Better Water LLC

Pre-Treatment Components

Operator Manual

rev. Feb 2019

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

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Our Company

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

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

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

Contact Us

Better Water LLC
698 Swan Dr
Smyrna, TN 37167

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

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

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

Technical Phone Support

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

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

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

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

BEFORE calling for emergency assistance:

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

Technical Support Info Online

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

- Operator and Service Manuals
- Interactive Frequently Asked Questions for Troubleshooting
- Consumables and Accessories Lists
- Technical Service Bulletins

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

Specific Contacts

Technical Support	Phone	(615) 355-6063, option "1"
	Email	support@betterwater.com
To Place an Order (*purchase orders*)	Fax	(615) 355-6065
	Email	orders@betterwater.com
	Phone	(615) 355-6063
Customer Service (*returns*)	Phone	(615) 355-6063, option "2"
	Fax	(615) 355-6065
	Email	customerservice@betterwater.com

Website **www.betterwater.com**

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

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

Introduction

The Better Water LLC Pre-Treatment System is manufactured to the utmost quality. With proper operation, maintenance, and care, these components should give you years of reliable service.

Before starting you should first read and have a thorough understanding of this entire Operator Manual. It describes in detail the steps and procedures for safe usage of the Pre-Treatment Components.

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

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

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

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

WARNINGS

1. It is unsafe to operate or service this device without first reading and understanding the **entire** Operator's Manual. Keep this manual and other associated documentation for future reference.

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

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

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

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

CAUTIONS

1. When used as a medical device, federal law restricts this device to sale by or on the authority of a physician. Per CFR 801.109 (b)(1).

2. Improper operation of this device could result in a low or no-flow alarm on the dialysis machines.

3. Misuse or improper operation of this device will void any warranty.

4. Where water is mentioned, unless otherwise noted, it must be AAMI standard quality water.

5. Electrical and plumbing connections must adhere to local statutes and any facility codes. Connect this device to a proper ground connection in accordance with the National Electrical Code. Do not remove the ground wire or ground plug. Do not use an extension cord with this device.

6. Do not remove any Caution, Warning, or any other descriptive labels from the device.

7. Do not operate this device in an explosive environment or in the presence of flammable materials. Do not use this device to store, mix, or transfer flammable liquids.

8. Movement or vibrations during shipment may cause connections to loosen.

9. Do not operate this unit in an environment where temperatures may be below 50^{o} F or above 90^{o} F.

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

QUICK REFERENCES

MAINTENANCE SCHEDULE					
MAINTENANCE TASKS	**Each Shift/ Daily**	**Weekly**	**Monthly**	**3-12 months**	**Other**
Check the system for leaks	X				
Monitor the system for unusual sounds	X				
Clean external surfaces		X			
Record operational values, ie. flows, pressures, temperature, etc.	X				**Or more often as required by the facility. Record on Pre-Treatment Daily Checklist**
Refill brine tanks with salt					**Prior to salt level falling below 50% in the brine tank**
Empty and clean brine tank				**Annually**	
Change particulate filter cartridges			**Every 30 days…**		**…Or if there is a pressure drop across the device greater than 15 psi while the RO is running**
Clean UV quartz sleeve				**6 months**	
Change UV quartz sleeve					**As Needed**
Change UV bulb				**Annually**	
Media inside media tanks					**Better Water LLC recommends that tank media be changed every three years unless… … otherwise specified by the medical director and/or company policies, … by the specific thresholds determined for each individual pre-treatment component device after two verified regeneration cycles**
Perform chemical, microbial, and endotoxin testing on feed and product water as per AAMI requirements					**Schedule established by the medical director**

RELATED CONSUMABLE and REPLACEMENT PARTS		
DESCRIPTION	**PART#**	**PICTURE**
CONSUMABLES & RELATED ITEMS		
Multi-Cartridge Filter, 20”, 5 micron - O-ring **EQFHOO00467**	**SUCAOO00552**	
20” Big Blue Sediment Filter, 5 micron - O-ring **SUMIOO00587**	**SUCAOO00553**	
Multi-Cartridge Filter, 20”, 1 micron - O-ring **EQFHOO00471**	**SUCAOO00555**	
20” Big Blue Sediment Filter, 1 micron - O-ring **SUMIOO00587**	**SUCAOO01896**	
Hurricane Filters: 1 micron 20 micron .35 micron 5 micron - Gasket E**QFHOO00467**	**SUCAOO00540** **SUCAOO00541** **SUCAOO00542** **SUCAOO00543**	
F4+ UV Light Bulb	**SUUVOO00928**	
F4+ UV Quartz Sleeve	**SUUV02021**	
F4+ UV Sensor	**SUUVOO02019**	
Pictures do not reflect the size of the item in relation to the other pictures		

RELATED CONSUMABLE and REPLACEMENT PARTS		
DESCRIPTION	**PART#**	**PICTURE**
F4+ UV Power Supply	**EQUVOO01928**	
Seal and Spacer Rebuild Kit for Fleck Valves: - for Fleck Valve 2750 - for Fleck Valve 2850 - for Fleck Valve 3150 ** Kit includes all the necessary spacers and O-rings for rebuilding the valve. Contents will vary from picture base on which kit is ordered.*	**EQVAFL2750REBUILD** **EQVAFL2850REBUILD** **EQVAFL3150REBUILD**	
Fleck Valve Puller Tool - for Fleck Valve 2750 - for Fleck Valve 2850 - for Fleck Valve 3150	**EQVAFL13061** **EQVAFL17623** **EQVAFL12682**	
Fleck Valve Stuffer Tool - for Fleck Valve 2750 - for Fleck Valve 2850 - for Fleck Valve 3150	**EQVAFL11098** **EQVAFL16516** **EQVAFL12682**	
CONSUMABLE MEDIA		
Carbon Media **- 1 cubic foot bag**	**EQMEOO00467**	
Organic Scavenger Resin - 1 cubic foot bag	**EQMEOO01175**	
Dealkalizer Resin - 1 cubic foot bag	**EQMEOO01180**	
Pictures do not reflect the size of the item in relation to the other pictures		

RELATED CONSUMABLE and REPLACEMENT PARTS		
DESCRIPTION	**PART#**	**PICTURE**
Iron Removal Media - 1/2 cubic foot bag	**EQMEOO01607**	
Softener Resin - 1 cubic foot box, Purolite C100X10-S	**EQMEOO01675**	< No Picture >
Multi-Media Filter, Anthracite - 52 lb bag	**EQMEOO01770**	< No Picture >
Multi-Media Filter, Sand - 50 lb. bag	**EQMEOO01771**	< No Picture >
Multi-Media Filter, Garnet - 50 lb. bag	**EQMEOO01772**	
Media Gravel - 50 lb. bag	**EQMEOO01774**	
Brine Tank Salt - Cargil SOD Chloride Pellet - 50 lb. bag	**SUMI01659**	
Pictures do not reflect the size of the item in relation to the other pictures		

DEVICE INFORMATION

PRE-TREATMENT COMPONENT DEVICES

There are several pre-treatment component devices that are used in conjunction with one another based on the level of pre-treatment needed for the incoming water source. Use of any one of these component devices is dependent on the make up of the feed water being treated. Most of these use a combination of media or cartridges to filter different types of material from the water. Each of these are described in further detail in this manual. The sequential order and placement of these component devices can vary slightly but the standard order of these are listed in the table below.

STANDARD ORDER of PRE-TREATMENT COMPONENT DEVICES

Pre-Treatment Component Device	Function	Backwash or Regenerate
Multi-Media Depth Filtration	Particulate/Sediment Filtration	Backwash
Particulate Filtration (*pre-carbon*): **- Hurricane Filter** **- Big Blue Cartridge** **- Multi-Cartridge Housing**	Particulate/Sediment Filtration	n/a with filter
Iron Removal Media Filtration	Reduce heavy metals	Backwash
Water Softener	Reduce water hardness (*calcium and magnesium*)	Regenerate
Dealkalizer	Lower water pH	Regenerate
Organic Scavenger	Reduce organic material	Regenerate
Carbon Media Filtration	Reduce of chlorine and chloramines	Backwash
Particulate Filtration (*post-carbon*): **- Big Blue Cartridge** **- Multi-Cartridge Housing**	Particulate/Sediment Filtration	n/a with filter
Ultra-Violet Light	Reduce Bacteria	n/a with bulb

Filters are consumable products whose life is directly related to the monitoring and routine care programs that are in place at the facility. This Pre-Treatment frame is a highly effective component of the water treatment system that with proper care, monitoring, and filter changes, should provide many years of quality service.

SYSTEM COMPONENTS: Automatic Control Valves

DESCRIPTION: All automatic backwashing filters and softeners are equipped with automatic control valves, which control the backwashing/regeneration times, cycles, and frequencies for the specific filter it operates. These feature a 7 day calendar time clock and has an interlock feature to prevent the RO from running while the filter is in backwash or regeneration. (*See Interlock Wiring System Section*)

MONITORING REQUIREMENTS:
Daily: Verify the controller day, and time of day is properly set.

MAINTENANCE:
- The seals and spacers in the valve should be changed every 3 to 5 years. This may have to be done sooner if there is a malfunction of the device.
* *See System Maintenance section.*

SYSTEM COMPONENTS: Interlock Wiring System

DESCRIPTION:
The interlock wiring system is a safety feature, incorporated into all Better Water LLC water systems, is a low voltage (*24 vac*) lockout system designed to shut down the RO machine, if running, or prevent the RO from running, when any filter or softener goes into backwash or regeneration.

On a single RO system, a 24 volt signal originates at the RO and is sent to each selected piece of equipment in series, and the last piece of equipment is equipped with a “jumper” to return the signal to the RO. When a filter or softener goes into backwash or regeneration mode, the signal is redirected to a red light on the specific control valve, which illuminates to indicate the backwash or regeneration mode of that piece of equipment. For those systems which have a pretreatment rack with a control box, it will also start the booster pump and open the blend valve bypass. With this signal not being returned to the RO, the RO will not run or will stop if running when the signal is broken. The interlock wiring system utilizes quick-connect fittings on all connections.

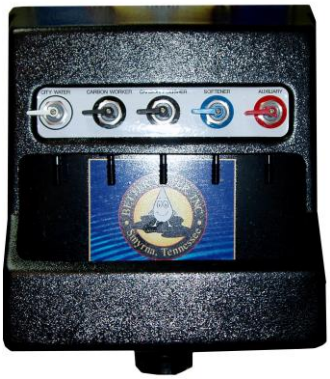
On a dual or dual-alternating RO system, the 24 volt signal originates at the level control box and is sent to each piece of equipment in series, with the last piece of equipment having a splitter to send the signal to both ROs. Although different in the path of the current, the principal is the same and when the signal is broken, the ROs will stop or not run.

SYSTEM COMPONENT DEVICES: Sample Box

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

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

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

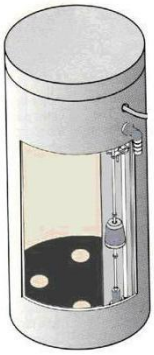


part#
EQ-SAMPLE-BOX
Central Pre-Treatment
Water Sample Box

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

SYSTEM COMPONENT DEVICES: Brine Tanks

DESCRIPTION:
Water softeners, organic scavengers, and dealkalizers, include a brine tank that holds the salt which produces the brine solution for the regeneration of the water conditioning resin. The brine tanks supplied with all Better Water LLC water softeners are made of a non-corrosive, plastic with a plastic grid plate in the bottom to reduce or eliminate "bridging" of the salt *(see note below).* On the inside of the tank is a brine well which houses the brine valve. This brine valve is connected with a 3/8" or larger brine line to a single or duplex softener. Only one brine tank is required for a duplex system. This tube serves to draw the brine solution out of the brine tank during the "brine draw" cycle, and also to refill the brine tank during the "brine refill" cycle of the control valve.


Cutaway view of brine tank

Better Water, LLC utilizes three safety measures with the brine valve; First, located on the bottom of the brine valve is an air check valve. This is a device incorporated into the brine valve to stop the flow through the brine tube in case the brine level drops to an insufficient level. This will prevent the control valve from drawing air into the system. Second, the brine valve is equipped with a float valve on the top, to prevent the brine tank from overfilling, in the event of a control valve malfunction, event of a power outage during the refill cycle. Thirdly, an overflow line is installed, in the rare case of overflow; the excess will be routed to a suitable drain.

The brine tank should only be filled with quality, premium grade salt pellets specified for water softening and/or conditioning. ***Do not use rock salt***, as this form of salt carries impurities and will tend to have adverse effects on your water pre-treatment system.

*NOTE: **Bridging** occurs in brine tanks when the salt sticks together to form one large solid mass of pellets, or by the salt caking in a dry-salt brine tank which causes failure of the liquid or brine beneath the dry salt to become saturated. The result of bridging is insufficient salt in the regeneration solution to properly regenerate the cation resin.*

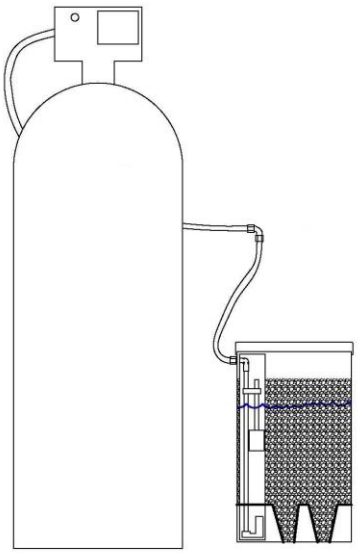
Brine tanks are sized according to the size of the water softener, organic scavenger, and dealkalizer vessels. Better Water LLC, primarily uses 2 sizes of brine tanks. 16" diameter and smaller devices will be supplied with an 18" diameter brine tank. 20" and larger devices will be supplied with a 24" brine tank. 30" and larger devices, although seldom used, can be supplied with even larger brine tanks. On occasion, a customer will request a smaller brine tank, due to space restrictions. Although adequate with some procedural modifications, this is not recommended. A smaller brine tank will require salt filling more often.

MONITORING REQUIREMENTS:
Daily: Daily monitoring of the salt level in the brine tank is required, refilling as necessary.

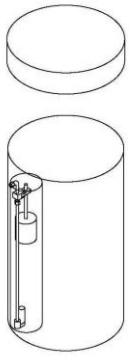
MAINTENANCE:
- The salt level in the brine tank should be filled periodically so it doesn't fall below 50%. The salt level should be maintained above the water level in the tank. It is recommended that the salt level be allowed to rise and fall over time, and not just "top off" on a daily basis, which will allow a good "turn-over" of the salt in the tank.

NOTE: It takes a minimum of 3 to 4 hours to fully saturate the water in the brine tank after refilling for maximum results.

Brine tanks should be emptied and cleaned annually, or more often if necessary.



Typical Media Tank and
Brine Tank Setup



Brine Tank Cutaway

BRINE TANK PART #	Brine Tank Size	Operating Weight lbs
EQTAOO01847	18" X 33"	300
EQTAOO01848	24" X 41"	600
EQTAOO01846	24" X 50"	600
EQTAOO01850	30" X 50"	1000

Larger sizes of tanks are available as well as custom tanks and applications.
Operating weights are estimated.

SYSTEM COMPONENT DEVICES: Multi-Media Depth Filtration

DESCRIPTION:
The multi-media depth filter contains a multi-layered media which is used when the feed water has a high silt density index. It first filters out these particles, and then removes them when backwashing the media. This filter will reduce particulates that are above 10 microns. Particles smaller than this may flow through.


Multi-Media Depth Filtration

Each multi-media depth filter in the system has a 7 day calendar time clock to control backwashing. The controller can be set to backwash at pre-set times on specific days, giving the user maximum flexibility. The controller has an inter-lock feature to prevent the RO from running during the backwash cycle. When backwashing a red light is illuminated as an indicator of this cycle and the RO will not run due to the interlock.

WHEN CAN THIS COMPONENT BE OMITTED FROM THE SYSTEM:
The multi-media depth filter can be omitted when another form of particulate removal is used with sufficient capacity and rating to remove particulate contaminants that are found in the tap water.

MONITORING REQUIREMENTS:
Daily: Check pre and post-filter pressure, and ΔP (*pressure drop*) across it while the RO is running.

MAINTENANCE:
- The media in the tank should be changed (*rebedded*) when a silt density index (SDI) test indicates the need to do so.

MULTI-MEDIA DEPTH FILTRATION

- Fiberglass Reinforced Plastic tanks
- HDPE or ABS lining
- 150 PSI Max Pressure
- 120°F Max Temperature
- Designed for sediment filtration when the feed water has a high silt density index, reducing particulates that are above 10 microns

Multi-Media Depth Filtration

- RO interlock with visual indicator
- Adjustable backwash times with 7 day wheel
- See-through environmental covers (*as per AAMI standards*)
- All valves are brass Fleck valves

SPECIFICATIONS

MULTI-MEDIA FILTER PART #	Fleck Valve Used	Total Cu. Ft. Media	Service Flow GPM	PSI Drop	Media Tank Size	Piping Size	Drain Flow GPM	Operating Weight
EQM-128-A	2750	2	8	< 6	12" X 52"	1"	10	274
EQM-1411-A	2750	3	11	< 8	14" X 65"	1"	15	455
EQM-1411-B	2850	3	11	< 6	14" X 65"	1 1/2"	15	455
EQM-1616-B	2850	4	16	< 9	16" X 65"	1 1/2"	20	695
EQM-2016-B	2850	6	16	< 9	21" X 62"	1 1/2"	25	989
EQM-2022-C	3150	6	22	< 6	21" X 62"	2"	25	989
EQM-2424-C	3150	8	24	< 7	24" X 72"	2"	30	1370
EQM-2430-C	3150	10	30	< 7	24" X 72"	2"	30	1409

Larger sizes of tanks are available as well as custom tanks and applications.
Pressure drops are based on clean bed operation and are estimates.

SYSTEM COMPONENT DEVICES: Hurricane Filter

DESCRIPTION:
The hurricane filter is a stainless steel housing which holds one pleated cartridge filter. If required, other micron filters are available. The system uses centrifugal force to separate dense particles such as sand, rust, grit, and metal fines from the water. Heavy particles drop to the bottom of the filter's outer chamber, where they are discharged manually or continuously. With the dense particles reduced, water and the light solids rise up, over, and into an inner chamber where the rotational flow is continue

WHEN CAN THIS COMPONENT BE OMITTED FROM THE SYSTEM:
The hurricane filter is an optional piece of equipment that is generally used when there is an unusually high amount of silt in the tap water. It can therefore, be omitted when there is not a high amount of silt present in the tap water.

DAILY START-UP PROCEDURES:
There are no start-up requirements, however the drain from this device should be checked to verify that it is partially open. This drain can be closed at the end of the dialysis day and opened at the beginning of the next dialysis day.

MONITORING REQUIREMENTS:
Daily: Check pre and post-filter pressure, and ΔP (*pressure drop*) across it while the RO is running.

MAINTENANCE:
- Replace filters every 30 days or as required if there is a pressure drop across the filter of greater than 15 psi while the RO is running; whichever comes first. Filters can be rinsed, cleaned, and reused until filter deteriorates.
- When changing the filter, the inside of the filter housing should be wiped down with a clean cloth using either water or a mild (*1%*) bleach solution.
** See System Maintenance section.*

part#
SUCAOO00540
Hurricane 1 Micron

SUCAOO00541
Hurricane 20 Micron

SUCAOO00542
Hurricane .35 Micron

SUCAOO00543
Hurricane 5 Micron

SYSTEM COMPONENT DEVICES: Particulate Filtration Cartridge (Pre-Carbon 20" Big Blue, 5 micron filter)

DESCRIPTION:
A basic particulate filtration system (*cartridge type*) consists of a properly selected housing (*usually 20" length*) fitted with a cartridge type filter element. These are specified to trap particulate matter of 5 microns or larger at a specified flow rate. Normally, there will be a pre-filter and a post-filter gauge to measure pressure drop that indicates filter clogging. The filter housing is threaded for easy cleaning and filter element exchanges available in both single and dual filter options.
Other micron filters are available if required.

WHEN CAN THIS COMPONENT BE OMITTED FROM THE SYSTEM:
This filter and housing can be omitted when another form of particulate removal is used with sufficient capacity and rating to remove particulate contaminants found in the tap water.

MONITORING REQUIREMENTS:
Daily: Check pre and post-filter pressure, and ΔP (*pressure drop*) across it while the RO is running.

MAINTENANCE:
- Replace filters every 30 days or as required if there is a ΔP (*pressure drop*) across the filter of greater than 15 psi while the RO is running; whichever comes first.
- When changing the filter, the inside of the filter housing should be wiped down with a clean cloth using either water or a mild (*1%*) bleach solution.
** See System Maintenance section*

part#
SUCAOO01896
20" Big Blue
1 Micron Filter

part#
SUCAOO00553
20" Big Blue
5 Micron Filter

SYSTEM COMPONENT DEVICES: Multi-Cartridge Housing

DESCRIPTION:
The multi-cartridge housing is a stainless steel housing which holds four standard 20" cartridge filters. This system is capable of trapping large quantities of particulate matter while maintaining a high flow rate with little pressure drop.

WHEN CAN THIS COMPONENT BE OMITTED FROM THE SYSTEM:
The multi-cartridge housing can be omitted when another form of particulate removal is used with sufficient capacity and rating to remove particulate contaminants found in the tap water.

MONITORING REQUIREMENTS:
Daily: Check pre and post-filter pressure, and ΔP (*pressure drop*) across it.

MAINTENANCE:
- Replace filters every 30 days or as required if there is a pressure drop across the filter of greater than 15 psi; whichever comes first.
- When changing the filters, the inside of the filter housing should be wiped down with a clean cloth using either water or a mild (*1%*) bleach solution.
** See System Maintenance section.*

part#
SUCAOO00555
20" Multi-Cartridge,
1 Micron Filter

part#
SUCAOO00552
20" Multi-Cartridge
5 Micron Filter

SYSTEM COMPONENT DEVICES: Iron Removal Media Filter


Iron Removal Media Filter

DESCRIPTION:
The iron removal media filter contains media which is designed for the removal of heavy metals in the tap water. It has proven to be very effective in the removal of iron, hydrogen sulfide, and manganese by first filtering out these particles, and then removing them through backwashing the media.

Each iron removal filter in the system has a 7 day calendar time clock to control backwashing. The controller can be set to backwash at pre-set times on specific days, giving the user maximum flexibility. The controller has an interlock feature to prevent the RO from running during the backwash cycle. When backwashing a red light is illuminated as an indicator of this cycle and the RO will not run due to the interlock.

WHEN CAN THIS COMPONENT BE OMITTED FROM THE SYSTEM:
The iron removal media is intended for use on source water that possesses a high concentration of heavy metals, therefore can be omitted whenever these high levels of heavy contaminants are not present.

MONITORING REQUIREMENTS:
Daily: This device requires daily monitoring to insure the controller clock is properly set.
Daily: Check pre and post-filter pressure, and ΔP (*pressure drop*) across it while the RO is running.
Daily: Check the Total Iron Content, post filter, which should be less than 0.1 part per million.

MAINTENANCE:
Better Water LLC recommends that tank media be changed (*rebedded*) every three years unless…
… otherwise specified by the medical director and/or company polices,
… or the post-filter Total Iron Content is greater than 0.1 parts per million after two verified backwash cycles.

IRON REMOVAL FILTERS

- Fiberglass Reinforced Plastic tanks
- HDPE or ABS lining
- 150 PSI Max Pressure
- 120°F Max Temperature
- *Iron removal* media designed for the removal of iron and other heavy metals

Iron Removal Media Filtration

- RO interlock with visual indicator
- Adjustable backwash times with 7 day wheel
- See-through environmental covers (*as per AAMI standards*)
- All valves are brass Fleck valves

SPECIFICATIONS

IRON REMOVAL FILTER PART #	Fleck Valve Used	Total Cu. Ft. Media	Service Flow GPM	PSI Drop	Media Tank Size	Piping Size	Drain Flow GPM	Operating Weight lbs
EQF-1416-A	2750	3	16	< 6	14" X 65"	1"	15	463
EQF-1422-B	2850	3	18	< 6	14" X 65"	1 1/2"	15	463
EQF-2026-B	2850	4	24	< 5	21" X 62"	1 1/2"	25	961
EQF-2430-C	3150	6	36	< 5	24" X 72"	2"	30	1359

Larger sizes of tanks are available as well as custom tanks and applications.
Pressure drops are based on clean bed operation and are estimates.

SYSTEM COMPONENT DEVICES: Water Softener


Water Softener

DESCRIPTION: Water softening consists of a single water softener or twin water softeners that are paralleled (*double capacity*) to meet system flow demands, reduction ratios, and user criteria. The water softeners in this system are commercial/industrial grade, automatic, and custom sized to meet the demand.

Each water softener in the system has a 7 day calendar time clock to control regeneration. The controller can be set to regenerate at pre-set times on specific days, giving the user maximum flexibility. The controller has an interlock feature to prevent the RO from running during the regeneration cycle. When regenerating a red light is illuminated as an indicator of this cycle and the RO will not run due to the interlock.

The resin is a premium grade, strong acid cation for high flow rate condensate demineralizing made from food-grade materials that meet FDA CFR 173.25 specifications. The water softener is regenerated with salt brine that is made from quality, premium grade salt pellets specified for water softening and/or conditioning. **Do not use rock salt**, as this form of salt carries impurities and will tend to have adverse effects on your water pre-treatment system. For information on about brine tanks, see the previous section titled “System Components: Brine Tanks”.

WHEN CAN THIS COMPONENT BE OMITTED FROM THE SYSTEM:
Water softening can be omitted when the tap water hardness is less than 2 grains per gallon (gpg) and the Primary Treatment Segment produces water that meets the AAMI Standards.

MONITORING REQUIREMENTS:
Daily: This device requires daily monitoring to insure the controller clock is properly set
Daily: Check pre and post-filter pressure, and ΔP (*pressure drop*) across it while the RO is running
Daily: Check the salt level in the brine tank is greater than 50%
Daily: The hardness, measured post softener, should be tested daily while the softener is under peak demand, usually late in the afternoon.

MAINTENANCE:
- The salt level in the brine tank should be filled periodically so it doesn’t fall below 50%.
- Better Water LLC recommends that tank media be changed every three years unless…
… otherwise specified by the medical director and/or company polices,
… or the hardness breakthrough is greater than 2 grains per gallon after two verified regeneration cycles.

SIMPLEX & DUPLEX WATER SOFTENERS

- Fiberglass Reinforced Plastic tanks
- HDPE or ABS lining
- 150 PSI Max Pressure
- 120° F Max temperature
- Strong acid, cation, high capacity resin

Simplex

Duplex

- RO interlock with visual indicator
- Adjustable backwash times with 7 day wheel
- See-through environmental covers (*as per AAMI Standards*)
- All valves are brass Fleck valves

SPECIFICATIONS

SIMPLEX WATER SOFTENERS PART #	Fleck Valve Used	Total Cu. Ft. Media	Grains Capacity	Service Flow GPM	PSI Drop	Media Tank Size	Brine Tank Size	Piping Size	Drain Flow GPM	Operating Weight Media / Brine lbs
EQS-122-A	2750	2	60,000	4.5	< 10	12" X 62"	18" X 33"	1"	3	279 / 345
EQS-143-A	2750	3	90,000	6.5	< 15	14" X 65"	18" X 33"	1"	5	463 / 387
EQS-143-B	2850	3	90,000	6.5	< 9	14" X 65"	24" X 41"	1 1/2"	5	463 / 706
EQS-163-B	2850	3	90,000	6.5	< 10	16" X 65"	24" X 41"	1 1/2"	5	463 / 706
EQS-204-B	2850	4	120,000	13	< 11	20" X 62"	24" X 41"	1 1/2"	10	994 / 747
EQS-205-B	2850	5	150,000	13	< 15	20" X 62"	24" X 41"	1 1/2"	10	984 / 789
EQS-206-B	2850	6	180,000	13	< 15	20" X 62"	24" X 41"	1 1/2"	10	1006 / 830
EQS-246-B	2850	6	180,000	19	< 15	24" X 71"	24" X 50"	1 1/2"	15	1393 / 977
EQS-247-B	2850	7	210,000	19	< 15	24" X 71"	24" X 50"	1 1/2"	15	1382 / 1018
EQS-248-B	2850	8	240,000	19	< 15	24" X 71"	24" X 50"	1 1/2"	15	1405 / 1060
EQS-249-B	2850	9	270,000	19	< 15	24" X 71"	24" X 50"	1 1/2"	15	1427 / 1101
EQS-2410-B	2850	10	300,000	19	< 15	24" X 71"	24" X 50"	1 1/2"	15	1450 / 1143
EQS-3011-C	2900	11	330,000	29.5	< 15	30" X 71"	30" X 50"	1 1/2"	20	2154 / 1546
EQS-3012-C	2900	12	360,000	29.5	< 15	30" X 71"	30" X 50"	1 1/2"	20	2110 / 1588
EQS-3013-C	2900	13	390,000	29.5	< 15	30" X 71"	30" X 50"	1 1/2"	20	2133 / 1630
EQS-3015-C	2900	15	450,000	29.5	< 15	30" X 71"	30" X 50"	1 1/2"	20	2178 / 1713

Larger sizes of tanks are available as well as custom tanks and applications.
Pressure drops are based on clean bed operation and are estimates.
Flow rates based on 6 GPM / FT^2 bed area.

DUPLEX WATER SOFTENERS PART #	Fleck Valve Used	Total Cu. Ft. Media for 2 tanks	Grains Capacity	Service Flow GPM	PSI Drop	Media Tank Size	Brine Tank Size	Piping Size	Drain Flow GPM	Operating Weight Media / Brine lbs
EQSD-124-A	2750	4	120,000	9	< 10	12" X 52"	18" X 33"	1"	3	279 / 345
EQSD-146-A	2750	6	180,000	13	< 15	14" X 65"	18" X 33"	1"	5	463 / 387
EQSD-146-B	2850	6	180,000	13	< 9	14" X 65"	18" X 33"	1 1/2"	5	463 / 387
EQSD-208-B	2850	8	240,000	26	< 11	20" X 62"	24" X 41"	1 1/2"	10	961 / 747
EQSD-2010-B	2850	10	300,000	26	< 15	20" X 62"	24" X 41"	1 1/2"	10	984 / 789
EQSD-2012-B	2850	12	360,000	26	< 15	20" X 62"	24" X 41"	1 1/2"	10	1006 / 831
EQSD-2414-B	2850	14	420,000	38	< 15	24" X 71"	24" X 50"	1 1/2"	15	1382 / 1018
EQSD-2416-B	2850	16	480,000	38	< 15	24" X 71"	24" X 50"	1 1/2"	15	1405 / 1060
EQSD-2418-B	2850	18	540,000	38	< 15	24" X 71"	24" X 50"	1 1/2"	15	1427 / 1101
EQSD-2420-B	2850	20	600,000	38	< 15	24" X 71"	24" X 50"	1 1/2"	15	1450 / 1143
EQSD-2422-B	2850	22	660,000	38	< 15	24" X 71"	24" X 50"	1 1/2"	15	1450 / 1143
EQSD-3030-C	2900	30	900,000	59	< 15	30" X 71"	30" X 50"	1 1/2"	20	2178 / 1713
EQSD-3032-C	2900	32	960,000	59	< 15	30" X 71"	30" X 50"	1 1/2"	20	2178 / 1713

Larger sizes of tanks are available as well as custom tanks and applications.
Pressure drops are based on clean bed operation and are estimates.
Flow rates based on 6 GPM / FT^2 bed area.

SYSTEM COMPONENT DEVICES: Dealkalizer


Dealkalizer

DESCRIPTION:
The desired pH of water is 7 for the feed water to the RO. If the pH is lower than 7 it is more acidic, and if the pH is higher than 7, it is more alkaline. If the pH of the water is higher than 8, a dealkalizer can be employed to assist in lowering the alkalinity. The resin used in dealkalizers is typically a Type 2 strong base anion. The resin bead used for dealkalizing is a conventional ion exchange resin bead. This resin will provide ion exchange (*removal of*) HCO_3, CO_3, sulfate (SO_4) ions and nitrate (NO_3) ions when regenerated with Sodium Chloride (*NaCL*). Water should be pre-softened before the dealkalizer so when used in a system, a water softener (*cation resin exchanging for the sodium ion*) should precede the dealkalizer. This will help to prevent fouling caused by the water hardness (*calcium & magnesium*).

A dealkalizer usually consists of a single, or multiple tanks that are in parallel to double the capacity, to meet system flow demands, reduction ratios, and user criteria. The dealkalizer is a commercial/industrial grade, automatic, and custom sized filter to meet the demands of the facility.

Each dealkalizer in the system has a 7 day calendar time clock to control regenerating. The controller can be set to regenerate at pre-set times on specific days, giving the user maximum flexibility. The controller has an interlock feature to prevent the RO from running during the regeneration cycle. When in regeneration a red light is illuminated as an indicator of this cycle and the RO will not run due to the interlock.

The resin is a premium grade, Type 2 strong base anion for high flow rate alkalinity reduction, made from food-grade materials that meet FDA CFR 173.25 specifications. The dealkalizer is regenerated with salt brine that is made from quality, premium grade salt pellets specified for water softening and/or conditioning. **Do not use rock salt**, as this form of salt carries impurities and will tend to have adverse effects on your water pre-treatment system. For information on about brine tanks, see the previous section titled “System Components: Brine Tanks”.

WHEN CAN THIS COMPONENT BE OMITTED FROM THE SYSTEM:
Dealkalizers can be omitted when the pH of the feed water supply is 8 or less.

MONITORING REQUIREMENTS:
Daily: This device requires daily monitoring to insure the controller clock is properly set
Daily: Check pre and post-filter pressure, and ΔP (*pressure drop*) across it while the RO is running
Daily: Check the salt level in the brine tank is greater than 50%
Weekly: The pH should be checked to ensure it is within the required range

MAINTENANCE:
- The salt level in the brine tank should be filled periodically so it doesn’t fall below 50%.
- Better Water LLC recommends that tank media be changed every three years unless…
… otherwise specified by the medical director and/or company polices,
… or the pH is not reduced by a minimum of 1 pH unit after two verified regeneration cycles.

DEALKALIZERS

- Fiberglass Reinforced Plastic tanks
- HDPE or ABS lining
- 150 PSI Max Pressure
- 120° F Max temperature

Dealkalizer

- RO interlock with visual indicator
- Adjustable backwash times with 7 day wheel
- See-through environmental covers (*as per AAMI Standards*)
- All valves are brass Fleck valves

SPECIFICATIONS

DEALKALIZER PART #	Fleck Valve Used	Total Cu. Ft. Media	Service Flow GPM	PSI Drop	Media Tank Size	Brine Tank Size	Piping Size	Drain Flow GPM	Operating Weight Media / Brine lbs
EQD-122-A	2750	2	4	< 10	12" X 62"	18" X 33"	1"	3	204 / 347
EQD-205-B	2850	5	11	< 15	20" X 62"	24" X 41"	1 1/2"	5	770 / 790
EQD-2410-B	2850	10	16	< 15	24" X 71"	24" X 50"	1 1/2"	10	1023 / 1145
EQD-3011-B	2850	11	24	< 15	30" X 72"	24" X 50"	1 1/2"	15	1618 / 1185

Larger sizes of tanks are available as well as custom tanks and applications.
Pressure drops are based on clean bed operation and are estimates.
Flow rates based on 5 GPM / FT^2 bed area.
Feed water to dealkalizer must be softened.

SYSTEM COMPONENT DEVICES: Organic Scavenger

DESCRIPTION:
An organic scavenger resin is typically a strong based anion resin. The resin bead used for organic reduction is not used like a conventional ion exchange resin bead. Instead of an actual chemical exchange of ions, the bead acts more by absorption. The organics are absorbed into the bead like a sponge. When the unit is regenerated with sodium chloride (*salt*), it causes it to shrink. This action squeezes the organics out of the resin bead and therefore backwashed to drain. This is also the reason that a macroporous resin does a more effective job at organic removal. It has a larger pore structure, allowing more organics to be removed per bead.

To get the full benefit of the reduced organics, the unit should be placed before the Carbon filters (c*arbon performs poorly on waters with high organics*). The resin will not have a very long life due to the exposure to chlorine (*oxidizer*); however, in cases of extremely high TOC's, it is more cost effective and easier to re-bed the organic scavenger more often.

An organic scavenger usually consists of a single tank to meet system flow demands, reduction ratios, and user criteria. The organic scavenger is a commercial/industrial grade, automatic, and custom sized to meet the demands of the facility.

Each organic scavenger in the system has a 7 day calendar time clock to control regenerating. The controller can be set to regenerate at pre-set times on specific days, giving the user maximum flexibility. The controller has an interlock feature to prevent the RO from running during the regeneration cycle. When in regeneration a red light is illuminated as an indicator of this cycle and the RO will not run due to the interlock.

The resin is a premium grade, strong based anion for high flow rate organic removal, made from food-grade materials that meet FDA CFR 173.25 specifications. The organic scavenger is regenerated with salt brine that is made from quality, premium grade salt pellets specified for water softening and/or conditioning. **Do not use rock salt**, as this form of salt carries impurities and will tend to have adverse effects on your water pre-treatment system.

WHEN CAN THIS COMPONENT BE OMITTED FROM THE SYSTEM:
Organic Scavengers can be omitted when the TOC's are less than 3.0 parts per million.

MONITORING REQUIREMENTS:
Daily: This device requires daily monitoring to insure the controller clock is properly set
Daily: Check pre and post-organic scavenger pressure, and ΔP (*pressure drop*) across it while the RO is running
Daily: Check the salt level in the brine tank is greater than 50%
Monthly: The TOC's should be checked once a month to ensure that the scavenger is continuing to remove the organics as designed.

MAINTENANCE:
- The salt level in the brine tank should be filled periodically so it doesn't fall below 50%.
- Better Water LLC recommends that tank media be changed every three years unless…
… otherwise specified by the medical director and/or company polices,

… or the Total Organic Content change across the filter is not reduced by a minimum of 50% after two verified regeneration cycles.

Organic Scavenger

ORGANIC SCAVENGERS

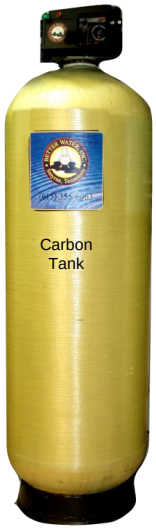
- Fiberglass Reinforced Plastic tanks
- HDPE or ABS lining
- 150 PSI Max Pressure
- 120° F Max temperature
- RO interlock with visual indicator
- Adjustable backwash times with 7 day wheel
- See-through environmental covers (*as per AAMI Standards*)
- All valves are brass Fleck valves

SPECIFICATIONS

ORGANIC SCAVENGERS PART #	Fleck Valve Used	Total Cu. Ft. Media	Service Flow GPM	PSI Drop	Media Tank Size	Brine Tank Size	Piping Size	Drain Flow GPM	Operating Weight
EQA500CL-143-B	2850	3	5.5	< 10	14" x 65"	18" x 33"	1 1/2"	3	463 / 387
EQA500CL-204-B	2850	4	12.5	< 15	21" x 62"	24" x 41"	1 1/2"	5	961 / 747
EQA500CL-205-B	2850	5	12.5	< 15	21" x 62"	24" x 41"	1 1/2"	5	984 / 789
EQA500CL-206-B	2850	6	12.5	< 15	21" x 62"	24" x 41"	1 1/2"	5	1006 / 831
EQA500CL-248-B	2850	8	16	< 15	24" x 72"	24" x 50"	1 1/2"	10	1405 / 1060
EQA500CL-249-B	2850	9	16	< 15	24" x 72"	24" x 50"	1 1/2"	10	1427 / 1101
EQA500CL-2410-B	2850	10	16	< 15	24" x 72"	24" x 50"	1 1/2"	10	1450 / 1143
EQA500CL-2411-B	2850	11	16	< 15	24" x 72"	24" x 50"	1 1/2"	10	1473 / 1185
EQA500CL-3012-C	2900	12	24.5	< 15	30" x 72"	30" x 50"	1 1/2"	15	2110 / 1588
EQA500CL-3016-C	2900	16	24.5	< 15	30" x 72"	30" x 50"	1 1/2"	15	2201 / 1755

Larger sizes of tanks are available as well as custom tanks and applications.
Pressure drops are based on clean bed operation and are estimates.
Flow rates based on 5 GPM / FT^2 bed area.
Feed water to scavenger must be softened.

SYSTEM COMPONENT DEVICES: Carbon Media Filtration



DESCRIPTION:
Carbon filtration is based upon a naturally occurring phenomenon called adsorption, in which molecules of a liquid or gas are trapped by either the external or internal surface of a solid. Activated carbon has a very high internal surface area and thus is an ideal material for adsorption. Raw water quality can be improved with the removal of trace components.

Carbon filters are backwashed periodically (*every other day*) to expose new adsorption sites in the media. After backwash, a down-flow rinse prepares the media for service.

Carbon filtration consist of at least 2 properly sized pressure vessels (*tanks*) which are filled with predetermined volumes of carbon. In most systems, two properly sized, backwashable carbon filters are connected in series with tank #1 adsorbing the entire load and tank #2 performing a polishing task while providing a back-up capability.

Each carbon filter in the system has a 7 day calendar time clock to control backwashing. The controller can be set to backwash at pre-set times on specific days, giving the user maximum flexibility. The controller has an interlock feature to prevent the RO from running during the backwash cycle. When backwashing a red light is illuminated as an indicator of this cycle and the RO will not run due to the interlock.

The carbon selected is of the highest quality available and meets our demanding specifications for chlorine/chloramine removal. The carbon is granular activated, acid washed, and designed for the purification of aqueous liquids which may be sensitive to acid soluble constituents such as iron.

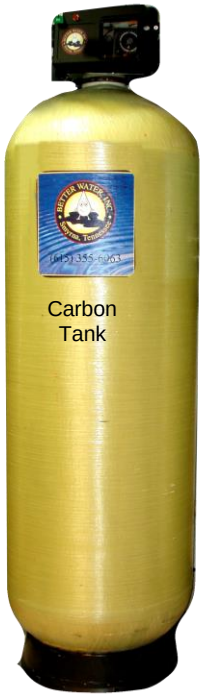
WHEN CAN THIS COMPONENT BE OMITTED FROM THE SYSTEM:
Carbon Filtration should never be omitted per AAMI standards.

MONITORING REQUIREMENTS:
Daily: Daily monitoring should be done to insure that chlorine/chloramine free water is available prior to each hemodialysis treatment shift. This will require testing for chlorine/ chloramines before the first treatment of the day and prior to each treatment shift throughout the day.
Daily: This device requires daily monitoring to insure the controller clock is properly set
Daily: Check pre and post-carbon tanks (*both worker and polisher*), and ΔP (*pressure drop*) across them while the RO is running

MAINTENANCE:
- Better Water LLC recommends that tank media be changed every three years unless…
… otherwise specified by the medical director and/or company polices,
… or the chlorine/chloramines breakthrough is greater than 0.1 parts per million after two verified backwash cycles.

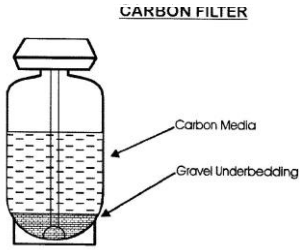
CARBON TANKS

- Fiberglass Reinforced Plastic tanks
- HDPE or ABS lining
- 150 PSI Max Pressure
- 120°F Max Temperature
- *Acid washed* carbon 12 x 40 mesh
- Minimum iodine # of 900



Carbon Tank

- RO interlock with visual indicator
- Adjustable backwash time with 7 day wheel
- See-through environmental covers (*as per AAMI Standards*)
- All valves are brass Fleck valves



SPECIFICATIONS

CARBON TANK PART #	Fleck Valve Used	Total Cu. Ft. Media	Service Flow GPM (6 min EBCT)	PSI Drop	Media Tank Size	Piping Size	Drain Flow GPM	Operating Weight lbs
EQC-122-A	2750	2	2.5	< 15	12" X 52"	1"	7	260
EQC-143-A	2750	3	3.75	< 15	14" X 65"	1"	10	435
EQC-143-B	2850	3	3.75	< 15	14" X 65"	1 1/2"	10	435
EQC-163.5-2A (*2 tanks*)	2750	3.5	4.25	< 15	16" X 65"	1"	10	551
EQC-164-B	2850	4	5	< 15	16" X 65"	1 1/2"	10	575
EQC-204-B	2850	4	5	< 15	20" X 62"	1 ½"	20	923
EQC-205-B	2850	5	6.25	< 15	20" X 62"	1 1/2"	20	936
EQC-206-B	2850	6	7.5	< 15	20" X 62"	1 1/2"	20	949
EQC-247-B	2850	7	8.75	< 15	24" X 71"	1 1/2"	25	1316
EQC-248-B	2850	8	10	< 15	24" X 71"	1 1/2"	25	1329
EQC-249-B	2850	9	11.25	< 15	24" X 71"	1 1/2"	25	1342
EQC-2410-B	2850	10	12.5	< 15	24" X 71"	1 1/2"	25	1355
EQC-2410-C	3150	10	12.5	< 15	24" X 71"	2"	30	1355
EQC-2411-B	2850	11	13.75	< 15	24" X 71"	1 1/2"	25	1368
EQC-2412-B	2850	12	15	< 15	24" X 71"	1 1/2"	25	1381
EQC-3013-C	3150	13	16.25	< 15	30" X 71"	2"	30	2009
EQC-3014-C	3150	14	17.5	< 15	30" X 71"	2"	30	2022
EQC-3015-C	3150	15	18.75	< 15	30" X 71"	2"	30	2036
EQC-3017-C	3150	17	21.25	< 15	30" X 71"	2"	30	2061

Larger sizes of tanks are available as well as custom tanks and applications.
Pressure drops are based on clean bed operation and are estimates.
Flow rates for single tank rated at 6 minutes Empty Bed Contact Time.
** 2 tanks rated 4.25 GPM @ 12 minutes Empty Bed Contact Time.*
Better Water LLC; rev. Feb 2019

SYSTEM COMPONENT DEVICES: Particulate Filtration (Pre-UV)

NOTE:
Some systems may include additional particulate filtration in various micron sizes prior to the UV Light in the form of a Multi-Cartridge Housing or a Big Blue Filter. Both of these devices have been discussed in previous sections.

SYSTEM COMPONENT DEVICES: Ultra-Violet Irradiation (Pre-RO)

DESCRIPTION:
The ultraviolet irradiation water disinfection unit consists of a UV lamp housed inside a fused quartz sleeve which seals the lamp from direct water contact. The sleeve, in turn, is housed in a stainless steel treatment chamber. The UV rays pass through the quartz sleeve and into the surrounding water. These UV rays alter the DNA of many common waterborne bacteria and sterilize (*prevent reproduction*) them. The low-pressure germicidal UV lamp produces a slightly shorter UV ray in concentrated form. 90% of the energy produced by this lamp has a wavelength of 254 nanometers, which will reduce many water-borne microorganisms.

part#
EQUVOO01910
UV Max, F4+

WHEN CAN THIS COMPONENT BE OMITTED FROM THE SYSTEM:
This component can be omitted from the pre-treatment when the city water supply contains more than .5 mg/l of chlorine or does not have bacteria.

MONITORING REQUIREMENTS:
Daily: This component must be monitored on a daily basis to insure the UV light is operating and the bulb is on

MAINTENANCE:
- The UV bulb should be replaced every 12 months.
- Clean the quartz sleeve every 6 months.
- Change the quartz sleeve as needed.

part#
SUUVOO00928
UV Bulb, F4+

part#
SUUV02021
UV Quartz Sleeve,
F4+

SYSTEM COMPONENT DEVICES: UV Light Control Box

DESCRIPTION:
The UV light control box is a water-tight, chemical resistant box, containing the necessary controls to operate the UV light. This box will control a solenoid valve on the UV light and will open the valve at preset intervals to purge the water (*to drain*) in the UV light vessel when the RO is not running and prevent the water in the vessel from heating up enough to affect the high feed temp alarm on the RO. The UV light control box is usually surface mounted on the wall near the UV light and incorporates a 120 vac outlet to which the UV light is plugged into. This control box is designed to act in conjunction with the interlock wiring system and will eliminate the power to the UV light when the filters are in backwash/regeneration mode, allowing time for the water in the UV light to cool, prior to the RO flush mode.

part#
EQASSYUVCB-4
UV Interlock Control Box

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.

MONITORING PROCEDURES

The pre-treatment systems must be monitored on a daily basis by a qualified technician, documenting the items specified below. A sample **Pre-Treatment Daily & Periodic Checklist** (*Appendix A*) has been included in this manual as an example for convenience and can be reproduced. The list below and the sample checklist include all the possible pre-treatment component devices available. This list may not be an exact representative of your system due to its unique feed water characteristics and the components which have been installed to treat that water.

Multi-Media Depth Filter:
Daily: Insure the controller clock is properly set
Daily: Check pre and post-filter pressure, and ΔP (*pressure drop*) across it while the RO is running

Particulate Filtration (pre-carbon filters):
Daily: Check pre and post-filter pressure, and ΔP (*pressure drop*) across each of the filters while the RO is running
***** *Dates the filters were last changed should be recorded*

Iron Removal Filtration:
Daily: Insure the controller clock is properly set
Daily: Check pre and post-filter pressure, and ΔP (*pressure drop*) across it while the RO is running
Daily: Check the Total Iron Content, pre and post filter, which should be less than 0.1 part per million

Water Softener:
Daily: Insure the controller clock is properly set
Daily: Check pre and post-filter pressure, and ΔP (*pressure drop*) across it while the RO is running
Daily: Check the salt level in the brine tank is greater than 50%
Daily: The hardness, measured post softener, should be tested daily while the softener is under peak demand, usually late in the afternoon.

Dealkalizer:
Daily: Insure the controller clock is properly set
Daily: Check pre and post-filter pressure, and ΔP (*pressure drop*) across it while the RO is running
Daily: Check the salt level in the brine tank is greater than 50%
Weekly: The pH should be checked to ensure it is within the required range

Organic Scavenger:
Daily: Insure the controller clock is properly set
Daily: Check pre and post-organic scavenger pressure, and ΔP (*pressure drop*) across it while the RO is running
Daily: Check the salt level in the brine tank is greater than 50%
Monthly: The TOC's should be checked once a month to ensure that the scavenger is continuing to remove the organics as designed

Carbon Filtration (*both worker and polisher tanks*):
Daily: Insure that chlorine/chloramine free water is available prior to each hemodialysis treatment shift. This will require testing for chlorine/ chloramines before the first treatment of the day and prior to each treatment shift throughout the day.
Daily: Insure the controller clock is properly set

Daily: Check pre and post-carbon tanks (*both worker and polisher*), and ΔP (pressure drop) across them while the RO is running

Particulate Filtration (post-carbon filters):

Daily: Check pre and post-filter pressure, and ΔP (*pressure drop*) across each of the filters while the RO is running

***** *Dates the filters were last changed should be recorded*

UV Light:

Daily: This component must be monitored on a daily basis to insure the UV light is operating and the bulb is on

** Dates the UV bulb and quartz sleeve were last changed should be recorded*

SYSTEM MAINTENANCE

MAINTENANCE SCHEDULE					
MAINTENANCE TASKS	**Each Shift/ Daily**	**Weekly**	**Monthly**	**3-12 months**	**Other**
Check the system for leaks	X				
Monitor the system for unusual sounds	X				
Clean external surfaces		X			
Record operational values, ie. flows, pressures, temperature, etc.	X				**Or more often as required by the facility. Record on Pre-Treatment Daily Checklist**
Refill brine tanks with salt					**Prior to salt level falling below 50% in the brine tank**
Empty and clean brine tank				**Annually**	
Change particulate filter cartridges			**Every 30 days…**		**…Or if there is a pressure drop across the device greater than 15 psi while the RO is running**
Clean UV quartz sleeve				**6 months**	
Change UV quartz sleeve					**As Needed**
Change UV bulb				**Annually**	
Rebed tank media					**Better Water LLC recommends that tank media be changed every three years unless… … otherwise specified by the medical director and/or company policies, … by the specific thresholds determined for each individual pre-treatment component device after two verified regeneration cycles**
Perform chemical, microbial, and endotoxin testing on feed and product water as per AAMI requirements					**Schedule established by the medical director**

SYSTEM MAINTENANCE, Long Term Storage or Non-Use

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

1. Drain water from the pre-treatment system.

2. Remove any media or filters.

3. Let the component devices air-dry.

4. When ready to re-start, filter cartridge housings and media tanks should be wiped down with a mild bleach solution before installing new cartridges and new media.

SYSTEM MAINTENANCE, Change Particulate Filter Cartridges (Hurricane, Multi-Cartridge, and Big Blue filters)

Better Water LLC, recommends that the cartridge be changed monthly or when the ΔP (*pressure drop*) reaches or exceeds 15 psi while the RO is running

1. Start with all valves, sample ports, vents, and drain ports closed.

2. Open the drain port on the bottom of the housing to allow the water to drain completely from the housing. Close the drain port when water flow stops.

3. Depending on the filter housing either open it, or use a filter wrench to gain access to the filter.

4. Remove the old filter(s), and wipe out the inside of the housing with a clean, damp cloth.

5. Insert the new filter(s).

6. Verify any o-rings are properly seated.

7. Depending on the filter housing, either close it, or use a filter wrench to seal the cover, without over-tightening.

8. Slowly open the inlet valve to allow water to begin filling the housing.

9. Partially open the sample port or vent to allow air to be purged from the device.

10. When water flows from the sample port or vent, signaling that the air has been purged from the device, close the sample port or vent.

11. Slowly open the outlet valve fully to allow water to flow through the device and check for leaks.

12. The filter is now on-line and ready for use.

part#
SUCAOO00540
Hurricane 1 Micron

SUCAOO00541
Hurricane 20 Micron

SUCAOO00542
Hurricane .35 Micron

SUCAOO00543
Hurricane 5 Micron

part#
SUCAOO00553
20” Big Blue
5 Micron Filter

part#
SUCAOO01896
20” Big Blue
1 Micron Filter

part#
SUCAOO00555
20” Multi-Cartridge
1 Micron Filter

part#
SUCAOO00552
20” Multi-Cartridge
5 Micron Filter

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

SYSTEM MAINTENANCE, Automatic Control Valves

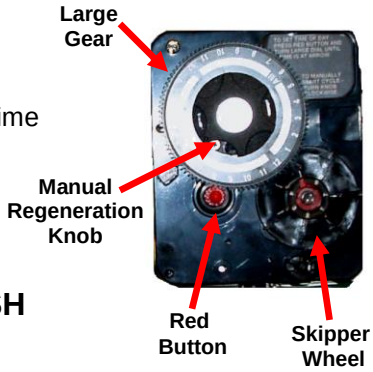
SET TIME OF DAY

1. Open the automatic control valve cover.

2. Press and hold the **Red Button** in to disengage the drive gear.

3. Turn the **Large Gear** until the actual time of day is opposite the time of day pointer.

4. Release the **Red Button** to engage the drive gear.



SET ON WHICH DAYS TO REGENERATE/BACKWASH

1. Open the automatic control valve cover.

2. Rotate the **Skipper Wheel** until the number is equal to the day being set, at the red pointer. 1=Monday, 2=Tuesday, 3=Wednesday, 4=Thursday, 5=Friday, 6=Saturday, 7=Sunday

3. Set the days that regeneration/backwash is to occur by sliding the tabs on the **Skipper Wheel** outward to expose trip fingers. Each tab is one day. Trip finger on the red pointer is “tonight”.

4. Moving clockwise from the red pointer, extend or retract the trip fingers to obtain the desired schedule.

INITIATE A MANUAL REGENERATE/BACKWASH

1. Open the automatic control valve cover.

2. Turn the **Manual Regeneration Knob (*black-center*)** clockwise.

3. This knob will make one revolution in approximately three hours.

4. Even though it takes three hours for this knob to complete one revolution, the regeneration/backwash cycle of your unit might be set for only one half of this time.

5. In any event, conditioned water may be drawn after rinse water stops flowing from the drain line.

SYSTEM MAINTENANCE, Changing Regenerate & Backwash Program Cycles

WARNING:

There can be dire consequences to the quality of the water produced by the prê-treatment system which can affect the RO and ultimately any patient undergoing hemodialysis treatment if the backwash and regeneration cycles are programmed incorrectly.

NOTE

The backwash and regeneration cycles are critical procedures in the pretreatment process. There is a very balanced, structured, and programmed relationship between the different pre-treatment component devices and the RO. Because of these, great care must be taken when making any changes to the backwash and regeneration cycle programs that have been setup by the manufacturer or authorized dealer. Before considering or attempting to make any changes to these cycles by changing the pin and hole settings on the regeneration cycle program wheel, technical support should be consulted to advise and support any such changes.

The Fleck valve time settings for both filters and softeners have been provided for reference below:

TIME SETTINGS FOR FILTERS (FLECK VALVES)

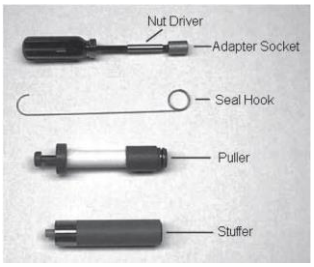
TANK SIZE	vol. of carbon	vol. of gravel	valve	BACKWASH TIME		SLOW RINSE TIME		FAST RINSE TIME		To put back into service	
				MINUTES	PINS	MINUTES	HOLES	MINUTES	PINS	HOLES	PINS
12 X 52	2	50lbs	Fleck 2750	12	6	4	2	6	3	2	2
14 X 65	3	50lbs	Fleck 2750	16	8	4	2	6	3	2	2
16 X 65	4	100lbs	Fleck 2850	20	10	4	2	8	4	2	2
20 X 62	4,5,6	100lbs	Fleck 2850	20	10	4	2	10	5	2	2
24 X 71	7,8,9,10,11	150lbs	Fleck 2850	20	10	4	2	12	6	2	2
30 X 72	12,13	250lbs	Fleck 3150	22	11	4	2	16	8	2	2

TIME SETTINGS FOR SOFTENERS (FLECK VALVES)

TANK SIZE	VOL. OF RESIN	VOL OF GRAVEL	VALVE	REGENERATE		SLOW RINSE		FAST RINSE		BRINE RE-FILL		PINS TO BUT BACK INTO SERVICE POSITION	BRINE TANK SIZE
				TIME	PINS	TIME	HOLES	TIME	PINS	TIME	HOLES	PINS	
12x52	2 CF	50 LBS	FLECK 2750	10 MIN	5	46 MIN	23	10 MIN	5	16 MIN	8	2	18 x 40
14x65	3 CF	50 LBS	2750 or 2850	10 MIN	5	46 MIN	23	10 MIN	5	16 MIN	8	2	18 x 40
16x65	4 CF	50 LBS	FLECK 2850	10 MIN	5	62 MIN	31	10 MIN	5	18 MIN	9	2	18 x 40
20x62	4-7 CF	100 LBS	FLECK 2850	10 MIN	5	70 MIN	35	10 MIN	5	18 MIN	9	2	24 x 50
24x71	7-10 CF	150 LBS	FLECK 2850	10 MIN	5	70 MIN	35	10 MIN	5	18 MIN	9	2	24 x 50
30x72	15 CF		FLECK 3150	10 MIN	5	88 MIN	44	10 MIN	5	16 MIN	8	2	24 x 50

SYSTEM MAINTENANCE, Replacing Seals and Spacers

The seals and spacers in the valve should be changed every 3 to 5 years. This may have to be done sooner if there is a malfunction of the valves. This procedure applies to Fleck head models (2750, 2850, 2900, and 3150)



* You will need the following tools:
  - Appropriate socket
  - Seal hook
  - Puller
  - Spacer
  - Spacers/Seals Kit

See Related Consumable and Replacement Parts section for part numbers specific to the Fleck valve

1. Turn off water supply to valve. Next cycle the valve to backwash position, then to service. Now remove electrical plug from outlet.

2. Remove control box cover.

3. Disconnect the brine line from the injector housing to the brine valve (if your unit has timed brine tank fill).

4. Remove the two cap-screws that hold the back plate to the valve.

5. Grasp the back plate on both sides and slowly pull end plug and piston assembly out of the valve body and lay aside**.** *(see figure 1)*

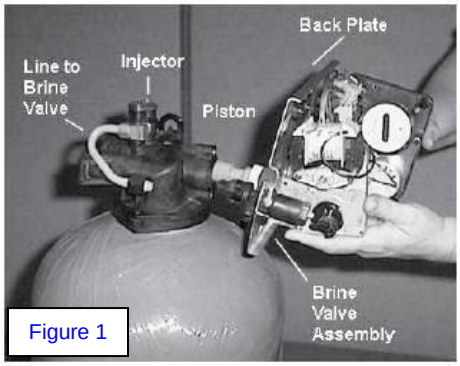


Figure 1

6. Remove the seal first using the wire hook with the finger loop. *(see figure 2)*

7. The puller tool (use only for removing the spacers) has three retractable pins, retained by a rubber ring, at one end. They are retracted or pushed out by pulling or pushing the center button the opposite end.

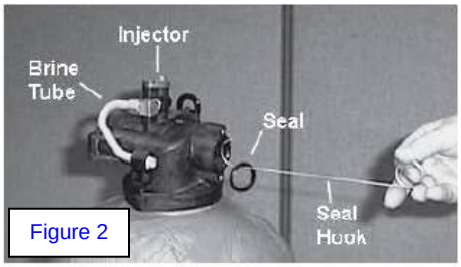


Figure 2

8. Insert the pin end of the spacer tool into the valve body with the pins retracted (button pulled back). Push the tool tight against the spacer and push the button in. When the button is pushed in, the pins are pushed out to engage the ¼ diameter holes in the spacer. Remove the tool from the valve body. The spacer will be on the end. Pull the center button back, the pins will be retracted and the spacer can be removed from the spacer tool. *(see figure 3)*

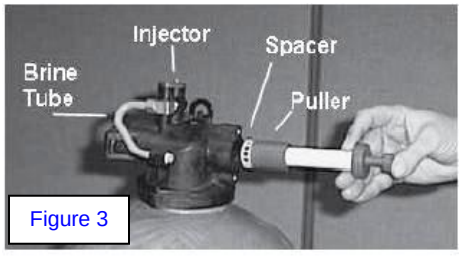


Figure 3

9. Alternately remove the remaining seals and spacers in accordance with steps 6 and 8.

10. The last or end spacer does not have any holes for the pins of the spacer tool to engage, therefore if the end spacer does not come out on the first try, try again using the wire hook with the finger loop.

(continued)

11. To replace the seals, spacers, and end ring, use the stuffer tool with the brass sleeve on one end. This is a double-purpose tool. The male end acts as a pilot to hold the spacers as they are pushed into the valve body and the brass female end is used to insert the seals into the valve body.

12. To re-stuff a valve body, first take the end ring (the plastic or brass ring without holes), then with your thumb press the button on the brass sleeve end. The large diameter inner portion is now exposed. Place the end ring on this pilot with the lip on the end ring facing the tool. Push the tool into the valve body bore until it bottoms. While the tool is in the valve body, take a seal and press it into the inside diameter of the exposed brass female end. *(see figure 4)*

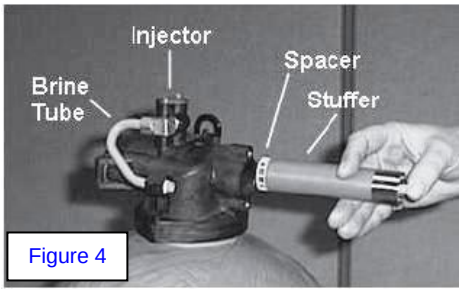


Figure 4

13. Remove the tool, turn it end for end and insert it into the valve body bore. While holding the large diameter of the tool, slide it all the way into the valve body bore until it bottoms. Then push the center button to push the seal of the tool and leave it in place in the valve body.

14. Remove the tool from the valve body and push the center on the brass female end to expose the pilot on the opposite end. Place a spacer on this end and insert the spacer and tool into the valve. Continue until all spacers and seals are in place.

15. Reattach back plate, reconnect brine line (if applicable), re-attach the control box cover, reconnect to power outlet, and turn water supply back on to valve.

16. Verify operation by doing a manual regeneration or backwash, then perform residual testing.

SYSTEM MAINTENANCE, Rebedding a Media Tank

Use the following procedure to extract the media from a media tank. This procedure is basically the same for all media tanks, with any exceptions related to a specific type of media noted in the details.

FREQUENCY

Better Water LLC recommends that media be changed every three years unless…
… otherwise specified by the medical director and/or company polices,
… or for **carbon tanks** the chlorine/chloramines breakthrough is greater than 0.1 parts per million after two verified backwash cycles.
… or for **iron removal tanks** the post-filter Total Iron Content is greater than 0.1 parts per million after two verified backwash cycles.
… or for **multi-media tanks**, a silt density index (SDI) test indicates the need to do so.
… or for **water softener tanks** the hardness breakthrough is greater than 2 grains per gallon after two verified regeneration cycles.
… or for **organic scavenger tanks** the total organic carbon (TOC) change across the filter is not reduced by a minimum of 50% after two verified regeneration cycles.
… or for **dealkalizer tanks** the pH is not reduced by a minimum of 1 pH unit after two verified regeneration cycles.
** Always verify that the control valve is functioning before rebedding.*

PRIMARY TOOLS REQUIRED

1. Media extractor, part# **EQTAOO00365**
2. 55 Gallon trash bin w/wheels and drain assembly
   - OR -
   Collection Can Assembly part# **EQTAOO00371** *(collection/trash can not provided)*
3. Water hose
4. 6' ladder
5. Media funnel

PROCEDURE FOR MEDIA EXTRACTION

1. Verify NO dialysis treatments are in-process.

2. Turn the RO unit off.

3. Verify the media tank to be extracted by identifying the label located on the side of the tank.

4. Place the media tank into a brief backwash cycle by rotating the manual regeneration knob located on the 3200 regeneration timer. This will loosen the media for easier extraction.

5. After a couple of minutes of backwashing...
… close the inlet valve to the tank,
… open a sample port after the outlet valve of the tank to relieve tank pressure, and then close,
… and then close the outlet valve to the tank.

6. Verify, by reading the pressure gauge post media tank that all pressure has been relieved and the gauge is at zero.

7. Disconnect the RO interlock cable and pre-treatment cables from the control valve. Verify that these cables are properly labeled before disconnecting.

8. Unplug control valve power cord from electrical receptacle.

9. Remove the drain line from the control valve.

10. Remove the inlet and outlet hoses from the control valve.

11. If the control valve is hard plumbed, unscrew the unions to detach plumbing from valve.

12. Remove control valve from tank by turning it counter clockwise taking caution not to break any plumbing attached to it.

13. If the distributor did not pull loose from the control valve, disconnect it from the control valve by pulling down on it while holding the control valve.

14. Place the control valve in a safe location that is not in the work area.

15. Remove distributor from tank by pulling upward.

16. Loosen compression fitting on media extractor and pull riser pipe upward.

17. Insert media extractor into media tank and turn clockwise until hand tight.

18. Locate trash bin close to the media tank and place extractor hose into the bin.

19. Connect a drain hose from trash bin to a nearby floor drain.

20. Connect water hose to media extractor then, connect the other end of the water hose to a nearby water supply.

21. Verify the extractor riser pipe is secured by tightening the compression fitting in which the riser pipe is inserted through. *Located on top of the extractor*.

22. Turn on water supply approximately half way.

23. Once the tank is pressurized, media will begin to flow into the trash bin.

24. After the media begins to flow steady, fully open the water supply.

25. Once the water runs clear from the media extractor, turn off the water supply.

26. Loosen the compression fitting in which the riser pipe is inserted through. Push the riser pipe down further into the tank and tighten the compression fitting.

27. Turn on water supply to the extractor.

28. Allow the media to fill into the trash bin, until full.

29. Close water supply.

30. Disconnect drain hose from trash bin.

31. Remove trash bin to nearby dumpster to empty, as many times as required.

32. Repeat steps 19 through 32 until media has been extracted.

33. Once media has been extracted, disinfect tank if necessary.

BEDDING OF NEW MEDIA

1. Once the tank has been cleaned, place tank in the appropriate location to load new media.

2. Cover the open end of the distributor to prevent media from going into it, with either a cap, rag, tape, or similar.

3. Insert distributor into tank, centering it, and so that it rests on the bottom.

4. Place media funnel into the top opening of the tank.

5. Locate ladder aside of tank to be filled.

6. Stage the appropriate amount of media near the tank.

7. Add the appropriate amount of **gravel** into the tank by slowly pouring each bag carefully into the funnel, keeping the distributor centered inside of tank.
**** See tables below specific to the type and size of media tank being loaded.***

8 Level the gravel as completely as possible. Improper leveling can result in poor operation of the tank.

9. Add the appropriate amount of **media** into the tank by slowly pouring into the funnel keeping the distributor centered inside of tank.
**** See tables below specific to the type and size of media tank being loaded.***

10. When complete, clean the tank opening to clear the threads of any loose material.

11. Relocate the tank back to its original location or the location in which it will be placed during service.

12. Remove cover from the open end of the distributor.

13. Replace the control valve onto the tank, verifying that the distributor is inserted into the base of the control valve. Turn control valve clockwise to tighten until secure.

14. Reconnect the inlet and outlet plumbing connections.

15. Reconnect the drain line.

16. Reconnect the RO interlock and pretreatment cables, taking note to correctly reconnect.

17. Plug control valve power cord into the appropriate receptacle outlet.

18. Slowly open the inlet water supply to the tank, and fill the tank with water up to 6 inches below the top opening of the tank, and then close the inlet water supply.

19. For ***Carbon Filters, Iron Removal Filters, and Multi-Media Filters ONLY…***
… allow the media to soak for as long as time permits, preferably overnight, but at minimum for two hours.
**** Failure to soak the media could result in media loss to drain, malfunction of the system, and possible damage to the system components.***

20. Advance the control valve to a fast rinse cycle by rotating the manual regeneration knob to

the second set of pins.

21. Slowly and partially open the inlet water supply valve to the tank. Once water begins flowing to drain, open the inlet water supply valve all the way.

22. Allow control valve to complete the fast rinse.

23. Once the fast rinse is complete, advance the control valve to the back wash cycle. (First set of pins).

24. For ***Carbon Filters…***
… once the tank is back washing, unplug control valve power cord,
… allow to backwash for 2 hours,
… once the tank has backwashed for 2 hours, check the drain water for carbon fines. If carbon fines are still visible continue backwashing until the water is clear of carbon fines.
… plug control valve power cord back in to the electrical receptacle, and allow it to complete the remaining cycles.

25. Once the control valve is in the service position, open the sample port located on the outlet of the tank allowing water to run to drain.

26. Perform appropriate water testing based on the type of media filter. For best results a sample should be taken and tested PRE-filter (before), and then POST-filter (after), and compared to truly determine the effectiveness of the filter.
- For ***Carbon Filters***, perform pH and chlorine tests.
- For ***Iron Removal Filters***, perform iron test.
- For ***Multi-Media Filters***, perform silt density index (SDI) test.
- For ***Water Softener Filters***, perform hardness test.
- For ***Organic Scavenger Filters***, perform total organic carbon (TOC) test, which are normally sent to a lab for testing.
- For ***Dealkalizer Filters***, perform pH test.
* In the event the related test result(s) are contrary to the expected outcome, place the media filter into another 30 minute backwash cycle, and test again it its completion. If results are still not satisfactory after a few such cycles contact technical support for assistance.
* Once the related test result(s) are satisfactory, the filter is ready to be placed back into service.

27. Check the plumbing connections for leaks.

28. If no leaks are visible, slowly open the outlet valve.

29. Verify by-pass valve is closed, if so equipped.

30. Turn RO unit to operate and press reset, the RO should begin to start up.

31. Once the RO unit is in operation, verify that there is no significant pressure drop across the tank and the RO unit has adequate pressure.

32. Test RO interlock to verify operation.

33. Reset control valve timer to the correct time of day.

MEDIA FILTERS GRAVEL and MEDIA REQUIREMENTS BASED on TANK TYPE and SIZE

CARBON FILTERS		
Tank Size	**Media Gravel** part# **EQMEOO01774**	**Cubic Feet of Carbon** part# **EQMEOO00467**
12” x 52”	50 lbs.	2 ft³
14” x 65”	50 lbs.	3 ft³
16” x 65”	100 lbs.	4 ft³
21” x 62”	100 lbs.	4, 5, or 6 ft³
24” x 71”	150 lbs.	7, 8, 9, 10, 11 ft³
30” x 72”	250 lbs.	12, or 13 ft³
IRON REMOVAL FILTERS		
Tank Size	**Media Gravel** part# **EQMEOO01774**	**Cubic Feet of Iron Removal Medial** part# **EQMEOO01607**
12” x 52”	50 lbs.	2 ft³
16” x 65”	50 lbs.	3 ft³
21” x 62”	100 lbs.	4, 5, or 6 ft³
24” x 71”	150 lbs.	6, 7, 8, 9, or 10 ft³
30” x 72”	250 lbs.	11, 12, 13, 14, or 15 ft³
WATER SOFTENER FILTERS		
Tank Size	**Media Gravel** part# **EQMEOO01774**	**Cubic Feet of Softener Resin** part# **EQMEOO01675**
12” x 52”	50 lbs.	2 ft³
16” x 65”	50 lbs.	3 ft³
21” x 62”	100 lbs.	4, 5, or 6 ft³
24” x 71”	150 lbs.	6, 7, 8, 9, or 10 ft³
30” x 72”	250 lbs.	11, 12, 13, 14, or 15 ft³
ORGANIC SCAVENGER FILTERS		
Tank Size	**Media Gravel** part# **EQMEOO01774**	**Cubic Feet of Organic Scavenger Resin** part# **EQMEOO01175**
12” x 52”	50 lbs.	2 ft³
16” x 65”	50 lbs.	3 ft³
21” x 62”	100 lbs.	4, 5, or 6 ft³
24” x 71”	150 lbs.	6, 7, 8, 9, or 10 ft³
30” x 72”	250 lbs.	11, 12, 13, 14, or 15 ft³

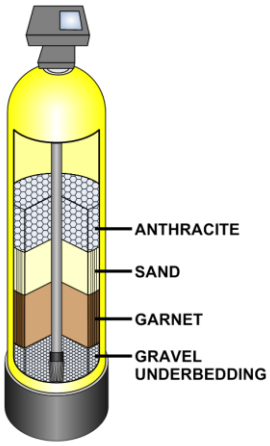
DEALKALIZER FILTERS		
Tank Size	**Media Gravel** part# **EQMEOO01774**	**Cubic Feet of Dealkalizer Resin** part# **EQMEOO01180**
12” x 52”	50 lbs.	2 ft^3
16” x 65”	50 lbs.	3 ft^3
21” x 62”	100 lbs.	4, 5, or 6 ft^3
24” x 71”	150 lbs.	6, 7, 8, 9, or 10 ft^3
30” x 72”	250 lbs.	11, 12, 13, 14, or 15 ft^3

MULTI-MEDIA FILTERS				
Tank Size	**Media Gravel** part# **EQMEOO01774**	**Cubic Feet of Garnet** part# **EQMEOO01772**	**Cubic Feet of Sand** part# **EQMEOO01771**	**Cubic Feet of Anthracite** part# **EQMEOO01770**
12” x 52”	50 lbs.	12.5 lbs.	25 lbs.	52 lbs.
14” x 65”	50 lbs.	25 lbs.	37.5 lbs.	104 lbs.
16” x 65”	50 lbs.	50 lbs.	50 lbs.	104 lbs.
21” x 62”	100 lbs.	50 lbs.	75 lbs.	208 lbs.
24” x 71”	150 lbs.	100 lbs.	100 lbs.	208 lbs.

Media in a Multi-Media Filter must be layered in a specific order.

Top to bottom:

1. Anthracite
2. Sand
3. Garnet
4. Gravel



MULTI-MEDIA FILTER

SYSTEM MAINTENANCE, Adding Salt To Brine Tanks

The salt level in the brine tank should be filled periodically so it doesn't fall below 50%. The salt level should be maintained above the water level in the tank. It is recommended that the salt level be allowed to rise and fall over time, and not just "top off" on a daily basis, which will allow a good "turn-over" of the salt in the tank.

PROCEDURE

1. Remove the brine tank lid.

2. Add the desired amount of salt.

3. Replace the brine tank lid.

NOTE: It takes a minimum of 3 to 4 hours to fully saturate the water in the brine tank after refilling for maximum results.

part#
SUMI01659
Chloride Pellets
50 lb. bag

ANNUAL CLEANING

Brine tanks should be emptied and cleaned annually, or more often if necessary.

SYSTEM MAINTENANCE, UV Light

The UV Manufacturer's Operator Instructions should be referenced concerning specific usage and maintenance instructions for the model in question. Below are general instructions and recommendations relating to the UV Lamp and Quartz Sleeve.

part#
SUUVOO00928
F4+,
UV Lamp

part#
SUUV02021
F4+,
Quartz Sleeve

part#
EQUVOO01928
F4+,
Power Supply

part#
SUUVOO02019
F4+,
Sensor

UV LAMP MAINTENANCE

The amount of UV light created by the lamp decreases over time, requiring that the lamp be replaced every 12 months. The UV system is designed to operate continuously and should not be shut off for short periods of time, such as a period of less than three weeks.

UV QUARTZ SLEEVE MAINTENANCE

Minerals in the water slowly form a coating on the UV Quartz Sleeve. This coating must be removed because it reduces the amount of UV light reaching the water, thereby reducing purification performance. These sleeves should be cleaned yearly, or more often if necessary, depending on the water quality. Recommended to be replaced every 24 months, or if broken, cracked, or chipped.
- Inspect and replace the O-ring if necessary. The O-ring is not sold separately but comes with the quartz sleeve.

PROCEDURE for REPLACING UV LAMP and/or QUARTZ SLEEVE

- Avoid touching the sides of the quartz sleeve and lamp with bare hands. Use soft gloves, and handle with care.

1. Turn the Pre-Treatment System OFF by turning the **OPERATE-OFF Switch** to **OFF**.

2. Disconnect the power supply connection from the UV Light.

3. Close the following valves:
- **UV Light Inlet Valve**
- **UV Light Outlet Valve**

4. Open a drain port after the UV Light to relieve the system pressure. Close the drain port when complete.

5. Remove the end of the UV Light to expose the UV Lamp and Quartz Sleeve.

6. Carefully remove the UV Lamp and the Quartz Sleeve for cleaning or replacement.

- Take care not to remove at an angle, which could put undue pressure on either the bulb or sleeve causing breakage.
** See manufacturer's instructions for removing the quartz sleeve.*

7. Inspect the O-ring and replace if necessary.

8. Perform the necessary maintenance (replacement and/or cleaning).

9. Reinstall the UV Light and Quartz Sleeve to the unit.

10. Open the following valves and check for leaks:
- **UV Light Inlet Valve**
- **UV Light Outlet Valve**

11. Reconnect the power supply connection to the UV Light.

12. Turn the Pre-Treatment System ON by turning the **OPERATE-OFF Switch** to **OPERATE**.

PROCEDURE for CLEANING the QUARTZ SLEEVE

1. Remove the Quartz Sleeve following the instructions above.

2. Clean with vinegar consisting of 5-20% acetic acid.

3. Rinse the Quartz Sleeve with RO or DI water after cleaning.

4. Let it air dry before reinstalling.

PROCEDURE for CLEANING the UV SENSOR

In the event the UV starts alarming abnormally, try cleaning the UV Sensor.

1. Remove the UV Sensor from the UV Housing.

2. Clean the sensor with CLR (calcium, lime, rust remover) to remove any build-up.

3. Rinse the Sensor with RO or DI water after cleaning.

4. Let it air dry before reinstalling.

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

Sample Checklists

Sample Pre-Treatment Daily Checklist

page 1

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

Sample Pre-Treatment Daily Checklist

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

Sample Pre-Treatment Daily Checklist

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

Sample Pre-Treatment Periodic Checklist

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

APPENDIX C

EMPTY BED CONTACT TIME (EBCT CALCULATION)

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

- First equation:

  NUMBER of RO MEMBRANES x 1.25 x 2 = RO GPM (gallons per minute)

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

  4 x 1.25 x **2** = **10**

- Second equation:

  RO GPM x **EBCT(minutes)** ÷ **7.48** = **Total Cubic Feet of Carbon**

- *Example: 12 minutes EBCT required*

  10 x 12 ÷ 7.48 = 16

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

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

- Equation:

  Total Cubic Feet of Carbon x 7.48 ÷ RO GPM = EBCT Flow Rate in Minutes

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

  16 x 7.48 ÷ 10 = 11.968 minutes

  ** Round to 12 minutes*

NOTES:


BETTER WATER LLC
Smyrna, Tennessee