Better Water LLC

PB2
Mediport Portable RO
Operator Manual

rev. Sep 2021

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
- 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 PDF 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 **PB2** is manufactured to the utmost quality. With proper care, preventative maintenance, and proper use, it should provide you with a very effective means of treating water for dialysis treatments.

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 **PB2**.

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

Once 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 and Service Manuals. Keep this manual and other associated documentation for future reference.

2. Misuse, improper operation, and/or improper monitoring of this system could result in serious injury, death, or other serious reactions to patients undergoing hemodialysis treatment.

3. Misuse, improper use or handling of disinfectants and chemical cleaning solutions could result in serious injury or even death. You must comply with the information contained in the Material Safety Data Sheet (MSDS) for the chemical being used.

4. To avoid electrical shock hazard, do not operate this device when the covers or panels are removed.

5.  **ELECTROMAGNETIC INTERFERENCE: This device can create and radiate radio frequency energy and may cause harmful interference if not installed according to the manufacturer's instructions**.

CAUTIONS

1. 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

- PB2 Specifications, Requirements, and Features

- Differences Between PB2 Models 120V versus 220V

SPECIFICATIONS		
Capacity at 77°F	2600 cc's/min *(1000 gallons per day minimum)*	
Recovery Rate	50%	
Operating Weight	110 lbs.	
Dimensions	Height 30 ¾" x Depth 12" x Width 20 ½"	
Electrical *(two models)*	120 vac, single phase, 6.5 amps 220 vac, single phase, 6.5 amps	
Operating Decibels	55 dB	
Electromagnetic Interference *This equipment generates, uses, and can radiate radio frequency energy. If not used in accordance with these instructions, it may cause harmful interference to other devices in the vicinity.*	If such interference is determined to be coming from the PB2, then do the following to correct: - Reorient, relocate, and/or increase separation between the PB2 and the device experiencing the interference. - Connect the PB2 to a different electrical circuit than the device experiencing the interference.	
REQUIREMENTS		
Electrical	It is recommended that the PB2 be plugged into a dedicated G.F.I. plug, and be on a stable power supply. Do not use power strips or extension cords, and do not operate on an emergency electrical supply or any unstable power supply that may supply over or under voltage.	
Incoming Water Requirements	Flow/Pressure Total Chlorine Chloramines Silt Density Index Operating pH Range Optimum pH range Total Iron Total Hardness Temperature Range Optimum Water Temp.	Minimum: 2.2 gpm at greater than 10 psi <0.1 parts per million (ppm) < .01 parts per million (ppm) < 5 3 – 11 5 – 8 < 0.1 parts per million (ppm) < 10 grains per gallon (gpg) 50°F - 85°F 77°F (25°C) The PB2 is normally connected to a cold water supply. The performance specifications are based on 77°F (25°C) feed water temperature. The PB2 product flow will decrease approximately 1.5% with each degree Fahrenheit drop, or 3% with each degree Celsius drop. Serious damage can result if the temperature reaches or drops below freezing.
Drain Requirement	Drain capable of discharging 2 gpm	
General Operating Pressures	Filter-In: 20-40 psi, Filter-Out: 10-40 psi, Pump: 90-150 psi, Product: 0-70 psi	
FEATURES		
Membrane	One - 4" x 21" TFC Membrane	
Internal Filters	Pre Filter, 5 micron Filter *(sediment)* Pre Filter, 10" Carbon Block *(chlorine/chloramines)* Final Filter, Capsule Filter *(pyrogen)*	
Standard Alarms	Poor Water Quality, Low Feed Pressure	
Pressure Gauges	Filter-In, Filter-Out, Pump, Product	
Water Quality Monitor	Digitally displays: % Rejection, Feed TDS, Product TDS, and Alarm Set Point	

DIFFERENCES BETWEEN PB2 MODELS 120V versus 220V

The operation and maintenance are the same for all models of the PB2, but there are a few parts that are either different or require setup to be used with a specific voltage.

1. The following PB2 parts are different between the PB2 models:

Part Description	120V Model Part#	220V Model Part#
Transformer *(control box)*	ELMTTR00739	ELMTTR01907
Contactor *(control box)*	ELSICN009	ELSICN008
Piezo-Alarm *(control box)*	ELSAPZ01097	ELSAPZ01748
Red Indicator Light *(control box)*	ELPLLP00741	ELPLLP01362
Water Quality Monitor/Display Board *(control box)*	EQMOCO1067	EQMOCO1069
Cooling Fan *(internal)*	ELPBFN01036	ELPBFN01044
Recirculation Hydro-Block Assembly *(internal)*	EQSUBPB2HYDRECIRC	EQSUBPB2HYDRECIRC220
1/2HP Motor	EQMTOO00920	EQMTOO00921

2. PB2's Power Cord has Different Ends

The PB2's power cord, part number **ELPCOO00200**, comes with the standard 120V, three prong plug connection. If purchased it must have that connection cut off, and the following 220V, two prong plug connection added to it in order for it to be compatible with the 220V model.
- Part number: **ELHBPL01362** **"220V Euro Plug for PB2"**

3. External Accessories are different between the PB2 models:

Part Description	120V Model Part#	220V Model Part#
PB2 UV Light Assembly *(VT4 complete with fittings)*	EQSUBUVPB2	EQSUBUVPB2220
PB2 UV Light *(VT4 UV light only)*	SUUV02017	SUUV02018
PB2 UV Light + Dual 20" Big Blue Filters Assembly	EQASSY20BB/UV	EQASSY20BB/UV220
PB2 UV Light, Power Supply/Ballast	EQSUBUVPB2-1	EQSUBUVPB2-3
Booster Pump Assembly *(complete with fittings)*	EQSUBPB2BP	EQSUBPB2BP-220V
End to End Disinfect Pump Adaptor	EQSUBPB2BP01925	EQSUBPB2BP01927

IF TECHNICAL SUPPORT IS REQUIRED, it is vital that you inform the technician, at the onset of any communications the voltage model of the device in question.

DEVICE INFORMATION

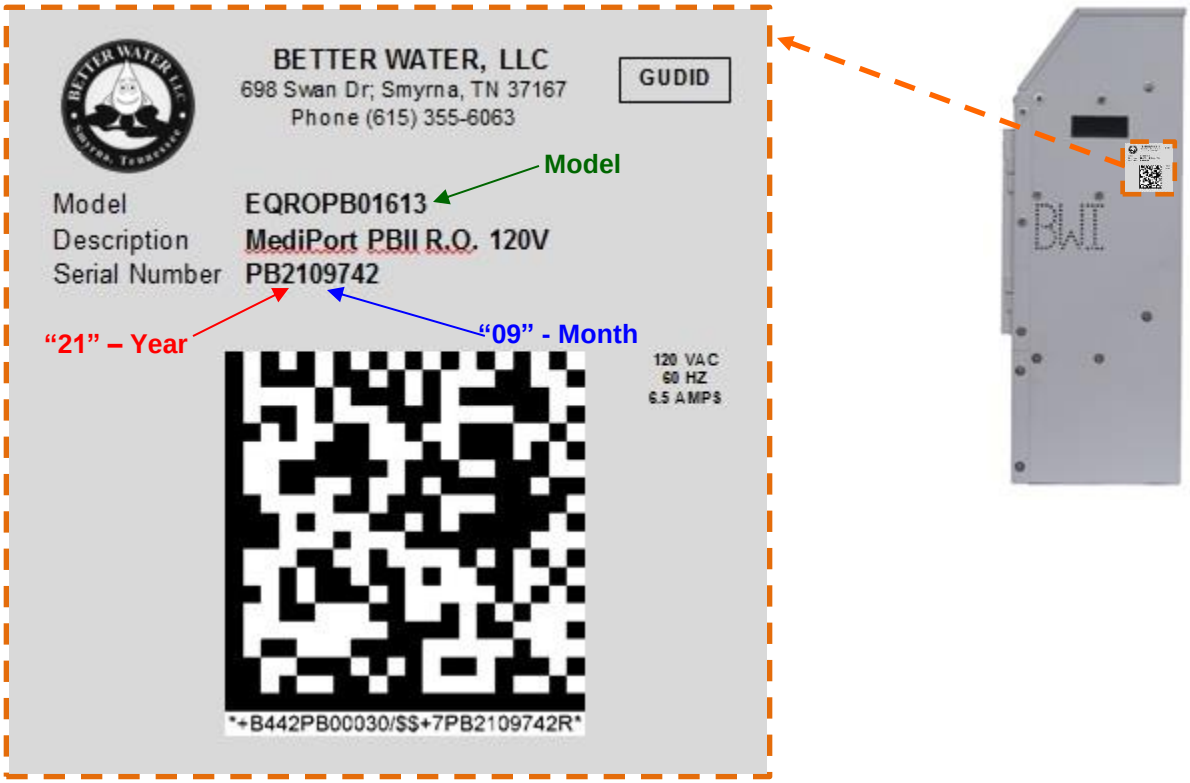
MODELS

There are two models of the **PB2**, based on the electrical requirements. The operation, service, and replacement parts of these two units are basically the same with the only difference being some electrical components.

Electrical
120 vac, single phase
220 vac, single phase

IMPORTANT INFORMATION FOR SUPPORT

Adhered to the side of the control box of each PB2 is a label containing important information relating to the specific unit, and details both the **Model** and **Serial Number**. Both of these pieces of information are very important in obtaining support, determining warranty, and properly servicing the unit. Please have this information available if you contact Technical Support.



The first four numbers in the serial number denote the year and month the device was manufactured. *In the example above the PB2 was produced in **2021**, in the month of **September**.*

PRODUCT DESCRIPTION

The PB2 is a versatile, user-friendly, portable reverse osmosis unit built for a number of hemodialysis applications such as acute, sub-acute, beside, and home, for both daily and nocturnal dialysis. It is extremely quiet, being rated at only 53 decibels. It also has a number of optional accessories to enhance its capabilities and functionality such as a booster pump, UV light, divert-to-drain, and carts.

BASIC COMPONENTS

1. The **Control Box** contains the electronic components for operational control, monitoring, and alarms, which includes the **Water Quality Monitor**.

2. Mounted on the front of the unit there are **Gauges** for monitoring operational status. These are the Filter-In, Filter-Out, Product, and Pump.

3. The **Top Panel** is hinged to fold forward to access the control box and the back of the Water Quality Monitor.

4. A hinged **Cabinet Door** is located on the front of the PB2 for easy accessibility to its inner components

5. There are three **Filters** on the inside of the cabinet:
- 10” 5 micron Filter – pre-treatment, sediment filtration
- 10” Carbon Block Filter – pre-treatment, chlorine/chloramines filtration
- Capsule Filter – post-membrane, pyrogen filtration

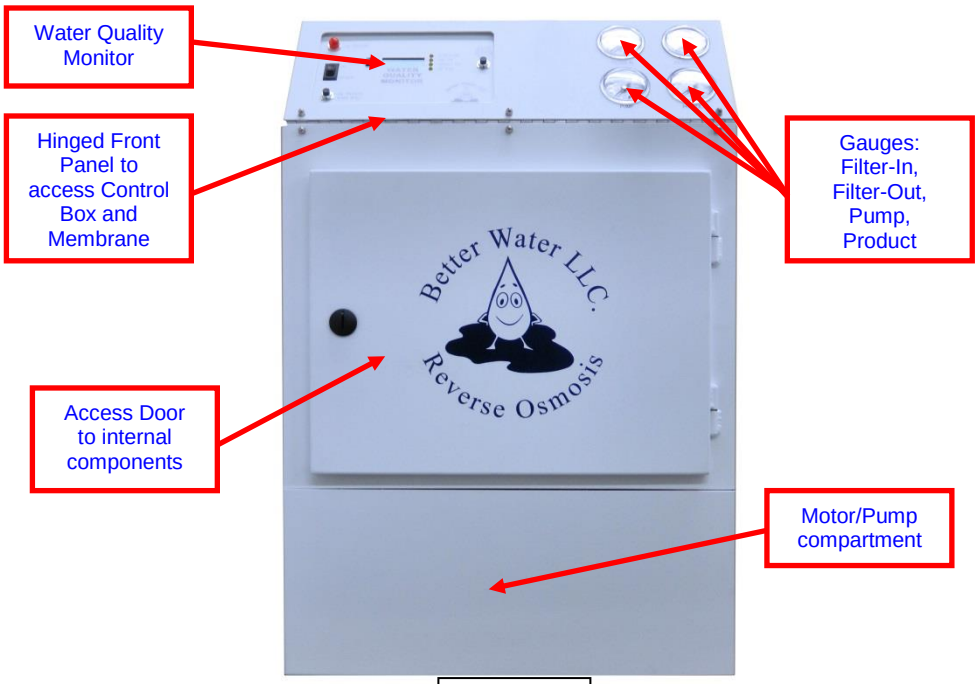
6. The center of the reverse osmosis process is a **4” x 21” Membrane** located inside the cabinet.

7. Removable **Bottom Panel** to access the compartment containing the **Motor** and **Pump**.

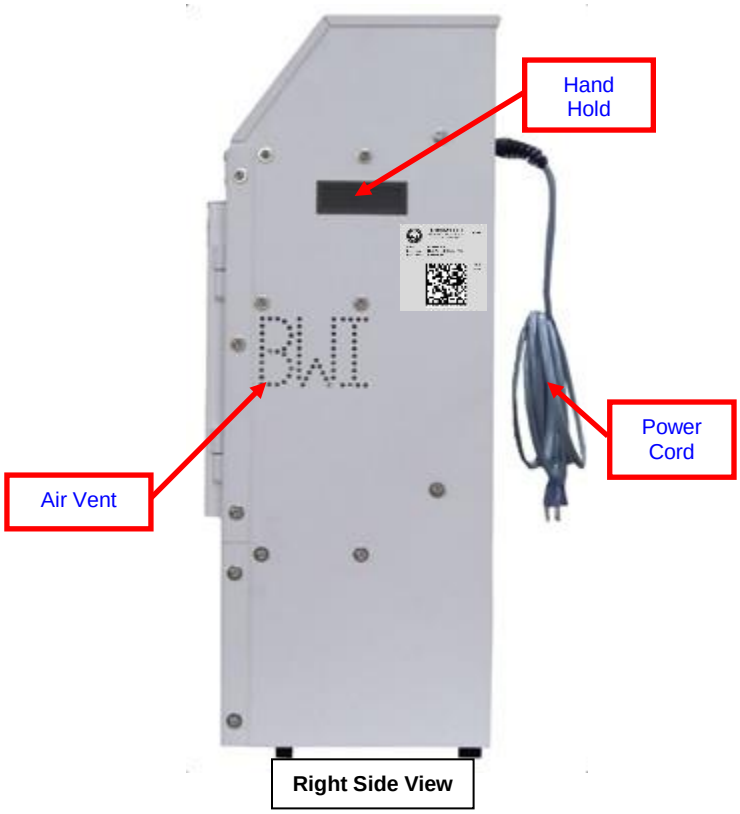
8. Located on the back of the PB2 is the **Accessories Connections and Electrical Panel**. Besides the power cord and two breakers (Hot & Neutral), are power and control connection points for a UV Light, Booster Pump, and Divert-to-Drain.

9. On the left side of the PB2 are many **Hose Connection Ports** for Water-In, Product-Out, Drain, Disinfect, Pre-Booster Pump, and Post-Booster Pump. There is also a manual Flush Valve.

DETAILED VIEWS

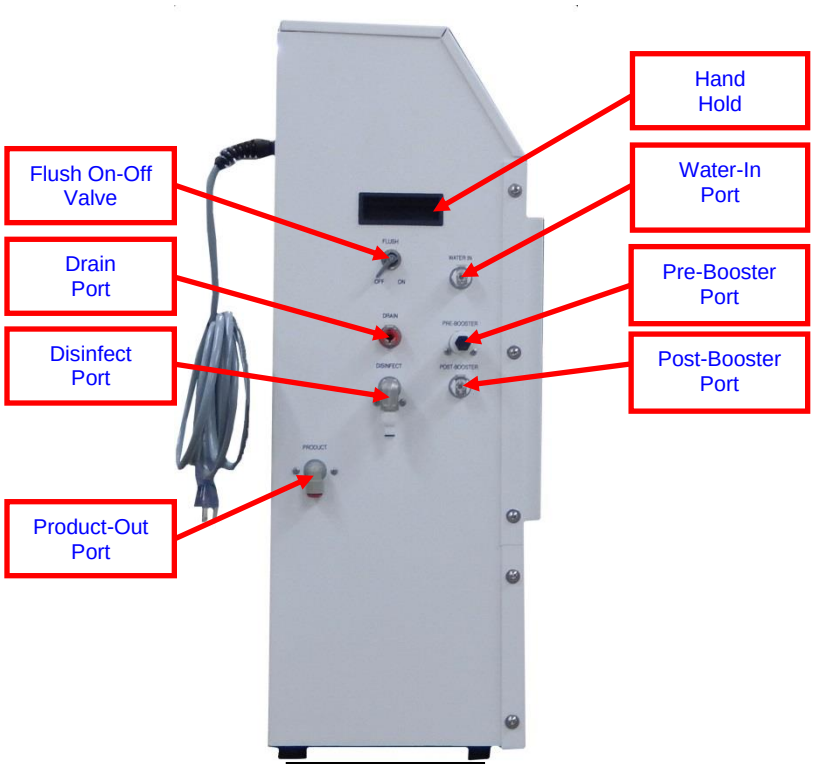


Front View



Right Side View

Back View



Left Side View

MONITOR and CONTROL SYSTEM

The **Control Box** contains the electronic components needed to operate the RO. The front panel has gauges, as well as the following: Operate switch, Low Pressure Alarm Light, Low Pressure Alarm Reset Button, Water Quality Monitor Mute Button, as well as the Water Quality Monitor's display and Mode Switch.

A **Water Quality Monitor** is a key component of the control box, which monitors and displays vital information concerning the quality of water. The digital display reports % Rejection, Feed TDS (total dissolved solids), Product TDS, and Set Point. The monitor's primary function is to alert when in a poor water condition and controls product and drain flow direction accordingly.

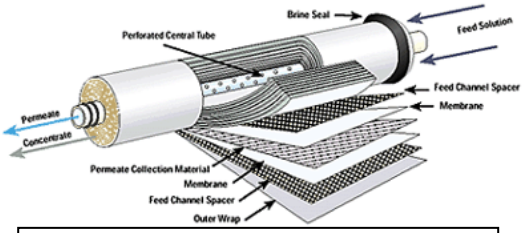
There are four **Gauges** for monitoring the various related pressures. These are Filter-In, Filter-Out, Pump, and Product.

There is a **Feed Water Low Pressure Switch** located on the suction side of the pump. This switch, in conjunction with the main control board, will shut down the pump in the event of insufficient fluid flow through the pump to prevent pump failure.

RO UNIT

The RO unit is housed inside a stainless-steel, insulated box and contains a variety of components. The components include the membranes, filters, pump, electrical, and plumbing parts required for the reverse osmosis process as well as distribution.

The **Membrane** is at the heart of the reverse osmosis process. This membrane is semi-permeable, allowing water that is being purified to pass through it, while rejecting the contaminants that remain. The reverse osmosis process uses the membrane to separate and remove dissolved solids, organics, pyrogens, and submicron colloidal matter from the water. The process is called "reverse" osmosis since it requires pressure to force water across the membrane, leaving the impurities behind. Reverse osmosis is capable of removing up to 99% of the total dissolved solids (TDS), thereby providing safe, and pure water.



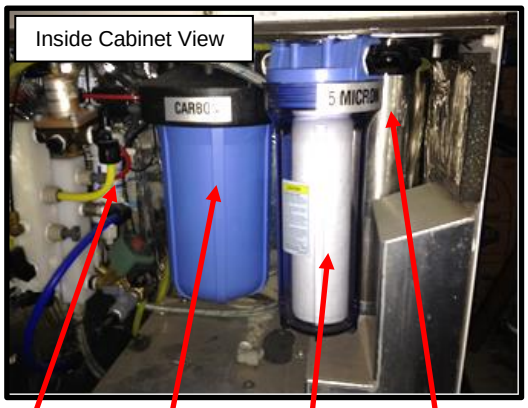
Cut-away example of a RO Membrane

A **Capsule Filter** is used to help reduce bacteria and endotoxins from the product water *(post--membrane)*. It is located inside the PB2 cabinet on the left side.

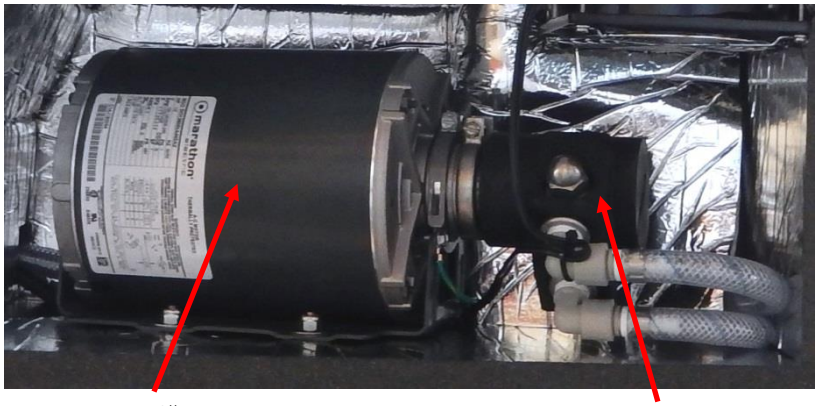
A **10" Carbon Block Filter** is located inside the PB2 cabinet to reduce chlorine and chloramine as part of pre-treatment from the feed water prior to the RO membrane. This cartridge contains extruded carbon.

A **5 micron Sediment Filter** provides another layer of sediment filtration as part of the pre-treatment from the feed water prior to the RO membrane, inside the PB2 cabinet.

The **4" x 21" Membrane** is located inside the PB2 cabinet inside a stainless-steel housing. It is the heart of the reverse-osmosis process for water-treatment.



The PB2 uses a stainless-steel **Pump** covered in a rubber boot to reduce noise. This works in conjunction with a **1/2" HP Motor** to pump water within the PB2 loop.



part#
EQMTOO00920
PB2 1/2HP Motor, 120V

- OR -

EQMTOO00921
PB2 1/2HP Motor, 220V

part#
EQSUBPB2PUMP
Pump Assembly

OPTIONAL ACCESSORIES: Short & Extended Carts

Better Water offers two models of carts to hold the PB2 and various accessories. Both are strong and lightweight, and includes casters, two of which lock. The extended cart is also designed to transport the dialysis machine as well.

Short Cart
- H 43.5” x L 28” x W 25.5”
- 63 lbs
- Part# **FXCROO01656**

Extended Cart
- H 43.5” x L 45.5” x W 25.5”
- 77 lbs
- Part# **FXCROO00890**
- Mounts the Dialysis Machine and either carbon tanks or a water softener.

Extended cart shown with PB2 and Dialysis Machine

OPTIONAL ACCESSORIES: Disinfect Jug

This Disinfect Jug makes the disinfect and cleaning process much easier, by providing a convenient and efficient way to mix chemical solutions, and connect the various hoses required during the process.
Comes complete with a Disinfect Hose and Short Product Adaptor Hose.

part#
EQASSYDISJUG
Disinfect Jug & Hoses

OPTIONAL ACCESSORIES: Booster Pump

This pump boosts the incoming water pressure to the PB2, and mounts onto the top bracket of either cart.
The pump is 1/4HP, single phase, and has been adapted to plug directly into the back of the PB2 via a twist-lock connector.
Comes complete with the pump and IN and OUT hoses.

part#
EQSUBPB2BP
Booster Pump Assembly, 120V
- or -
EQSUBPB2BP-220V
Booster Pump Assembly, 220V

OPTIONAL ACCESSORIES: Divert-to-Drain

The Divert-to-Drain will automatically divert the product water from the PB2 to drain when the water quality monitor detects a poor water condition. It includes a "Good Water Quality" Light, and connection ports for "Product Out", "From RO", and "To-Drain".

part#
EQDTD-PB2
PB2 Divert-to-Drain

There is a kit available to retrofit PB2s manufactured prior to 2013 with a new control box, Divert-to-Drain, and Cart Bracket, whose part# is **EQSUBPB2CB/DTD**.

OPTIONAL ACCESSORIES: UV Light

UV rays alter the DNA of many common waterborne bacteria and sterilize them preventing reproduction thus reducing them. This UV unit consists of a fused quartz sleeve which seals the lamp from direct water contact. This sleeve is housed in a stainless-steel treatment chamber. A power supply is provided which has been adapted to plug directly into the back of the PB2. Both the UV Light and its power supply mount to the cart.

part#
EQSUBUVPB2
PB2 UV Light with Power Supply, 120V
- or -
EQSUBUVPB2220
PB2 UV Light with Power Supply, 220V

OPTIONAL ACCESSORIES: 5 micron Pre-Filter

Additional sediment filtration is available from either a 10" or 20" 5 micron Pre-Filter which attaches to the cart. It Includes a pressure gauge for monitoring.

part#
EQASSY5.0MICRON
5 micron, 10" Pre-Filter

part#
EQASSY5.0MICRON20
5 micron, 20" Pre-Filter

OPTIONAL ACCESSORIES: 20” Carbon Block Filters

The carbon block filters pre-treat the source Water to reduce chlorine and chloramines. Since AAMI standards require a dual bed solution, which is a worker and polisher, there are multiple configuration options.
- Dual 20” Carbon Block Filters mounted to the cart. The internal carbon block filter can either be used or replaced with a short bowl.
- A Single Carbon Block Filter can also be used in conjunction with a portable carbon tank.

Part# EQASSY20BB W GAC.

part#
EQASSY20BBDUAL
Dual 20” Carbon Blocks

OPTIONAL ACCESSORIES: Portable Carbon Tanks

The Carbon Tanks use GAC carbon to reduce chlorine and chloramines. Since AAMI standards require a dual bed solution, which is a worker and polisher, either two tanks are required or a single tank used in conjunction with an external 20” Carbon Block filter. The internal carbon block filter can either be used or replaced with a short bowl. These Carbon Tanks come in either 8”x30” or 9”x42” sizes. *NOTE: 9”x42” tanks will not fit on the PB2 carts.*

part#
EQASSYCFRO.8CF830PB2
8”x30” Carbon Tank

part#
EQASSYCFRO942PB2
9”x42” Carbon Tank

EQASSYCFRO.DUAL830
Dual Carbon Tanks 8”x30” for PB2

EQASSYCFRO.DUAL942
Dual Carbon Tanks 9”x42” for PB2

OPTIONAL ACCESSORIES: 8” x 30” Water Softener with Brine Tank

Water softeners pre-treat the source water to reduce water hardness *(calcium and magnesium)* when the feed water is greater than or equal to 10 grains hardness (171 ppm). The water softener is regenerated with a salt brine that is made from quality salt pellets specified for water softening and/or conditioning. The softener tank can be mounted to the extended cart for transportability, while the brine tank would be stored in a stationary location when regeneration is required.

part#
EQASSYSORO22CAP830
8”x30” Water Softener & Brine Tank

OPTIONAL ACCESSORIES: DI Polishing Filter

The DI Polishing Cartridges polishes the product water from the PB2. This is sometimes necessary when the tap water has a high pH, or when concentrations of contaminants are too high for the PB2 to remove to produce AAMI standard water.

The housing would be mounted onto the cart and contains a FDA grade mixed bed deionization cartridge which has a capacity of 488 grains as NaCl at a 1 meg cut-off. A resistivity monitor is located on top of the unit.

part#
EQSUBDI01456
DI Cartridge Assembly

OPTIONAL ACCESSORIES: Short Bowl for 10” Carbon Block Filter Housing

If additional external carbon blocks or carbon tanks are used the internal 10” Carbon Block Filter can be eliminated. A short bowl installed in place of the filter housing.

CAUTION: The short bowl SHOULD NOT BE USED if there are no additional external Carbon Tanks and/or Carbon Blocks used in the pre-treatment of the feed water to the PB2.

part#
PLFIS801951
Short Bowl for 10” Big Blue Housing

OPTIONAL ACCESSORIES: False Tube the for Capsule Filter

If the Capsule Filter is to be replaced with an alternative external filter of greater or equal capacity a false tube can be used in place of the filter. This false tube has the same type of connections as the filter and simply installed in place of the filter.

part#
EQSUBPB2FT
PB2 False Tube for the Capsule Filter

OPTIONAL ACCESSORIES: Water Temperature Gauge Kit

This versatile kits comes a multiple fittings which allow a water temperature gauge to be installed in various places between the feed water supply and the PB2.

part#
EQSUBPB2TG
PB2 Temperature Gauge Retro Kit

OPTIONAL ACCESSORIES: Dual 20” Carbon Blocks and 20” 5 micron Filter Assembly

If additional filtration is required for certain applications, this assembly is available to be wall-mounted or cart-mounted.

part#
EQASSY20BBDUAL20SL
Wall-Mounted Dual 20” Carbon Blocks and 20” 5 micron Filter Assembly

part#
EQASSY20BBDUAL20SL
Dual 20” Carbon Blocks and 20” 5 micron Filter Assembly

FXCROO00889
2 Wheel Cart for PB2 Filter Assembly

INSTALLATION & SET-UP

- Unpacking and Initial Start-Up
- Diagram of Water Hose Connections and Water Flow
- Order of Pre-Treatment and Diagram of Water Flow
- Point-to-Point Connection Details
- Connection Configurations With and Without a Booster Pump and/or a Divert-to-Drain
- 8” x 30” Carbon Tank
- 8” x 30” Water Softener with Brine Tank
- Divert-to-Drain

UNPACKING AND INITIAL START-UP

CAUTION

The PB2 comes from the factory, tagged and packed in a preservative solution to prevent microbiological growth. Take the necessary precautions to prevent physical exposure to this preservative when following the steps below. Treat exposure by quickly flushing with water.

NOTE: Suitable drains should include an "**air-gap**" between the drain tube/hose and the drain to prevent accidental draw-up from the drain. Drain tubes/hoses should never be inserted directlv into a drain.

1. Inspect for damage prior to unpacking
a. If any damage, report to the carrier and to Better Water.

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2. Unpack the PB2
a. Remove from box or shipping skid.

b. Open and examine contents of any additional boxes containing accessories, which will vary based on the optional accessories purchased. Locate and layout all interconnecting hoses.

c. Locate the PB2 Operator Manual.

d. Remove any cable-ties securing cords and hoses

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3. Install external filters (*if equipped*)
a. Install external 20" Big Blue Carbon Block filters *(if equipped)*

b. Install external 5 micron filter *(if equipped)*

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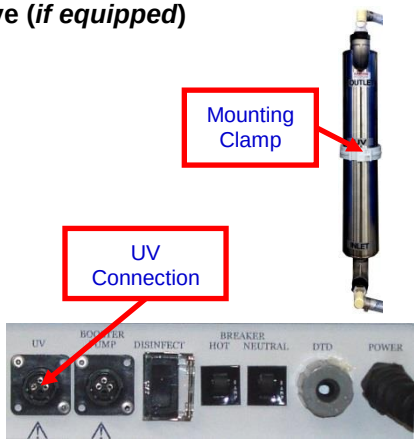
4. Mount Ultra-Violet (UV), install UV bulb, and quartz sleeve (*if equipped*)
a. Install UV bulb and quartz sleeve into UV light housing.
See detailed instructions in the PB2 Service Manual.

b. Mount the **UV** and power supply onto the cart by securing it to the pre-installed clamp using the included hardware.
** UV light may be mounted horizontally or vertically based on the placement of other Pre-Treatment pieces on the cart.*

c. Connect the **Electrical Cord** from the UV to the back of the PB2, into the **PB2 UV** connection.



5. Prep 8"x30" Carbon Tank(s) ***(if equipped)***

a. The 8"x30" Carbon Tanks must be prepared prior to use. See instructions detailed per the ***"Portable Carbon Tank Quick Start Guide"*** or the ***"PB2 Operator Manual"***.

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6. Prep 8"x30" Water Softener ***(if equipped)***

a. The 8"x30" Water Softener must be prepared prior to use. See the "***Portable Water Softener Quick Start Guide"*** or the ***"PB2 Operator Manual"***.

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7. Connect Inlet Water Hose

a. Connect female garden-hose end of the **Inlet Water Hose** to a suitable water source. *This hose will be either a 1/2" Style 5000 Hose or a 3/8" Clear Braided Hose depending on the first piece of external Pre-Treatment (if any) the system is equipped with.*

b. Connect the other end of this hose to…
… the **first piece of external Pre-Treatment** *(if any),*
…*otherwise if no external Pre-Treatment*, connect it to the **PB2 WATER IN** port.

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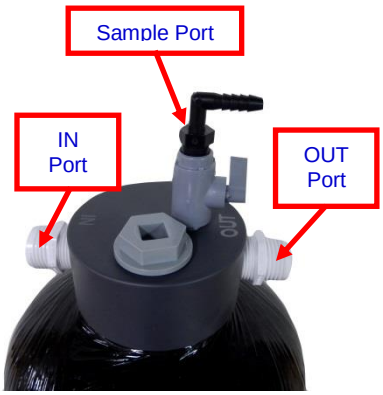
8. Purge air and carbon fines from External 8"x30" Carbon Tanks ***(if equipped)***

Each Carbon Tank must be purged separately if equipped with two tanks.



a. Connect **3/8" Clear Braided Hose** to the **Carbon Tank Out** port, and a temporary drain tube to the sample port, running both to a suitable drain. Open the lab-cock.

b. Slowly turn the water source **ON** to expel air from the tank.

c. Continue until a steady stream of *CLEAR* water is flowing from the sample port, and then close the lab-cock, and remove the drain tube.

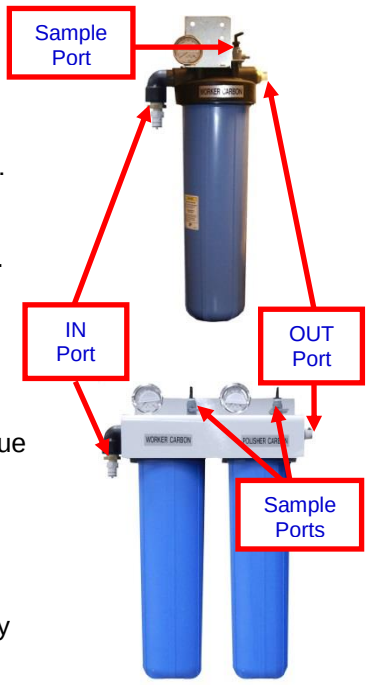
d. Turn the water source **OFF**.

e. * *For Dual Carbon Tanks*…
… connect a **3/8" Clear-Braided Jumper Hose** from the **Worker Carbon Tank OUT** port to the **Polisher Carbon Tank IN** port,
… move hose previously connected to the **Worker Carbon Tank Out** port to the **Polisher Carbon Tank Out** port,
… and then repeat steps "a" through "d" to purge air from the second tank.

f. Connect the other end of the **3/8" Clear Braided Hose** previously attached to the **Polisher Carbon Tank OUT** port to…
… the **next piece of external Pre-Treatment** *(if any)*,
… *otherwise if no more external Pre-Treatment*, connect it to the **PB2 WATER IN** port.

9. Purge air from External 20" Single or Dual Big Blue Carbon Block(s) ***(if equipped)***

a. Connect **3/8" Clear Braided Hose** to the **Carbon Block OUT** port.



b. Connect a temporary drain tube to the sample port and run to a suitable drain.
* *For Dual Carbon Blocks* use the First Carbon Block's sample port.
Open the lab-cock.

c. Slowly turn the water source **ON** to expel air from the housing(s).

d. Continue until a steady stream of *CLEAR* water is flowing from the sample port, and then close the lab-cock, and remove the drain tube.
* *For Dual Carbon Blocks* connect the temporary drain tube to the Second Carbon Block's sample port, open the lab-cock, and continue until a steady stream of *CLEAR* water is flowing from it as well, and then close that lab-cock, and remove the drain tube.

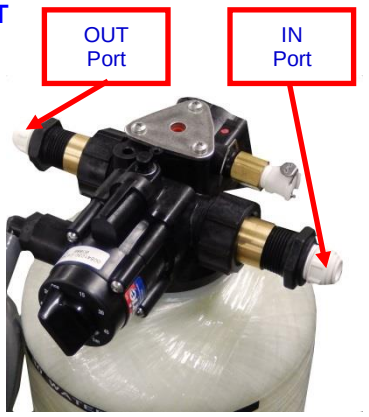
e. Turn the water source **OFF**.

f. Connect the other end of the **3/8" Clear Braided Hose** previously attached to the **Carbon Block OUT** port to…
… the **next piece of external Pre-Treatment** *(if any)*,
… *otherwise if no more external Pre-Treatment*, connect it to the **PB2 WATER IN** port.

---

10. Purge air from External 8"x30" Water Softener ***(if equipped)***

a. Connect a **3/8" Clear-Braided Hose** to the **Water Softener OUT** port and run to a suitable drain.



b. Slowly turn the water source **ON** to expel air from tank.

c. Continue until a steady stream of water is flowing from the hose.

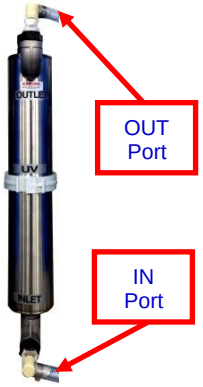
d. Turn the water source **OFF**.

e. Connect the other end of the **3/8" Clear Braided Hose** previously attached to the **Water Softerner OUT** port to…
… the **next piece of external Pre-Treatment** *(if any)*,
… *otherwise if no more external Pre-Treatment*, connect it to the **PB2 WATER IN** port.

---

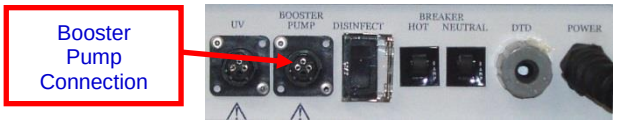
11. Connect UV to PB2 (*if equipped*)

a. Connect a **3/8" Clear-Braided Hose** from the **UV OUT port** to the **PB2 WATER-IN** port.



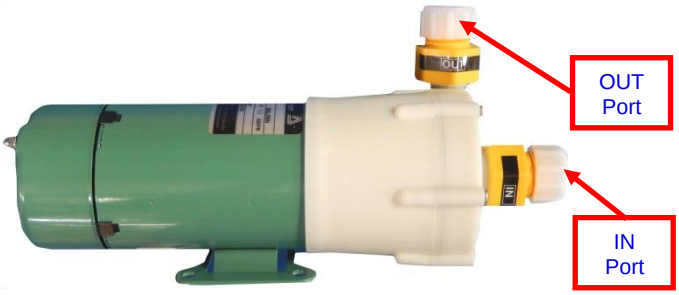
12. Connect Booster Pump (*if equipped)*

a. Connect the **Electrical Cord** from the Booster Pump to the back of the PB2, into the **PB2 BOOSTER PUMP** connection.



b. Connect a **3/8" Clear-Braided Hose** from the **PB2 PRE-BOOSTER** port to the **Booster Pump IN** port.

c. Connect a **3/8" Clear-Braided Hose** from the **Booster Pump OUT** port to the **PB2 POST-BOOSTER** port.



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13. Reverse inner tubing for Booster Pump use (*if equipped*)

- Before the booster pump can be operated, the following setup must be performed.

⚠ ***Failure to do so will result in damage to the pump!*** ⚠

- Prior to operating the booster pump an inner tube must be reversed. Before shipping, a complete, closed-loop disinfection was performed, which is why this procedure could not be done which could create a contamination issue.

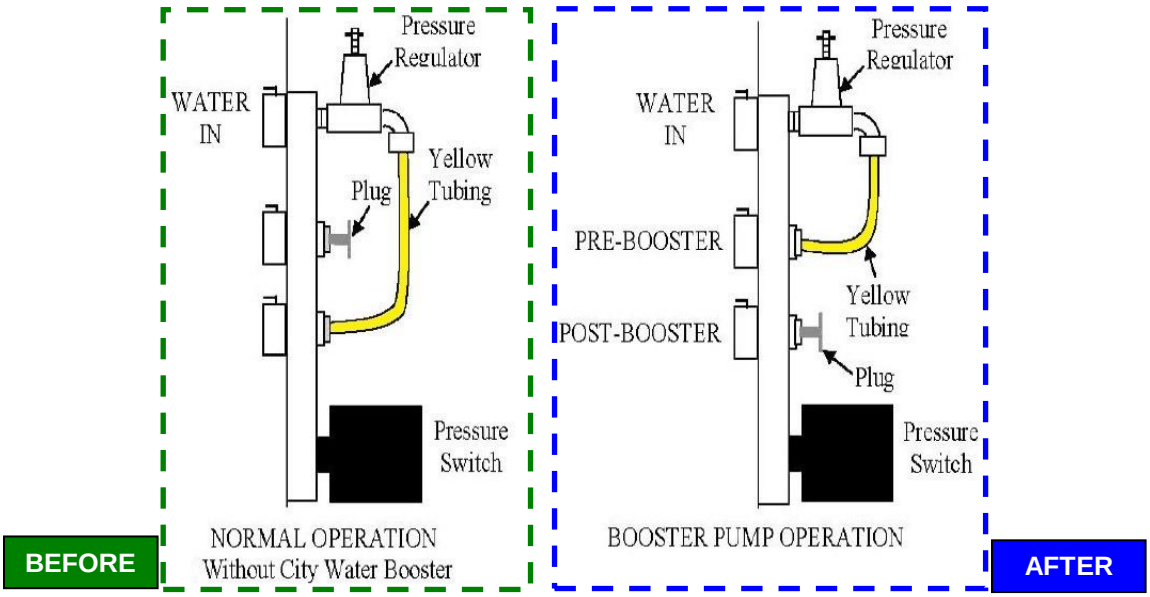
a. Open the cabinet door and locate the pressure regulator on the upper left corner next to the side wall. Note the location of the plug and yellow tubing.

b. On the fitting above the yellow tubing is a plug. Remove the plug by pressing in on the grey locking ring and gently pull the plug out.

c. Locate the yellow tubing from the pressure regulator and disconnect it at the white block by pressing in on the grey locking ring and gently pull the tubing out.

d. Cut one inch off of the yellow tubing off to prevent kinking when it is moved.

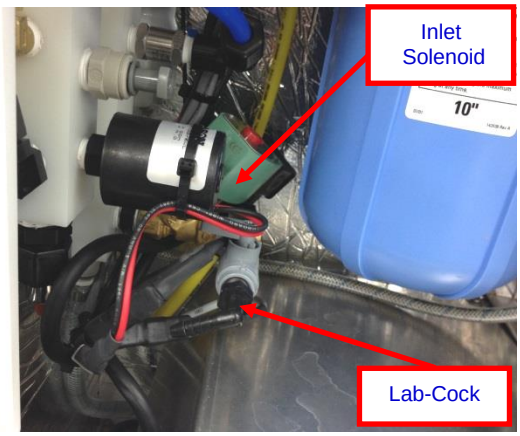
e. Reverse the positions of the plug and yellow tubing. Place the yellow tubing in the top fitting, and the plug in the bottom fitting.



14. Purge air from PB2

a. Verify that a **3/8" Clear Braided Hose** is connected to the **PB2 WATER IN** port. Turn the water source **ON**.

b. Open the RO cabinet door and locate the lab-cock near the inlet solenoid valve.



c. Connect a temporary drain tube from the hose barb on the lab-cock. Open the lab-cock.

d. Slowly turn the water source **ON** which expel the air from the internal filter housings.

e. Continue until a steady stream of *CLEAR* water is flowing from the drain tube.

f. Close the lab-cock.

g. Turn the water source **OFF**.

h. Disconnect the drain tube from the hose barb on the lab-cock.

i. Close the RO cabinet door.

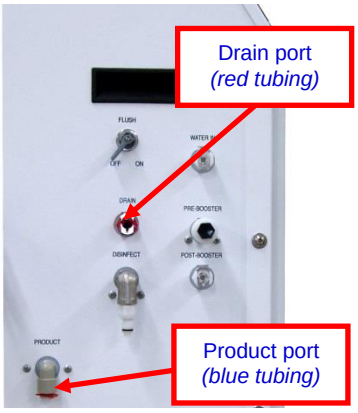
---

15. Connect PB2 Drain Hose and Product Hose

a. Remove shipping plugs on the **PB2 DRAIN** and **PB2 PRODUCT** ports.

b. Connect one end of the **3/8" Red Tubing** to the **PB2 DRAIN** port on the RO, until it seats, running the other end to a suitable drain.

c. Connect one end of the **3/8" Blue Tubing** to the **PB2 PRODUCT** port, until it seats, running the other end to a suitable drain.
* *Take care not to contaminate this tubing while draining.*



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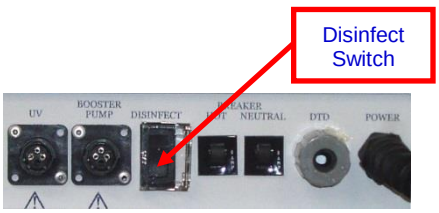
16. Verify the following before proceeding:

a. The **Disinfect Switch** on the back of the PB2 is in the **OFF** position.

b. The **Flush Valve** on the side of the PB2 is in the **OFF** position.



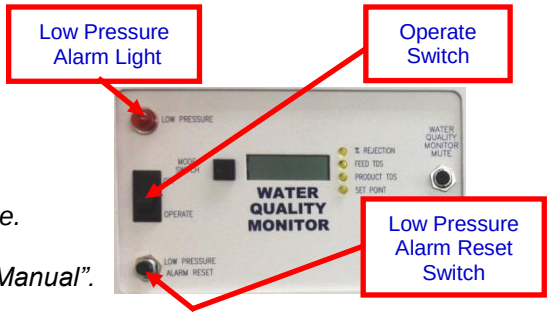
17. Connect PB2 power cord to a grounded G.F.I. receptacle.
- Do not use power strips or extension cords.

---

18. Turn the PB2 ON
- Turn the **Operate Switch** to the **ON** position.
- Press the **Low Pressure Reset Button**.

** If the Low Pressure alarm sounds, press the Low Pressure Reset Button again.*

** If the problem persists, check the Filter-In pressure. If the pressure is not above 20 psi, refer to the Low Pressure Alarm Section in the "PB2 Operator Manual".*



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19. Check the PB2 and all connections for leaks

---

20. Allow product water to rinse to drain for 2 hours to rinse preservative from membrane

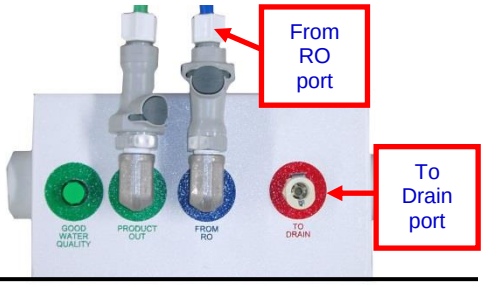
---

21. Turn the PB2 OFF
a. Turn the **Operate Switch** to the **OFF** position.

---

22. Connect Divert-to-Drain (DTD) (*if equipped*)
a. Connect the **3/8" Blue Tubing** from the **PB2 PRODUCT** port to the **DTD FROM RO** port.

b. Connect the **3/8" Red Tubing** from the **DTD TO DRAIN** port to a suitable drain.



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23. Check water quality.
a. A minimum of 90% rejection should be maintained.

b. If the PB2 does not maintain greater than 90% rejection, check the source water pH. If the pH is above 8.0 this may impact the rejection of the PB2 and a DI polishing cartridge may be required.

c. A low source water TDS/Conductivity may also result in a low percent rejection.

d. Also check chlorine and chloramine levels in the product water. A maximum of 0.1 mg/1 chloramine and 0.5 mg free chlorine should be maintained.

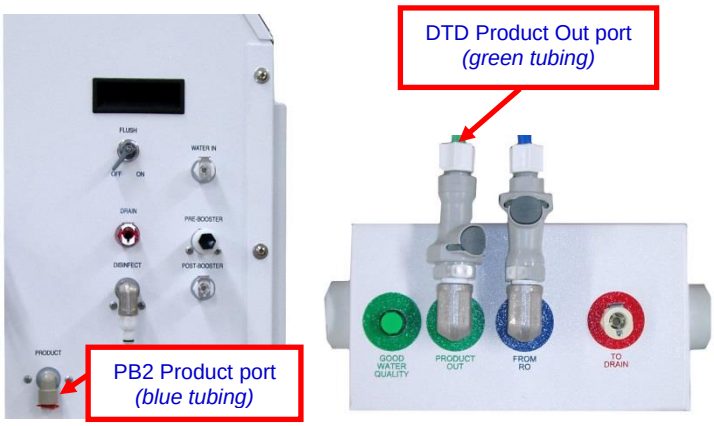
---

24. Take water sample.
a. At this point a water sample may be taken and submitted for analysis to assure AAMI standard water is being produced. * **This sample should be taken from the product hose.**

25. Final Connection to Dialysis Machine.

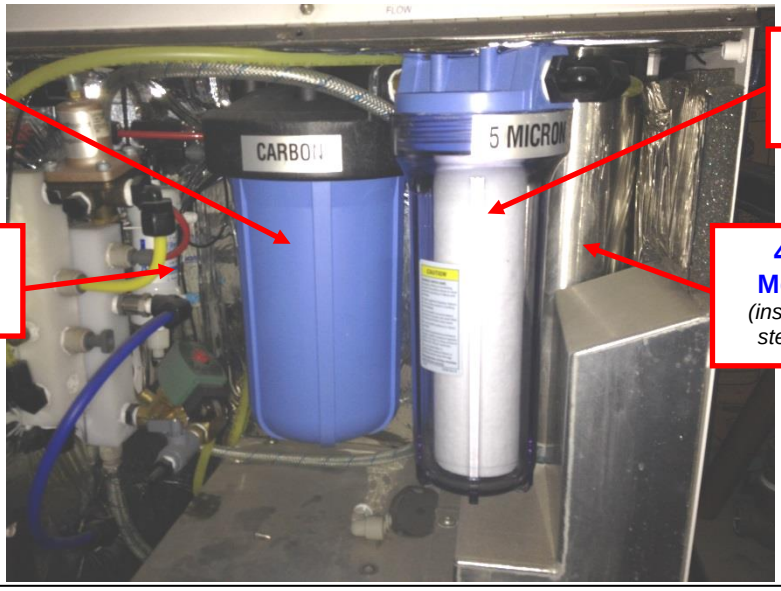
a. *If NOT equipped with a Divert-to-Drain…*
… connect the **3/8" Blue Tubing** from the **PB2 PRODUCT** port to the **Dialysis Machine**.

b. *If equipped with a Divert-to-Drain…*
... connect the **3/8" Green Tubing** from the **DTD PRODUCT OUT** port to the **Dialysis Machine**.



INTERNAL FILTERS/MEMBRANES

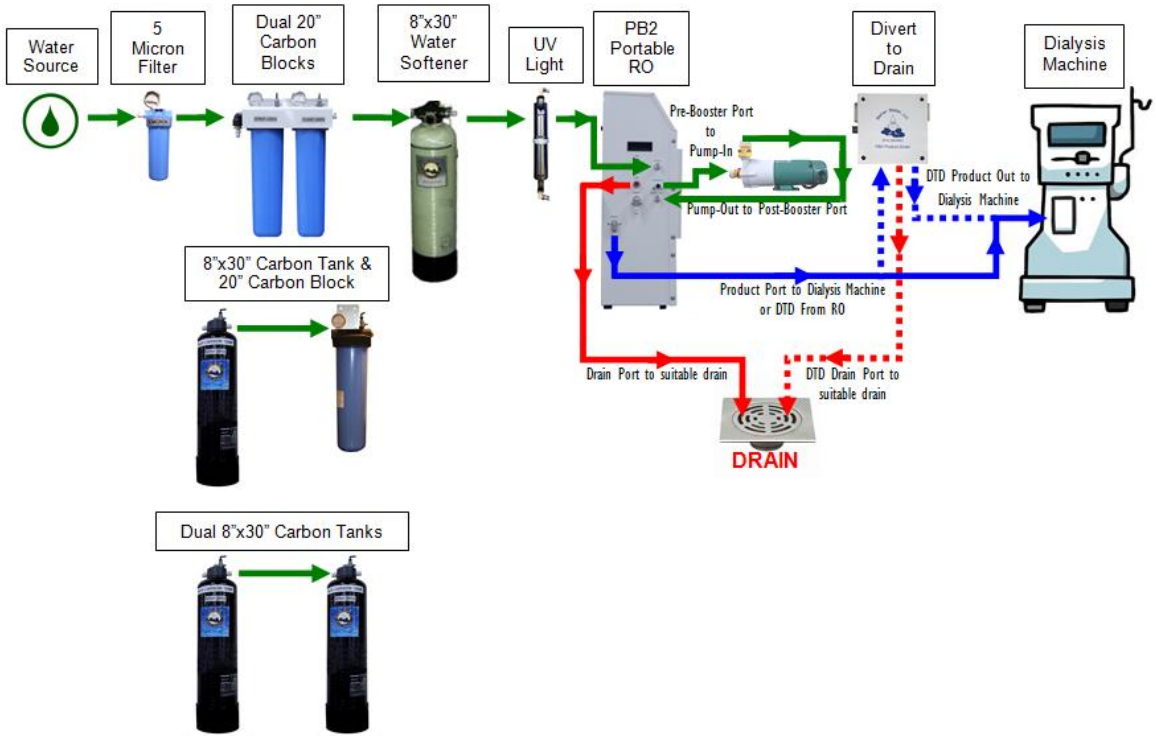
The following internal filters/membranes were installed at the factory:



IMPORTANT OPERATIONAL NOTE

Do not use "**hydrochloric acid**" based products for disinfection and/or cleaning the PB2 as these can damage the internal components and will void the Limited Warranty. Use only the manufacturer recommended products as detailed in the "***PB2 Operator Manual***".

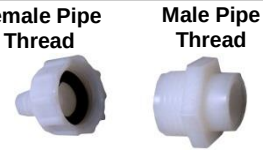
ORDER of PRE-TREATMENT and DIAGRAM of WATER FLOW



POINT-to-POINT CONNECTION DETAILS

PRE-TREATMENT OPTIONS		
DESCRIPTION	**INLET CONNECTION**	**OUTLET CONNECTION**
1/2" Inlet Water Hose ***(gray style 5000)*** **- OR - 3/8" Inlet Water Hose** ***(clear braided)*** *(This hose size will vary based on the first piece of Pre-Treatment it first connects to)*	**1/2" Hose: garden hose, female pipe thread - OR - 3/8" Hose: garden hose, female pipe thread**	**1/2" Hose: 1/2" female quick disconnect - OR - 3/8" Hose: 3/8" male quick disconnect**
5 Micron Pre-Filter	**1/2" male quick disconnect**	**1/2" hose barb**
Dual Carbon Blocks	**1/2" male quick disconnect**	**3/8" female quick disconnect**
8" x 30" Carbon Tank + 20" Carbon Block *- Interconnect: Tank Outlet: garden hose, MPT to Block Inlet: 3/8" female QD*	**Tank Inlet: garden hose, male pipe thread**	**Block Outlet: 3/8" female quick disconnect**
Dual 8" x 30 Carbon Tanks *- Interconnect: First Tank Outlet: garden hose, MPT to Second Tank Inlet: garden hose, MPT*	**Tank Inlet: garden hose, male pipe thread**	**Tank Outlet: garden hose, male pipe thread**
8" x 30" Water Softener	**3/8" male quick disconnect**	**3/8" male quick disconnect**
UV Light	**3/8" female quick disconnect**	**3/8" female quick disconnect**

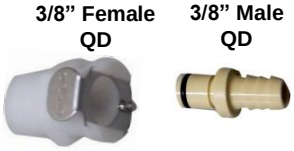
PB2 PORT CONNECTIONS		
PB2 Water-In Port (INLET)	**3/8" female quick disconnect**	**3/8" clear braided from** last piece of Pre-Treatment
PB2 Product Port (OUTLET)	**3/8" John Guest**	**3/8" blue tubing to** either… … Divert-to-Drain FROM RO, - OR - … Dialysis Machine IN
PB2 Drain Port (OUTLET)	**3/8" male quick disconnect**	**3/8" red tubing to** a suitable drain
PB2 Pre-Booster Port (OUTLET)	**3/8" male quick disconnect**	If using a Booster Pump, **3/8" clear braided to** Booster Pump IN
PB2 Post-Booster Port (INLET)	**3/8" male quick disconnect**	If using a Booster Pump, **3/8" clear braided from** Booster Pump OUT
PB2 Disinfect Port (INLET)	**3/8" male quick disconnect**	Used only during the disinfect process, **3/8" clear tubing from** the Disinfect Jug
BOOSTER PUMP CONNECTIONS		
Booster Pump IN (INLET)	**garden hose male pipe thread**	**3/8" clear braided from** PB2 Pre-Booster Port
Booster Pump OUT (OUTLET)	**garden hose male pipe thread**	**3/8" clear braided to** PB2 Post-Booster Port
DIVERT-to-DRAIN CONNECTIONS		
FROM RO (INLET)	**1/2" female quick disconnect**	**3/8" blue tubing** *(with 3/8" to 1/2" adapter)* **from** PB2 Product Port
PRODUCT OUT (OUTLET)	**1/2" male quick disconnect**	**3/8" green tubing** *(with 3/8" to 1/2" adapter)* **to** Dialysis Machine IN
DRAIN (OUTLET)	**3/8" female quick disconnect**	**3/8" red tubing to** a suitable drain



Garden Hose Connection

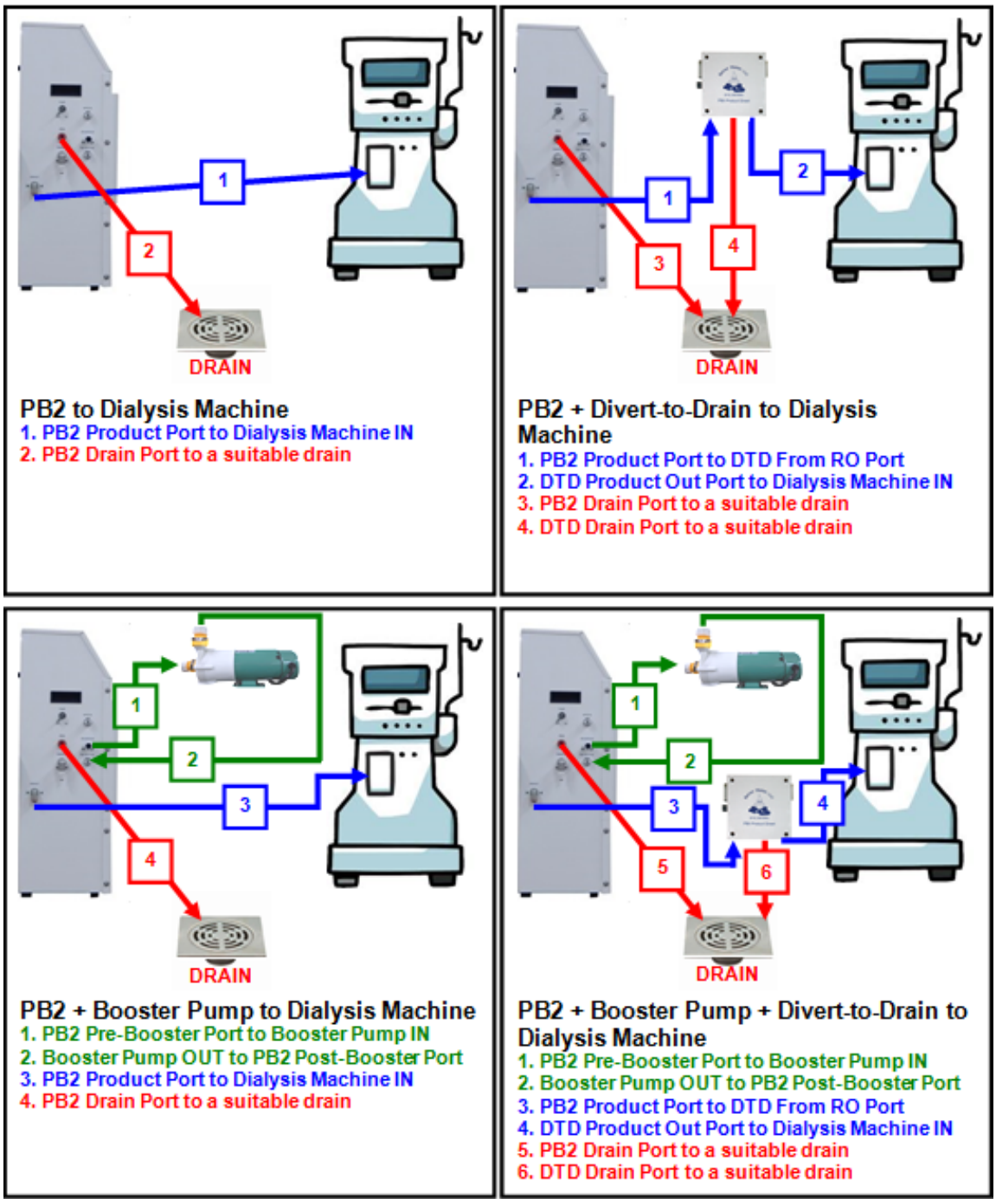
John Guest Connection

1/2" Quick Disconnect Connection



3/8" Quick Disconnect Connection

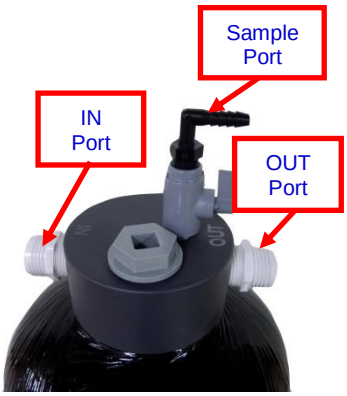
CONNECTION CONFIGURATIONS WITH and WITHOUT a BOOSTER PUMP and/or a DIVERT-to-DRAIN



PORTABLE CARBON TANKS

INITIAL START-UP

The carbon media must be soaked and rinsed for new Carbon Tanks supplied dry and after rebedding existing Tanks. This removes air pockets within the carbon media and then rinses it free of excess carbon fines.



1. Soaking
a. Connect **1/2" Style 5000 Hose** from water source and to the **Carbon Tank IN** port.
b. Connect a **3/8" Clear Braided Hose** with a garden hose fitting to the **Tank OUT** port and run the other end to drain.
c. Verify that the Sample Port is closed.
d. Turn water **ON** and fill Carbon Tank, and then turn the water **OFF**.
e. Allow to soak for a **minimum of 4 hours**, not to exceed 24 hours. Tag the Carbon Tank with the wet date.
f. Turn the water **ON** and rinse out excess carbon fines, allowing it to run to drain for several minutes, and then turn the water **OFF**.

2. Rinse after Soaking
a. After soaking for a minimum of 4 hours, turn the water **ON** to rinse the Carbon Tank, running to drain for 10-15 minutes or until the water is clear and no carbon fines present.

3. Check Chlorine
a. Perform a total (*low-range*) chlorine check per test kit instructions from the sample port. If results are above .05 ppm, rinse for an additional 15 minutes. Continue to test and rinse until results are at or below .05 ppm or contact Tech Support. Turn water **OFF**.

4. Connection to Devices
a. Device Placement
- In general it should be placed between the Source Water Inlet and the PB2.
- If equipped with any external Sediment Filters it should be placed after these.
- If equipped with an external Carbon Block, Water Softener, or UV Light, it should be placed before these.

b. For a **Single Carbon Tank**…
- Connect **1/2" Style 5000 Hose** from water source or previous piece of external Pre-Treatment *(if any)* to **Carbon Tank IN** port.
- Connect a **3/8" Clear Braided Hose** from the **Carbon Tank OUT** port to…

… the **next piece of external Pre-Treatment** *(if any)*,
… *otherwise if no more external Pre-Treatment,* connect it to the **PB2 WATER IN** port.


SINGLE

c. For **Dual Carbon Tanks**…
- Connect **1/2" Style 5000 Hose** from water source or previous piece of external Pre-Treatment *(if any)* to the **Worker Carbon IN** port.
- Connect **3/8" Clear Braided Jumper Hose** from the **Worker Carbon Tank OUT** port to the **Polisher Carbon Tank IN** port.
- Connect **3/8" Clear Braided Hose** from the **Polisher Carbon Tank OUT** port…

… to the **next piece of external Pre-Treatment** *(if any),*
… *otherwise if no more external Pre-Treatment*, connect it to the **PB2 WATER IN** port.


DUAL
Worker Polisher

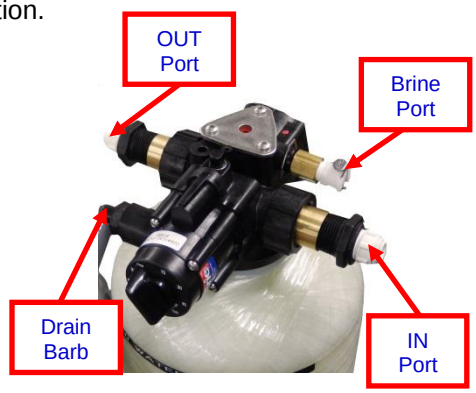
8” X 30” WATER SOFTENER WITH BRINE TANK

INITIAL START-UP

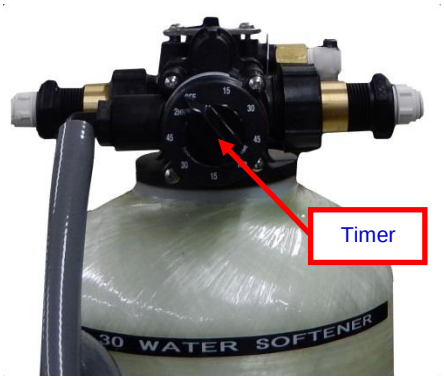
For new water softeners the brine tank must be filled, and the salt soaked, and the softener tank setup and regenerated.

1. Prep Brine Tank
a. Fill the Brine Tank to half its volume with high purity salt pellets.
b. Fill Brine Tank with water, so the water level is 2” to 4” inches above the salt.
c. Allow the salt to **soak for 4 hours** before first regeneration.

2. Prep Softener Tank
a. Connect the **Source Water Hose** to the **Water Softener IN** port, but leave the stem plug in the **Water Softener OUT** port.
- Connect **1/2" Style 5000 Drain Hose** to **Water Softener Drain Barb** and place to drain.
b. Turn the water **ON**, to purge air from the Softener Tank, until a steady stream of water is flowing to drain.
c. Turn the water **OFF**.
d. Connect **3/8” Connector Hose** from the **Brine Tank** to the **Water Softener Brine** port.



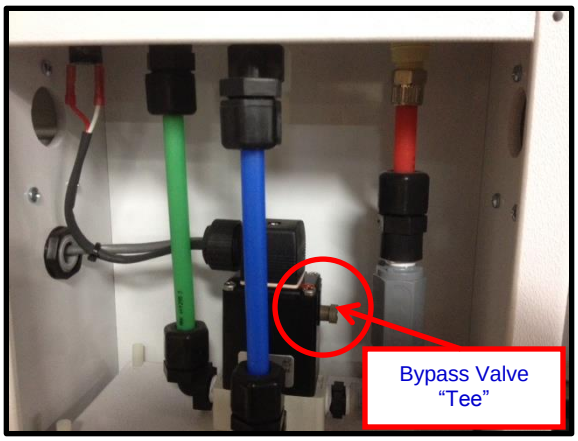
3. Initiate First Regeneration
a. Turn the **Timer on the Softener’s Valve Head** to **1 HOUR** to start the regeneration cycle.
b. Turn the water **ON** to the Softener.
c. Once the regeneration cycle is complete, turn the water **OFF**.
d. Remove the stem plug from the **Water Softener OUT** port and connect a **3/8” Clear Braided Hose** to this port and place the other end to drain.
e. Turn the water **ON** and rinse the Softener for 5 minutes.
f. Using a Hardness Test Kit, check the water’s hardness at the **Water Softener OUT** port which should read 0 gpg.



4. Connection to Devices
a. Device Placement
- In general the Softener should be placed between the Source Water Inlet and the PB2.
- If equipped with any external Carbon Tanks or Carbon Blocks it should be placed after these.
- If equipped with a UV Light, it should be placed before the UV Light.
b. Connect **3/8” Clear Braided Hose** from the **Water Softener OUT** port to…
… the next piece of external Pre-Treatment *(if any),*
… otherwise if no more external Pre-Treatment, connect it to the **PB2 WATER IN** port.

DIVERT-TO-DRAIN

Manual Divert "Tee"
Located inside the Divert-to-Drain is a manual "Divert Tee" which is used during certain procedures noted in this manual.
- *Divert/Bypass Position:* Press in the "tee" and turn clockwise to lock into position.
- *Normal Operation Position:* Turn the "tee" counter-clockwise until it "pops" out.
**** NOTE: Failure to set the "Divert Tee" back to its normal operating position and the Divert-to-Drain's solenoid valve will NOT divert to drain in a poor water quality condition.***



SETUP/INSTALL if NOT INSTALLED AT THE FACTORY

1. Connect tubing:
- Connect **Red Tubing** from Divert-to-Drain's **"TO DRAIN"** port to drain.
- Connect **Blue Tubing** from PB2's **"PRODUCT"** port to the Divert-to-Drain's **"FROM RO"** port.
- Connect **Green Tubing** from Divert-to-Drain's **"PRODUCT OUT"** port to the dialysis machine.

2. The Divert-to-Drain's electrical and control connection is not plug-n-play, but hardwired directly into the PB2's control box through the designated Hubble on the back of the PB2 labeled as **"DTD"**. Follow these steps if it must be connected:

a. Verify that the PB2 is powered OFF, and unplugged from its electrical receptacle.

b. Remove the two corner screws on top of the PB2's cabinet, and swing open the top panel.

c. Remove the two screws securing the control box cover and remove the cover.

d. Locate the Hubble Strain Relief adaptor on the back of the control box and remove the compression nut by unscrewing it.

e. Thread the control wire from the Divert-to-Drain through the compression nut, then through the Hubble into the control box.

f. Cut the Red and Brown wires off, since they will not be used.

g. Strip the Black, White, and Green wires back for the connections.

h. Locate the red, blue, and green/yellow Phoenix Blade Connectors.

i. Connect the Black wire into the red Phoenix Blade Connector.

j. Connect the White wire into the blue Phoenix Blade Connector.

k. Connect the Green wire into the green/yellow Phoenix Blade Connector.

l. Screw compression nut back on, and hand-tighten.

TESTING AFTER SETUP/INSTALL

1. Place the Green Tubing from the Divert-to-Drain's "PRODUCT OUT" port and the Red Tubing from the "TO DRAIN" port to drain.

2. Plug the PB2 into an electrical receptacle.

3. Verify that all air has been purged from the PB2's pre-treatment as detailed in the "*Unpacking and Initial Start-Up" section.*

4. Turn the **OPERATE Switch** to the **OPERATE** position.
- If the PB2 goes into Low Pressure Alarm, press the **LOW PRESSURE ALARM RESET Button**. If it continues to go into Low Pressure Alarm, see "*Low Pressure Alarm" Section.*
- The PB2 should start up and the Water Quality Monitor should go into poor water quality condition. Verify that while in this condition the following is happening:
    - No product water should be coming out of the Green Tubing from the "PRODUCT OUT" port.
    - Product water is being diverted to drain through the Red Tubing from the "TO DRAIN" port.
    - The "Good Water Quality" LED indicator is not lit.
- Once the Water Quality Monitor gets above the set-point it should go into a good water quality condition. Verify that while in this condition the following is happening:
    - The product water should flow from the Green Tubing from the "PRODUCT OUT" port.
    - No product water should be diverting to drain through the Red Tubing from the "TO DRAIN" port.
    - The "Good Water Quality" LED indicator should be lit.
- If it is not functioning as described, recheck setup/install, and if necessary contact Technical Support.

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.

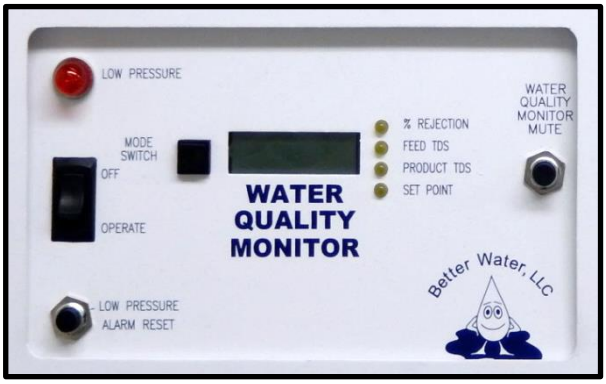
It is **unsafe** to operate this device without a basic understanding of water treatment and a thorough understanding of the contents of this manual. Inadequately treated water for hemodialysis poses a severe threat to the health and safety of hemodialysis patients. Education and training of the staff 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.

Reference the Diagram of Water Hose Connections and Water Flow listed previously for assistance if needed.

FAMILIARIZATION with WATER QUALITY MONITOR and PB2 CONTROLS

The Water Quality Monitor is located on the front panel of the PB2's control box, and contains the control switches and buttons for operating the PB2.



The **Water Quality Monitor** monitors and displays vital information concerning the quality of water. The **WQM DIGITAL DISPLAY** reports the following:

- **% Rejection** which is the ratio of TDS (total dissolved solids) rejected as compared to the Feed TDS.
- **Feed TDS** (ppm) is the total dissolved solids in the feed water.
- **Product TDS** (ppm) is the total dissolved solids in the product water.
- **Set-Point** is the % Rejection set at which the PB2 will go into poor water quality and divert to drain.

These different readings can be displayed by pressing the **MODE Switch**. Each time it is pressed it will scroll to the next reading in order as denoted by each of the yellow lights beside each reading. After 30 seconds it will revert back to the **% Rejection** which is the default display. The monitor's primary function is to alert when in a poor water condition and controls product and drain flow. It receives signals from the Feed Water Probe and the Product Water Probe, and automatically calculates the % Rejection. The poor water quality alarm Set-Point is set to **90%** at the factory, and must be calibrated periodically (s*ee "Calibrate Water Quality Monitor" section*). It can be changed but should only be done so when advised to do so by Technical Support.

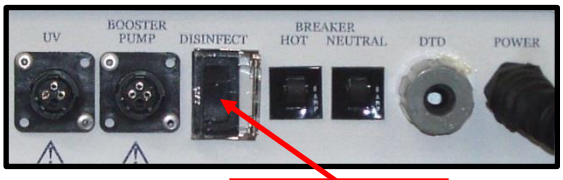
The **OPERATE Switch** is a two-position switch:
- **OPERATE**; Turns the PB2 ON for normal operation.
- **OFF**; Turns the PB2 OFF.

The **LOW PRESSURE Alarm Indicator Light** will illuminate in a low pressure condition, and will have an audible alarm.

The **LOW PRESSURE ALARM RESET Button** when pressed will silence the Low Pressure audible alarm and turn the Low Pressure Alarm Indicator Light out.
- If a low pressure condition persists, it will alarm again and additional measures should be taken to correct the issue.

The **WATER QUALITY MONITOR MUTE Button** will temporarily mute a poor water quality alarm, but does nothing to correct it. If the condition persists the alarm will resound after 90 seconds.

The only other control switch is the **DISINFECT Switch** which is located on the back of the PB2
- **ON**; Puts the PB2 into Disinfect Mode
- **OFF**; Takes the PB2 out of Disinfect Mode



SET-UP FOR A DIALYSIS TREATMENT

1. Connect **Inlet Water Hose** *(clear-braided hose)* to water source.

2. Place **Drain Hose** *(red tube)* to drain.
- If equipped with a Divert-to-Drain, then also place the Divert-to-Drain's Drain Tube to drain.

3. Connect **Product Hose** *(blue tube)* to dialysis machine.
- If equipped with a Divert-to-Drain, the Product Tube will come from it, otherwise it will come directly from the PB2.
- NOTE: It is important to note that when the PB2 product line is connected to the dialysis machine and the PB2 is running, the dialysis machine must be pulling water in order for an accurate reading of the water quality monitor. It will take approximately 15-20 minutes before optimum water quality is reached. There will be no product pressure or when the product hose is not connected to the dialysis machine.

4. Turn **Water Source** to the PB2 **ON.**

5. Plug PB2 into an electrical receptacle.

6. Turn **OPERATE Switch** on the PB2 to the **OPERATE** position.
- If the Low Pressure Alarm sounds press the **LOW PRESSURE ALARM RESET Button** on the PB2.
- If the PB2 continues to go into Low Pressure Alarm, see "*Low Pressure Alarm" Section.*

7. Perform chlorine/chloramine check.
- It is highly recommended that before each dialysis treatment a check should be made for chlorine/chloramine breakthrough which should not exceed 0.1 mg/L.
- If external carbon blocks or tanks are used, the internal carbon block should have been removed and replaced with a false cartridge.
- Open the PB2's cabinet door and obtain a sample of water from the Labcock located on the inlet solenoid valve.
**** The water obtained from this location is pre-treated water only not AAMI standard water. Do not use this water for bicarb make-up or any other application where AAMI standard quality water is required.***
- Do not proceed unless water results are within the desire range.

8. Operational Notes:
- Filter-In and Filter-Out pressures should not exceed 15 psi differential. If it does, change the 5 micron filter and/or the 10" carbon block inside the PB2.
- Product pressure will vary as the dialysis machine uses water. Not to exceed 70 psi.
- Verify readings on the Water Quality Monitor to ensure good water quality. If water quality is 90% rejection or less the PB2 will shut-off and alarm, unless the set-point has been reset.

9. Once the dialysis treatment is complete the PB2 should be flushed for 15 minutes.
- See *"Flushing the PB2" section* for more information.
- Turn the **OPERATE Switch** to the **ON** position to start the PB2.
- If the PB2 goes into Low Pressure Alarm, press the **LOW PRESSURE ALARM RESET Button**. If it continues to go into Low Pressure Alarm, see "*Low Pressure Alarm" Section.*
- Turn the **Flush Valve** located on the left side of the PB2 to the **ON** position.
- After 15 minutes of flushing, turn the **Flush Valve** to the **OFF** position.

10. Turn the **OPERATE Switch** to the **OFF** position.

11. Turn **Water Source** to the PB2 **OFF**, and disconnect hoses.

FLUSHING THE PB2

Flushing the PB2 increases the life of the membrane by increasing the volume of water that passes over the membrane's surface to help remove suspended particles from it. This will extend the life of the membrane. This should be performed in the following cases…
… If only one dialysis treatment given during a given day, then perform after the treatment
… If multiple dialysis treatments are given with the PB2 during the day, the flush can be done after the last one rather than between each one
… If the PB2 has not been used at all during any given day, simply connect and flush for 15 minutes. This is not required but will increase the life of the membrane.

1. Connect **Inlet Water Hose** *(clear-braided hose)* to water source.

2. Place **Drain Hose** *(red tube)* to drain.
- If equipped with a Divert-to-Drain, then also place the Divert-to-Drain's Drain Tube to drain.

3. Connect **Product Hose** *(blue tube)* to drain.
- If equipped with a Divert-to-Drain, the Product Tube will come from it, otherwise it will come directly from the PB2.

4. Turn **Water Source** to the PB2 **ON.**

5. Plug PB2 into an electrical receptacle.
- Preferably a hospital-grade, G.F.I. circuit.

6. Turn **OPERATE Switch** on the PB2 to the **OPERATE** position.
- If the Low Pressure Alarm sounds press the **LOW PRESSURE ALARM RESET Button** on the PB2.
- If the PB2 continues to go into Low Pressure Alarm, see "*Low Pressure Alarm" Section.*

7. Turn the **Flush Valve** located on the left side of the PB2 to the **ON** position.
- If the PB2 goes into Low Pressure Alarm, press the **LOW PRESSURE ALARM RESET Button**. If it continues to go into Low Pressure Alarm, see "*Low Pressure Alarm" Section.*
- After 15 minutes of flushing, turn the **Flush Valve** to the **OFF** position.

8. Turn the **OPERATE Switch** to the **OFF** position.

9. Turn **Water Source** to the PB2 **OFF**.

10. Disconnect hoses.

LOW PRESSURE ALARM

The Low Pressure Alarm will sound and the Low Pressure Alarm Light will illuminate if the feed water pressure as displayed on the Filter-In Gauge falls to 10 psi or below. It is normal for this to alarm when turning the PB2 ON, and in such case the **LOW PRESSURE ALARM RESET Button** should be pressed to silence the alarm and turn the Low Pressure Alarm Indicator Light out.

If a low pressure condition persists, it will alarm again and additional measures should be taken to correct the issue. Water pressure must be above 20 psi before the PB2 will reset. Below are a few solutions for this condition which should be tried before contacting Technical Support.

SOLUTIONS
1. Confirm the water supply is turned fully ON.
2. Contact maintenance department to determine if the plumbing is being worked on.
3. Test the low pressure switch as detailed in the “System Maintenance, Test Low Pressure Switch” section.
4. Water pressure must be increased or a city booster pump added.
5. Feed water line may be too small to supply the PB2.

Also see the following Technical Service Bulletins in “Appendix A” section related to low pressure issues:

TSB 2012001 – PB1/PB2 Low PSI / Monitor Modification

TSB 2012002 – PB2 Low Pressure Issues When In Flush

CONNECTING TWO DIALYSIS MACHINES

The PB2 is capable of providing RO water to two dialysis machines simultaneously with the simple addition of a fitting to split the product flow. A booster pump is required to provide sufficient water pressure.

REQUIRED:

- 3/8" John Guest "Y" Fitting	Part# **PLFIJG00969**
- Small piece of blue product hose	*"cut from existing hose"*
- Second Product Hose	Part# **EQSUBPB2TRPH**
- PB2 booster pump ***(voltage specific)***	Part# **EQSUBPB2BP – *or* – EQSUBPB2BP-220V**

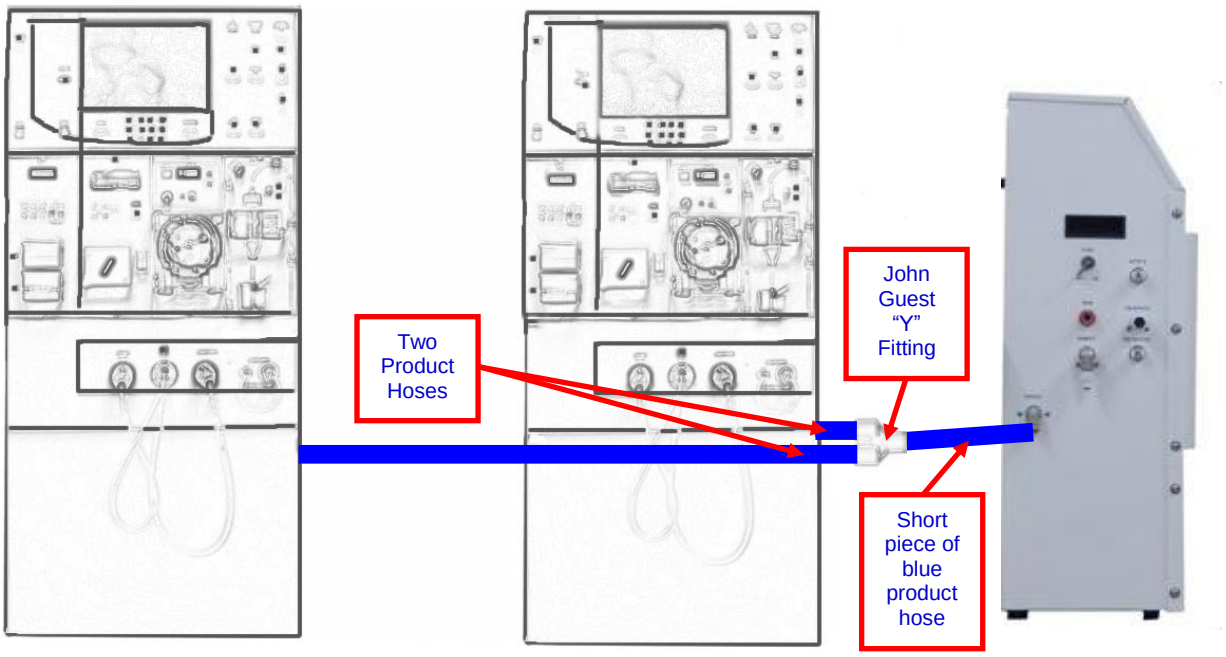
PROCEDURE

1. Disconnect the blue product hose from the PB2's Product Port.

2. Cut a small piece off of the blue product hose long enough to go between the PB2 and the John Guest "Y" Fitting.

3. Connect one end the short-cut piece of blue product hose to the PB2's Product Port and the other end to the single leg of the John Guest "Y" fitting.
- If equipped with a Divert-to-Drain, the short-cut piece of blue product hose will be connected to the Divert-to-Drain's Product-Out Port.

4. Connect the blue product hoses from each of the two dialysis machines to the split legs of the John Guest "Y" Fitting.



GENERAL CLEANING AND DISINFECTING INFORMATION

To perform at peak efficiency the PB2 must periodically be cleaned and disinfected.

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

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

CLEANING and DISINFECTING FREQUENCY

As the manufacturer, Better Water LLC recommends the following:

- **If membrane fouling is indicated**: Low pH Clean with BWI-1000 and Disinfection with Minncare
- **If after 4 days *(96 hours)* of non-use**: Low pH Clean with BWI-1000 and Disinfection with Minncare
- **Monthly**, if used frequently where periods of non-use don't exceed 4 days *(96 hours):* Low pH Clean with BWI-1000 and Disinfection with Minncare
- **Quarterly**: Low pH Clean with BWI-1000, High pH Clean with BWI-2000, and Disinfection with Minncare *(in that order).*
- **If the PB2 has been in storage** and should have been loaded with preservative, then after performing the initial setup the following should be done: Low pH Clean with BWI-1000, High pH Clean with BWI-2000, and Disinfection with Minncare *(in that order).*
- If an **End-to-End Disinfect** *(source-inlet through product-outlet)* is required then the following should be done: Disinfection with Minncare, and High pH Clean with BWI-2000 *(in that order)*. *For further details on this see the "End-to-End Disinfect Procedure" section.*

PB2s may require more frequent cleaning and disinfecting, which is ultimately the Medical Director's responsibility to determine and is typically based on water testing.

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

1. The Product Flow **decreases** and the Reject Flow **increases**, and the two cannot be adjusted to design specifications.
2. The Water Quality Monitor indicates a **continuous decline** in water quality.

RESIDUAL CHEMICAL TESTING

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

WARNING

Chemical cleaners and disinfectants can cause serious injury or death. Do not disinfect or clean the PB2 while patients are dialyzing.

Proper protective equipment must be used.

The preparation and handling of these chemical solutions must be done in accordance with the specifications established for the particular chemical, and their Material Safety Data Sheet (MSDS).

WARNING

These procedures should be performed by trained and qualified technicians.

WARNING

DO NOT use "Hydrochloric Acid" based products for disinfection and/or cleaning the PB2 as these can damage the internal components and will void the Limited Warranty. Use only the recommended products as previously detailed.

Also DO NOT use "Sodium Hypochlorite" (bleach) based products as these will damage the membrane.

CAUTION

If performing both Low pH and High pH cleanings, always perform the Low pH first, otherwise the membrane can be damaged.

Changes in the tap water pH, TDS, temperature, or pressure, can also cause significant changes in the overall performance of the PB2.

OUTSOURCED WATER TESTING

A laboratory specified by the physician or Medical Director should perform chemical and microbial analyses as outlined in the current AAMI/ISO Standards to determine the current compatibility of the PB2 with the feed water and the suitability of the system for providing product water meeting the AAMI requirements. This should be performed annually or more often if needed but, is it is ultimately at the discretion of the physician or Medical Director. ***Water samples for this type of testing should always be taken from the final product hose, and not the labcock on the inlet solenoid. This would be from the Product-Out of the PB2, or if equipped with a Divert-to-Drain from its Product Out, or if equipped with a DI Polishing Cartridge from its Outlet Port, whichever is last in line.***

NOTE: WHEN DISINFECTING the PB2 with a the OPTIONAL DI POLISHING FILTER INSTALLED

When disinfecting the PB2 the DI Polishing Cartridge must be removed and discarded, and a false tube substituted in its place inside the filter housing. This false tube should remain in place during the entire disinfection procedure and rinsing procedure. Once complete a new DI Polishing Cartridge should be installed.

part#
SUFFOO00581
10" Standard False Tube

CLEANING AND DISINFECTING PROCEDURE

REQUIRED MATERIALS

Part#	Description	Notes/Usage
EQASSYDISJUG	Disinfect Jug	- Used to mix water and chemicals for the cleaning and disinfecting procedure.
SUMCOO00572 	BW-1000, Acid Cleaner, low pH For CLEANING - scale removal	- Replaces MinnClean AC - **Application:** For removing mineral scale in membrane applications. - Acid Cleaner 1000 must be used before Alkaline Cleaner 2000, MemStore, or MinnCare. - It can be used on brass. - **Dilution:** 61 grams of Acid Cleaner 1000 to 2 gallons of RO or DI water. **- Duration:** Circulate for 15 minutes and then flush completely.
SUMCOO00571 	BW-2000, Alkaline Cleaner, high pH For CLEANING - organic removal	- Replaces MinnClean TF - **Application:** For removing grime, grease, oil, and biological matter on thin film composite membranes. Mineral deposits can inhibit the Alkaline Cleaner, so the Acid Cleaner 1000 should be used first to remove these deposits. - It can be used on brass. **- Dilution:** 61 grams of Alkaline Cleaner 2000 to 2 gallons of RO or DI water. **- Duration:** Circulate 15 minutes and then flush completely.
SUMCOO00575 	MinnCare Cold Sterilant For DISINFECTING	- **Application:** MinnCare Cold Sterilant is an oxidant that stops organism growth by oxidizing microbial cell proteins and enzyme systems, and effectively removes biofilm. - It can be used on units with stainless steel fittings only. - **Dilution:** 75 cc of MinnCare Cold Sterilant to 2 gallons of RO or DI water. Use MinnCare 1% Test Strips to ensure proper solution concentration. - **Duration:** Circulate 15 minutes then test with MinnCare 1% Test Strips to ensure proper solution concentration. Allow to dwell for 30 minutes (minimum), up to 2 hours (recommended), then flush completely. Use MinnCare Residual Test Strips during rinsing to ensure complete removal of Sterilant from the system.
SUMCOO00577 	MinnCare 1% Test Strips For DISINFECTING	- Used to verify the proper dilution of the Sterilant solution. - Follow manufacturer's instructions for proper use.
SUMCOO00576 	MinnCare Residual Test Strips For DISINFECTING	- Used to verify no residual Sterilant is present after flushing and rinsing. - Follow manufacturer's instructions for proper use.

PROCEDURE

The following procedure is basically the same for both Cleaning and Disinfecting, with any details specific to each noted in the instructions.

NOTEs

1. This procedure uses Better Water's Disinfect Jug. If not using this jug, then take care to make sure the hoses are fully submerged in whatever container is being used, and appropriate safety measures are taken to protect against spills and splashes.

2. This procedure is also written to include details for both using a PB2 with and without a Divert-to-Drain.

PREPARATION

1. Place a **"CAUTION" sign** on the PB2 stating that it contains chemical solution and not to be used for dialysis, informing any personnel necessary.

2. Verify that the PB2 is NOT connected to a dialysis machine, and that…

… *if NOT equipped with a Divert-to-Drain,* that the **PB2's Product Hose** *(blue tube)* is loose and not connected to anything.

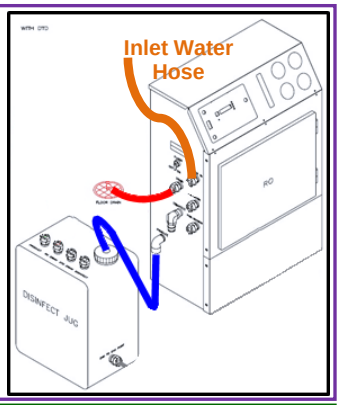
… *if equipped with a Divert-to-Drain,* that the **DTD's Product Hose** *(green tube)* is loose and not connected to anything.

3. *If equipped with a DI Polishing Filter*, then replace the DI cartridge with a false tube.

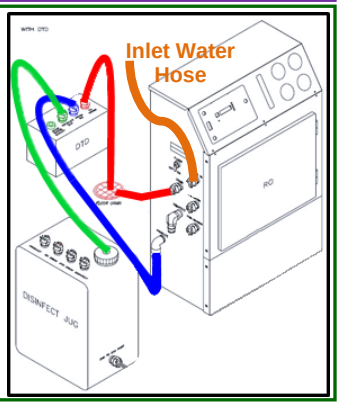
FILL JUG WITH WATER

4. Connect hoses for initial filling of the jug:

If NOT equipped with a Divert-to-Drain…
… Connect **Inlet Water Hose** *(clear-braided hose)* to **Water Source** and to the **PB2's Water In Port**, and turn the water **ON**
… Place the **PB2's Drain Hose** *(red tube)* to drain
… Place loose end of **PB2's Product Hose** *(blue tube)* to the **Jug's Large/Fill Opening**



If equipped with a Divert-to-Drain…
… Connect **Inlet Water Hose** *(clear-braided hose)* to **Water Source** and to the **PB2's Water In Port**, and turn the water **ON**
… Place the **DTD's Drain Hose** *(red tube)* to drain
… Place the **PB2's Drain Hose** *(red tube)* to drain
… Place loose end of **DTD's Product Hose** *(green tube)* to the **Jug's Large/Fill Opening**
… **PB2 Product Hose** *(blue tube)* remains in place between the PB2's Product Port and the Divert-to-Drain's From RO Port



5. Turn the **OPERATE Switch** to the **OPERATE** position and fill **Disinfect Jug** with 2 gallons of "Good Quality" RO water. *Two gallons of DI water can also be used if desired.*

*- If the Low Pressure Alarm sounds press the **LOW PRESSURE ALARM RESET Button** on the PB2. If the PB2 continues to go into Low Pressure Alarm, see "Low Pressure Alarm" Section.*

- Turn the **OPERATE Switch** to the **OFF** position once the **Disinfect Jug** is filled to 2 gallons.

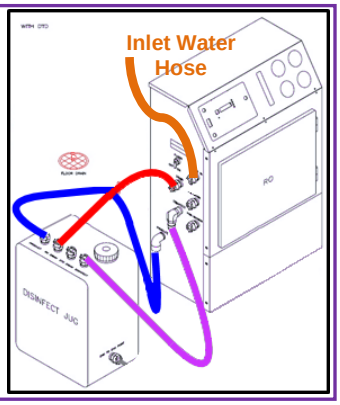
MIX SOLUTION and CIRCULATE

6. ***If cleaning,*** check and record water's baseline pH which will be referenced during rinsing to assure a complete rinse.

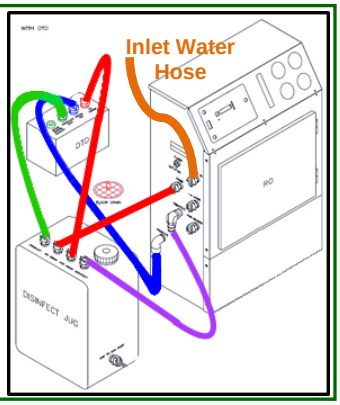
7. Add the following chemicals to the Disinfect Jug and mix based on the procedure performing:
- *If disinfecting,* add 75 cc of Minncare. Use 1% Test Strips to test for proper dilution strength.
- *If cleaning, and doing a Low pH Clean,* add 61 grams of BWI-1000
- *If cleaning, and doing a High pH Clean,* add 61 grams of BWI-2000

8. Connect Hoses to Jug:

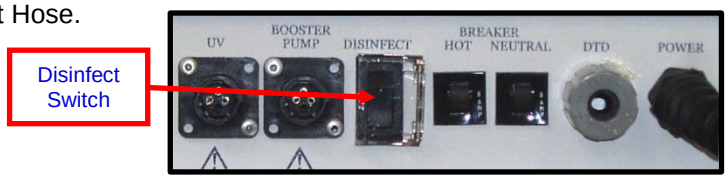
If NOT equipped with a Divert-to-Drain…
… Connect **Disinfect Hose** from the **PB2's Disinfect Port** to the **Jug's Disinfect Port**
… Remove the end of the **PB2's Product Hose** *(blue tube)* in the **Jug's Large/Fill Opening**, and connect to the **Jug's Product Port** *(adaptor hose with Disinfect Jug may be required)*.
… Connect the **PB2's Drain Hose** *(red tube)* to the **Jug's RO Drain Port**



If equipped with a Divert-to-Drain…
… Connect **Disinfect Hose** from the **PB2's Disinfect Port** to the **Jug's Disinfect Port**
… Remove the end of the **DTD's Product Hose** *(green tube)* in the Jug's Large/Fill Opening, and connect to the **Jug's Product Port** *(adaptor hose with Disinfect Jug may be required).*
… Connect the **PB2's Drain Hose** *(red tube)* to the **Jug's RO Drain Port**
… Connect the **DTD's Drain Hose** *(red tube)* to the **Jug's DTD Drain Port**



9. Turn the **DISINFECT Switch** *(found on the back of the PB2)* to the **DISINFECT** position which will start the PB2's pump and start pulling solution up through the Disinfect Hose and out through the Product Hose.



**** If a loud pulsating noise occurs for more than 15 seconds, turn the DISINFECT SWITCH to the OFF position, then repeat step 8 to reseat the hoses.***
**** Never run the PB2 in Disinfect Mode without a solution being pulled up through the Disinfect Hose, which will cause the pump to run dry and damage it.***

10. Circulation:

If NOT equipped with a Divert-to-Drain…
… Allow the PB2 to recirculate the solution for 15 minutes, and then proceed to the Step#11.

If equipped with a Divert-to-Drain…
… Allow solution to recirculate for 5 minutes,

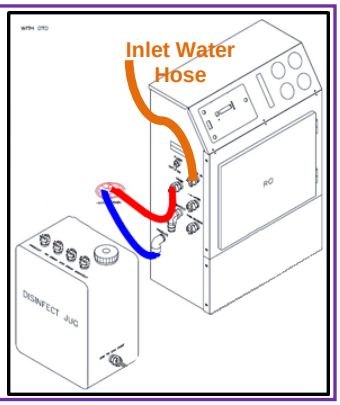
… Remove the back cover of the Divert-to-Drain,
… Push the "Divert Tee" in and turn clockwise to lock into "by-pass" position which will allow solution to flow through the product side of the Divert-to-Drain's solenoid valve,
… Allow to circulate for an additional 10 minutes.

… Turn the "Divert Tee" counter-clockwise which should cause it to "pop" back out to its normal operating position.
… Reinstall the back cover onto the Divert-to-Drain.

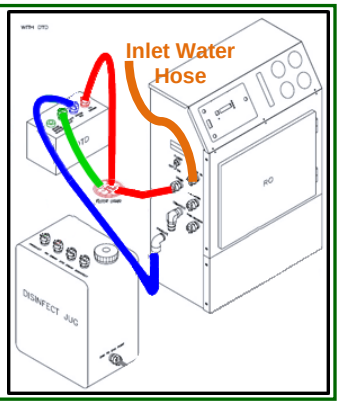
11. After 15 minutes of recirculation, turn the **DISINFECT Switch** to the **OFF** position.

12. Disconnect hoses from the Disinfect Jug:
- Disconnect the **Disinfect Hose** from the **PB2's Disinfect Port**, and hold it upright to allow any solution in it to drain back into the Disinfect Jug. Once drained, disconnect the **Disinfect Hose** from the **Disinfect Jug**.

If NOT equipped with a Divert-to-Drain…
… Disconnect the **PB2's Product Hose** and the **PB2's Drain Hose** from the **Disinfect Jug** and place both to drain.



If equipped with a Divert-to-Drain…
… Disconnect the **DTD's Product Hose**, **PB2's Drain Hose**, and the **DTD's Drain Hose** from the **Disinfect Jug** and place them all to drain.



13. Safely discard the solution in the **Disinfect Jug**.

14. Solution dwelling.
- ***If disinfecting*****,** then allow the solution to dwell for a minimum of 30 minutes up to 2 hours. Longer dwell times are acceptable, especially if experiencing high microbiological issues.
- *If cleaning***,** no dwell time is necessary.

RINSE PROCEDURE

15. After the dwell time, turn the **OPERATE Switch** to the **OPERATE** position to restart the PB2.
*- If the Low Pressure Alarm sounds press the **LOW PRESSURE ALARM RESET Button** on the PB2. If the PB2 continues to go into Low Pressure Alarm, see "Low Pressure Alarm" Section.*

16. Allow the product water to run to drain for 30-45 minutes to rinse solution from the PB2.

17. Test product water to determine if any residual solution still present.

If NOT equipped with a Divert-to-Drain, sample from the **PB2's Product Hose** *(blue tube).*

If equipped with a Divert-to-Drain, sample from the **DTD's Product Hose** *(green tube).*

- *If disinfecting with Minncare***,** use the Residual Test Strips to determine if any disinfectant can be detected. Rinse until no residuals can be detected.
- *If cleaning with either Low pH or High pH Cleaners***,** check the water's pH and compare to baseline reading taken at the start of this procedure. Rinse until pH returns to baseline.
**** If any residual solution detected, then continue to rinse and test until no residual solution can be detected.***

18. Turn the **OPERATE Switch** to the **OFF** position for a 15-20 minute Rebound Break.
** This rebound break is highly recommended because residual disinfectant could still be present in the membrane even if a negative result was obtained during rinsing.*

19. After the 15-20 minute Rebound Break, turn the **OPERATE Switch** to the **ON** position to restart the PB2.
*- If the Low Pressure Alarm sounds press the **LOW PRESSURE ALARM RESET Button** on the PB2. If the PB2 continues to go into Low Pressure Alarm, see "Low Pressure Alarm" Section.*

20. Test product water to determine if any residual solution still present.
- *If disinfecting with Minncare***,** use the Residual Test Strips to determine if any disinfectant can be detected. Repeat steps 16-20 to rinse until no residuals can be detected.
- *If cleaning with either Low pH or High pH Cleaners***,** check the water's pH and compare to baseline reading taken at the start of this procedure. Repeat steps 16-20 to rinse until pH returns to baseline.
**** If any residual solution detected, then continue to rinse and test until no residual solution can be detected.***

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

21. Turn the **Water Source OFF**, and disconnect **Inlet Water Hose.**

22. Remove the **"CAUTION" sign** from the PB2.

LONG TERM STORAGE; PRESERVE AND PACK

During the operation of a PB2, organic materials that may be present in the feed water can accumulate on the RO membrane surfaces. The presence of organics also provides an environment conducive to microbiological activity, which over time can lead to microbiological growth. If left unchecked, these organisms can grow to a level that will foul the membrane and thereby make it unusable.

If the PB2 will not be used for a temporary period of greater than 7 days, it should be Preserved and Packed for storage, which is good for up to 6 months. It should be noted that the BWI-3000 Membrane Preservative is NOT a disinfecting agent. It will not destroy micro-biological growth, only inhibit further growth. Therefore follow these recommendations concerning cleaning and disinfecting prior to packing with preservative:

- Always perform a Low pH Clean and High pH Clean performed prior to packing.
- If the PB2 has not been used within the last 48 hours, then it should also be disinfected prior to packing.
- If the PB2 will be stored for more than 7 days, then it should also be disinfected prior to packing.

The PB2 may be stored in preservative for a period for up to 6 months. If longer storage is required, the PB2 must be rinsed of the preservative, have a Low pH Clean and Disinfect performed, and then re-pack it in preservative.

REQUIRED MATERIALS

Part#	Description	Notes/Usage
SUMCOO00574 	**BWI-3000, MemStore** **Preservative**	- Replaces MinnClean MP - **Application:** To prevent microbial growth in the RO and Membranes during storage. - It can be used on brass. **- Dilution:** 152 grams *(152 ml)* of BWI-3000 to 2 gallons of water.

NOTEs

1. This procedure uses Better Water's Disinfect Jug. If not using this jug, then take care to make sure the hoses are fully submerged in whatever container is being used, and appropriate safety measures are taken to protect against spills and splashes.

2. This procedure is also written to include details for both using a PB2 with and without a Divert-to-Drain.

PREPARATION

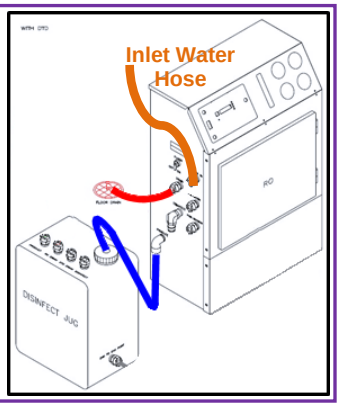
1. Place a **"CAUTION" sign** on the PB2 stating that it is **"Packed with Preservative"** and not to be used for dialysis, informing any personnel necessary.

2. As previously discussed, perform the required cleanings and/or disinfecting procedures.

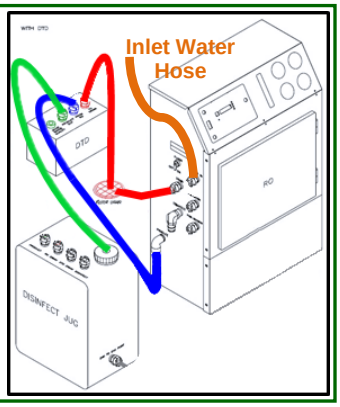
FILL JUG WITH WATER

3. Connect hoses for initial filling of the jug:

If NOT equipped with a Divert-to-Drain…
… Connect **Inlet Water Hose** *(clear-braided hose)* to **Water Source** and to the **PB2's Water In Port**, and turn the water **ON**
… Place the **PB2's Drain Hose** *(red tube)* to drain
… Place loose end of **PB2's Product Hose** *(blue tube)* to the **Jug's Large/Fill Opening**



If equipped with a Divert-to-Drain…
… Connect **Inlet Water Hose** *(clear-braided hose)* to **Water Source** and to the **PB2's Water In Port**, and turn the water **ON**
… Place the **DTD's Drain Hose** *(red tube)* to drain
… Place the **PB2's Drain Hose** *(red tube)* to drain
… Place loose end of **DTD's Product Hose** *(green tube)* to the **Jug's Large/Fill Opening**
… **PB2 Product Hose** *(blue tube)* remains in place between the PB2's Product Port and the Divert-to-Drain's From RO Port



4. Turn the **OPERATE Switch** to the **OPERATE** position and fill **Disinfect Jug** with 2 gallons of "Good Quality" RO water. *Two gallons of DI water can also be used if desired.*

*- If the PB2 goes into Low Pressure Alarm, press the **LOW PRESSURE ALARM RESET Button**. If it continues to go into Low Pressure Alarm, see "Low Pressure Alarm" Section.*

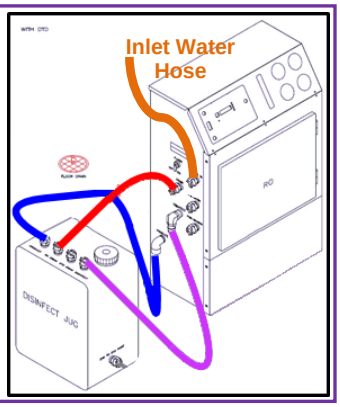
- Turn the **OPERATE Switch** to the **OFF** position once the **Disinfect Jug** is filled to 2 gallons.

MIX SOLUTION and CIRCULATE

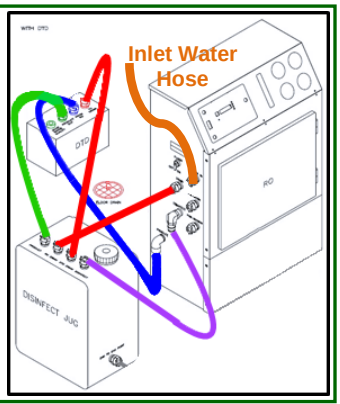
5. Add 152 grams *(152 ml)* of BWI-3000 to the Disinfect Jug, and stir until dissolved.

6. Connect Hoses to Jug:

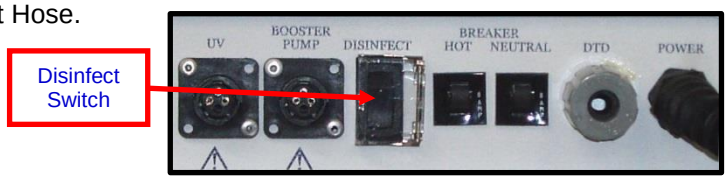
If NOT equipped with a Divert-to-Drain…
… Connect **Disinfect Hose** from the **PB2's Disinfect Port** to the **Jug's Disinfect Port**
… Remove the end of the **PB2's Product Hose** *(blue tube)* in the **Jug's Large/Fill Opening**, and connect to the **Jug's Product Port** *(adaptor hose with Disinfect Jug may be required)*.
… Connect the **PB2's Drain Hose** *(red tube)* to the **Jug's RO Drain Port**



If equipped with a Divert-to-Drain…
… Connect **Disinfect Hose** from the **PB2's Disinfect Port** to the **Jug's Disinfect Port**
… Remove the end of the **DTD's Product Hose** *(green tube)* in the Jug's Large/Fill Opening, and connect to the **Jug's Product Port** *(adaptor hose with Disinfect Jug may be required).*
… Connect the **PB2's Drain Hose** *(red tube)* to the **Jug's RO Drain Port**
… Connect the **DTD's Drain Hose** *(red tube)* to the **Jug's DTD Drain Port**



7. Turn the **DISINFECT Switch** *(found on the back of the PB2)* to the **DISINFECT** position which will start the PB2's pump and start pulling solution up through the Disinfect Hose and out through the Product Hose.



**** If a loud pulsating noise occurs for more than 15 seconds, turn the DISINFECT SWITCH to the OFF position, then repeat step 8 to reseat the hoses.***
**** Never run the PB2 in Disinfect Mode without a solution being pulled up through the Disinfect Hose, which will cause the pump to run dry and damage it.***

8. Circulation.

If NOT equipped with a Divert-to-Drain…
… Allow the PB2 to recirculate the solution for 15 minutes, and then proceed to the Step#9.

If equipped with a Divert-to-Drain…
… Allow solution to recirculate for 5 minutes,
… Remove the back cover of the Divert-to-Drain,
… Push the "Divert Tee" in and turn clockwise to lock into "by-pass" position which will allow solution to flow through the product side of the Divert-to-Drain's solenoid valve,
… Allow to circulate for an additional 10 minutes.
… Turn the "Divert Tee" counter-clockwise which should cause it to "pop" back out to its normal operating position.
… Reinstall the back cover onto the Divert-to-Drain.

9. After 15 minutes of recirculation, turn the **DISINFECT Switch** to the **OFF** position.

FINALIZE
10. Disconnect hoses from the Disinfect Jug:
- Disconnect the **Disinfect Hose** from the **PB2's Disinfect Port**, and hold it upright to allow any solution in it to drain back into the Disinfect Jug. Once drained, disconnect the **Disinfect Hose** from the **Disinfect Jug**.

If NOT equipped with a Divert-to-Drain…
… Disconnect the **PB2's Product Hose** and the **PB2's Drain Hose** from the **Disinfect Jug** and place both to drain.

If equipped with a Divert-to-Drain…
… Disconnect the **DTD's Product Hose**, **PB2's Drain Hose**, and the **DTD's Drain Hose** from the **Disinfect Jug** and place them all to drain.

11. Safely discard the solution in the **Disinfect Jug**.

12. Disconnect the **PB2 Product Hose**, **PB2 Drain Hose**, and **Inlet Water Hose** from the PB2, and plug these ports.

If equipped with a Divert-to-Drain…
… Disconnect the **DTD Product Hose**, **DTD Drain Hose**, and **PB2 to DTD Hose** from the Divert-to-Drain.

13. Open the front **Cabinet Door** and do the following…
… Carefully remove the **5 micron Filter Housing**, which will be filled with water. Drain the water from the housing, discard the filter, and allow the housing to air dry.
… Carefully remove the **10" Carbon Block Filter Housing**, which will be filled with water. Drain the water from the housing, discard the filter, and allow the housing to air dry.
… Once the housings are dry, reattach to the PB2.

14. Tag the PB2 to indicate that it is packed in preservative including the date it was packed.
- Consider also tagging the hoses and the booster pump (if equipped with one), to denote these were last used with preservative, in the event these are scavenged to be used with another PB2 at which time they should be rinsed before use.

15. The PB2 should be stored in a climate controlled environment, recommended to be between 60°-80°F.

Units may be stored in Membrane Preservative (BWI-3000) for up to 6 months.

RINSING THE PB2 AFTER BEING PACKED IN PRESERVATIVE

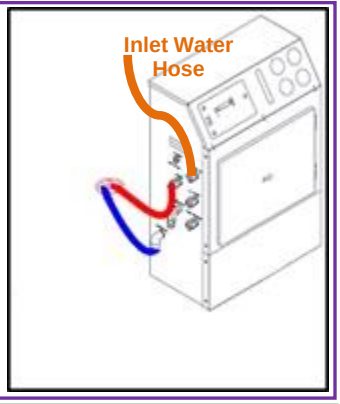
After packing the PB2 in preservative and storing, the following should be done to bring the PB2 back into service, or to repack for additional time *(up to 6 months)*.

1. Verify the **PB2's DISINFECT Switch** and the **OPERATE Switch** are in the **OFF** positions.

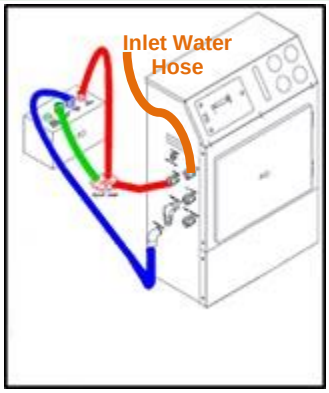
2. Plug the **PB2's Power Cord** into an electrical outlet.

3. Setup PB2 *(and Divert-to-Drain)*:

If NOT equipped with a Divert-to-Drain…
… Connect **Inlet Water Hose** *(clear-braided hose)* to **Water Source** and to the **PB2's Water In Port**
… Connect the **PB2's Product Hose** and the **PB2's Drain Hose** to their respective ports on the PB2, placing the other ends to drain.



If equipped with a Divert-to-Drain…
… Connect **Inlet Water Hose** *(clear-braided hose)* to **Water Source** and to the **PB2's Water In Port**
… Connect the **PB2's Product Hose** from the **PB2's Product Port** to the **DTD From RO Port**
… Connect the **PB2's Drain Hose** to the **PB2's Drain Port** and place the other end to drain
… Connect the **DTD's Product Hose** to the **DTD's Product Out Port** and place the other end to drain
… Connect the **DTD's Drain Hose** to the **DTD's To Drain Port** and place the other end to drain.



… Remove the back cover of the **Divert-to-Drain**,
… Push the "Divert Tee" in and turn clockwise to lock into "by-pass" position which will allow water to flow through the product side of the Divert-to-Drain's solenoid valve

4. Reinstall filters…
… Open the front **Cabinet Door** and insert a new **5 micron Filter** and a new **10" Carbon Block Filter**
… Turn **Water Source** to **ON**

… Following previously detailed instructions, purge air from both filters.

5. Turn the **OPERATE Switch** to the **OPERATE** position.
*- If the PB2 goes into Low Pressure Alarm, press the **LOW PRESSURE ALARM RESET Button**. If it continues to go into Low Pressure Alarm, see "Low Pressure Alarm" Section.*

6. Check the PB2 and its connections for leaks.

7. Press the **MODE Switch** until the **PRODUCT TDS** light is illuminated and record the Product TDS reading.
- Continue to check this Product TDS reading throughout the rinse process.
- The Product TDS reading will begin to fall, rapidly at first, then gradually slow down.

8. The PB2 should be rinsed for a minimum of 2 hours.

9. Take water sample.
- At this point a water sample may be taken and submitted for analysis to assure AAMI standard water is being produced. This sample should be taken from the product hose.

10. Check water quality.
- A minimum of 90% rejection should be maintained.
- If the PB2 does not maintain greater than 90% rejection, check the source water pH. If the pH is above 8.0 this may impact the rejection of the PB2 and a DI polishing cartridge may be required.
- A low source water TDS/Conductivity may also result in a low percent rejection.
- Also check chlorine and chloramine levels in the product water. A maximum of 0.1 mg/L chloramine and 0.5 mg/L free chlorine should be maintained.

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

If equipped with a Divert-to-Drain…
… Turn the "Divert Tee" counter-clockwise which should cause it to "pop" back out to its normal operating position.
… Reinstall the back cover onto the Divert-to-Drain.

12. Remove signage and tags which denoted the PB2 was packed in preservative.

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

TECHNICAL SERVICE BULLETINS

TECHNICAL SERVICE BULLETIN

PB1/PB2 Low PSI / Monitor Modification

TSB# **TSB2012001**	Date **01/11/12**	Page 1 of 6

In response to questions concerning operations of Better Water LLC Portable ROs without dialysis personnel/trained operators in attendance (within visual or audible range of the units) during the entire treatment, Better Water LLC issues the following:

Currently, on all PB1 and PB2 Portable RO units manufactured prior to Jan. 12, 2012, the following occurs during a low pressure default condition:

1) A visual alarm light is illuminated.
2) The inlet solenoid valve remains open / energized.
3) The pump motor is turned off (this is to protect the pump head from running dry).
4) The Water Quality Monitor is turned off.
5) The water feeding the dialysis machine continues to flow through the Pretreatment, RO membrane and .05 final filter (PB2 only).

If the customer desires changes to their unit allowing the Water Quality Monitor to remain on and the Inlet Solenoid Valve to close in a low water pressure default condition, shutting off water to the dialysis machine, see the following instructions.

In order to determine whether your Portable RO unit can be modified, see Illustrations 1 and 2.
Your control box must match exactly, having either
a Contactor Relay (Illustration 1 – see Page 2)
or a Blade-type Relay (Illustration 2 – see Page 4), to be modified.
Any deviation in appearance from Illustration 1 or 2 prevents the unit from being modified.

For units matching exactly either Illustration 1 or 2, modifications are available:

Field modifications are simple wire relocations taking about 15 minutes to complete. See illustrations and instructions.

*** Should you wish Better Water LLC to make these wire relocation modifications, verification and testing, please call Better Water LLC to receive a RGA, then issue a Purchase Order for Labor / Testing charge of $125.00 (as of 1/11/12).

If you have identified your unit as having a Contactor Relay, see Pages 2, 3 and 6.
If you have identified your unit as having a Blade-type Relay, see Pages 4, 5 and 6.

If you would like to speak to Technical Support prior to making modifications or need assistance during the process, please call (615) 355-6063, and press "1".

All Better Water LLC Portable RO units manufactured on or after Jan. 12, 2012 will include this modification as a standard.

TECHNICAL SERVICE BULLETIN

PB1/PB2 Low PSI / Monitor Modification

TSB# **TSB2012001**	Date **01/11/12**	Page 2 of 6

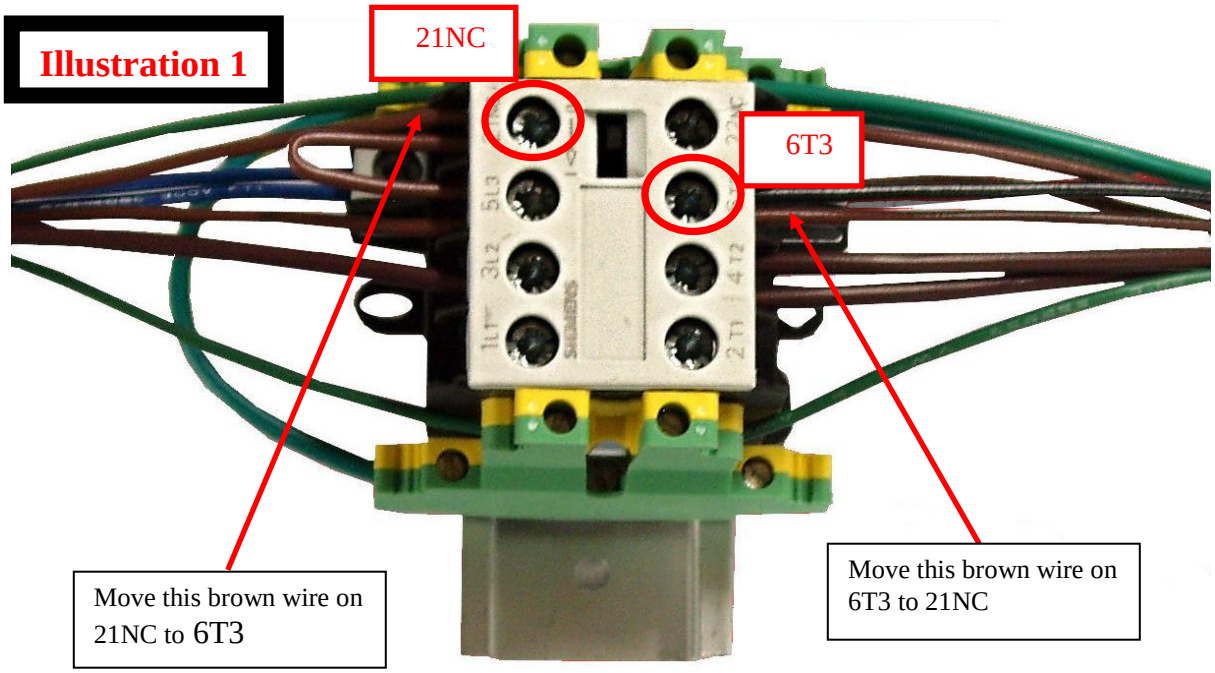
Contactor type

Note: Before performing any maintenance or modification on a PB2, ensure the unit has been removed from the power source and water source.

TOOLS / PARTS REQUIRED: Voltmeter, Phillips screwdriver, 7” 18ga wire, and 1 wire nut or Butt splice.
For your convenience you can order these parts from Better Water LLC, specifying Part # EQPB2RETROFIT

1) Unplug portable RO from outlet
2) On PB1 models, remove 4 screws in top cover of control box to access relay block. On PB2 models, remove 2 bolts in top corners of cabinet to access relay block.
3) On portables with a contactor locate 21NC on the contactor block. There should be 2 brown wires there.
 a) Locate the brown wire connecting 21NC to 16 pin connector #5 using volt meter set to continuity. See Illus. 1
 b) Remove that wire from position 21NC.
 c) Locate the brown wire at position 6T3.
 d) Remove that wire.
 e) Add the 7” wire extension to the brown wire removed from 21NC using the wire nut.
 f) Connect this assembly to 6T3.
 g) Locate the brown wire removed from 6T3.
 h) Connect to position 21NC.

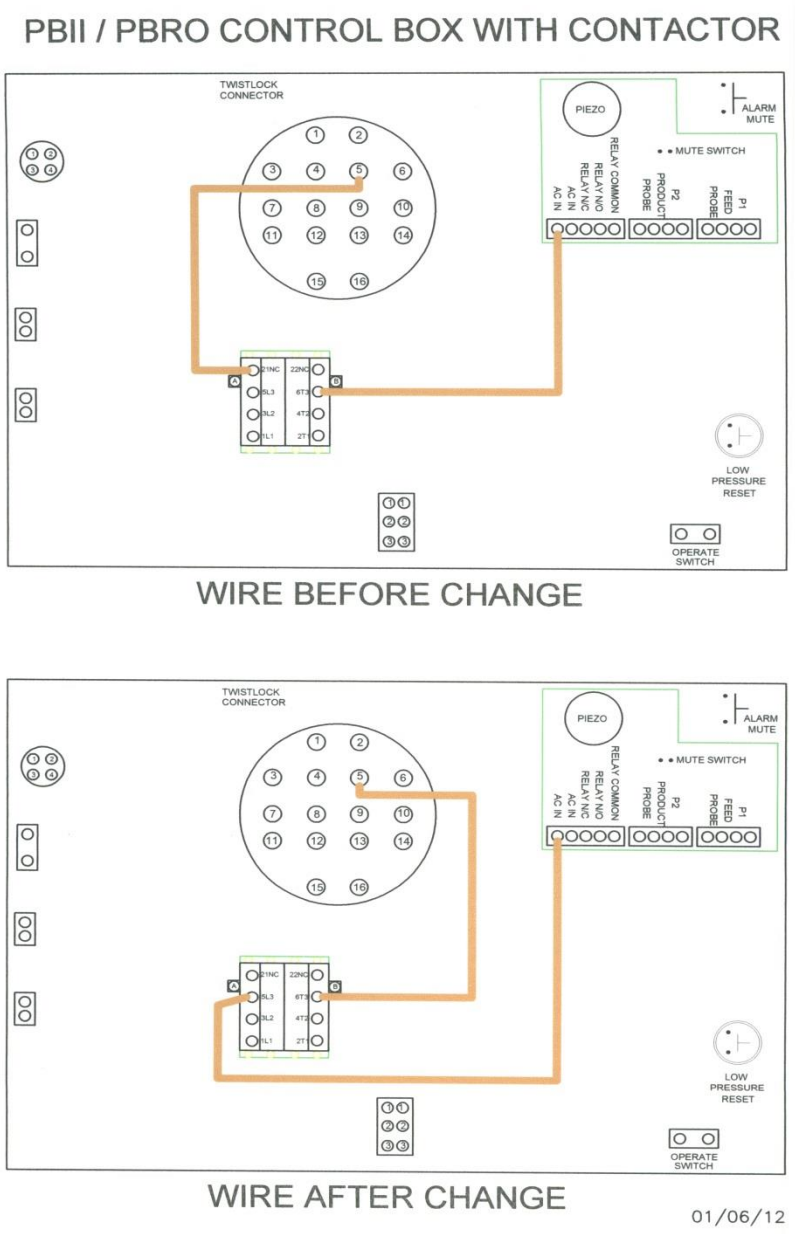
Illustration 1



TECHNICAL SERVICE BULLETIN		
PB1/PB2 Low PSI / Monitor Modification		
TSB# **TSB2012001**	Date **01/11/12**	Page 3 of 6

Note: There are 2 brown wires on 21NC currently. To locate the correct brown wire, a volt meter must be used to determine continuity between #5 on the twist lock connector and the target brown wire on 21NC.

Drawing 1



TECHNICAL SERVICE BULLETIN

PB1/PB2 Low PSI / Monitor Modification

TSB# **TSB2012001** | Date **01/11/12** | Page 4 of 6

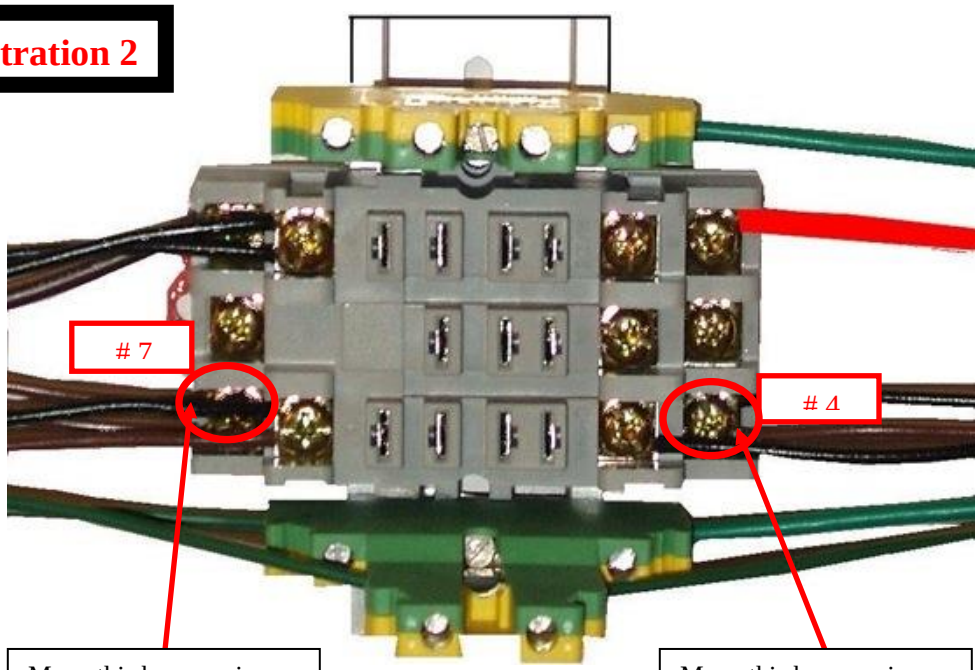
Blade-type Relay

Note: Before performing any maintenance or modification on a PB2, ensure the unit has been removed from the power source and water source.

TOOLS / PARTS REQUIRED: Voltmeter, Phillips screwdriver, 7" 18ga wire, and 1 wire nut or Butt splice. *For your convenience you can order these parts from Better Water LLC, specifying Part # EQPB2RETROFIT*

1) Unplug portable RO from outlet.
2) On PB1 models, remove 4 screws in top cover of control box to access relay block. On PB2 models, remove
bolts in top corners of cabinet to access relay block.
3) On portables with a relay locate #7 on the relay block. There should be 2 brown wires there.
a) Locate the brown wire connecting #7 to 16 pin connector #5 using volt meter set to continuity. See illus.2
b) Remove that wire from relay position #7.
c) Locate the brown wire at relay position #4.
d) Remove that wire.
e) Add the 7" wire extension to the brown wire removed from #7 using the wire nut.
f) Connect this assembly to #4.
g) Locate the brown wire removed from #4.
h) Connect to relay position #7.

Illustration 2

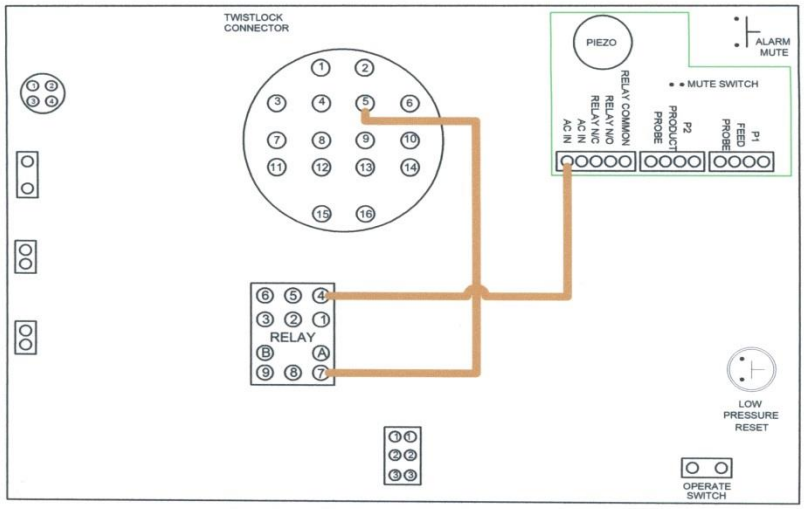


TECHNICAL SERVICE BULLETIN		
PB1/PB2 Low PSI / Monitor Modification		
TSB# **TSB2012001**	Date **01/11/12**	Page 5 of 6

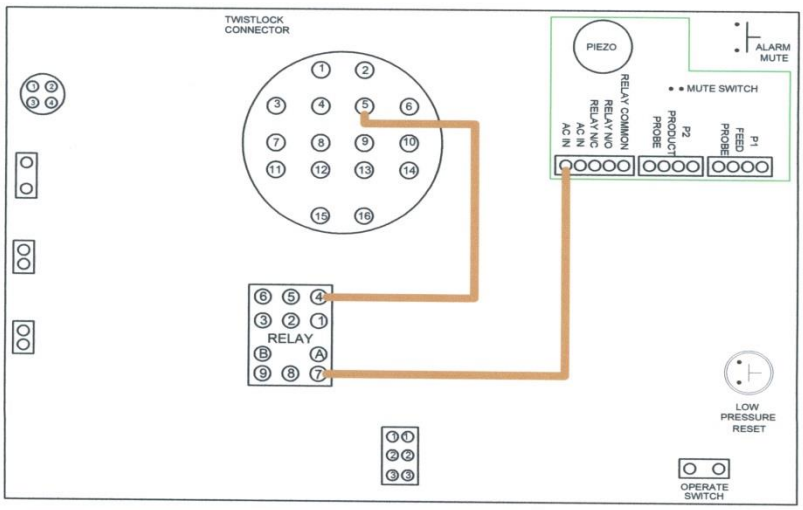
Note: There are 2 brown wires on #7 currently. To locate the correct brown wire, a volt meter must be used to determine continuity between #5 on the twist lock connector and the target brown wire on #7.

Drawing 2

PBII / PBRO CONTROL BOX WITH RELAY



WIRE BEFORE CHANGE



WIRE AFTER CHANGE

01/06/12

TECHNICAL SERVICE BULLETIN		
PB1/PB2 Low PSI / Monitor Modification		
TSB# **TSB2012001**	Date **01/11/12**	Page 6 of 6

Verifying Modifications:

After the modification is complete, BEFORE the cabinet is closed and put into service, you must ensure the accuracy of the work performed for safety and proper operation by doing the following:

1) When in operate mode, the Water Quality Monitor should power ON and remain ON after pressing the Reset Button.

2) Simulate a low water pressure condition by turning the tap water supply OFF to the RO unit. The following should happen:

- **a) Inlet Solenoid Valve should close,**
- **b) pump will shut down,**
- **c) Water Quality Monitor will remain on.**

3) Verify the Inlet Water Solenoid Valve is closed by removing red drain line from drain – after a few seconds, there should be no constant water flow.

4) After verification of the modification:

- **a) turn the tap water supply ON,**
- **b) close / replace the control box cover.**

IMPORTANT OPERATIONAL NOTE:

After this modification and BEFORE pressing the START button, during initial startup or filter change, air will need to be purged from the unit at the labcock on the inside of the cabinet.

TECHNICAL SERVICE BULLETIN

PB2 Low Pressure Issues When in Flush

TSB# **TSB2012002**	Date **04/27/12**	Page 1 of 2

ISSUE

A low pressure condition during flush has been observed, primarily in hospitals and home use applications because of insufficient water pressure and/or flow.

POSSIBLE CAUSES

1. **Insufficient flow.** The PB2 has a minimum incoming flow requirement of approximately 2.2 gpm and a minimum filter-in pressure of 20 psi during flush. The PB2 is set at 36 gph (0.60 gpm) or 2270 ml/min and 110 to 125 psi pump pressure during test. When the PB2 is put into full flush, the water volume required to flush the membrane should be approximately 2.2 gpm, product and reject flow combined. If the incoming flow is less than 2.2 gpm the PB2 may go into a low-pressure condition. If insufficient flow is the cause then this must be corrected at the tap source and the following solutions are not applicable.

2. **Insufficient tap water pressure.** If you have less than 20 psi at the PB2's filter-in gauge, while the PB2 is in flush, the PB2 may go into a low-pressure condition.

SOLUTIONS

1. Check for large pressure drops across external carbons and correct as necessary.

2. Check the following:
- Set the flush lever to a half open position.
- Adjust the pressure regulating valve, located inside the PB2 cabinet, by turning it clock-wise until fully open which may possibly increase the filter-in pressure.
- Monitor the pump pressure.
- Do not allow the pump pressure to go below 60 psi.
- If any pump cavitation is observed and/or heard (*the pump will make a distinct growling noise*) close the flush lever.

3. Do the following:
- Disconnect the product hose from the dialysis machine
- Do only one of the following:

a. If the PB2 is used or dedicated for a single dialysis machine application, set the pump to a minimum of 90 psi or look at the glass flow meter and set the product flow to a minimum of 25 gph (1575 ml/min), at 77º F.

b. If the PB2 is not used or dedicated for a single dialysis machine application, set the pump to a minimum of 100 psi or look at the glass flow meter and set the product flow to a minimum of 36 gph (2270 ml/min) at 77º F.

- In most cases this will allow the PB2 to flush with the flush lever fully open.

4. If this does not correct the problem you have one or two options:
Add a booster pump:

a. EQSUBPB2BP PB2 BOOSTER PUMP qty=1

* *Refer to the PB2 Service Manual for assistance on installing this pump. This manual is available online at www.betterwater.com/support.*

And/Or replace the feed line with the larger hose listed below:

b. PLFIPP00005	3/8" MPT x 1/2" HOSE BARB	qty=1
c. PLHOST00322	1/2" STYLE 5000 HOST	qty= 28 feet (*length as needed*)
d. PLFIOT00546	1/2" BARB x 3/4" GARDEN HOSE	qty=1

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e. PLHOCL001 1/2" HOSE CLAMP qty=2

5. If backflow preventers are used at the tap source it is recommended that a **WATTS MODEL 9D DOUBLE-CHECK (*BACKFLOW PREVENTER*)** be used with the PB2.
- For specifications go to **http://www.watts.com/pages/products_details.asp?pid=886**.

TECHNICAL SERVICE BULLETIN

PB2 Water Quality Monitor Adjustment to Alarm on %-Rejection for Nuisance Alarms

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ISSUE

On occasion feed water quality changes for various reasons. This is sometimes due municipalities changing water sources, modifying pretreatment, or construction and repair to main water lines. These can cause erratic feed TDS changes and fluctuating pH.

The PB2 is set at the factory to alarm on %-Rejection. In this setting the water quality is more prone to a nuisance alarm due to the above mentioned changes in feed water quality. The PB2 can alternately be set to allow the alarm set-point to be set on Product TDS instead of %-Rejection.

WARNING

1. ELECTRICAL HAZARD: Be careful where and what is touched when making the changes described below inside the internal control box.

2. The following changes should not be done while a hemodialysis treatment is being performed.

SOLUTION

PRE-CHANGE VERIFICATION

1. Verify the feed and product TDS values displayed on the Water Quality Monitor with a hand-held TDS meter.
*- If out of calibration see the Operators Manual for the calibration procedure. This manual is available online and can be downloaded from **www.betterwater.com/support**.*

DIPSWITCH CHANGE

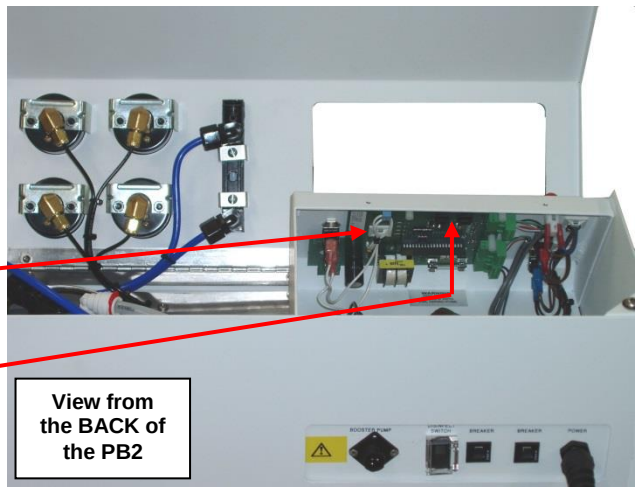
1. Turn the device **OFF**.

2. Unplug from the electrical receptacle

3. Open the **External Top Panel** and the remove the cover from the internal **Control Box** and locate the control board containing the…

… block of two **Dipswitches**…

…the **CAL-UP** and **CAL-DOWN buttons**



TECHNICAL SERVICE BULLETIN

PB2 Water Quality Monitor Adjustment to Alarm on %-Rejection for Nuisance Alarms

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4. The **Left Dipswitch** is labeled: **OFF:PROD**
ON:%REJ
*- The factory setting is on: **%REJ**, with the position of the dipswitch pushed down or in toward the board.*

- The **Right Dipswitch** is labeled: **OFF:µS**
ON:PPM
*- The factory setting is on: **PPM**, with the position of the dipswitch pushed down or in toward the board.*

5. Pull the **Left Dipswitch** up or toward the top back to set to **OFF: PROD**.

6. Plug the device back into the electrical receptacle and turn the device **ON**.

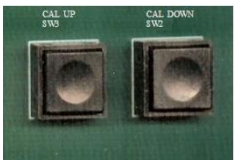
WATER QUALITY MONITOR ALARM SET-POINT CHANGE:

1. Monitor product TDS over a 15 minute period and periodically record several of the product values.

2. Average the recorded product values and then multiply by 4
- *example: if the average product TDS=5.2 ppm*
5.2 ppm x 4 = 20.8 ppm
round to the nearest whole number, so the new alarm set-point will be 21 ppm

3. On the Water Quality Monitor on the front of the PB2, push the **MODE switch button** until the **SET-POINT yellow-light** illuminates.
- The current Set-Point will display.
- The default set-point is 50 ppm.

4. Locate the **CAL-UP** and **CAL-DOWN buttons** on the Water Quality Monitor board inside the open Control Panel.



5. Change the set-point by pushing the **CAL-UP** or **CAL-DOWN buttons** until the desired set-point is displayed on the Water Quality Monitor display.

6. On the Water Quality Monitor on the front of the PB2, push the **MODE SWITCH button** until **CAL** is displayed.

7. Continue pressing the **MODE SWITCH button** to scroll through the different modes until the **SET-POINT yellow-light** is illuminated, then verify that the correct set-point is displayed.

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8. Replace the cover on the internal **Control Box**, and close the outer **External Top Panel** cover.

NOTE: *This same product set-point procedure applies if the Water Quality Monitor's Right Dipswitch is set to* ***OFF:µS*** *which will display in micro Siemens rather than parts-per-million if the switch is set to ON:PPM.*

TECHNICAL SERVICE BULLETIN

Portable RO Current Leakage Values

TSB# **TSB2012004**	Date **05/25/12**	Page 1 of 1

SUMMARY OF RISK: Current Requirements in rms microamperes (de to 1 kHz)

Enclosure Risk Current			**Earth Risk Current**
Isolated	Category	Cord Connected or Battery Powered Class 2 type B	General Cord Connected
	Normal Condition	100 µA	500 µA
	Single Fault Condition	500 µA	1000 µA

The table above is the Better Water LLC recommended leakage test parameters. This table is derived from the IEC 60601-1 UL and AAMI 60601-1 3rd Addition (*Reaffirmed January 2012*) Standards.

The PB and PB2 RO units are a class 2 or type B Device. All PB2's are tested to these standards at the factory before ship out. Beginning January 2012 the complete check off data sheet for each individual PB2 in the information packet included with the PB2. This data includes all hydraulic and electrical data recorded at time of testing and QA.

TECHNICAL SERVICE BULLETIN

Replacing the 10” Carbon Block Filter Bowl with Replacement Short Bowl on Portable ROs

TSB# **TSB2012005**	Date **07/17/12**	Page 1 of 2

OVERVIEW:

If additional, external Carbon Blocks and/or Carbon Filters are used Better Water's PB1 and PB2 portable ROs, the internal, 10” Carbon Block Filter can be eliminated. A False Cartridge can be used in-place of the filter, inside the standard Filter Bowl.

Cut-Away of a Big Blue False Cartridge inside the standard Filter Bowl of a PB2.

Big Blue False Cartridge
part# SUFFOO00580

An alternative to using the False Cartridge is to use a Replacement Short Bowl, which will reduce the amount of water in the bowl. Again, this can only be done if additional external Carbon and/or Carbon Blocks are used in the pre-treatment of the feed water to the RO unit.

Replacement Short Bowl
part# PLFIS801951

NOTE

PB2s built prior to January 2012 can use either the False Cartridge or the Replacement Short Bowl. *PB2s built after January 2012* CANNOT use the false cartridge because it will NOT fit the end-cap of the Big Blue housing, but they can use the Replacement Short Bowl.

CAUTION

The Replacement Short Bowl *SHOULD NOT BE USED* if there are no additional external Carbon and/or Carbon Blocks are used in the pre-treatment of the feed water to the RO unit. It should only be used if additional Carbon and/or Carbon Blocks are used in the pre-treatment of the feed water to the RO unit.

NOTE ABOUT O-RING:

The replacement bowl uses the same O-Ring as the Standard Filter Bowl. When replacing the Standard Filter Bowl with the Replacement Short Bowl, the existing O-Ring can be used but it is recommended that a new O-Ring be installed. Part number for the Big Blue O-Ring is **SUMIOO00587.**

Big Blue O-Ring
part# SUMIOO00587

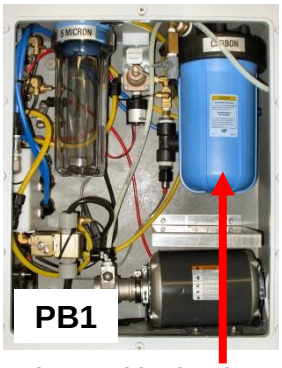
TECHNICAL SERVICE BULLETIN

Replacing the 10” Carbon Block Filter Bowl with Replacement Short Bowl on Portable ROs

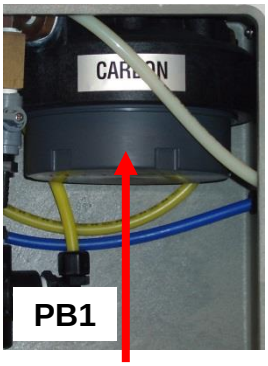
TSB# **TSB2012005**	Date **07/17/12**	Page 2 of 2

REPLACEMENT INSTRUCTIONS:

1. Turn the power to the RO unit OFF.
2. Turn the water supply to the RO unit OFF.
3. Open the lab-cock, located inside the RO cabinet, and relieve filter-in and filter-out pressure. It is advisable to use a small piece of tubing on the nipple of the lab-cock to route the draining water out of the cabinet.
4. Close the lab-cock once the drain is complete.
5. Using the Big Blue Filter Wrench remove the Big Blue Filter Bowl.
6. Remove and discard the Carbon Block Filter.
7. Ensure that the new Short Filter Bowl has the O-Ring in place.
8. Install the Short Filter Bowl by threading it into place, and hand-tighten. If necessary use the Big Blue Filter Wrench to tighten. Don't over-tighten.
9. Turn the water supply to the RO unit ON.
10. Open the lab-cock and allow water to flow until all air is purged. It is advisable to use a small piece of tubing on the nipple of the lab-cock to route the draining water out of the cabinet.
11. Close the lab-cock once all the air is purged.
12. The unit is now ready to run.



shown with Big-Blue Carbon Filter Bowl



shown with Replacement Short Bowl

TECHNICAL SERVICE BULLETIN

PB2 Bypass for Using External Nephros SSU Filter

TSB# **TSB2012008**	Date **10/15/12**	Page 1 of 1

OVERVIEW:

Nephros SSU Pyrogen Capsule Filter

The PB2 (portable RO) comes standard with an internal .05 micron Pyrogen filter. Better Water has created a simple solution for those customers who have expressed an interest in using an external Nephros SSU Pyrogen capsule filter. This solution involves the removal of the standard internal .05 micron Pyrogen filter and replacing it with a bypass tube with quick-connect ends.

This bypass tube, part# **EQSUBPB2FT** is available from Better Water.

NOTE

Better Water LLC recommends that one of these two filters must be used with the PB2 to ensure water quality.

PB2 .05 False Tube
part# EQSUBPB2FT

USE of the NEPHROS SSU CAPSULE FILTER:

When using the Nephros SSU capsule filter, it should be installed on the product hose between the PB2 and the dialysis machine. A sample port should also be installed after this filter to draw water to mix bicarb and for bacteria sampling,

REPLACEMENT INSTRUCTIONS:

1. Turn the power to the RO unit OFF.
2. Turn the water supply to the RO unit OFF.
3. Open the lab-cock, located inside the RO cabinet, and relieve filter-in and filter-out pressure. It is advisable to use a small piece of tubing on the nipple of the lab-cock to route the draining water out of the cabinet.
4. Close the lab-cock once the drain is complete.
5. Remove the .05 micron filter (*refer to the PB2 Operator Manual for instructions on how to remove the filter*)
6. Attach the false/bypass tube in place of the filter. The connections will only allow it to be installed one way.
7. Turn the water supply to the RO unit ON.
8. Open the lab-cock and allow water to flow until all air is purged. It is advisable to use a small piece of tubing on the nipple of the lab-cock to route the draining water out of the cabinet.
9. Close the lab-cock once all the air is purged.
10. Install the Nephros SSU capsule filter on the product hose coming from the PB2.
11. Install a sample port after the Nephros SSU capsule filter.
12. The unit is now ready to run.

TECHNICAL SERVICE BULLETIN

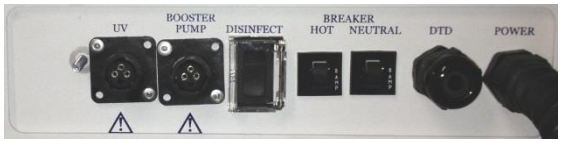
PB2 Conversion for New Control Box and Divert-to-Drain

TSB# **TSB2012011**	Date **12/26/12**	Page 1 of 5

OVERVIEW:

If a Divert-to-Drain is needed for PB2 models manufactured prior to 2013, a new control box must be installed in place of the original model. See the pictures to the right denoting the external differences between the two control boxes to determine which control box your PB2 has. A new bracket must also be installed on the cart on which the Divert-to-Drain will be mounted.

Older model control box that **is NOT** Divert-to-Drain capable.



New model control box that **IS** Divert-to-Drain capable

The following part number/kit is available which contains all the necessary items for retro-fitting older model PB2s with the Divert-to-Drain:

Part# EQSUBPB2CB/DTD

- New Control Box
- Divert-to-Drain
- Cart Mounting Bracket

The new Divert-to-Drain for the PB2 has been designed for renal dialysis applications

* The Divert-to-Drain has a 3-way solenoid valve and Good Water Quality LED Indicator light

* In good water conditions…
… the solenoid energizes
… the Good Water Quality LED indicator is lit

* In poor water conditions…
… the solenoid de-energizes
… product water from the PB2 is diverted to drain
… the Good Water Quality LED indicator is not lit

* The Divert-to-Drain is set to divert based on the PB2's Water Quality Monitor set-point setting

* If the Water Qualify Monitor fails, the Divert-to-Drain will divert the product water to drain

Top view of the Divert-to-Drain showing tube connections and the LED

TECHNICAL SERVICE BULLETIN

PB2 Conversion for New Control Box and Divert-to-Drain

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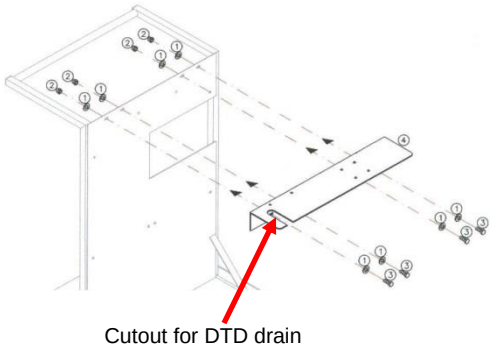
INSTRUCTIONS:

The following instructions detail how to remove and replace the control boxes as well as how to mount the bracket on the cart and the Divert-to-Drain onto the bracket.

WARNING

To avoid electrical shock, turn the power to the PB2 OFF, and unplug it from the electrical outlet.
A lock-out tag should be placed on the unit to prevent accidental use while this conversion is underway.

1. Turn the power to the PB2 **OFF**, and unplug it from the electrical outlet.



Cutout for DTD drain

MOUNT the BRACKET to the CART

2. Mount the bracket onto the cart, attaching with the four screws, washers and nuts as shown.

NOTE: *If Big Blue Filters are used, the same four screws that hold the filters on, can be undone and used to attach the bracket.*

NOTE: *The four holes for the bracket may have to be drilled on older model carts.*

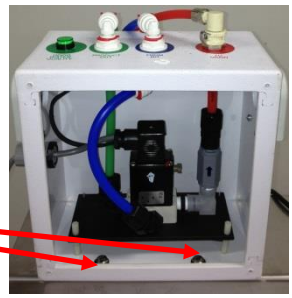
MOUNT the DIVERT-TO-DRAIN to the CART

3. Remove the front cover of the Divert-to-Drain, by removing the four screws that hold it in place.

4. Place the Divert-to-Drain onto the bracket, where the drain slides into the cutout on the bracket.

5. Attach the Divert-to-Drain using two screws, washers, and nuts, through the holes in the bottom.

6. Replace the Divert-to-Drain front cover using the four screws removed initially.



TECHNICAL SERVICE BULLETIN

PB2 Conversion for New Control Box and Divert-to-Drain

TSB# **TSB2012011** | Date **12/26/12** |

REMOVE OLD CONTROL BOX

7. Open the top cover of the PB2 to reveal the control box.

8. Remove the two screws that hold the top of the control box on, and remove that top.

9. Disconnect the **ground wire** that connects to the left side of the control box.

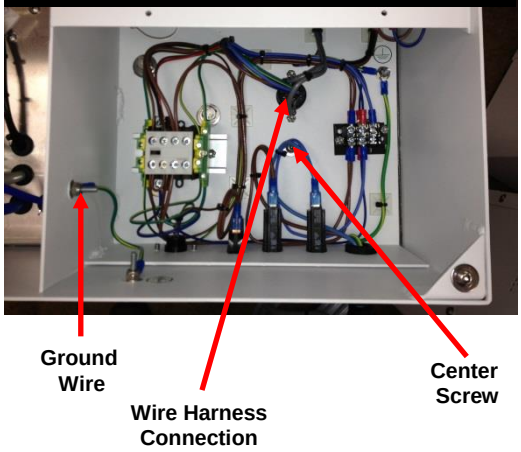
10. Locate the black **wire harness connector** inside the control box.

11. From inside the PB2 unscrew the **twist-lock** that holds that **wire harness** to the wire harness connection. Once the **twist-lock** is free, pull down on the **wire harness** to disconnect it from the **wire harness connection**.

12. Unscrew the **center screw** located in the center of the control box that holds the control box to the PB2 frame

13. Remove old control box, from the PB2 frame.

Top/Inside view of Control Box with the top of the control box removed



INSTALL NEW CONTROL BOX

14. Place new control box into top of PB2.

15. Replace the **center screw** to hold the control box to the PB2 frame.

16. From inside the PB2 reattach the **wire harness** to the **wire harness connection** in the control box by realigning the wire pins and re-screw the **twist-lock** on to hold it into place.

17. Reattach the **ground wire** to the side of the control box.

18. Connect the Divert-to-Drain wiring to the control box:

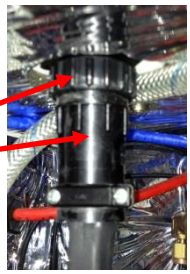
a. Locate the Hubble Strain Relief adaptor on the back of the control box and unscrew the Belden Compression Nut off.

b. Take the 5 wires from the Divert-to-Drain and pull through the compression nut, then through the Hubble adaptor into the control box.
- Red, Brown, Black, White, and Green wires

c. Cut the Red and Brown Wires as they will not be used.

d. Strip the Black, White, and Green wires back ¼" so they can be connected.

Inside view of the PB2 of the **twist-lock** for the **wire harness**



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PB2 Conversion for New Control Box and Divert-to-Drain		
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e. Locate the Red, Blue, and Green/Yellow Phoenix Blade Connectors.

f. Place the Black Wire into the Red Phoenix Connector.

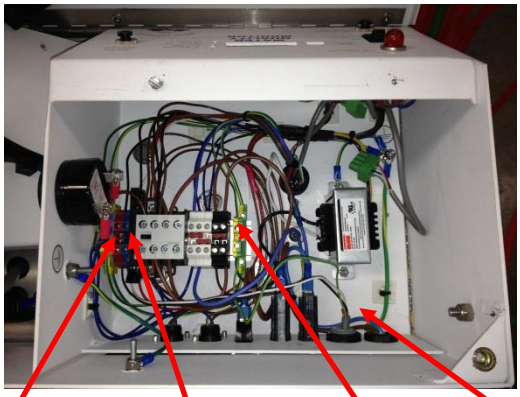
g. Place the White Wire into the Blue Phoenix Connector.

h. Place the Green Wire into the Green/Yellow Phoenix Connector.

i. Screw the Belden Compression Nut back on and hand-tighten.

19. Reattach the top cover to the control box using the 2 screws that hold it in place.

20. Close the top cover of the PB2.



CONNECT THE DIVERT-TO-DRAIN
21. Connect the DTD hoses…

a. Red Tube from the DTD **TO DRAIN port** to **DRAIN**

b. Blue Tube from the DTD **FROM RO port** to the PB2 **PRODUCT port**

c. Green Tube from the DTD **PRODUCT OUT Port** to the DIALYSIS MACHINE

22. Remove the lock-out tag from the PB2 and reconnect it to the electrical Outlet.

*** PB2 with Divert-to-Drain is ready to use.**

Top view of Divert-to-Drain showing tube connections

TEST the DIVERT-TO-DRAIN AFTER INSTALLING:
1. Place the Green Product Tube and the Red Drain Tube to Drain.

2. Before starting the PB2, make sure all air has been purged from the pretreatment.

3. Set the switch to OPERATE. The RO should start-up and the Water Quality Monitor should go into Poor Water Quality.

4. Verify that during this poor water quality condition that…
   a. No product water flow from the Green **PRODUCT OUT Tube**
   b. Product water is going to drain through the Red **TO DRAIN Tube**
   c. The **GOOD WATER QUALITY LED** should NOT be lit on the Divert-to-Drain during poor water quality

TECHNICAL SERVICE BULLETIN		
PB2 Conversion for New Control Box and Divert-to-Drain		
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5. Verify that once the Water Quality Monitor gets above the set-point and there is a good water quality condition that…
   a. The Divert-to-Drain should have flow coming out of the Green **PRODUCT OUT Tube**
   b. No product flow should be going through the Red **TO DRAIN Tube**
   c. The **GOOD WATER QUALITY LED** should be lit green on the Divert-to-Drain

6. If the items as detailed in steps 4 and 5 can be verified, the Divert-to-Drain is functioning properly. If not recheck connections and contact technical support if necessary.

APPENDIX C

PRE-SHIP TEST DATA

NOTES


BETTER WATER LLC
Smyrna, Tennessee