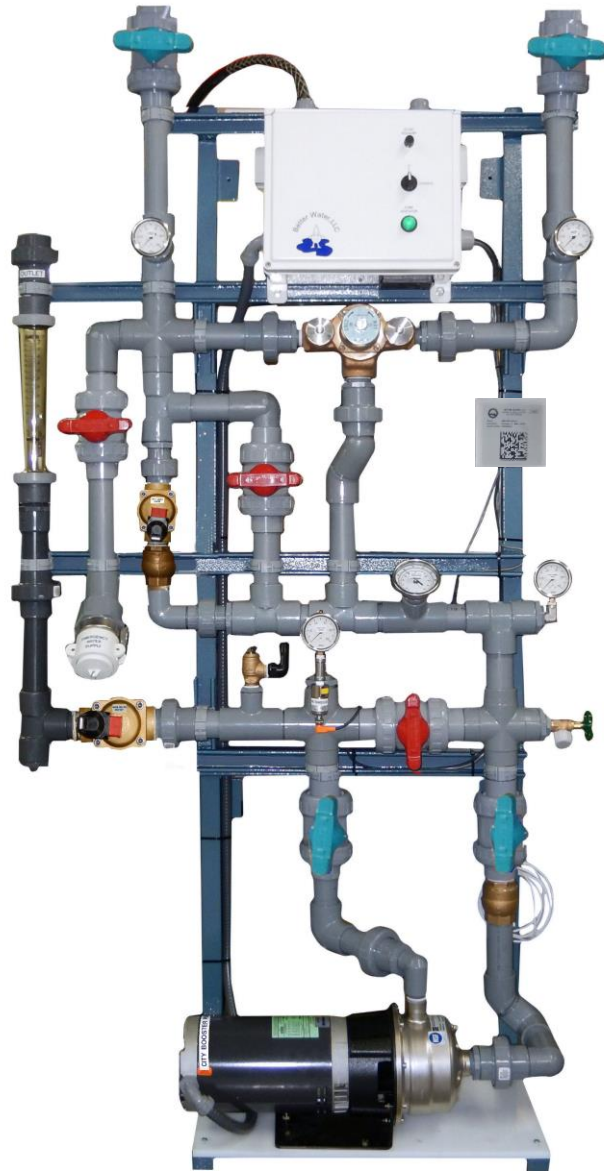


Better Water LLC

Pre-Treatment Standard Racks

Operator Manual



rev. Feb 2019

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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

Customer Service:
Phone (615) 355-6063, press "3"
Email 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, which is updated frequently, contains a wealth of technical support information on the **SUPPORT** tab and includes:

- Operator and Service Manuals
- Interactive Frequently Asked Questions for Troubleshooting
- 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 support@betterwater.com
To Place an Order (<i>purchase orders</i>)	Fax (615) 355-6065
	Email orders@betterwater.com
	Phone (615) 355-6063
Customer Service (<i>returns</i>)	Phone (615) 355-6063, option "2"
	Fax (615) 355-6065
	Email customerservice@betterwater.com

Website 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 Pre-Treatment Rack is manufactured to the utmost quality. With proper operation, maintenance, and care, this device should give you years of reliable service.

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 Pre-Treatment Rack.

This device was designed and built with consideration for the information that has been provided to use on the current product water requirements at your site of operation.

This device was designed and built to blend incoming hot and cold water, boost the pressure to an acceptable level to operate the system, and filter the source water, preparing it for the rest of the pre-treatment components of the water system. This device is not intended for any other application.

Once the this device has been delivered, it is the responsibility of the Medical Director to ensure that it is used, monitored, and maintained in such a manner so as to satisfy all applicable standards. Guidelines and other related information are available from:

- Food and Drug Administration (FDA)
- National Association of Nephrology Technicians/Technologists (NANT)
- Association for the Advancement of Medical Instrumentation (AAMI)


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's Manual. 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. When used as a medical device, federal law restricts this device to sale by or on the authority of a physician. Per CFR 801.109 (b)(1).
2. Improper operation of this device could result in a low or no-flow alarm on the dialysis machines.
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.

QUICK REFERENCES

MAINTENANCE SCHEDULE					
MAINTENANCE TASKS	Each Shift/Daily	Weekly	Monthly	3-12 months	Other
Check the system for leaks	X				
Monitor the system for unusual sounds	X				
Clean external surfaces		X			
Record operational values, ie. flows, pressures, temperature, etc.	X				Or more often as required by the facility. Record on Pre-Treatment Daily Checklist
Perform chemical, microbial, and endotoxin testing on feed and product water as per AAMI requirements					Schedule established by the medical director

DEVICE INFORMATION

MODELS

There are four models of the Wall-Mounted Pre-Treatment System Rack, with the difference being the size of the blend valve, the piping size, and the electrical phase. The operation and service for these models are basically the same, with very little physical differences between them.

Model	Specifications
WM-PRE-4101-C	1" CPVC piping, 7-400 Blend Valve, 1 phase
WM-PRE-4103-C	1" CPVC piping, 7-400 Blend Valve, 3 phase
WM-PRE-5151-C	1 1/2" CPVC piping, 7-500 Blend Valve, 1 phase
WM-PRE-5153-C	1 1/2" CPVC piping, 7-500 Blend Valve, 3 phase



IMPORTANT INFORMATION FOR SUPPORT

Adhered to a plate on the front of each Pre-Treatment Rack (or on the side of the control box for wall-mounted copper models) 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 Pre-Treatment unit. Please have this information available if you contact Technical Support.

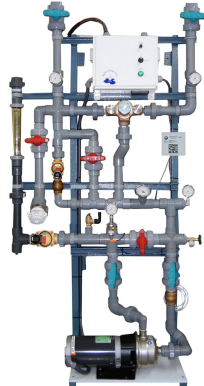


The first four numbers in the serial number denote the year and month the device was manufactured. *In the example above the unit, was produced in 2016, in the month of September.*

DEVICE DESCRIPTION

This Pre-Treatment Rack 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.

The current rack is a free-standing rack with CPVC piping. Prior models had copper piping, were wall-mounted and are mentioned only for reference here since the operation and components are basically the same for all models.



Floor Rack/CPVC
(design may vary based on
available models)



Wall-Mounted Rack/Copper
(design may vary; these models are
no longer available)

BASIC COMPONENTS

Most Pre-Treatment Frames have the following basic components:

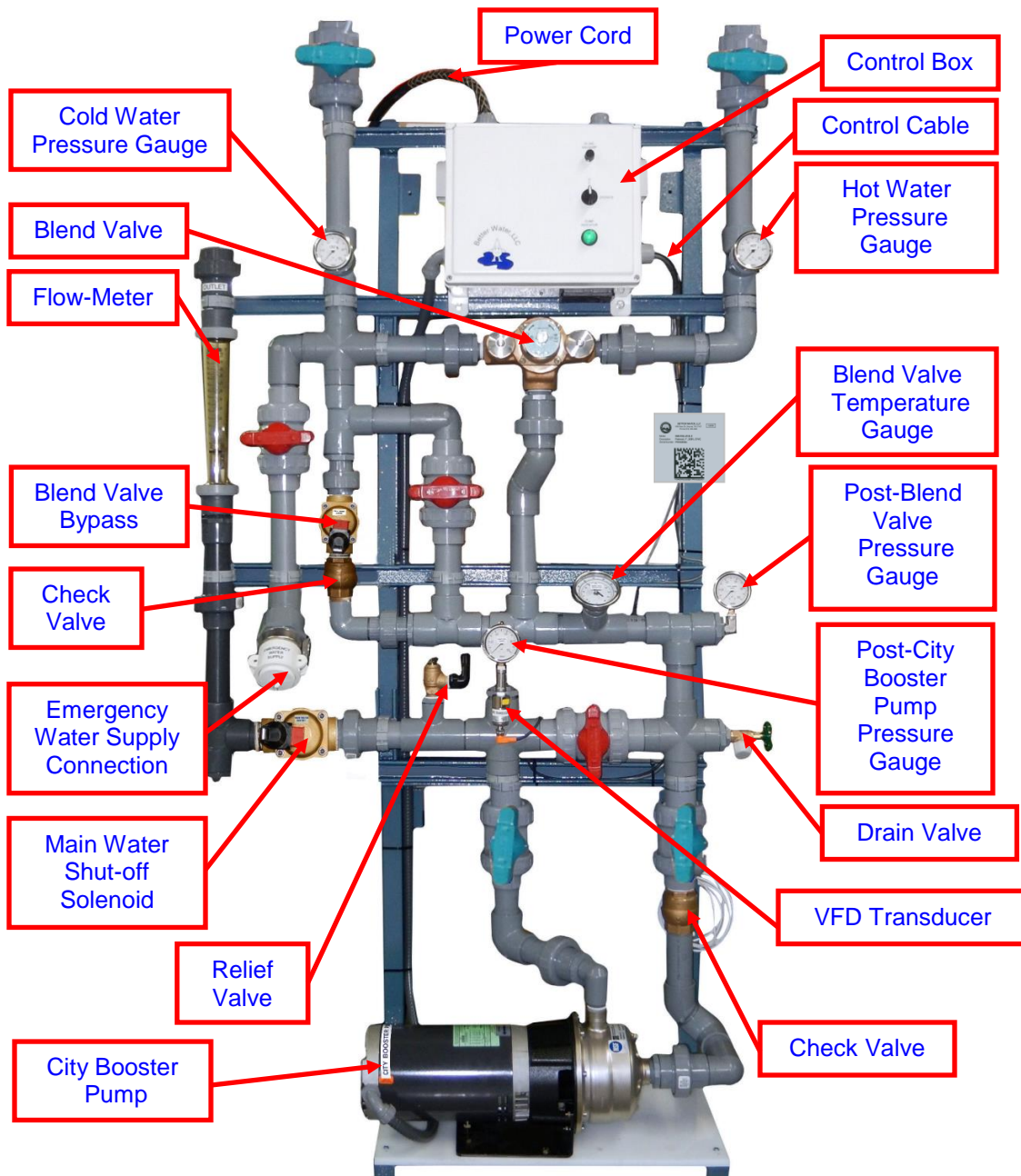
1. The **Control Box** controls the blend-valve bypass, and city booster pump.
2. The **Blend Valve** blends incoming hot and cold water to the optimum operating temperature of the entire water treatment system.
3. A **Blend Valve By-Pass**, which is a solenoid valve, is operated by signals from the Carbon and/or Media Filters to allow sufficient water (*to by-pass the blend-valve*) for proper backwashing of these filters on an "as needed" basis.
4. The **City Booster Pump(s)** are selected to meet the specific needs and characteristics of the water treatment system. These will increase the water pressure to meet the needs of all equipment in the pre-treatment and RO portions of the system.

OTHER FEATURES/COMPONENTS

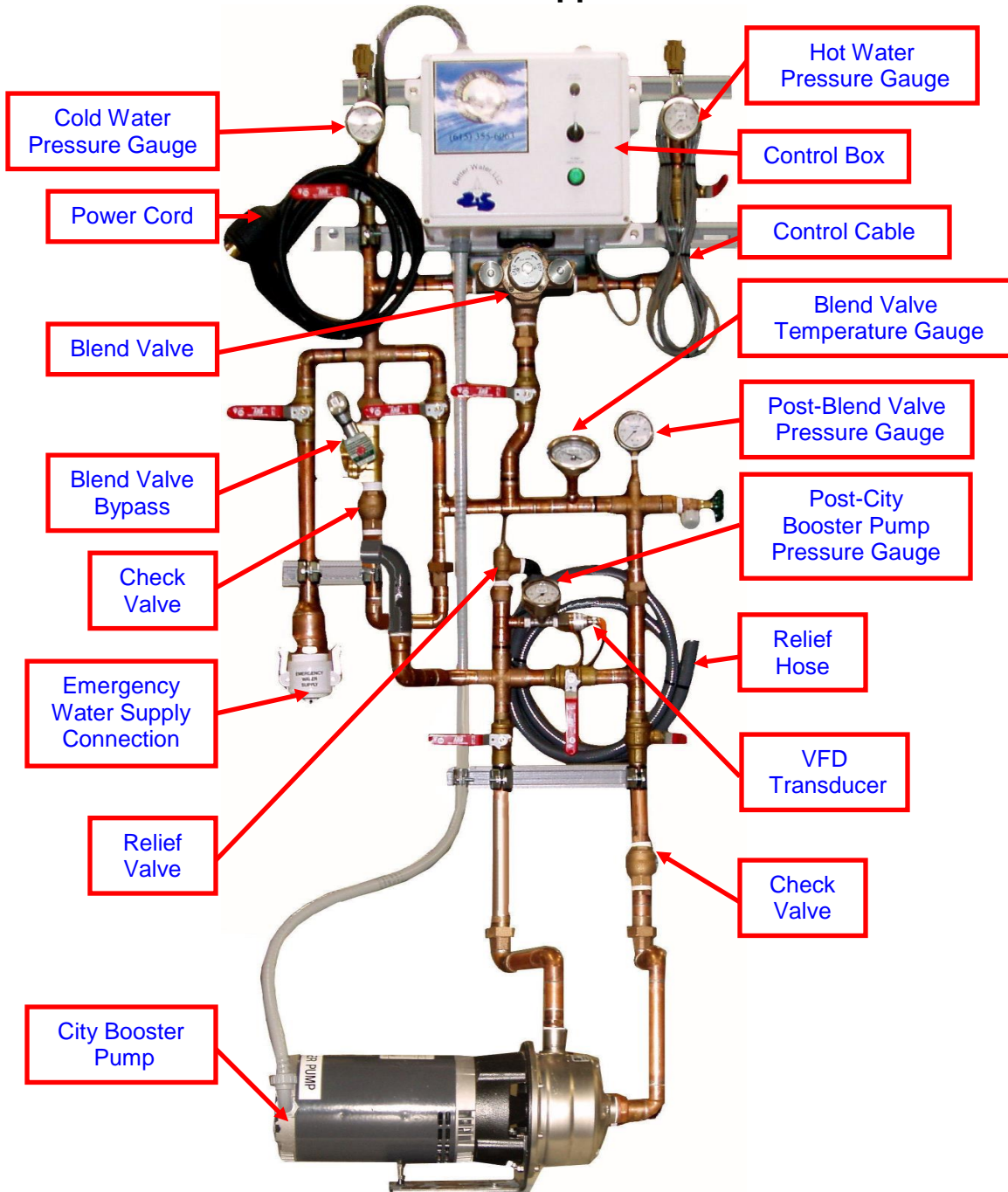
1. **Pressure Gauges** to monitor pressure at various points on the rack:
 - Cold Water Pressure
 - Hot Water Pressure
 - Post-Blend Valve Pressure
 - Post-City Booster Pump Pressure
2. **Temperature Gauge** for monitoring the water temperature after the blend valve.
3. There is an **Emergency Water Supply Connection** which facilitates a standard 2 inch hose in the event the primary city water source is interrupted and an alternate supply can be provided.
4. **Pressure Relief Valve** automatically opens to drain if pressure reaches 100 psi

5. **VFD Transducer** sends pressure readings to the VFD Controller, which in-turn turns the Variable Frequency Drive (VFD) on and off as needed.
6. **Check Valves** allow water to flow only in one direction.
7. **Water Leak Detector** will sound an audible alarm and close the Main Water Shutoff Valve if water is detected on the remote surface probe.
8. **Flow-Meter** measuring 3 to 30 gallons per minute.

DETAILED VIEW of Floor Rack CPVC Model



DETAILED VIEW of Wall-Mounted Copper Model



SYSTEM COMPONENTS: Control Box

DESCRIPTION:

The control box is a water-tight, chemical resistant box, containing electronic components needed to operate the pre-treatment interlocks, the city booster pump, and the blend-valve bypass valve. There is an indicator light when the city booster pump is operating. Later models included a variable frequency drive (VFD) to speed-up or slow-down the city booster pump as needed.

Specific operating details are discussed later in this manual.



SYSTEM COMPONENTS: Pressure Gauges

DESCRIPTION:

The monitoring of components in any water treatment system depends highly on monitoring the pressures before and after the component. Most components in the system will have less than 15 psi normal differential pressure. When this differential pressure rises toward or exceeds 15 psi, the component will require attention to determine the problem or cause.



Differential Pressure or **Delta Pressure** represented by the symbol Δ is equal to the Inlet Pressure minus the Outlet Pressure when the RO is running.

$\Delta P = \text{Inlet Pressure} - \text{Outlet Pressure}$. Example: If the #1 carbon filter is showing an inlet pressure of 60psi and an outlet pressure of 55 psi, the Δ pressure is 5 psi. Under most circumstances, the normal ΔP of most components will be less than 15 psi.

Most components in a Better Water LLC water system are supplied with gauges that will show the pressure before and after the specific component. Gauges used before the RO will be made of brass and stainless steel. Gauges used in and after the RO will be made of stainless steel only. All gauges in the system will be 0-100 psi, dry (*not glycerin filled*), with a 1.5% accuracy.

SYSTEM COMPONENTS: Thermometers

DESCRIPTION:

Maximum water production of the RO depends greatly on the temperature of the feed water. Water that is too cold will require more pressure from the RO pump to force it through the membranes, which will put undue stress on them, causing the membrane pressure to rise. Water that is too hot can cause damage to the membranes. If the water gets too hot, the RO will shut down in a high feed temp alarm.



77° F is the temperature for optimum performance of the Better Water LLC. RO. The pre-treatment system has a stainless steel, in-line temperature gauge located just after the blend valve. This temperature gauge will monitor the blend valve to assure adequate water temperature of the water being supplied to the RO. The blend valve will normally be set at approximately 72-75°F.

SYSTEM COMPONENTS: Blending Valve

DESCRIPTION:

The blending valve is an automatic, mechanical device that instantly compensates for supply line temperature and pressure changes to maintain the pre-selected temperature of the feed-water. The manufacturer states that this device complies with the requirements of Federal specifications WW-P-541/7B and all other known standards, codes, and specifications.



MONITORING REQUIREMENTS:

Daily: Verify the selected temperature range while the RO is running.

MAINTENANCE:

* See System Maintenance section for how to adjust the blend valve, thus affecting water temperature.

NOTE: The manufacturer states that this device, "Fails safely on hot or cold supply failure of thermal motor failure (when so specified) to shut down flow." When feed water flow ceases, the RO unit will shut down, producing a low feed pressure audible and visual alarm on the RO and on any remote alarm locations.

SYSTEM COMPONENTS: Blend Valve By-Pass Solenoid Valve

DESCRIPTION:

The blend valve by-pass valve is a 24 vac electric solenoid valve, automatically operated by signals sent from the carbon (*or other*) filter control valves when the filters go into backwash mode. This water added to the water passing through the blend valve will allow for a proper backwash of the carbons or other filters. With this by-pass open and the extra water not going through the blend valve, the temperature of the water will drop, resulting in a greater "lift of the carbon bed" during the backwash cycle. This will produce a more efficient backwash and add to the life of the carbon.



Current model



Old model

SYSTEM COMPONENTS: City Booster Pump

DESCRIPTION:

The city booster pump is a stainless steel, multi-stage, centrifugal pump designed for continuous duty service. The pump is usually powered by a 1½ or 3 HP, 208-230/460 VAC, 60 Hz, 1 or 3 phase motor, with the new standard being 3 HP. The pump starts automatically when the RO starts or when any of the pre-treatment components that backwash or regenerate start that cycle. This pump is designed for boosting water pressure for circulation service. Later models include a variable frequency drive (VFD) to speed-up or slow-down the city booster pump as needed. The city booster pump and repressurization (recirculation) pumps are *(in most cases)* interchangeable. The repressurization pump, when compatible, can be used to replace the city booster pump, but the city booster pump should NEVER be used to replace the repressurization pump after it has been used in the system as a city booster pump.



Horizontally Mounted
City Booster Pump
(Current Model)

MONITORING REQUIREMENTS:

Daily: Monitored to ensure desired pressure is maintained.

MAINTENANCE:

* See *System Maintenance* section for priming instructions.

SYSTEM COMPONENTS: Water Leak Detector

DESCRIPTION:

This Water Leak Detector Box is built into the control box and is designed to detect and alarm when a water leak has been detected and shut-off the water supply with an electrically controlled solenoid valve.

The unit has three major components:

1. **Control Console** which is hardwired into the control box.
2. **Remote Surface Probe** which is the actual water detector, and is hardwired into the detector control console.
3. **Solenoid Valve** which is connected to the Water Leak Detector Box via a din-connection, and will automatically close if the detector control module signals a leak has been detected.



Remote Surface Probe



Solenoid Valve

SYSTEM COMPONENT DEVICES: Sample Box

DESCRIPTION:

An optional accessory that can be added to the pre-treatment system is the sample box. This provides a place for central water sampling from the following:

- City Water; tempered, before filtering
- Carbon Worker; post
- Carbon Polisher; post
- Water Softener; post
- Auxiliary; pre or post any pre-treatment point

This box is normally centrally located amongst the pre-treatment component devices and attached to one of the media tanks for convenience.



part#
EQ-SAMPLE-BOX
Central Pre-Treatment
Water Sample Box

NOTE

This is not a sanitary sample port, therefore biological sampling for bacteria should not be taken from here.

INSTALLATION & SET- UP

INSTALLATION OVERVIEW

1. Connect pre-treatment rack to water supply, drain, and to the first pre-treatment component device down-line.
2. Set day and time, and backwash/regeneration cycles on each of the pre-treatment component device's with automatic control valves.
3. Verify that all wiring connections are complete.
4. There are other functions that must be performed on each of the individual pre-treatment component devices as a part of their initial installation which should be done by a qualified technician.
5. Bleed air from the city booster pump.
6. Verify that the power cord is connected to an appropriate electrical outlet.
7. Turn the **OPERATE-OFF Switch** on the Pre-Treatment Control Box to **OPERATE**.



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 for hemodialysis poses a severe threat to the health and safety of hemodialysis patients. Education and training of the staff in these facilities is critical given the technically complex subject of water treatment. Guidelines and other related information are available from:

- Food and Drug Administration (FDA)
- National Association of Nephrology Technicians/Technologists (NANT)
- Association for the Advancement of Medical Instrumentation (AAMI)

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.

FAMILIARIZATION with CONTROL BOX

The following is a brief description of the functions and functional settings of each of the controls on the Control Box. Specific operational functions are described in detail in the sections following, some of which require the controls to be used in conjunction with one another.



OPERATE-OFF Switch

This is a two position switch with controls whether the city-booster pump operation.

- **OFF** – Basically turns the Control Box and the City Booster Pump OFF.
- **OPERATE** – Provides power to and control of the city booster pump, when there is a need for a boost in water pressure to the water treatment system.

PUMP INDICATOR Light

This light will illuminate when the city booster pump is actually running.

DAILY START-UP

The pre-treatment system runs automatically based on signals received from the RO and pre-treatment media tanks. Its component devices are controlled based on the settings from their own automatic controllers.

For it to function in this manner, the **OPERATE-OFF Switch** on the Pre-Treatment Control Box must be in the **OPERATE** position.



MONITORING PROCEDURES

The pre-treatment systems must be monitored on a daily basis by a qualified technician, documenting the items specified below. A sample **Pre-Treatment Daily & Periodic Checklist** (*Appendix A*) has been included in this manual as an example for convenience and can be reproduced. The list below is specific to this Pre-Treatment Rack, although the sample checklist includes all the possible pre-treatment component devices as well.

Pre-Treatment Frame/Rack:

Daily: Inlet Hot and Cold Water pressure

Daily: Post Blend Valve pressure and temperature

Daily: Pre and Post-City-Booster Pump pressure

SHUTDOWN

Since the City Booster Pump runs automatically as long as the **OPERATE-OFF Switch** on the Pre-Treatment Control Box is in the **OPERATE** position, there is no daily shutdown procedure.

To turn the City Booster Pump off, simply turn the **OPERATE-OFF Switch** to the **OFF** position.

** Turning this switch to OFF only turns the City Booster Pump OFF, and will not stop the automated backwash and regeneration of the other pre-treatment components. If OFF, there will be water, but there may not be sufficient pressure and flow for an adequate backwash/regeneration.*



VALVES LEGEND and OPERATION of Floor Rack CPVC Model

1. Incoming Cold Water Valve

Open or close for cold water source.

* OPEN during normal operation

2. Incoming Hot Water Valve

Open or close for hot water source.

* OPEN during normal operation

3. Emergency Water Connection Valve

Open only if an emergency water supply is connected. If opened, then valves 1 and 2 must be closed.

* CLOSED during normal operation

4. Cold Water Blend Valve By-Pass Valve

Open only if only cold water is needed, and not blended water. If opened, then valves 2 and 5 must be closed.

* CLOSED during normal operation

5. Blended City Water Boiler Drain Valve

This valve is provided as a convenience, and should only be opened if a hose is attached.

* CLOSED during normal operation

6. City Booster Pump Outlet Valve

Close only if maintenance is required on the city booster pump. If closed, then open valve 8 and close valve 9.

* OPEN during normal operation

7. City Booster Pump By-Pass Valve

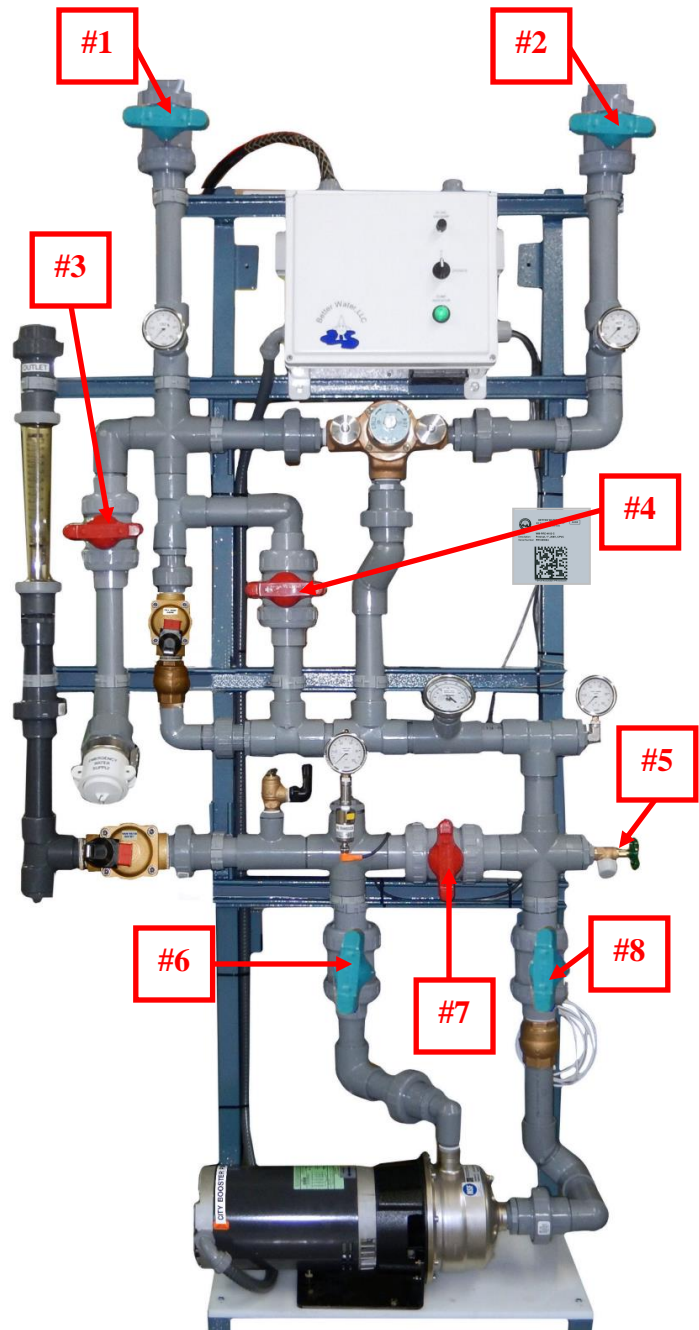
Open only if maintenance is required on the city booster pump. If opened, then close valves 7 and 9.

* CLOSED during normal operation

8. City Booster Pump Inlet Valve

Close only if maintenance is required on the city booster pump. If closed, then close valve 7, and open valve 8.

* OPEN during normal operation



VALVES LEGEND and OPERATION of Wall-Mounted Copper Model

1. Incoming Cold Water Valve

Open or close for cold water source.

* OPEN during normal operation

2. Incoming Hot Water Valve

Open or close for hot water source.

* OPEN during normal operation

3. Emergency Water Connection Valve

Open only if an emergency water supply is connected. If opened, then valves 1 and 2 must be closed.

* CLOSED during normal operation

4. Cold Water Blend Valve By-Pass Valve

Open only if only cold water is needed, and not blended water. If opened, then valves 2 and 5 must be closed.

* CLOSED during normal operation

5. Blend Valve Outlet Valve

Close only if maintenance is required on the blend valve. If closed, then valves 1, 2, and 5 must be closed.

* OPEN during normal operation

6. Blended City Water Boiler Drain Valve

This valve is provided as a convenience, and should only be opened if a hose is attached.

* CLOSED during normal operation

7. City Booster Pump Outlet Valve

Close only if maintenance is required on the city booster pump. If closed, then open valve 8 and close valve 9.

* OPEN during normal operation

8. City Booster Pump By-Pass Valve

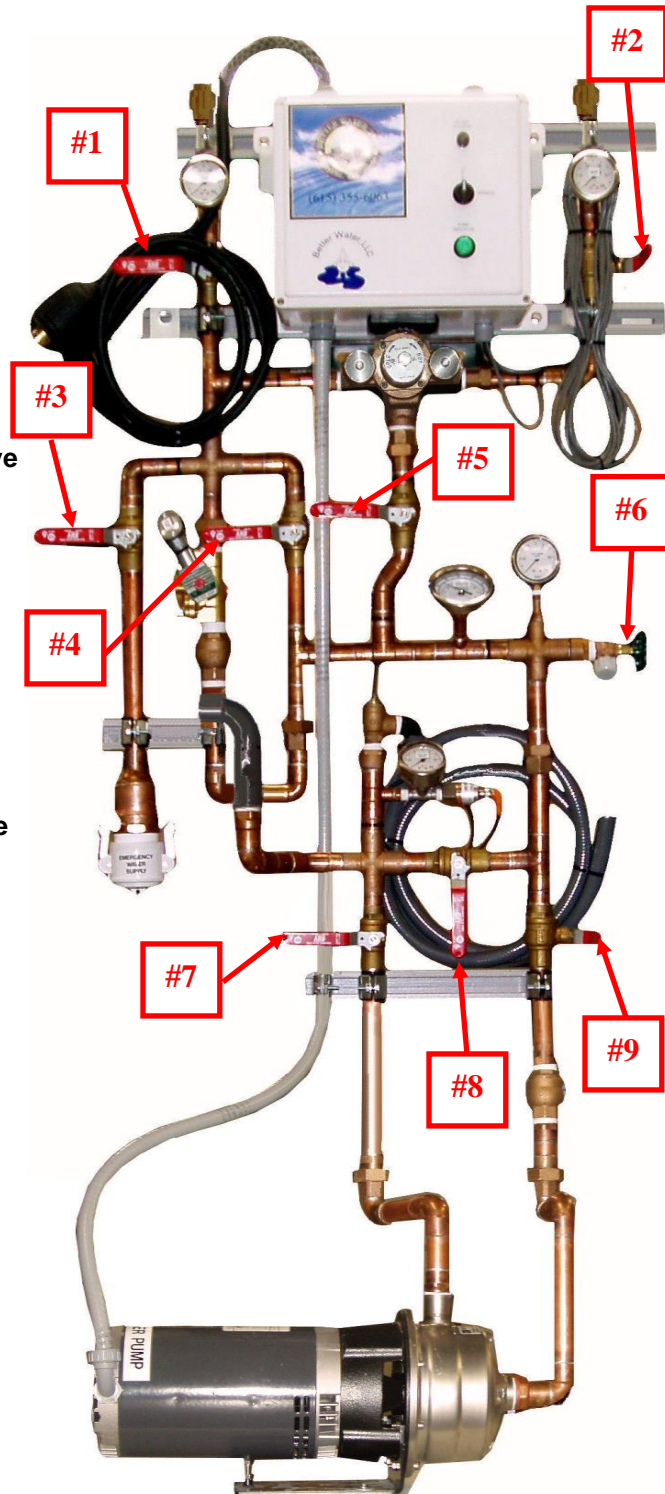
Open only if maintenance is required on the city booster pump. If opened, then close valves 7 and 9.

* CLOSED during normal operation

9. City Booster Pump Inlet Valve

Close only if maintenance is required on the city booster pump. If closed, then close valve 7, and open valve 8.

* OPEN during normal operation



WATER LEAK DETECTOR

Current models of the Pre-Treatment Rack are equipped with a water leak detector. This detector is composed of two parts. The first is a **control console** which is hardwired into the control box, with the second being a **remote surface probe** which lays flat on the floor near the rack. All that is required to signal an alarm condition is a film of moisture forming a bridge between the two metallic contacts on the remote surface probe. It was designed to detect water only (*distilled or deionized water cannot be detected*). As sensitive as it is, it will not alarm due to high humidity or condensation.

If the detector senses water an audible alarm will sound, the main water shutoff solenoid will close, which turns off all water to the Pre-Treatment system, and the city booster pump will turn OFF. Once dry again, the alarm will be silenced and the main water shutoff solenoid will re-open restoring water flow once again.

SILENCING THE WATER LEAK DETECTOR ALARM

In the event the water leak detector senses water and sounds the alarm there are two ways to silence the alarm:

TURN the PRE-TREATMENT RACK OFF

- Turn the **OFF-OPERATE Switch** on the Pre-Treatment Control Box to **OFF**.
 - This will silence the alarm, but the main water shutoff solenoid will remain closed, and the city booster pump will turn OFF.
- Determine the source of the water that caused the alarm and correct the problem.
- Lift and dry the remote surface probe with a clean dry cloth or paper towel, then return to its original location.
- Once the condition that caused the alarm has been corrected, turn the **OFF-OPERATE Switch** to **OPERATE**.

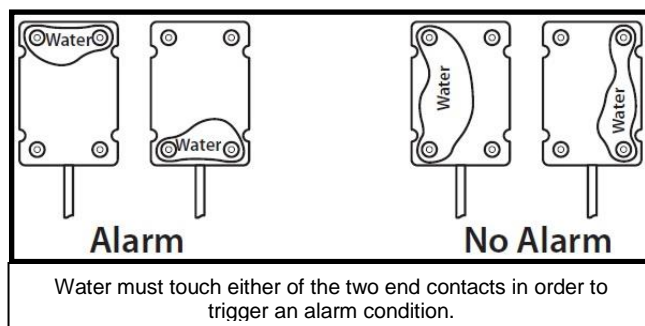
DRY THE REMOTE SURFACE PROBE

- Determine the source of the water that caused the alarm and correct the problem.
 - If a simple spill, then clean up the water.
 - If a leak, fix the leak at its source. This may require turning off the incoming water.
- Lift and dry the remote surface probe with a clean dry cloth or paper towel, then return to its original location.
 - After a few seconds, this will silence the alarm and re-open the main water shutoff solenoid valve.

NOTE: Make sure if the problem was a leak, to correct the problem or turn off the incoming water prior to drying off the remote surface probe since when dry it will re-open the main water shutoff solenoid if the Pre-Treatment system is ON.



Remote Surface Probe and connecting cable



SYSTEM MAINTENANCE

MAINTENANCE SCHEDULE					
MAINTENANCE TASKS	Each Shift/Daily	Weekly	Monthly	3-12 months	Other
Check the system for leaks	X				
Monitor the system for unusual sounds	X				
Clean external surfaces		X			
Record operational values, ie. flows, pressures, temperature, etc.	X				Or more often as required by the facility. Record on Pre-Treatment Daily Checklist
Perform chemical, microbial, and endotoxin testing on feed and product water as per AAMI requirements					Schedule established by the medical director

SYSTEM MAINTENANCE, Long Term Storage or Non-Use

For long-term storage or long periods of non-use we recommend the following procedure which would apply for any of the pre-treatment component devices:

1. Drain water from the pre-treatment system.
2. Remove any media or filters.
3. Let the component devices air-dry.
4. When ready to re-start, filter cartridge housings and media tanks should be wiped down with a mild bleach solution before installing new cartridges and new media.

SYSTEM MAINTENANCE, Adjusting the Blend Valve Temperature Setting

*** Adjustments to the blend valve should be made when the RO is running, but patients are not dialyzing.**

* 77°F is optimum operating temperature for the RO machine. Water will inherently increase in temperature by a few degrees when going through the filters; therefore the final temperature at the blend valve should be determined by achieving 77° at the RO. Keep in mind that it will take several minutes (*up to 20 minutes or more*) for the temperature change to reach the RO.

FOR SERIES 5 VALVES: (for older models)

* Ensure both hot and cold water supplies are open, and the RO is running in good water quality.

1. Turn Adjustment Knob clock-wise, until it is all the way in and can no longer be turned.

2. Turn the Adjustment Knob counter-clockwise, and count the number of turns it takes for the Knob to turn all the way out, which is usually 4 ½ turns.

3. Turn the Adjustment Knob back clockwise, half the number of turns, which is usually 2 ¼ turns.

4. Remove the small Phillips screw and screw cover from the center of the Adjustment Knob.

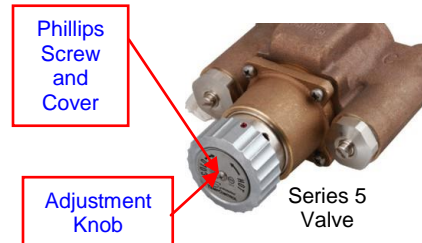
5. Have slotted screwdriver ready to adjust the screw under the cover plate.

6. Hold the large adjusting knob stationary and adjust the slotted screw to obtain the desired temperature optimum operating temperature at the RO as discussed above.

7. Adjustments should be made in small increments, allowing time for the newly blended water to be pulled through the blend valve and for the Temperature Gauge to stabilize.

8. Once the desired temperature is obtained, re-install the center cover plate and cover screw.

9. Any further adjustments should be made with the Adjustment Knob only, in the direction indicated on the cover plate to obtain the desired temperature.



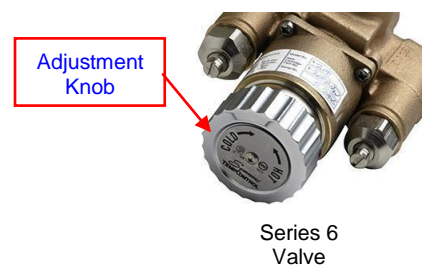
FOR SERIES 6 VALVES: (for older models)

1. Ensure both hot and cold water supplies are open, and the RO is running in good water quality.

2. Turn the Adjustment Knob clock-wise until it is all the way in and can no longer be turned. Observe the Temperature Gauge to verify that the water temperature is changing.

3. Turn the Adjustment Knob counter-clockwise, four complete turns. Observe the Temperature Gauge to verify that the water temperature is changing.

4. Repeat steps 2 and 3, two more times.



5. Turn Adjustment Knob clock-wise to adjust the water temperature to the desired setting, by verifying the Temperature Gauge reading. Allow time for the newly blended water to be pulled through the Blend Valve and for the Temperature Gauge to stabilize.
6. The final water temperature setting should be based on a verified water temperature of 77°F at the RO.
7. Any further adjustments should be done by turning the Adjustment Knob in small increments. Allow time for the newly blended water to be pulled through the Blend Valve and for the Temperature Gauge to stabilize.

FOR SERIES 7 VALVES:

1. Ensure both hot and cold water supplies are open, and the RO is running in good water quality.

2. Loosen the Locking-Nut on the Adjustment Bolt, by turning it counter-clockwise until it can no longer be turned.

3. Using a wrench turn the Adjustment Bolt clock-wise until it is all the way in and can no longer be turned. Observe the Temperature Gauge to verify that the water temperature is changing.

4. Turn the Adjustment Bolt counter-clockwise, four complete turns. Observe the Temperature Gauge to verify that the water temperature is changing.

** CAUTION: Turning the Adjustment Bolt fully counter-clockwise will remove the Bolt from the Blend Valve. If this occurs simply replace the bolt.*

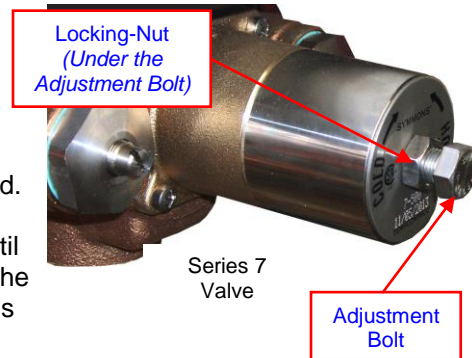
5. Repeat steps 3 and 4, two more times.

6. Turn Adjustment Bolt clock-wise to adjust the water temperature to the desired setting, by verifying the Temperature Gauge reading. Allow time for the newly blended water to be pulled through the Blend Valve and for the Temperature Gauge to stabilize.

7. The final water temperature setting should be based on a verified water temperature of 77°F at the RO.

8. Once the desired temperature has been achieved, hand-tighten the Locking Nut on the Adjustment Bolt, by turning it clockwise until it can no longer be turned to ensure the Adjustment Bolt will stay in the final position set.

9. Any further adjustments should be done by loosening the Locking-Nut, then turning the Adjustment Bolt in small increments, and then re-tighten the Locking-Nut. Allow time for the newly blended water to be pulled through the Blend Valve and for the Temperature Gauge to stabilize.



SYSTEM MAINTENANCE, Priming the City Booster Pump

WARNING

All city booster and repressurization pumps must be primed prior to initial use, or whenever air has been allowed to enter the pump. This includes the initial start-up of the pump and usually every time the pump has shutdown from a no-flow situation. Failure to complete this procedure may result in damage to the pump and may void all warranties.

To prime the pump, air must be bled from the casing of the pump from the air bleed screw. The location of this screw will vary from model to model.

1. Verify that the pump inlet valve to the pump is open and there is an ample supply of water.
2. Verify that the pump outlet valve is closed.
3. Slowly open the air bleed screw and allow air to escape until a solid stream of water is flowing from the screw. It is not necessary to completely remove the screw, as this will make it difficult to replace while the water is flowing.
4. When a solid stream of water is flowing from the air bleed screw, tighten it back down. Do not over-tighten which can damage the underlying o-ring.



Horizontally Mounted
City Booster Pump
(Current Model)

SYSTEM MAINTENANCE: Variable Frequency Drive Adjustments

VFD – Adjusting Pump Pressure

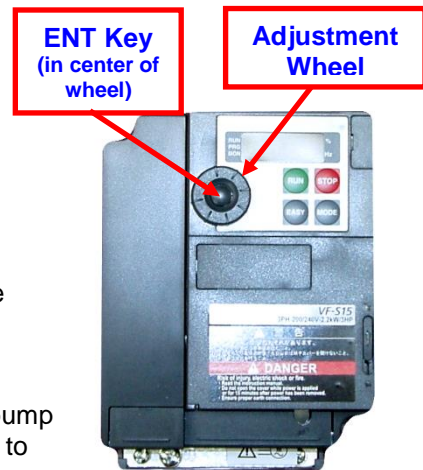
The VFD is pre-programmed with operational parameters set by Better Water and locked out to the end user. **If trouble-shooting VFD issues Call Better Water for technical assistance.**

The VFD pump pressure is set by turning the **ADJUSTMENT Wheel**. *NOTE: Older models had Up and Down Arrow Buttons for adjustment.*

- To properly set the correct pump pressure the pump must be ON and running.

When setting the pump pressure....

- Turn the **ADJUSTMENT Wheel** to set the desired hertz for pump pressure. Turn clock-wise to increase and counter-clockwise to decrease.
- Once set then push **ENT Button**.
- **FC** will appear briefly in the display and then the display will read actual frequency the Pump is running at.
- * *If the **ENT** is not pushed the VFD will revert back to the last set point.*



VFD ERROR CODES

Occasionally power interruptions cause a VFD error to occur. First check the breaker in the Control Box, and reset if tripped. Otherwise check to see if any error codes are displayed on the VFD. Below are some of the more common error codes and their cause.

- **OC1, OC2, or OC3** = Over current event has occurred.
- **EPHI or EPHO** = Phase input or output event has occurred.
- **OP1, OP2, OP3** = Over voltage event has occurred.
- **OL1 or OL2** = Overload event has occurred.
- **LStP** = VFD is idle and below minimum programmed set point. This set point is 6 Hz, is pre-programmed, and is locked out to the end-user.

To correct any of the above error codes except for the **LStP** do the following:

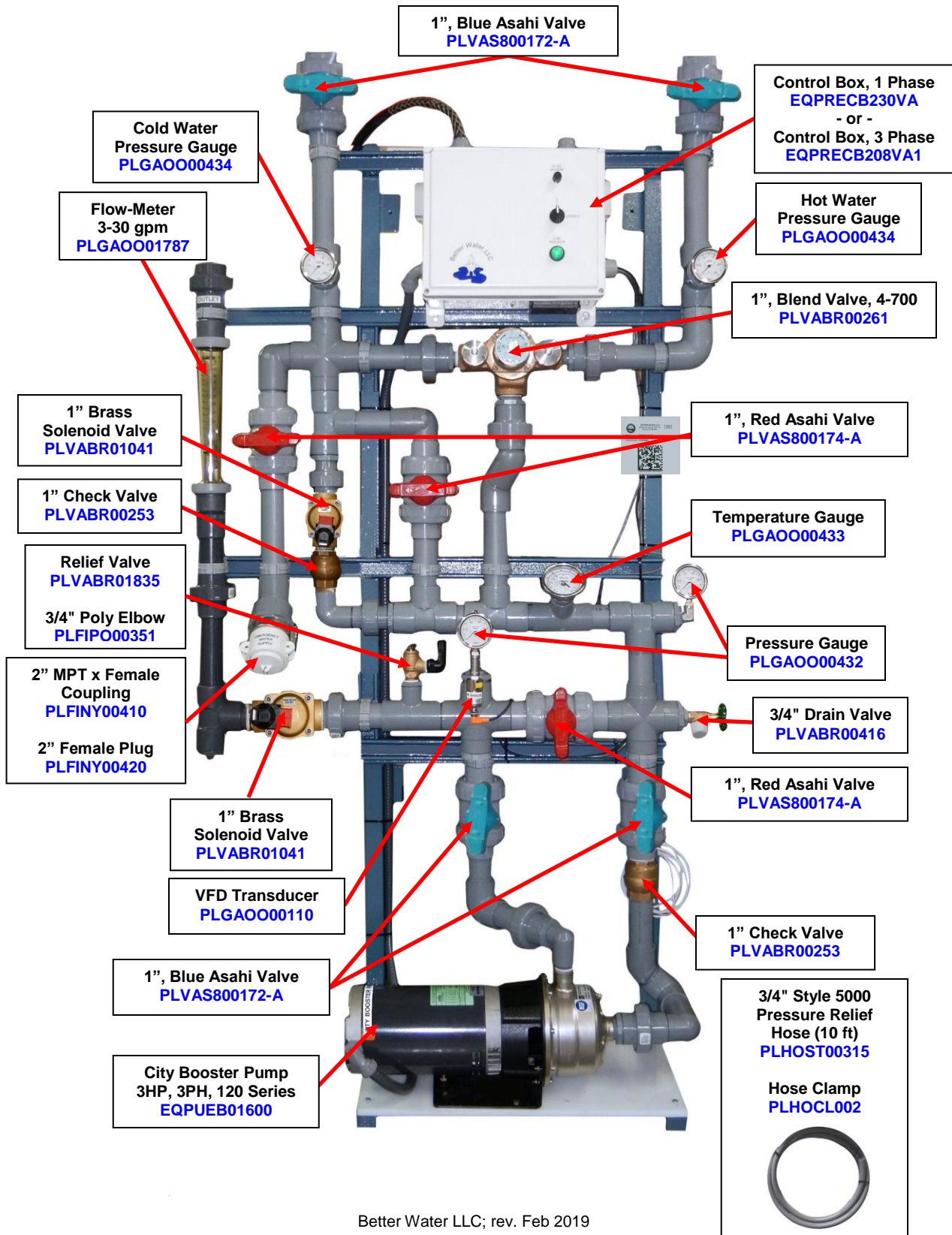
1. Press the STOP button on the VFD twice.
 - * If this clears the error code nothing else is required, otherwise perform the following steps.
2. Turn the **OPERATE-OFF Switch** to **OFF**.
3. Unplug the Main Power Cord and wait 10-15 seconds for the VFD to power down.
4. Reconnect the Main Power Cord.
5. Turn the **OPERATE-OFF Switch** to **OPERATE**.
6. If the error persists contact Technical Support for assistance.

VFD – Breaker

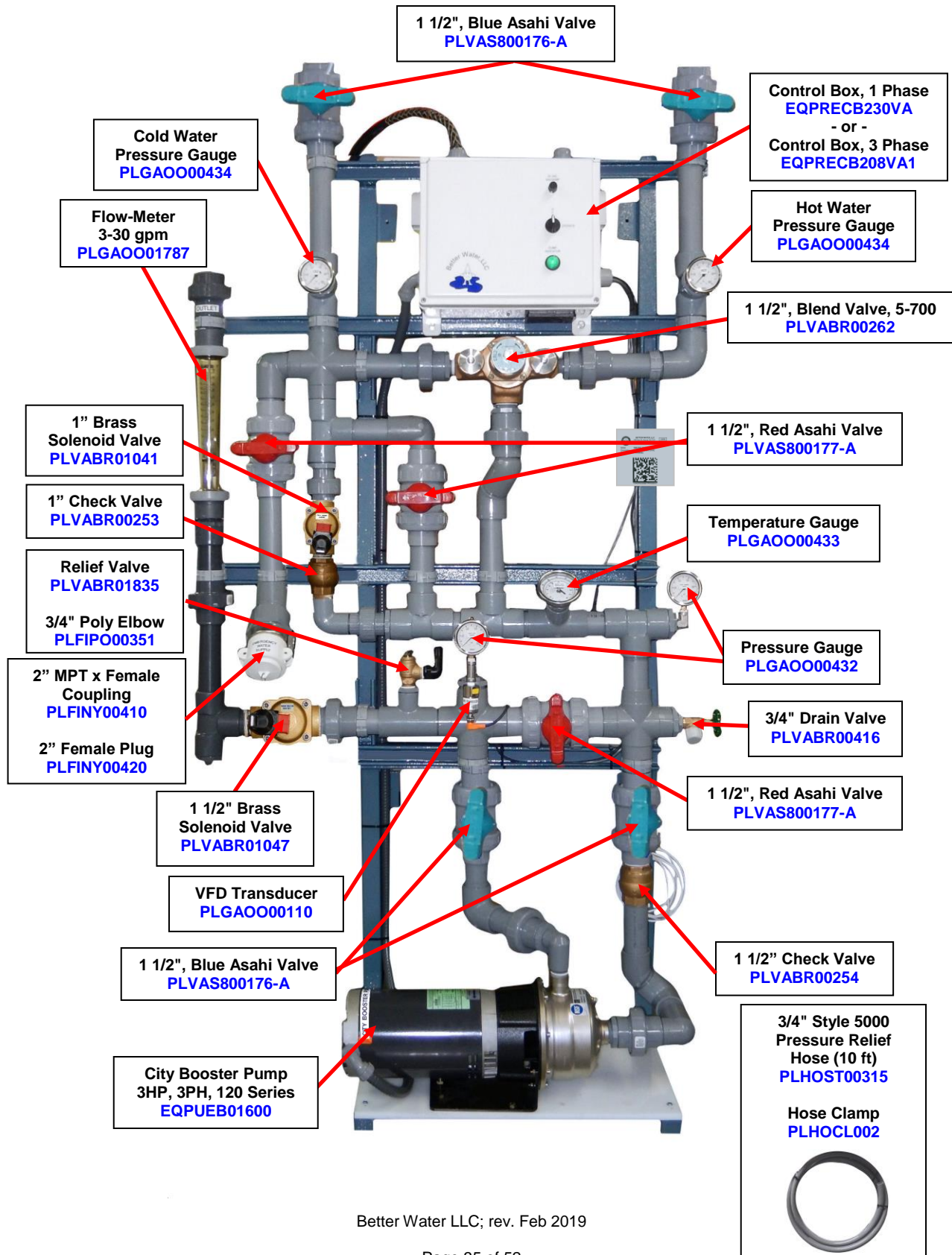
The VFD breaker is located in the Control. If the breaker has tripped the Pump and VFD will not operate. This breaker will shut off power to the VFD to prevent damage to the VFD and the Pump.

SERVICE HELP

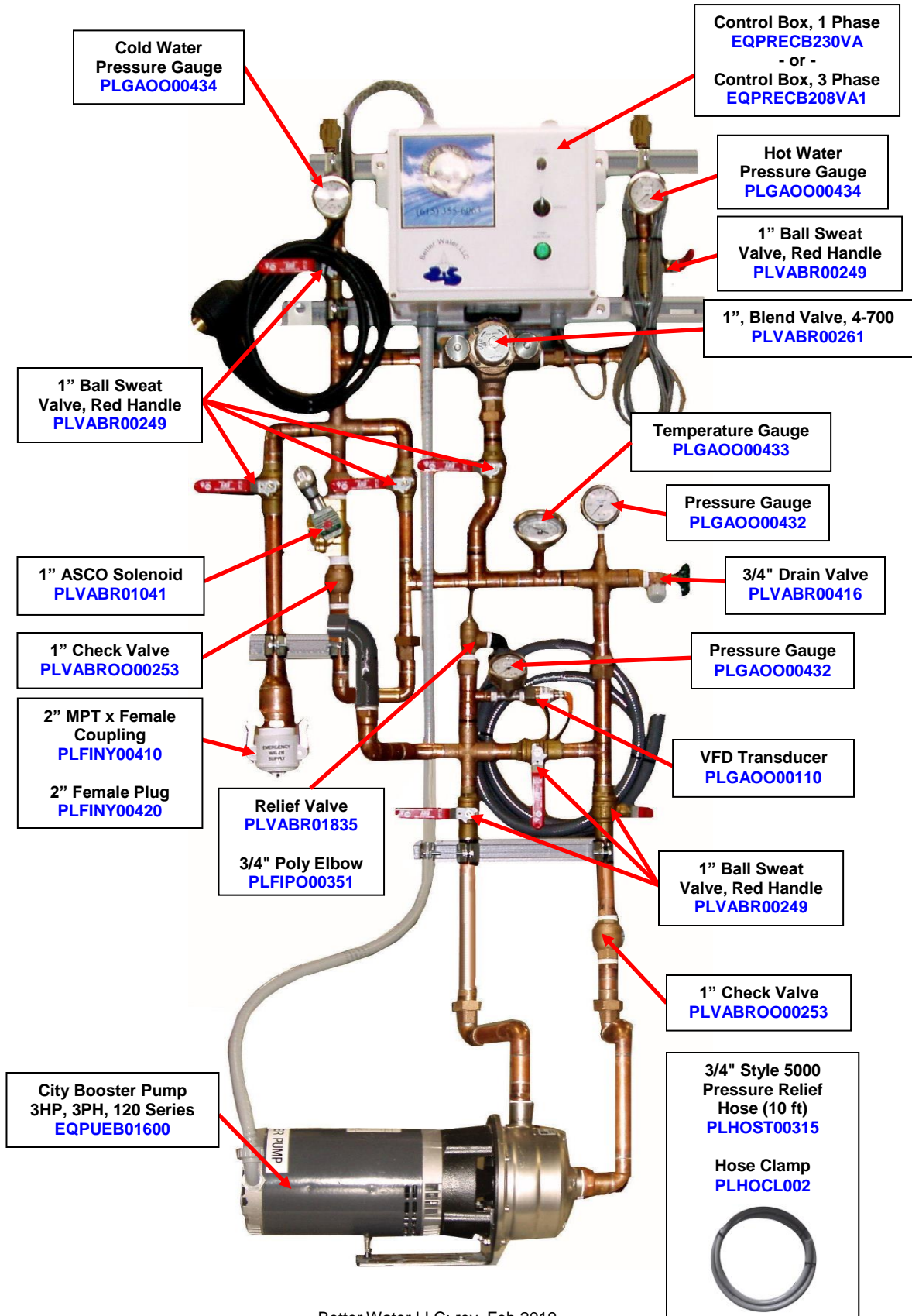
SERVICE HELP: 1" Floor Rack, CPVC



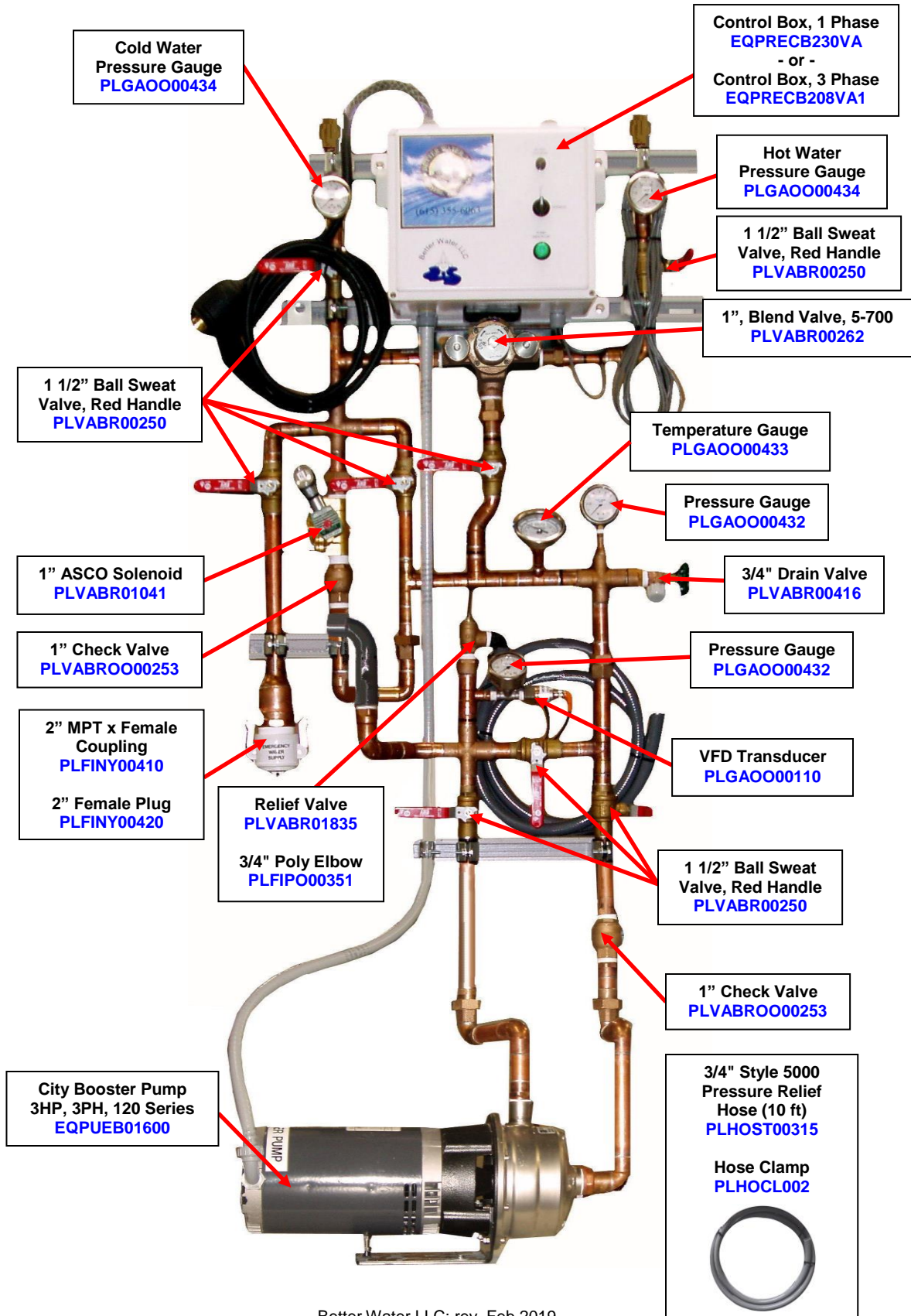
SERVICE HELP: 1 1/2" Floor Rack, CPVC



SERVICE HELP: 1" Wall-Mounted Rack, Copper

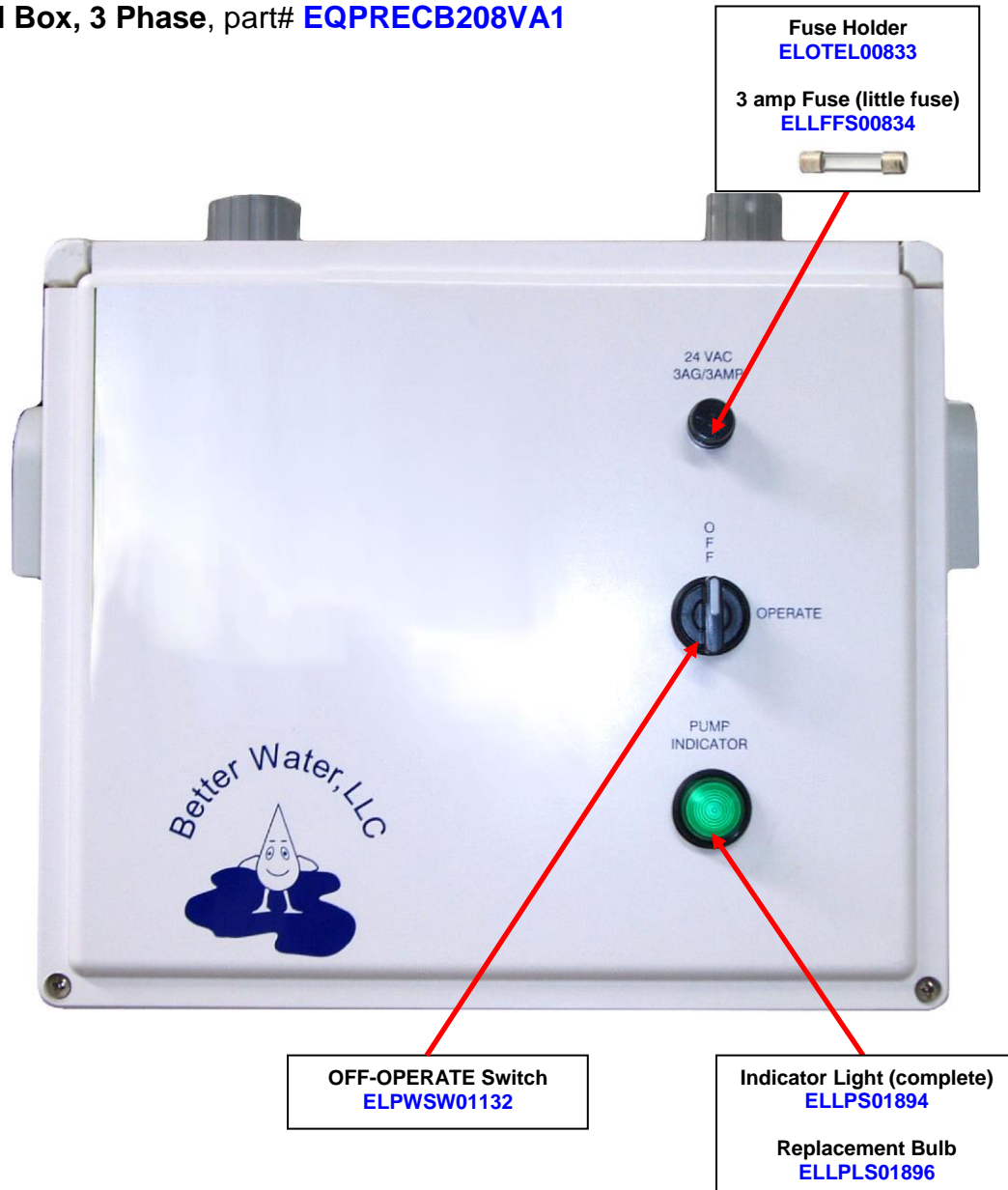


SERVICE HELP: 1 1/2" Wall-Mounted Rack, Copper

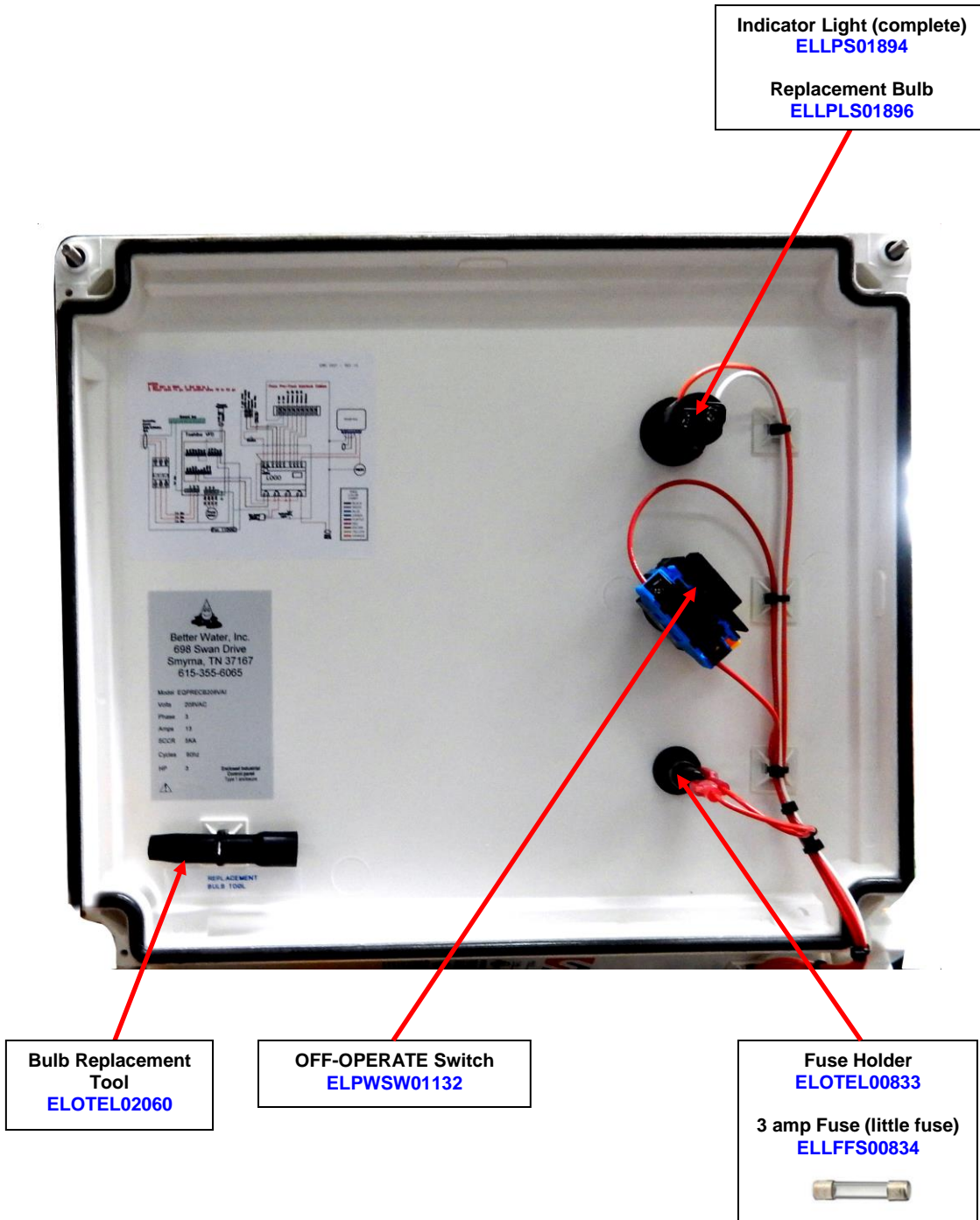


SERVICE HELP: Control Box (front view)

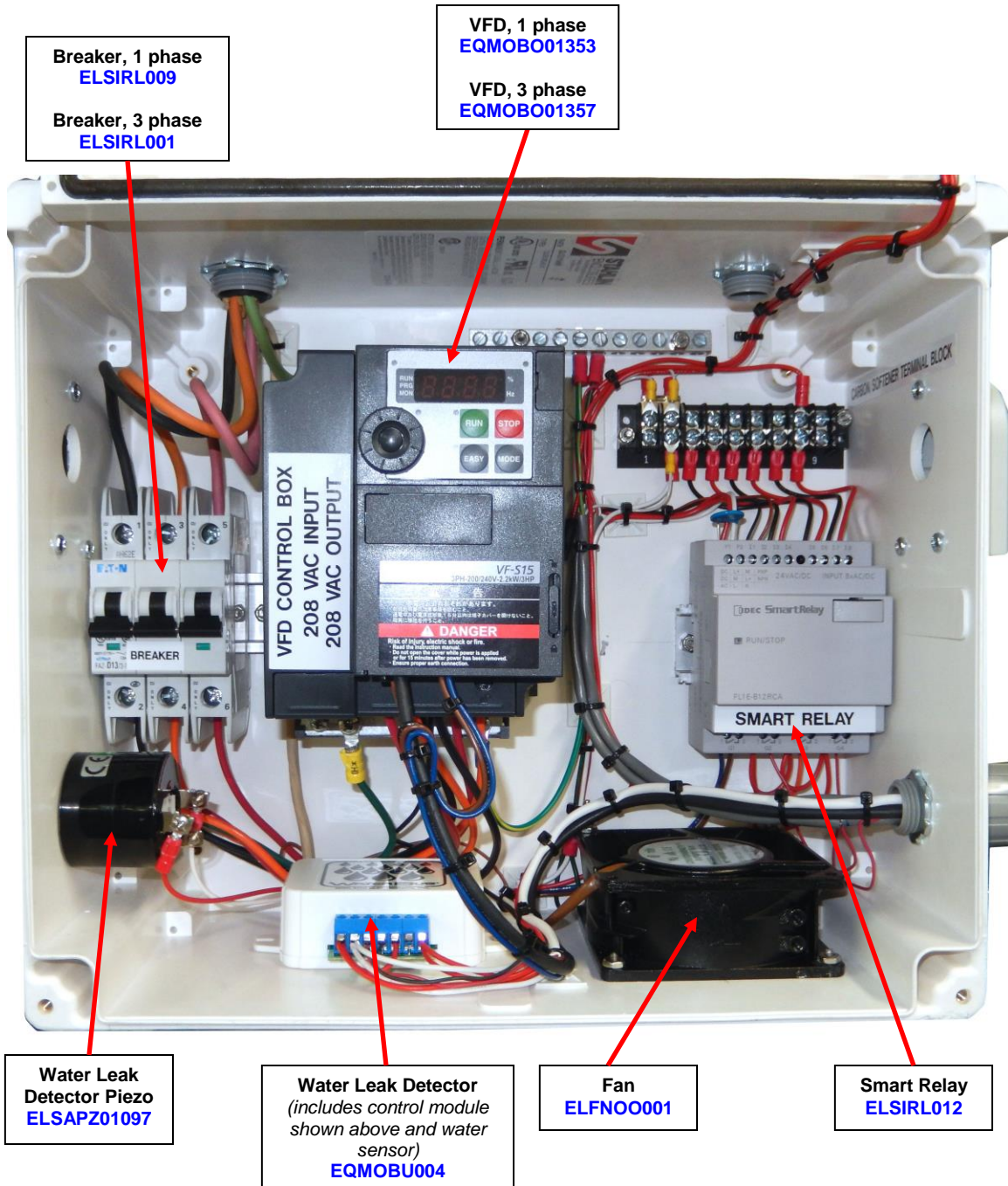
Control Box, 1 Phase, part# [EQPRECB230VA](#)
Control Box, 3 Phase, part# [EQPRECB208VA1](#)



SERVICE HELP: Control Box (inside lid view)



SERVICE HELP: Control Box (inside view)



Breaker, 1 phase
ELSIRL009
Breaker, 3 phase
ELSIRL001

VFD, 1 phase
EQMOB001353
VFD, 3 phase
EQMOB001357

Water Leak
Detector Piezo
EL SAPZ01097

Water Leak Detector
(includes control module
shown above and water
sensor)
EQMOBU004

Fan
ELFN0001

Smart Relay
EL SIRL012

NOTE: VFD label will vary based on model. Older models will not have the Water Leak Detector Piezo or the Water Leak Detector Control Module.

APPENDIX A

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.

APPENDIX B

Sample Checklists

Sample Pre-Treatment Daily Checklist

PRE-TREATMENT SYSTEM QUALITY ASSURANCE CHECKLIST							
ITEMS TO BE CHECKED	MON	TUE	WED	THU	FRI	SAT	SUN
DATE							
Incoming Cold Water Pressure, psi							
Incoming Hot Water Pressure, psi							
Post Blend Valve Pressure, psi							
Water Temperature Post-Blend Valve							
Pre-City Booster Pump Pressure, psi							
Post-City Booster Pump Pressure, psi							
Multi-Media Depth Filter (if used)							
Pre-Filter Pressure, psi							
Post-Filter Pressure, psi							
ΔP PSI Across Filter, psi (<15 psi)							
Hurricane Filter (if used)							
Pre-Filter Pressure, psi							
Post-Filter Pressure, psi							
ΔP Across-Filter, psi (<15 psi)							
Drain Open?							
Big Blue #1 and or #2 (if used)							
Pre-Filter Pressure, psi							
Post-Filter Pressure, psi							
ΔP PSI Across Filter, psi (<15 psi)							
Multi-Cartridge Housing (if used)							
Pre-Housing Pressure, psi							
Post-Housing Pressure, psi							
ΔP PSI Across Housing, psi (<15 psi)							
Iron Removal Filter (if used)							
Pre-Filter Pressure, psi							
Post-Filter Pressure, psi							
ΔP Across Filter, psi (<15 psi)							
Pre-Filter Iron, ppm							
Post-Filter Iron, ppm							
Water Softener, #1 (if used)							
Pre-Softener Pressure, psi							
Post-Softener Pressure, psi							
ΔP Pressure, psi (<15 psi)							
Pre-Softener Hardness, grains							
Post-Softener Hardness, grains							
Salt in Brine Tank? (>50%)							
< CONTINUED >							

Sample Pre-Treatment Daily Checklist

PRE-TREATMENT SYSTEM QUALITY ASSURANCE CHECKLIST							
ITEMS TO BE CHECKED	MON	TUE	WED	THU	FRI	SAT	SUN
Water Softener, #2 (if used)							
Pre-Softener Pressure, psi							
Post-Softener Pressure, psi							
ΔP Pressure, psi (<15 psi)							
Pre-Softener Hardness, grains							
Post-Softener Hardness, grains							
Salt in Brine Tank? (>50%)							
Dealkalizer (if used)							
Pre-Dealkalizer Pressure, psi							
Post-Dealkalizer Pressure, psi							
ΔP Pressure, psi (<15 psi)							
Pre-Dealkalizer pH level (weekly)							
Post-Dealkalizer pH level (weekly)							
Organic Scavenger							
Pre-Scavenger Pressure, psi							
Post-Scavenger Pressure, psi							
ΔP Pressure, psi (<15 psi)							
Carbon Tank, 1A (Worker)							
Pre-Tank Pressure, psi							
Post-Tank Pressure, psi							
ΔP Pressure, psi (<15 psi)							
Post-Tank Total Chlorine, ppm							
Post-Tank Free Chlorine, ppm							
Carbon Tank, 1B (Worker)							
Pre-Tank Pressure, psi							
Post-Tank Pressure, psi							
ΔP Pressure, psi (<15 psi)							
Pre-Tank Total Chlorine, ppm							
Post-Tank Free Chlorine, ppm							
Carbon Tank, 2A (Polisher)							
Pre-Tank Pressure, psi							
Post-Tank Pressure, psi							
ΔP Pressure, psi (<15 psi)							
Pre-Tank Total Chlorine, ppm							
Post-Filter Free Chlorine, ppm							
< CONTINUED >							

APPENDIX C

EMPTY BED CONTACT TIME (EBCT CALCULATION)

To Calculate Carbon Needed for a specific Empty Bed Contact Time (EBCT):

- First equation:

$$\text{NUMBER of RO MEMBRANES} \times 1.25 \times 2 = \text{RO GPM (gallons per minute)}$$

- *Example:* for a 50% recovery RO with 4 membranes:

$$4 \times 1.25 \times 2 = 10$$

- Second equation:

$$\text{RO GPM} \times \text{EBCT(minutes)} \div 7.48 = \text{Total Cubic Feet of Carbon}$$

- *Example:* 12 minutes EBCT required

$$10 \times 12 \div 7.48 = 16$$

* 16 Total Cubic Feet of Carbon required for the Worker and Polisher. So the Worker will get 8.0 cubic feet and the Polisher will get 8.0 cubic feet.

To Calculate Empty Bed Contact Time (EBCT) Flow Rate in Minutes:

- Equation:

$$\text{Total Cubic Feet of Carbon} \times 7.48 \div \text{RO GPM} = \text{EBCT Flow Rate in Minutes}$$

- *Example:* 16 Cubic Feet of Carbon with 10 RO GPM

$$16 \times 7.48 \div 10 = 11.968 \text{ minutes} \quad * \text{ Round to 12 minutes}$$

APPENDIX D

PRE-SHIP TEST DATA

