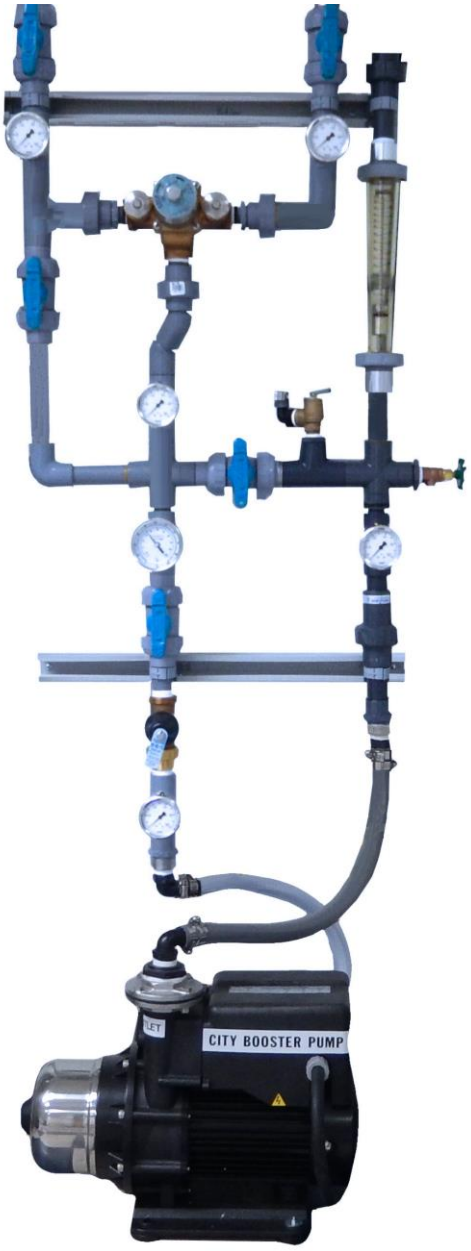
Better Water LLC

Wall-Mounted
Pre-Treatment Rack

Operator Manual



rev. Jan 2019

Better Water LLC; 698 Swan Dr; Smyrna, TN 37167; www.betterwater.com

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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.**

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 (*purchase orders*)	Fax	(615) 355-6065
	Email	orders@betterwater.com
	Phone	(615) 355-6063
Customer Service (*returns*)	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 System 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 System.

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 and boost the pressure to an acceptable level to operate the system, 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^{o} F or above 90^{o} F.

10. This device should not be used for purposes outside the device's stated applications, specifications, or limitations.

QUICK REFERENCES

- Specifications, Features, and Requirements

- Maintenance Schedule

- Related Consumable and Replacement Parts

SPECIFICATIONS	
Capacity at 77°F	Tempered water flow-rate, up to 27 gallons per minute
Operating Weight	- Pre-Treatment Rack: 35 lbs. - City Boost Pump (*not attached to wall*): 25 lbs.
Dimensions	- The rack should be attached to the wall, leveled, and with adequate operator access. - Dimensions for rack on the wall *(optimum):* Height 80" x Width 40" x Depth 15" - Floor Space for City Boost Pump *(not attached to wall)* Height 9" x Width 17" x Depth 9"
Electrical	110 vac / 230 vac, 60 Hz, single phase - or - 208 vac, 60 Hz, three phase
FEATURES	
Components	- Blend valve - Flow-Meter, 3 – 30 gallons per minute - Gauges: cold water pressure, hot water pressure, post-blend valve pressure, pre-city booster pump pressure, post-city booster pump pressure - Temperature Gauge - Pressure Relief Valve - Check Valve - Water Leak Detector *(optional)* - City Booster Pump
REQUIREMENTS	
Electrical	- Dedicated outlets, protected against electrical surges, and be on a stable power supply, within 6 feet of the components requiring power. - Do not use power strips or extension cords. - 1 phase 110 vac / 230 vac, 60 Hz; 20 amp breaker - 3 phase 208 vac, 60 Hz; 20 amp breaker
Incoming Water	- **Requirements:** The importance of monitoring the municipal tap water cannot be understated. The condition of the feed water will determine which pre-treatment component devices are required **Pressure:** 25 psi *(minimum)* to 50 psi *(maximum),* 40 psi *(optimum).* The minimum pressure must be maintained with water flowing at the maximum required flow rate, which is dynamic pressure, not static pressure. **Flow Rate:** 27 gallons per minute - **Feed Water Supply Connection:** 1 1/2" female NPT threaded water connections, both hot and cold water, with an adjacent shut-off valve. These are piped to 1" connections on the rack.
Drains	- A drain capable of discharging at least 20 gallons per minute.

MAINTENANCE SCHEDULE							
MAINTENANCE TASKS	**Each Shift**	**Daily**	**Monthly**	**3 Months**	**6 Months**	**12 Months**	**Other**
Check the system for leaks	X	X					
Monitor the system for unusual sounds	X	X					
Record operational values such as pressures and flow-rate	X	X					
Clean external surfaces			X				
Perform chemical, microbial, and endotoxin testing on feed and product water as per AAMI requirements.							**Periodic**

RELATED CONSUMABLE and REPLACEMENT PARTS

DESCRIPTION	PART#	PICTURE
Ball Valve, 1”, Blue Handle, Asahi	PLVAS8C0010-A	
Temperature Gauge, 0-200°F, 3” dial	PLGAOO00433	
Pressure Gauge, 0-100 psi, 2 1/2" dial - Cold Water Pressure - Hot Water Pressure - Post-Blend Valve Pressure - Pre-City Booster Pump Pressure - Post-City Booster Pump Pressure	PLGAOO00434	
Flow-Meter, 3-30 gpm	PLGAOO01787	
Pressure Regulator Valve, 1”, Brass	PLVABR00257	
Blend Valve, 1”, 7-400	PLVABR00261	
Drain Valve, 3/4", Brass	PLVABR00416	
Pressure Relief Valve	PLVABR01835	

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

RELATED CONSUMABLE and REPLACEMENT PARTS

DESCRIPTION	PART#	PICTURE
Check Valve, 1”	**PLVAS800158**	
Hose, Style 5000, 3/4"	**PLHOST00315**	
Hose, Style 5000, 1”	**PLHOST00316**	
Hose, Clear Suction, 1”	**PLHOSU01237**	
City Booster Pump: Walrus TQI-2200; 3HP / 1 Phase Walrus TQ-2200; 3HP / 3 Phase	**EQPUWA00248** **EQPUWA00249**	
City Booster Pump: Walrus TQ-800; 1 HP / 1 Phase	**EQPUWA00251**	

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

DEVICE INFORMATION

MODELS

There is only one model of the Wall-Mounted Pre-Treatment Rack. The city boost pump may vary but the operation and service for these are the same, with any differences noted.

Model	Specifications
WM-PRE-2101-CE	1" CPVC piping, 7-400 Blend Valve, Electric Controlled Pump, 1 HP, 115V, Single Phase
WM-PRE-4101-CE	1" CPVC piping, 7-400 Blend Valve, Electric Controlled Pump, 3 HP, 230V, Single Phase
WM-PRE-4103-CE	1" CPVC piping, 7-400 Blend Valve, Electric Controlled Pump, 3 HP, 208V, Three Phase

PRODUCT 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.

It is a wall-mounted rack is a with CPVC piping, which includes an electronic controlled pump which is connected to the rack with hosing.

BASIC COMPONENTS

Most Pre-Treatment Racks have the following basic components:

1. The **Blend Valve** blends incoming hot and cold water to the optimum operating temperature of the entire water treatment system.

2. The **City Booster Pump** is 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
   - Pre-City Booster Pump Pressure
   - Post-City Booster Pump Pressure

2. **Temperature Gauge** for monitoring the water temperature after the blend valve.

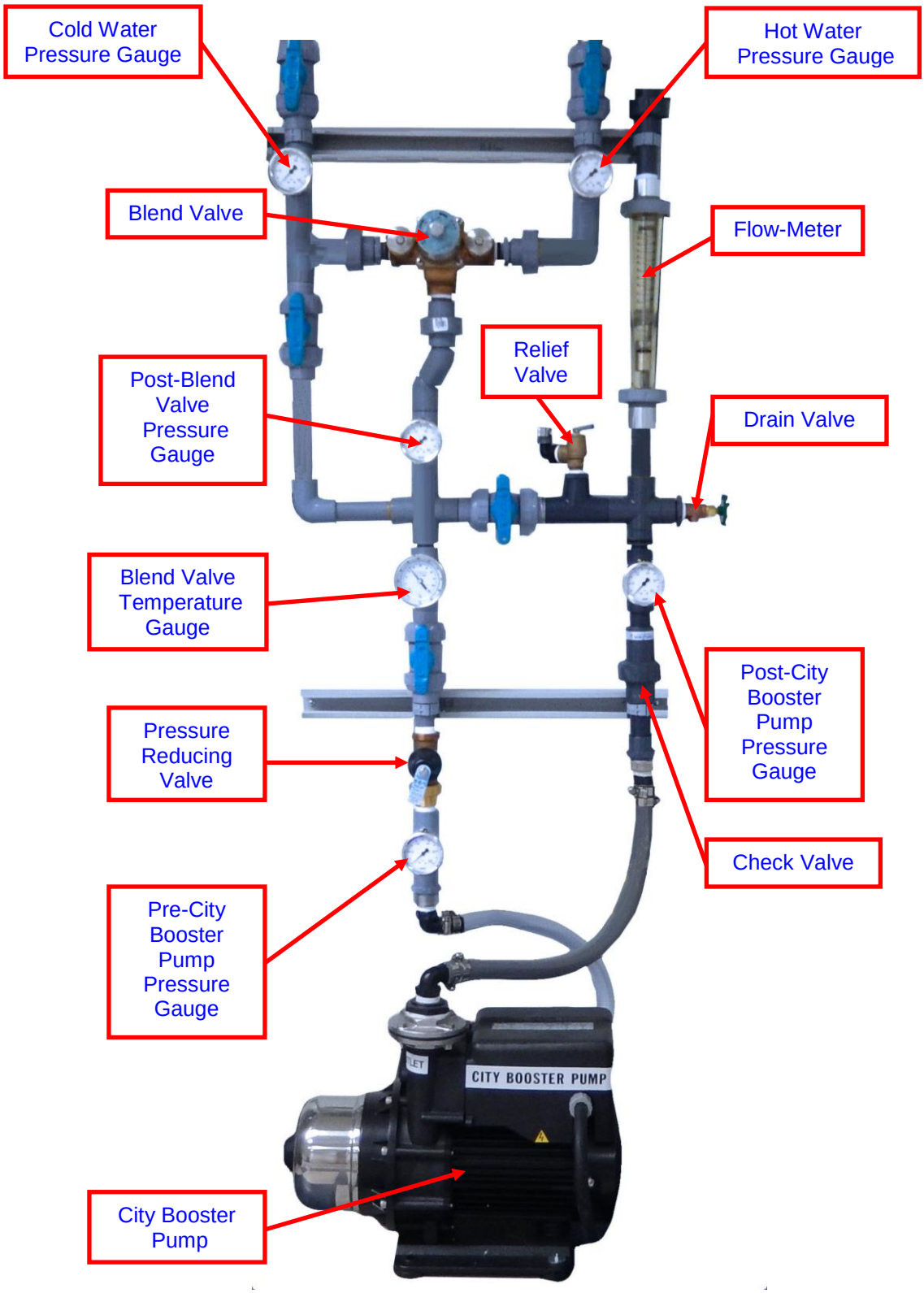
3. **Pressure Relief Valve** automatically opens to drain if pressure reaches 100 psi

4. **Check Valve** which allows water to flow only in one direction.

5. **Flow-Meter** measuring 3 to 30 gallons per minute.

6. **Water Leak Detector** *(optional)* will sound an audible alarm and close the Main Water Shutoff Valve if water is detected on the remote surface probe. See "System Components" for more information.

DETAILED VIEW



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.
ΔP = Inlet Pressure – 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 allow monitoring of pressure throughout the water system. 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 pressure gauges in the system are 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 a mechanical device that 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: City Booster Pump

DESCRIPTION:
The city booster pump is a stainless steel, multi-stage, centrifugal pump designed for continuous duty service. The pump starts automatically when there is a demand for water. This pump is designed for boosting water pressure for circulation service.

Pump models may vary between devices.

part#
EQPUWA00248
City Boost Pump,
3HP, 1 Phase
Walrus TQI-2200

- or -

part#
EQPUWA00249
City Boost Pump,
3HP, 3 Phase
Walrus TQ-2200

- or -

part#
EQPUWA00251
City Boost Pump,
1HP, 1 Phase
Walrus TQ-800

MONITORING REQUIREMENTS:
Daily: Monitored to ensure desired pressure is maintained.

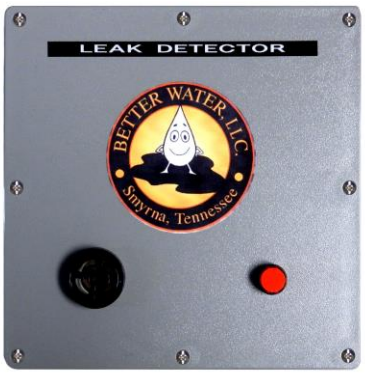
MAINTENANCE:
** See System Maintenance section for priming instructions.*

SYSTEM COMPONENTS: Water Leak Detector

DESCRIPTION:

This Water Leak Detector Box is an *optional* component 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. **Water Leak Detector Box** which contains the detector control module, alarm piezo, and alarm light.
2. **Remote Surface Probe** which is the actual water detector, and is hardwired into the box's detector control module.
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.



Water Leak Detector Box

part# for complete kit
EQSUBWLD

Remote Surface Probe

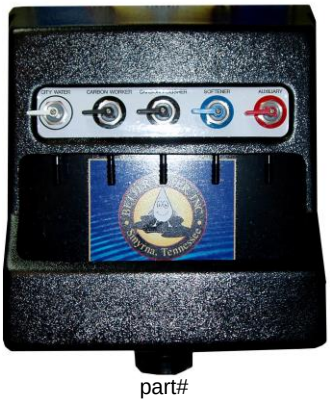
Solenoid Valve

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.



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 & INITIAL-START-UP

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. 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.

4. Bleed air from the city booster pump.

5. Verify that the city booster pump's power cord is connected to an appropriate electrical outlet.

6. Verify the **City Booster Pump** is **ON:**
- For the Walrus TQ Series… verify that the POWER SWITCH located on the pump is **ON**.

Walrus TQ Series Pump

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.

VALVES LEGEND and OPERATION

1. Incoming Cold Water Valve
Open or close for cold water source.
* OPEN during normal operation

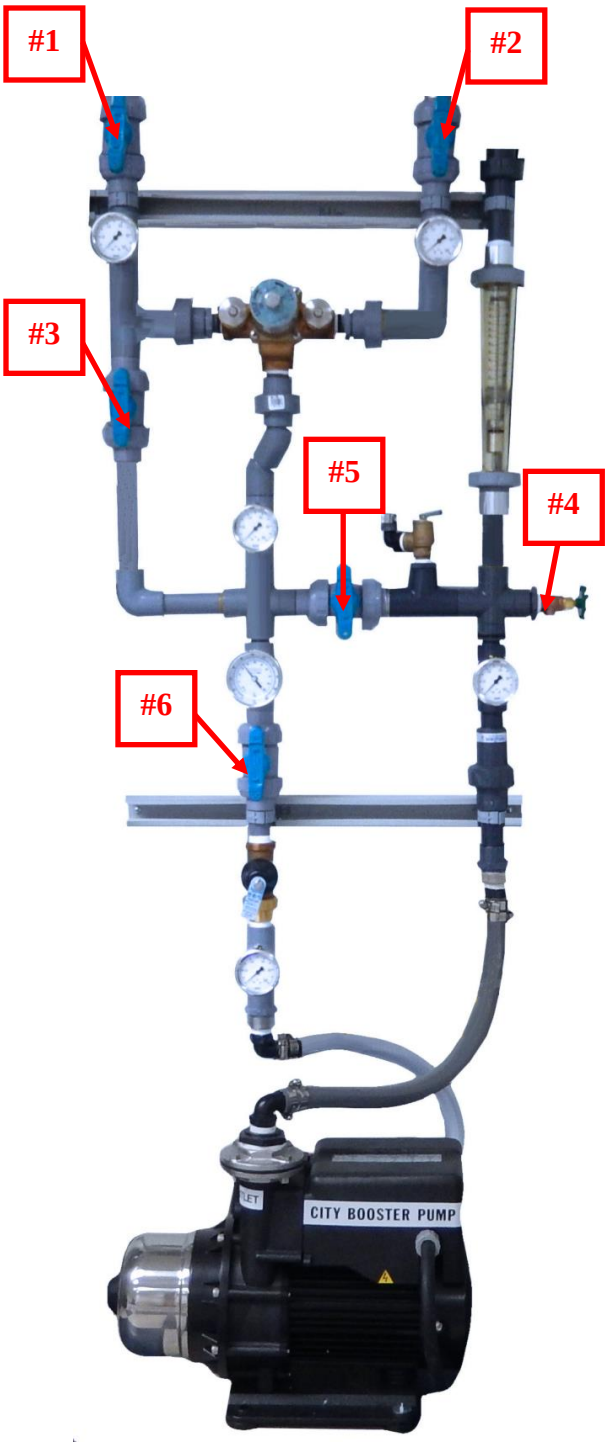
2. Incoming Hot Water Valve
Open or close for hot water source.
* OPEN during normal operation

3. Cold Water Blend Valve By-Pass Valve
Open only if only cold water is needed, and not blended water. If opened, then close valve 2.
* CLOSED during normal operation

4. 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

5. City Booster Pump By-Pass Valve
Open only if maintenance is required on the city booster pump. If opened, then close valve 6.
* CLOSED during normal operation

6. City Booster Pump Inlet Valve
Close only if maintenance is required on the city booster pump. If closed, then open valve 5.
* OPEN during normal operation



DAILY START-UP

There is no daily start-up other than verifying that the city booster pump is powered on. When powered it runs automatically, and will turn on when a reduction in water pressure is sensed, and turn off, when the maximum pressure has been achieved.

MONITORING PROCEDURES

The Pre-Treatment System **must be monitored** on a **daily** basis by a **qualified technician** recording the items listed below on a **Quality Assurance Checklist**. An example checklist for both Daily and Periodic use is provided in the **Appendix** of this manual and may be reproduced for use. The list below is specific to this Pre-Treatment Rack, although the sample checklist includes all the possible pre-treatment component devices available 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

The City Booster Pump runs automatically as long as it's **ON/OFF Switch** is **ON**.

To turn the City Booster Pump off, simply turn its **ON/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.*

WATER LEAK DETECTOR

The water leak 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. 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. 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:

UNPLUG the WATER LEAK DETECTOR BOX

a. Unplug the power cord for the Water Leak Detector Box from the electrical receptacle.
- This will silence the alarm, and the main water shutoff solenoid will remain closed.

b. Determine the source of the water that caused the alarm and correct the problem.
c. Lift and dry the remote surface probe with a clean dry cloth or paper towel, then return to its original location.
d. Once the condition that caused the alarm has been corrected, plug the power cord back into an electrical receptacle.

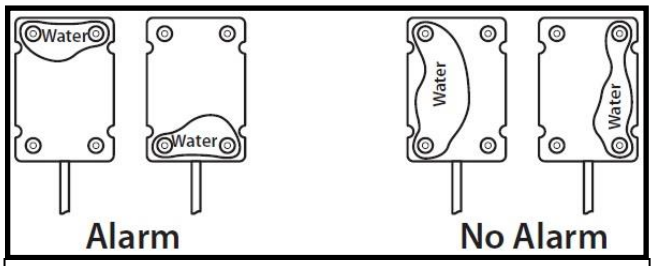
DRY THE REMOTE SURFACE PROBE

a. 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.

b. 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.

Remote Surface Probe and connecting cable



Water must touch either of the two end contacts in order to trigger an alarm condition.

SYSTEM MAINTENANCE

MAINTENANCE SCHEDULE							
MAINTENANCE TASKS	**Each Shift**	**Daily**	**Monthly**	**3 Months**	**6 Months**	**12 Months**	**Other**
Check the system for leaks	X	X					
Monitor the system for unusual sounds	X	X					
Record operational values such as pressures and flow-rate	X	X					
Clean external surfaces			X				
Perform chemical, microbial, and endotoxin testing on feed and product water as per AAMI requirements.							**Periodic**

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:

PUTTING SYSTEM INTO STORAGE

1. Disconnect power, then coil and secure the power cord.

2. Drain water from the pre-treatment system.

3. Disconnect from water source and drains.

4. Remove any media or filters.

5. Let the component devices air-dry.

6. Zip-tie plastic bags over all openings to prevent contamination:

BRINGING SYSTEM BACK FROM STORAGE

1. Remove protective plastic bags from openings.

2. Wipe down filter cartridge housings and media tanks should be wiped down with a mild bleach solution before installing new cartridges and new media.

3. Install new filters and media.

4. Reconnect to water source and drains.

5. Reconnect to power.

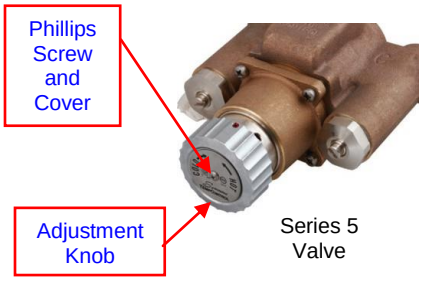
6. Sample feed and product water as per your procedures and AAMI requirements.

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.



Series 5 Valve

2. Turn the Adjustment Know 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.

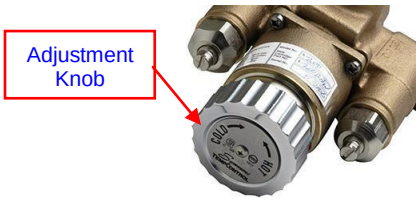
7. Adjustments should be made in small increments, allowing time for the newly blended water to be pulled through the blend valve and for the Temperature Gauge to stabilize.

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.



Series 6 Valve

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 77ºF at the RO.

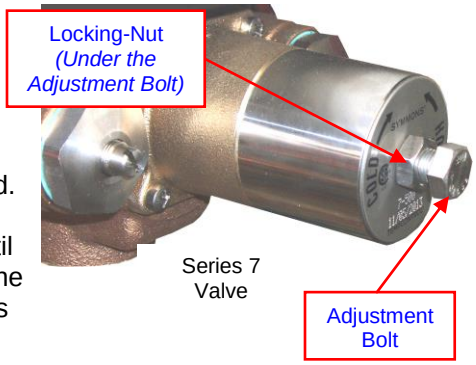
7. Any further adjustments should be done by turning the Adjustment Knob in small increments. Allow time for the newly blended water to be pulled through the Blend Valve and for the Temperature Gauge to stabilize.

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 77ºF 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 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.

Air Bleed Screw

City Boost Pump

Walrus TQI-2200,
3 HP, 1 Phase

- or –

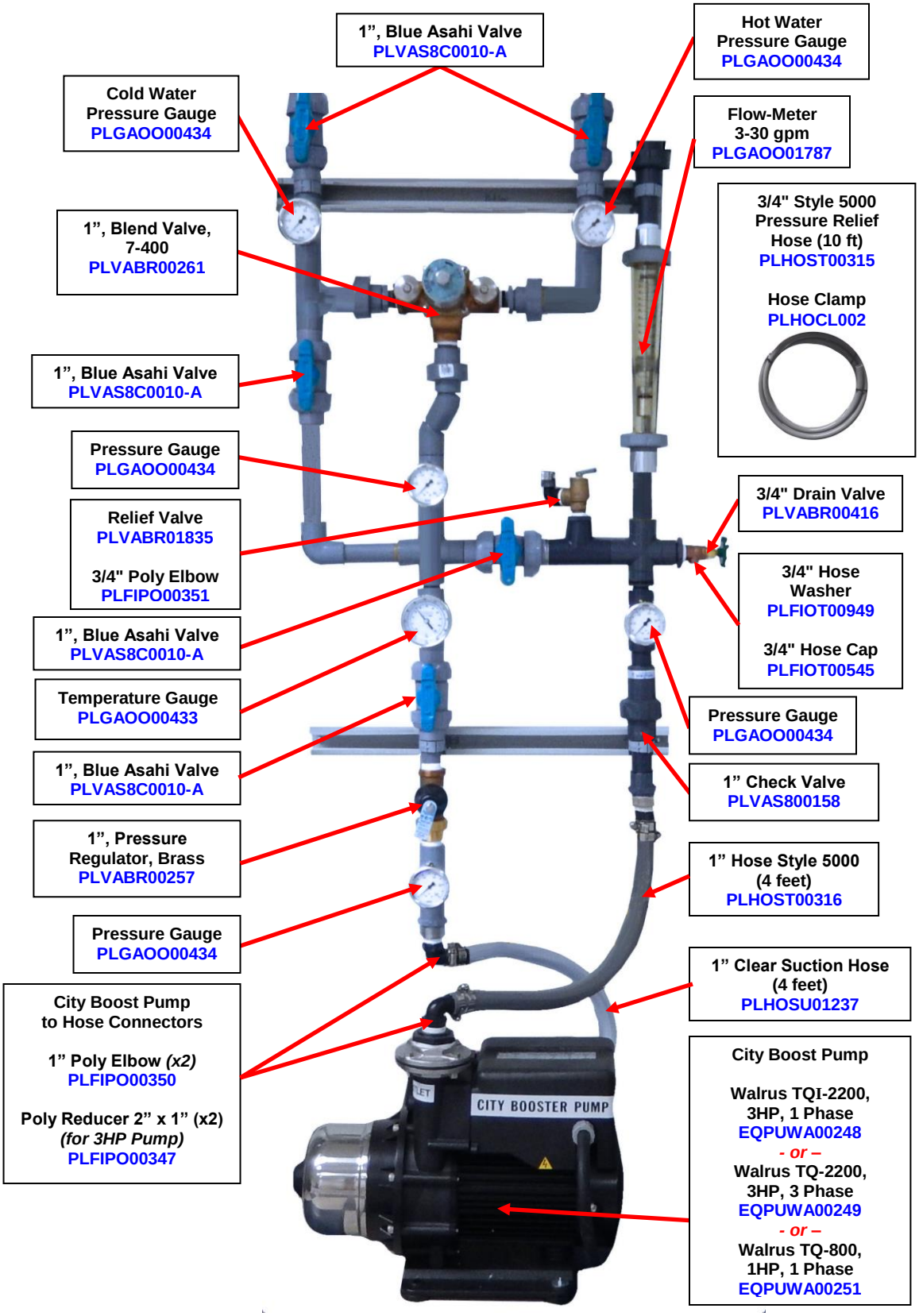
Walrus TQ-2200,
3 HP, 3 Phase

City Boost Pump

Walrus TQ800
1 HP, 1 Phase

SERVICE HELP

SERVICE HELP: 1” Wall-Mounted Rack, CPVC



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 of 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

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**
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							
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 >							

Sample Pre-Treatment Daily Checklist

PRE-TREATMENT SYSTEM QUALITY ASSURANCE CHECKLIST							
ITEMS TO BE CHECKED	**MON**	**TUE**	**WED**	**THU**	**FRI**	**SAT**	**SUN**
Multi-Cartridge (if used)							
Pre-Housing Pressure, psi							
Post-Housing Pressure, psi							
ΔP PSI Across Housing, psi (<15 psi)							
Big Blue Filter, #1 and/or #2 (if used)							
Pre-Filter Pressure, psi							
Post-Filter Pressure, psi							
ΔP Pressure, psi (<15 psi)							
U.V. Light (if used)							
Pre-U.V. Light Pressure, psi							
Post-U.V. Light Pressure, psi							
Light On?							
Technician's Initials							

Sample Pre-Treatment Periodic Checklist

PRE-TREATMENT SYSTEM QUALITY ASSURANCE CHECKLIST		
ITEMS TO BE CHECKED	**Tech Initials**	**Date**
Pre-Carbon Hurricane Filter (if used)		
Date of Last Filter Change (every 30 days)		
Pre-Carbon Big Blue Filter, #1 (if used)		
Date of Last Filter Change (every 30 days)		
Pre-Carbon Big Blue Filter, #2 (if used)		
Date of Last Filter Change (every 30 days)		
Pre-Carbon Multi-Cartridge Housing (if used)		
Date of Last Filter Change (every 30 days)		
Post-Carbon Big Blue #1 Filter (if used)		
Date of Last Filter Change (every 30 days)		
Post-Carbon Big Blue, #2 (if used)		
Date of Last Filter Change (every 30 days)		
Post-Carbon Sediment Filter; Multi-Cartridge (if used)		
Date of Last Filter Change (every 30 days)		
U.V. Light (if used)		
Date of Last U.V. Bulb Change (every 12 months)		
Date of Last Quartz Sleeve Clean (every 6 months)		
Date of Last Quartz Sleeve Change (as necessary)		

APPENDIX C

CALCULATIONS & CONVERSIONS

CONVERSION FORMULAS

OUNCES to MILLILITERS
Formula: **Fluid Ounces x 29.6 = Milliliters**
Example: 128 oz x 29.6 = 3790 milliliters

MILLILITERS to OUNCES
Formula: **Milliliters / 29.6 = Ounces**
Example: 750 ml / 29.6 = 25.34 ounces

GALLONS to OUNCES
Formula: **Gallon * 128 = Ounces**
*Example: 1 gal * 128 = 128 ounces*

OUNCES to GALLONS
Formula: **Ounces / 128 = Gallons**
Example: 128 ounces / 128 = 1 Gallon

EMPTY BED CONTACT TIME (EBCT CALCULATION)

To Calculate Carbon Needed for a specific Empty Bed Contact Time (EBCT):
- First equation:
NUMBER of RO MEMBRANES x 1.25 x 2 = PRE-TREAT FLOW RATE GPM (gallons per minute)

- *Example:* for a 50% recovery RO with 4 membranes:
4 x 1.25 x **2** = **10**

- Second equation:
PRE-TREAT FLOW RATE GPM x **EBCT(minutes)** ÷ **7.48** = **Total Cubic Feet of Carbon**

- *Example: 12 minutes EBCT required*
10 x 12 ÷ 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:
Total Cubic Feet of Carbon x 7.48 ÷ PRE-TREAT FLOW RATE GPM = EBCT Flow Rate in Minutes

- *Example: 16 Cubic Feet of Carbon with 10 PRE-TREAT FLOW RATE GPM*
16 x 7.48 ÷ 10 = 11.968 minutes
** Round to 12 minutes*

NOTES


BETTER WATER LLC
Smyrna, Tennessee