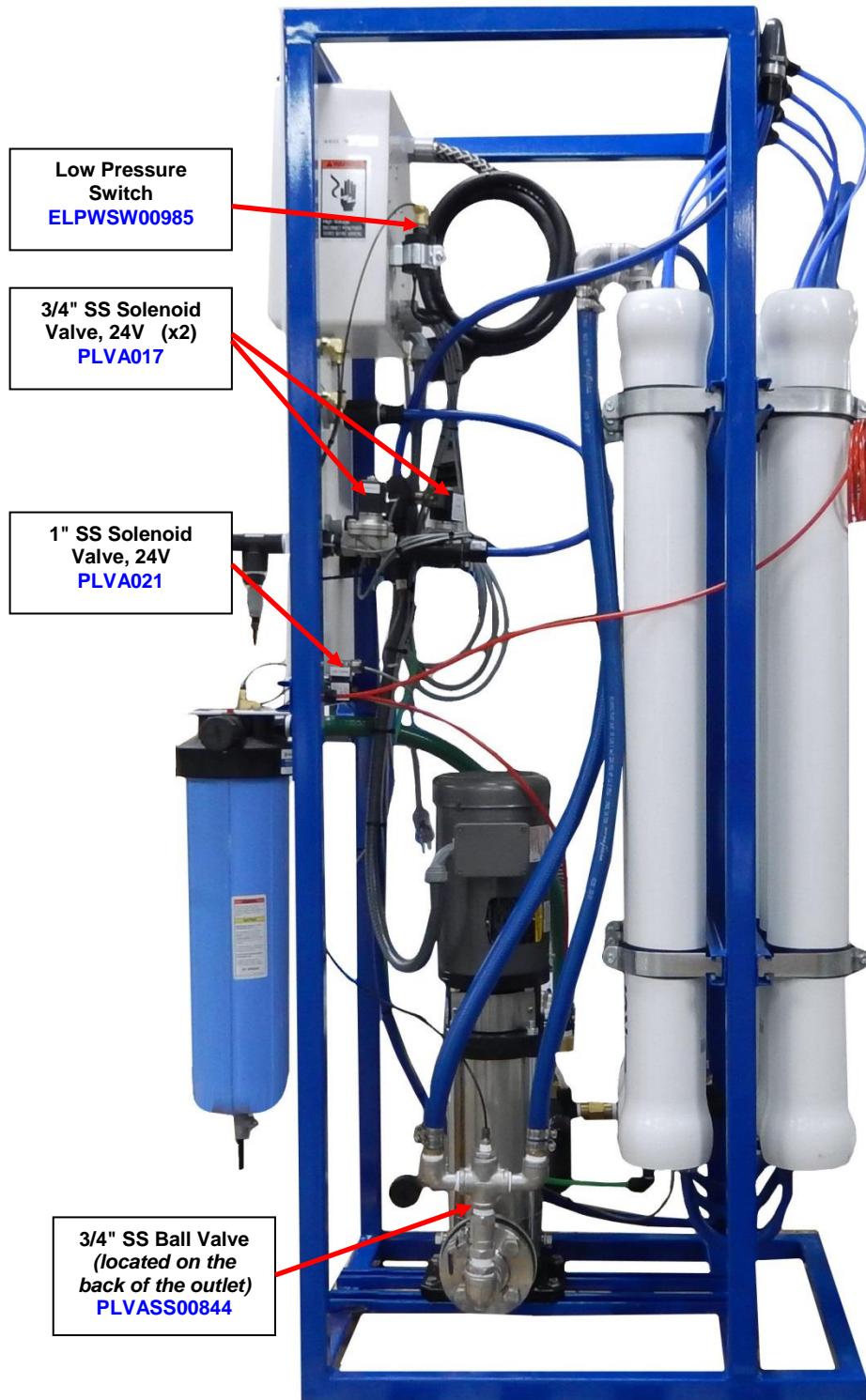
**SERVICE HELP: Control Box-Inside Cover**

## SERVICE HELP: Control Box-Inside

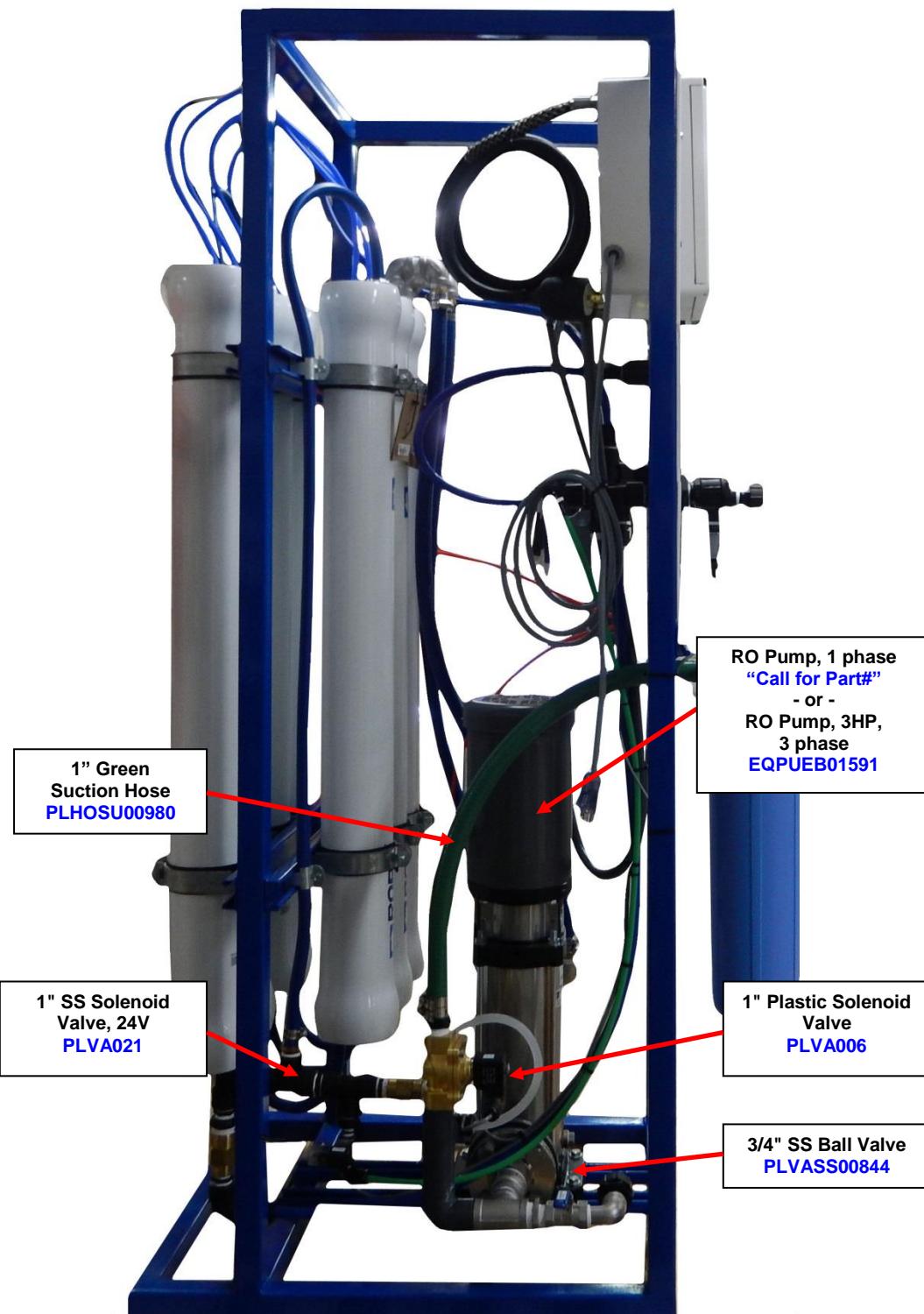


## SERVICE HELP: Front Side



**SERVICE HELP: Right Side**

## SERVICE HELP: Left Side



**SERVICE HELP: Back Side**

## RELATED CONSUMABLE and REPLACEMENT PARTS

<b>DESCRIPTION</b>	<b>PART#</b>	<b>PICTURE</b>
4" x 40" Membrane only for current Fiberglass Housings	<b>SUMEM006</b>	
10", 5 micron, Pre-Filter - O-ring <b>SUMIOO00587</b>	<b>SUCAOO00551</b>	
20", 5 micron, Pre-Filter - O-ring <b>SUMIOO00587</b>	<b>SUCAOO00553</b>	
Clean/Disinfect Tank - Includes hoses and connections	<b>EQASSYDISTANK</b>	
Remote Alarm Box	<b>EQASSYNSMB01601</b>	

*Pictures do not reflect the size of the item in relation to the other pictures*

**RELATED CLEANERS & DISINFECTANTS**

DESCRIPTION	PART#	PICTURE
BWI-1000, Acid Cleaner, low pH	<b>SUMCOO00572</b>	
BWI-2000, Alkaline Cleaner, high pH	<b>SUMCOO00571</b>	
MinnCare Cold Sterilant, Disinfectant	<b>SUMCOO00575</b>	
MinnCare 1% Test Strips	<b>SUMCOO00577</b>	
MinnCare Residual Test Strips	<b>SUMCOO00576</b>	
BWI-3000, MemStore, Preservative	<b>SUMCOO00570</b>	

*Pictures do not reflect the size of the item in relation to the other pictures*

## LIMITED WARRANTY TERMS and CONDITIONS

- a. This limited warranty is given only to the original buyer and covers the equipment delivered with this limited warranty.
- b. The buyer shall be barred from any recovery on this limited warranty or otherwise for damages due in whole or in part to...
  - ... unreasonable use
  - ... improper operation
  - ... use beyond normal fashion
  - ... failure to follow instructions
  - ... failure to maintain the product in good condition and repair
  - ... or the like.
- c. If the buyer discovers or should have discovered a defect in which it is reasonable to conclude that damage, either personal, property, or economic, may result, the buyer's continued use of the product shall constitute any assumption of risk by the buyer and a bar to any recovery for breach of this limited warranty or otherwise.
- d. No oral or written representation, information, or advice given by Better Water LLC or any of its representatives shall create a warranty or in any way increase the scope of this express limited warranty and shall not form a part of the basis for bargain.

## WHAT IS WARRANTED AND FOR HOW LONG?

- a. All equipment, excluding ion exchange and filtration media and cartridges, are warranted to be free from factory defects in materials, and workmanship under normal use for a period of one (1) year from the date of shipment.
- b. It is a condition precedent to recovery on this limited warranty that the buyer strictly comply with all operating and maintenance guidelines established by Better Water LLC and that the serial number (*if applicable*) is intact and legible on the equipment.
- c. It is a condition precedent to recovery on this limited warranty for damage to the external finish of the equipment that the buyer notifies Better Water LLC at the time of the installation that the finish is damaged.

## WHAT IS REMEDY FOR BREACH OF THIS LIMITED WARRANTY or NEGLIGENCE BY BETTER WATER LLC

- a. Buyer's sole and exclusive remedy for any breach of this limited warranty or negligence by Better Water LLC shall be repair or replacement of the defective part, at the option of Better Water LLC, provided such defective part is returned to Better Water LLC for inspection.
- b. Better Water LLC shall not be obligated to supply an exact replacement of the defective part and reserves the right to substitute new and improved parts.
- c. Better Water LLC shall provide at no cost to buyer, labor to remove and/or replace defective parts covered by this limited warranty for a period of ninety (90) days from the date of installation by Better Water LLC of the equipment.
- d. After such ninety (90) day period, buyer shall be responsible for any labor or service charge for the removal and/or replacement of any defective parts.
- e. Buyer shall be responsible for all travel expenses and freight charges at all times.
- f. Better Water LLC shall have no obligation to repair or replace any defective part if buyer fails to follow the procedure set forth in "HOW TO OBTAIN A REPLACEMENT PART UNDER LIMITED WARRANTY".

**IN NO EVENT SHALL THIS LIMITED WARRANTY BE CONSTRUED TO COVER, NOR SHALL BETTER WATER LLC BE LIABLE TO BUYER AS ANY OTHER PERSON FOR, ANY CONSEQUENTIAL, INCIDENTAL, ECONOMIC, DIRECT, INDIRECT, GENERAL OR SPECIAL DAMAGES, WHICH ARE HEREBY EXPRESSLY DISCLAIMED.**

**HOW TO OBTAIN A REPLACEMENT PART UNDER LIMITED WARRANTY**

- a. Buyer should contact the Customer Service or Technical Support Departments and request a Return Goods Authorization.
- b. Described part(s) will be sent with a purchase order.
- c. The returned part(s) will be returned to the factory for limited warranty consideration. If part(s) are not covered under the limited warranty, part(s) will be considered billable against the purchase order supplied.

**WHAT IS NOT COVERED BY THIS LIMITED WARRANTY:**

By way of example and not limitation, this limited warranty does not cover:

- Damage to or replacement of any ion exchange resin or filter media
- Labor or service charges for the removal and/or replacement of any defective parts after the ninety (90) day period from the date of installation or sale by Better Water LLC
- Freight charges and travel expenses
- Damage from inadequate or defective wiring, improper voltage, improper connections or electrical service, inadequate or defective plumbing, water supply, or water pressure, or in violation of applicable building, plumbing or electrical codes, laws, ordinances or regulations.
- Damage from improper installation or operation, including but not limited to, abuse, accident, neglect, improper maintenance, freezing and fires, or abnormal use.
- Damage caused by contaminants in Buyer's water supply, including hardness, chlorine, chloramines, sulfur, bacterial iron, tannin, algae, oil, organic matter or other unusual substances, if special equipment has not been installed by Better Water LLC to remove such contaminants
- Damage to or caused by filters/membranes or other replacement parts not purchased from Better Water LLC or damage caused by modification, alteration, repair or service of the equipment or any of its parts by anyone other than Better Water LLC or its expressly authorized representatives.

