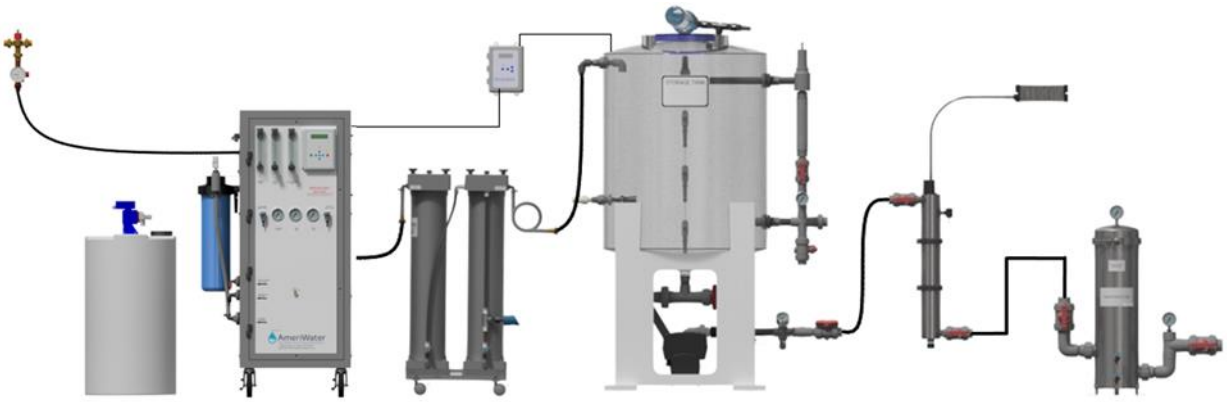
AmeriWater®
The Water Purification Specialists

Install & Start-Up Manual

Central Sterile Processing Systems



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98-2037 Rev A
Manufactured With Pride in the USA

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1 USER INFORMATION

1.1 Introduction

This system is designed to pretreat and purify water for use in health care applications. The system is shipped with required water treatment components. This System Manual was written specifically for the Central Sterile Processing Systems. Your system was thoroughly tested and in excellent condition when it was shipped to you. However, because damage during shipment is possible, please unpack and carefully inspect the system as soon as you receive it. Please notify AmeriWater if any problems are encountered.

Please read the Operations Manual before using the system. Contact AmeriWater Customer Service with any questions at 1-800-535-5585 Monday through Friday 8:00 a.m. to 5:00 p.m. Eastern Time. For after-hours emergencies call 1-800-535-5585 and follow the instructions on the recorded message. Our on-call technician will return your call as soon as possible.

This System manual will guide you through installation and start-up of your system as well as advise on system monitoring and disinfection. The Operation Manuals should be read before operating or servicing any component in this system. This System Manual should then be kept near the system and used as a reference.

For information on individual components and their operation, maintenance, and troubleshooting use the necessary Operation Manual listed below.

Item	Assembly Number	Manual Number
Blend Valve	00HC-5001	98-0135
RO	00HC-0015 (HCROS)	98-2004
	00HC-0045 (HCRO2)	98-0106
	00HC-0060 / 00HC-0075 (HCRO3/4)	98-2005
	00HCRO3X402 (HCRO3X)	098-0002
Dual Column Silex	00HC-2003	98-0108
Storage Tanks	00HC-0091/93/95/97	098-0001
Alarm Panel	00HC-0019	98-0149
UV	001-014-0011 (VP600M)	VIQUA Manual Provided
	001-014-0012 (VP600M)	
Endotoxin Filter	001-021-0006	98-0141
	001-021-0007	

1.2 System Specifications

Component	Electrical	Connection	Connection Type
00HC-5001 (Blend Valve)	N/A	Blend Valve Hot Water	1" Socket (Copper)
		Blend Valve Cold Water	1" Socket (Copper)
		Blend Valve Outlet	3/4" MGHT [1]
00HC-2003 (Dual Column Silex)	N/A	Silex in	3/4" FGHT [2]
		Silex out	3/4" FGHT [2]
Storage Tank (00HC-0091/93/95)	(1) 208-230V, 1ø, 7A	Water Inlet	3/4" MGHT [1]
		Tank Drain	1 ¼" Socket PVC
		Ozone	CPC coupling
		Loop Feed	1" Socket PVC
		Loop Return	1" Threaded PVC
		Loop Return Drain	1" Socket PVC
Storage Tank (00HC-0097)	(1) 208-230V, 3ø, 8A	Water Inlet	3/4" MGHT [1]
		Tank Drain	1 ½" Socket PVC
		Ozone	CPC coupling
		Loop Feed	1 ½" Socket PVC
		Loop Return	1 ½" Threaded PVC
		Loop Return Drain	1 ½" Socket PVC
HCROS (00HC-0015) & HCRO2 (00HC-0045)	(1) 115V, 1ø, 15A	Incoming Tap Water	½" push fit
		Product Water	½" MHB [3]
		Drain	3/8" push fit
		PAA Inlet	¼" Q-CON [4]
		Product Hose	¾" MGHT [1]
		Reject Hose	½"FPT [5]
HCRO3 (00HC-0060) & HCRO4 (00HC-0075)	(1) 115V, 1ø, 15A (1) 220V, 1ø, 15A	Incoming Tap Water	3/4" MHB [3]
		Product Water	½" push fit
		Drain	½" push fit
		PAA Inlet	¼" Q-CON [4]
		Product Hose	¾" MGHT [1]
		Reject Hose	½" Hose
HCRO3X (00HCRO3X402)	(1) 115V, 1ø, 15A (1) 208V, 3ø, 7.5A	Incoming Tap Water	¾" MHB [3]
		Product Water	½" MHB [3]
		Drain	¾" MHB [3]
		PAA Inlet	¼" Q-CON [4]
		Product Hose	¾" MGHT [1]
		Reject Hose	¾" Hose
UV (001-014-0011)	(1) 115V, 1ø, 15A	Water Inlet	1" or ¾" MHB [3] OR 1" or ¾" socket PVC
		Water Outlet	1" or ¾" MHB [3] OR 1" or ¾" socket PVC

UV (001-014-0012)	(1) 115V, 1ø, 15A	Water Inlet	1.5", 1", or ¾" MHB [3] OR 1.5", 1", or ¾" socket PVC
		Water Outlet	1.5", 1", or ¾" MHB[3] OR 1.5", 1", or ¾" socket PVC
Entoxin Filter (001-021-0006)	N/A	Water Inlet	1.5" MHB[3] OR 1.5" socket PVC
		Water Outlet	1.5"MHB[3] OR 1.5" socket PVC
Entoxin Filter (001-021-0007)	N/A	Water Inlet	1", or ¾" MHB[3] OR 1", or ¾" socket PVC
		Water Outlet	1.5"MHB[3] OR 1.5" socket PVC
Alarm Panel (00HC-0019)	(1) 115V, 1ø, 15A	N/A	N/A

NOTE: For specifications on system components related to electrical requirements, system pressures and voltage draws, please refer to component manuals listed in Section 1.1.

[1]MGHT=Male Garden Hose Thread
[2]FGHT=Female Garden Hose Thread
[3]MHB=Male Hose Barb
[4]Q-Con=Quick Connect
[5]FPT=Female Thread

1.3 System Components

HCROS Assembly	HCROS 00HC-0015	55 Gal Storage Tank 00HC-0091	Dual Column Silex 00HC-2003	Alarm Panel, UV, and Endotoxin Filter (00HC-0019, 001-014-0011, and 001-021-0007)
00HC-2019	•	•		
00HC-2050	•	•	•	
00HC-3019	•	•		•

HCRO2 Assembly	HCRO2 00HC-0045	55 Gal Storage Tank 00HC-0091	100 Gal Storage Tank 00HC-0093	185 Gal Storage Tank 00HC-0095	Dual Column Silex 00HC-2003	Alarm Panel, UV, and Endotoxin Filter (00HC-0019, 001-014-0011, and 001-021-0007)
00HC-2020	•	•				
00HC-2021	•		•			
00HC-2023	•			•		
00HC-2051	•	•			•	
00HC-2052	•		•		•	
00HC-2054	•			•	•	
00HC-3020	•	•				•
00HC-3021	•		•			•
00HC-3023	•			•		•

HCRO3/4 Assembly	HCRO3 00HC-0060	HCRO4 00HC-0075	100 Gal Storage Tank 00HC-0093	185 Gal Storage Tank 00HC-0095	Dual Column Silex 00HC-2003	Alarm Panel, UV, and Endotoxin Filter (00HC-0019, 001-014-0011, and 001-021-0007)
00HC-2022	•		•			
00HC-2024	•			•		
00HC-2025		•	•			
00HC-2026		•		•		
00HC-2053	•		•		•	
00HC-2055	•			•	•	
00HC-2056		•	•		•	
00HC-2057		•		•	•	
00HC-3022	•		•			•
00HC-3024	•			•		•
00HC-3025		•	•			•
00HC-3026		•		•		•

HCRO3X Assembly	HCRO3X 00HCRO402	185 Gal High Flow Storage Tank 00HC-0097	PT401 System and Anti-scalant (0084-0006 and 95810125)	Dual Column Silex 00HC-2003	Alarm Panel, UV, and Endotoxin Filter (00HC-0019, 001-014-0012, and 001-021-0006)
00HC-2030	•	•	•		
00HC-2060	•	•	•	•	
00HC-3030	•	•	•		•

2 SYSTEM INSTALLATION

2.1 System Flow Schematic

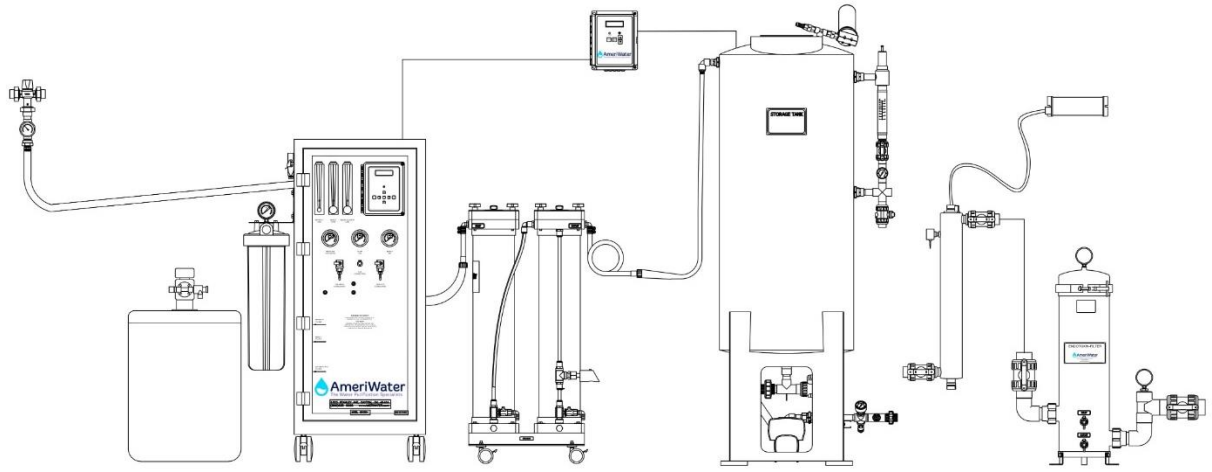


Figure 1. RO3X System

2.2 Pre-Installation Requirements

1. Utility requirements;
   a. Plumbing: 1” ball valve with NPT threads and dynamic pressure of at least 20 PSI at 10 GPM.
   b. Electrical: see section 1.2.
2. Hot and cold city/tap water supply line flushed and free of debris before equipment installation.
3. Floor drain within 4 feet of the RO/DI system and Storage Tank/Loop Return capable of handling up to 10 GPM flow each.
4. Supply piping to the washer/disinfector/sterilizer system(s) within 3 feet of the RO/DI distribution pump with a shut off valve.
5. Access space of 1 foot on each side and behind the water treatment equipment with a 3 foot aisle in front of the equipment or required to meet local codes.

2.3 General Installation

1. Two (2) hose clamps are to be used per hose connection.
2. A visual inspection is to be performed upon finishing installation and start-up of each system to ensure each component will function as intended. This includes, but is not limited to: lids and respective O-rings are not damaged or loose, damaged or loose hoses, leakage, secured power outlets, etc.

2.4 Blend Valve Installation

CAUTION: Local plumbing & electrical codes must be observed.

1. Locate the blend valve prior to the RO as close to the water source as possible. Plumb the cold-water piping into the cold-water side of the blend valve and plumb the hot water piping into the hot water side of the blend valve as shown on system installation drawing.

2. To prevent damage from excessive heat to valve body, filter screens and the fiber washer during soldering, loosen the unions and remove the valve body, filter screens and fiber washer prior to soldering.

3. After soldering, clean out any residue from soldering in piping and install valve body, filter screens and fiber washer. Open both the hot water and cold water valves and flush all piping thoroughly and check for leaks.

4. If you have a large amount of sediment in your water, AmeriWater recommends that you install a pre-filter on the hot side of the blend valve and a pre-filter on the cold side of the blend valve.

5. Let water flow for at least two minutes to allow supply temperature to stabilize.

6. Adjust the temperature adjustment screw until a value between 75 - 80 degrees Fahrenheit is achieved during water flow. This will need to be done utilizing a hex key (not provided).

7. To adjust the setting of the valve, loosen locking cap screw with hex key. Cap must be lifted 1/4" to adjust temperature. To increase the temperature, turn counterclockwise. To decrease temperature turn clockwise.

8. Calibrate the mixed water outlet temperature by placing a thermometer in the mixed water stream.

9. Lower handle and tighten screw.

10. Check outlet temperature.

2.5 RO Installation

1. The electrical source must be single phase, 3-conductor type provided with a hospital grade receptacle and a ground fault interrupter (GFI) at 115V, 20amp, and 60Hz. The proper polarity and ground integrity must be initially checked and thereafter maintained. Failure to do so may result in electrical shock to the operator. It is suggested that the RO be placed on an electrical supply with emergency backup.

2. The RO must only be plugged directly into a GFI receptacle. It must not be plugged into an extension cord or power strip that could cause low amperage.

CAUTION: To avoid electrical shock, always unplug the RO system before opening the face of the electrical controller.

3. Incoming water should be between 41°F and 90°F (5°C and 33°C). It is not recommended to use water at temperatures below 41°F (5°C) as it will reduce membrane performance significantly. Use only the cold water supply unless using an automatic blending valve to get 77°F (25°C) water. Never use water warmer than 90°F (33°C).

4. Water with silt density index (SDI) above 5 SDI will foul the membrane.

5. The RO system may be equipped with a pretreatment system to remove chlorine. It is important to test for chlorine at the chlorine sample port periodically. Chlorine will deteriorate the membrane and cause system failure. It is recommended to use a chlorine test strip.

6. Hardness control with anti-scalant or water softener is required.

7. Incoming tap water pH should be within EPA National Secondary Drinking Water Regulations of 6.5 – 8.5. Incoming tap water with pH higher or lower than the regulation will cause higher conductivity in the product water. If the water changes drastically, the membrane will be harder to clean. Periodically check the pH of the incoming tap water to verify that it is within the specified range (IBT pH Water Test Strips P/N 97PH20901).

8. Always maintain water flow and pressure to avoid damage to the pump.

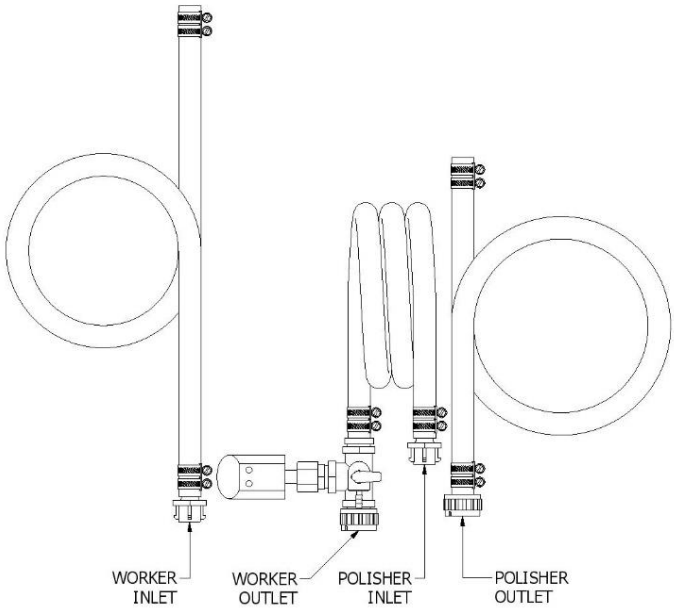
9. Minimum feed pressure is 20 PSI (while the RO is in operation, with flow). Maximum feed pressure is 90 PSI.

10. Remove the plugs from the product water, reject water to drain, and incoming tap water fittings on the front of the RO.

11. Connect the INCOMING TAP WATER, PRODUCT WATER and REJECT WATER TO DRAIN hoses to the appropriate fittings on the RO. All hoses should run to the right side of the RO. This will allow you to move the RO forward to access the rear panel.

NOTE: To remove the hoses, depress the gray "collet" inward while gently pulling the hose out. The tubing extension MUST be fully inserted into the fitting body to the tube stop.

CAUTION To ensure proper assembly, tubing extension MUST be fully inserted into the fitting body to the tube stop.



12. Open the back cover and remove any packing foam.

2.6 PT401 Installation (External Tank Only)

1. The anti-scalant feed system should be installed before the RO in a water treatment system. Don't use anti-scalant if the water source is softened.

2. Install the anti-scalant feed system on a firm, level floor. Be sure to follow all local plumbing and electrical codes.

3. Place the solution tank with injection pump in place and connect one end of the loose hose to the empty connector on the pump and the other end of the hose to the connector on the RO in after the pre-filters.

4. Fill the solution tank with the supplied chemical and follow the pump priming procedure.

NOTE: Use AmeriWater, CP Grade (Chemically Pure) chemicals only!

CAUTION: Disconnect ALL power supplies to the RO prior to connecting the metering pump to the RO control or electrical shock could result.

5. Plug the male 5-pin connector from the metering pump into the female 5-pin connector via the hood on the side of the RO.

6. Turn on the power to the RO and place RO into service, for the anti-scalant metering pump to turn on.

NOTE: In order for the metering pump to run, the RO pump must also be running.

2.7 Silex Installation

NOTE: This system uses a method of water purification known as DI polishing. This section covers the installation of a Silex. If you have received a divert to drain manifold, refer to Section 2.8 for Silex connections.

1. Locate the Silex to the right of the RO, just before the storage tank.

2. Route the product water hose from the RO to the Silex to connect to the Silex hose inlet after disinfection.

3. Plug the power cord into a 115-volt outlet.

2.8 Divert to Drain Manifold Installation

NOTE: This system uses a method of water purification known as DI polishing. This section covers the installation of a header used with DI tanks & Silex.

1. Locate the manifold on a firm, level foundation prior to the storage tank and post the RO system. Install manifold within 6 feet of RO system and the storage tank.

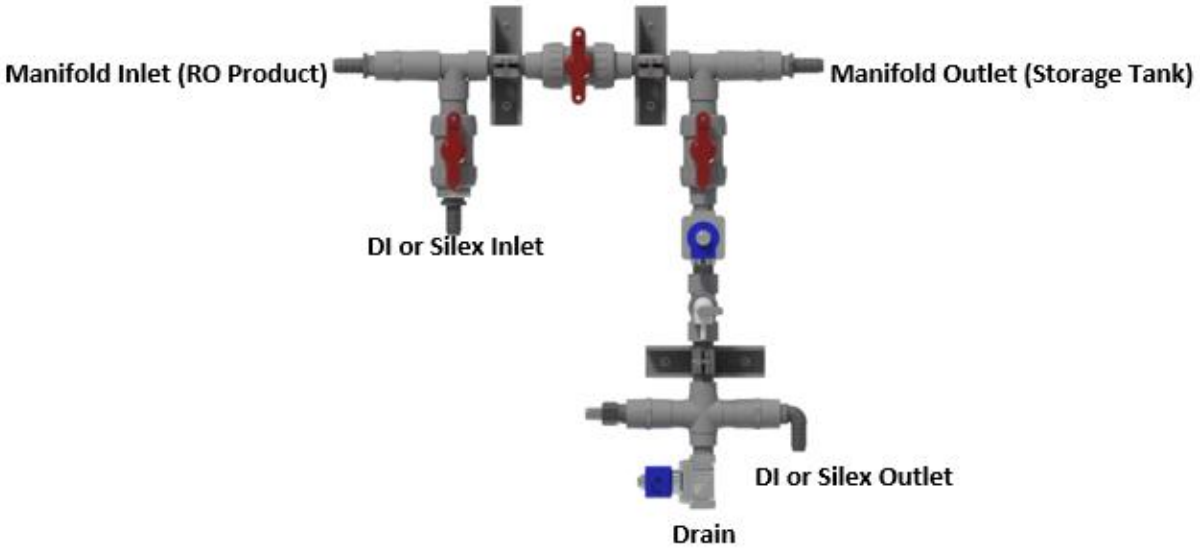
2. Attach hose labeled “manifold inlet” hose to the ¾” hose barb on the inlet side of the manifold.

3. Attach hose labeled “manifold outlet” hose to the ¾” hose barb on the outlet side of the manifold.

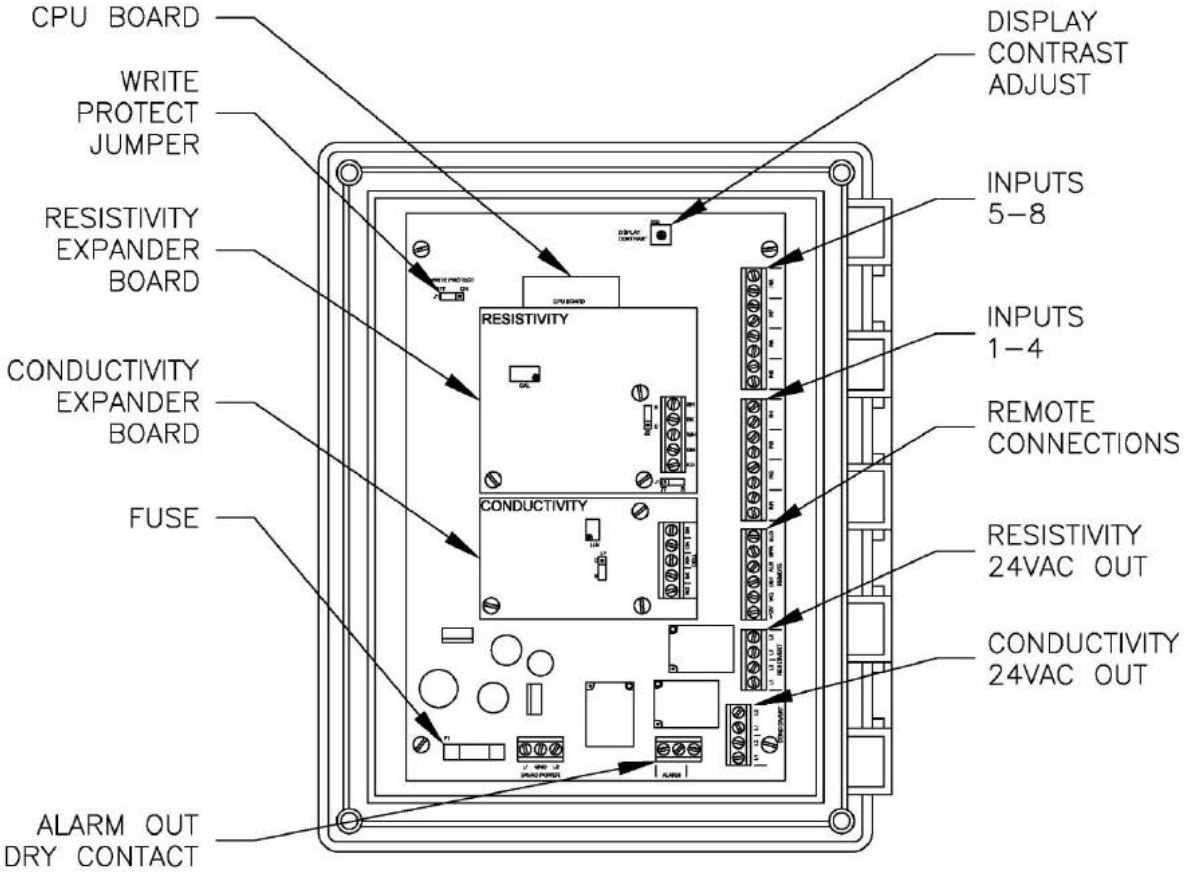
4. Install the ¾’ hose barb to the solenoid valve located on the drain section. Attach hose labeled “Drain” hose to the ¾” hose barb and route hose to the nearby drain.

5. Route the product water from the RO to the “manifold inlet” hose of the manifold. The “manifold outlet” hose will be plumbed to the storage tank inlet.

6. Route the DI system’s inlet hose to the DI or Silex inlet of the manifold. The DI system’s outlet hose will be plumbed to the DI or Silex outlet of the manifold.



7. The Two 24VAC solenoid valves will be wired into the alarm panel's RESISTIVITY 24VAC OUT located in the controller schematic below. Ensure the white wire is connected to L1 and the black wire is connected to L2.



2.9 Storage Tank Installation

1. Locate the storage tank on a firm, level foundation. For safety and to prevent tipping, install (4) 5/8" diameter, HILTI KB-TZ Expansion anchors (AmeriWater PN 92-0042) through the 4 holes on the pads to anchor into the ground. A minimum of 4 threads for each anchor must be below the concrete prior to application of 60 ft-lbs of torque.

2. Ensure the top, medium, low, and pump-float switches are in correct orientation; that is, close on rise, close on rise, open on fall, and close on rise, respectively.

3. Install tank vent filter in preferred orientation atop storage tank.

4. Use included ¾" hose to route loop drain valve to nearby drain.

NOTE: Ensure an air gap of at least 2" is maintained for the overflow hose when connected to drain.

5. Connect the DI Polisher outlet hose to the storage tank's inlet.

6. Connect the discharge from the pump to the distribution piping.

7. Run the float – switch quick disconnect to the RO and lock in place.

8. Plug the pump directly into a dedicated 220-volt, 15-amp GFI receptacle.

9. Connect low float to alarm panel IN 2.

2.9.1 Storage Tank to RO Wiring Instructions

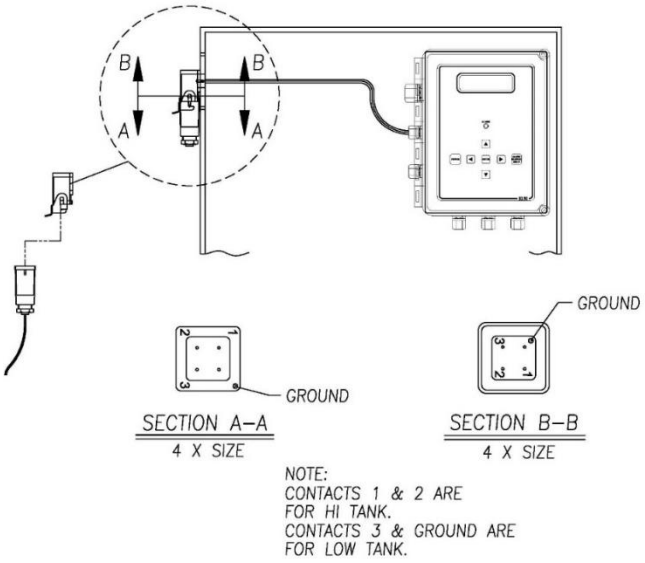
1. Bring the 4 pin female connector on the storage tank float switches over to the RO.

2. Verify that the pins on the 4-pin female and the 4-pin male connectors align with each other as shown to the right (1 – 1, 2 – 2, 3 – 3 and ground – ground).

3. Slide female connector into the male connector on the RO, snapping the two together.

4. Engage the lock between the female and male connector.

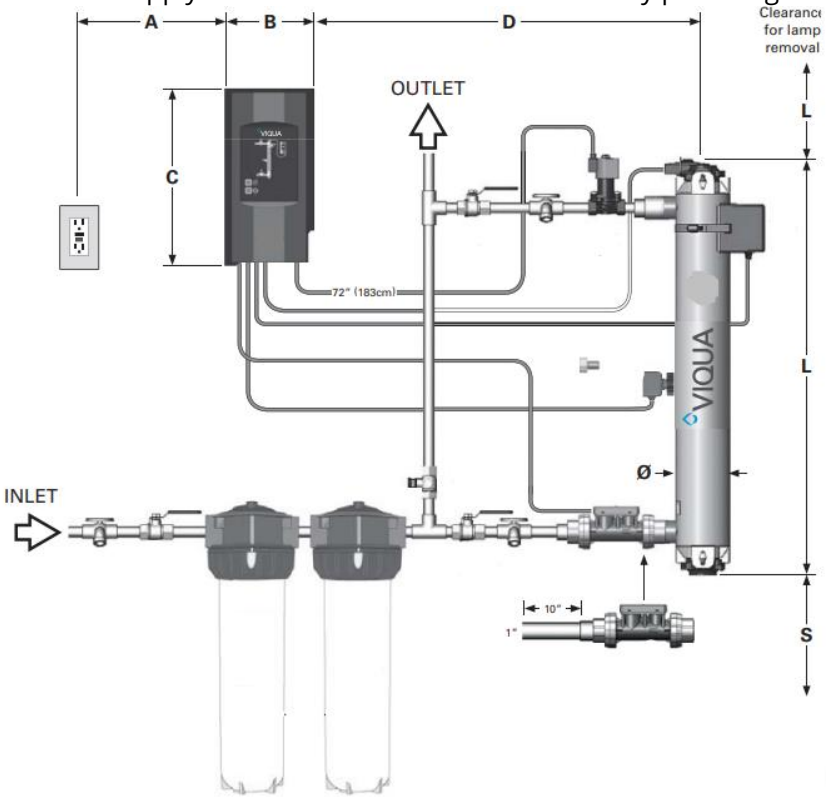
5. Lock in place.



2.10 Ultraviolet Lamp installation

1. Determine appropriate location of the controller and chamber. Ensure adequate clearance above chamber to allow for removal of the lamp and sleeve. See images below for proper clearance for each component.

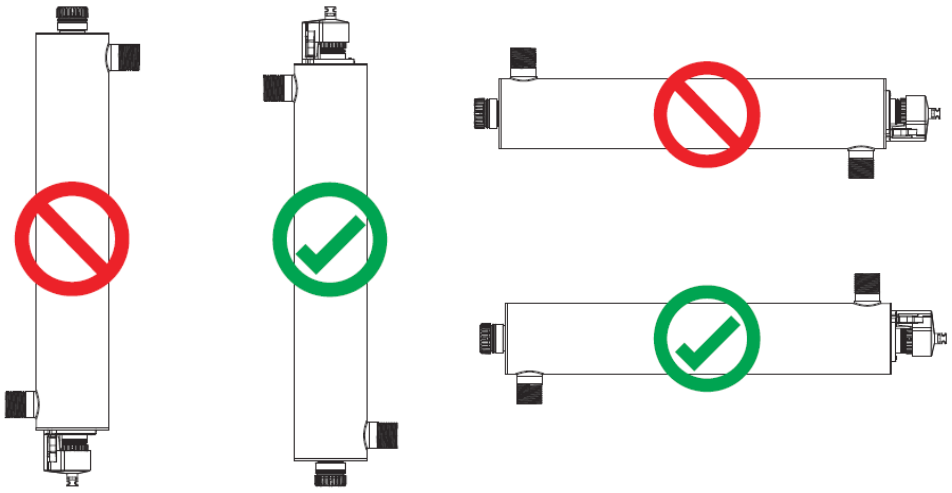
2. Ensure main water supply is turned off and make all necessary plumbing connections.



L	S (MIN)	⌀	A (MAX)	B	C	D
41” (103 cm)	12” (30 cm)	4” (10 cm)	72” (182 cm)	6.5” (16.5 cm)	13” (33 cm)	48” (122 cm)

3. Locate the lamp on a firm, level foundation, as shown in the figure below with 37.5” spacing using screws. Ensure chamber is installed with green arrows pointing upwards to indicate flow.

WARNING: The UV lamp MUST be installed in the orientation shown. FAILURE TO DO SO MAY RESULT IN DECREASED UNIT LIFE OR FAILURE.



4. Connect the sleeve bolt at the bottom of the sleeve assembly. Ensure sleeve bolt is rotated a full ¼" turn until positive stop.

5. Insert sleeve with arrow pointing up.

NOTE: DO NOT rotate sleeve and touch glass with bare hands.

6. Wet O-ring with water and place over top end of sleeve.

7. Connect the sleeve bolt to the top of the sleeve assembly. Ensure sleeve bolt is rotated a full ¼" turn until positive stop.

8. Remove the sleeve bolt at the bottom of the sleeve assembly.

9. Wet O-ring with water and place over bottom end of sleeve. Reconnect the sleeve bolt and install screw.

10. Install and rotate the lamp into the sleeve assembly. Ensure to rotate the lamp completely.

11. Install the controller unit to the wall, ensuring that the controller is installed higher than the chamber and away from all water sources.

12. Connect fan into either receptacle.

13. Install lamp harness onto chamber. Lock wire form into position.

NOTE: Ensure lamp harness ground is inserted into chamber ground terminal. Ensure magnet on top of chamber aligns with proximity sensor on lamp harness.

14. Connect controller to power outlet.

WARNING: The complete water system MUST be sterilized before start up by flushing with chlorine to destroy any residual contamination.

15. After a suitable location is chosen (vertically or horizontally), ensure enough space is left to allow for the removal of the UV lamp and/or quartz sleeve, which his approximately equal to the size of the chamber itself.

16. Using the supplied clamps and hardware, mount the system to the wall.

17. After ensuring there are no leaks, plug the system into the ground fault interrupter (120-volt, 1.5-amp) and check to ensure proper working conditions. The controller should illuminate with no alarms. Allow water to run to clear any air or particles in the chamber.

NOTE: To protect the controller, a UL1449 certified (or equivalent) transient voltage surge suppressor is required.

NOTE: When there is no flow, the water in the cell will become warm, as the UV lamp is always on. To remedy this, run a cold water tap for a minute to flush out the warm water.

Refer to product operation manual for disinfection procedure, lamp and UV replacement and care, and troubleshooting. AmeriWater does not provide plumbing between Storage Tanks, UV, & Endotoxin Filter to allow for flexibility of install.

2.11 Endotoxin Filter Installation

1. Locate the housing on a firm, level foundation. For safety and to prevent tipping, install three 5/8" diameter anchors through the three holes on the welded mounting legs to anchor into the ground. A minimum of four threads for each anchor must be below the concrete prior to application of 60 ft-lbs. of torque.

2. Make sure system is depressurized by closing all valves and opening sample ports.

3. Connect necessary plumbing from UV to endotoxin housing. Due to varying room configurations, this plumbing is not provided. It is recommended to use schedule 80 PVC pipe. Filters will be installed after system start-up.

2.12 Alarm Panel Installation

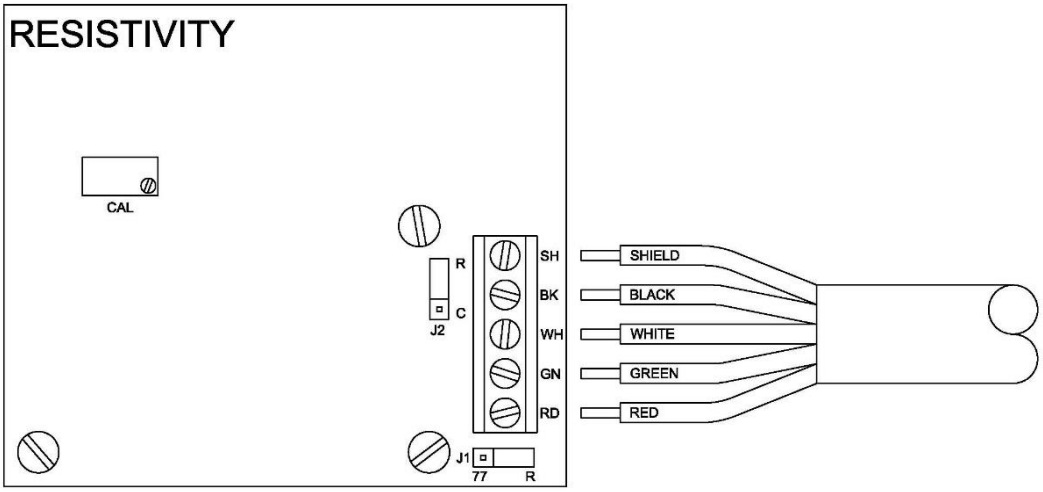
1. Locate the alarm panel in the water room at an easily accessible and highly visual position on the wall, near a 120-volt outlet. (Keep in mind the limited length of the wires from the float switches on the storage tank and the length of the wires on the resistivity probe.)

WARNING: Disconnect ALL power supplies to the equipment, prior to wiring the alarm panel or electrical shock could result.
WARNING: Be sure jumpers on the auxiliary board on the RO's controller are jumpered between J3 & J4 ONLY. If not, damage to the alarm panel or RO controller will result.

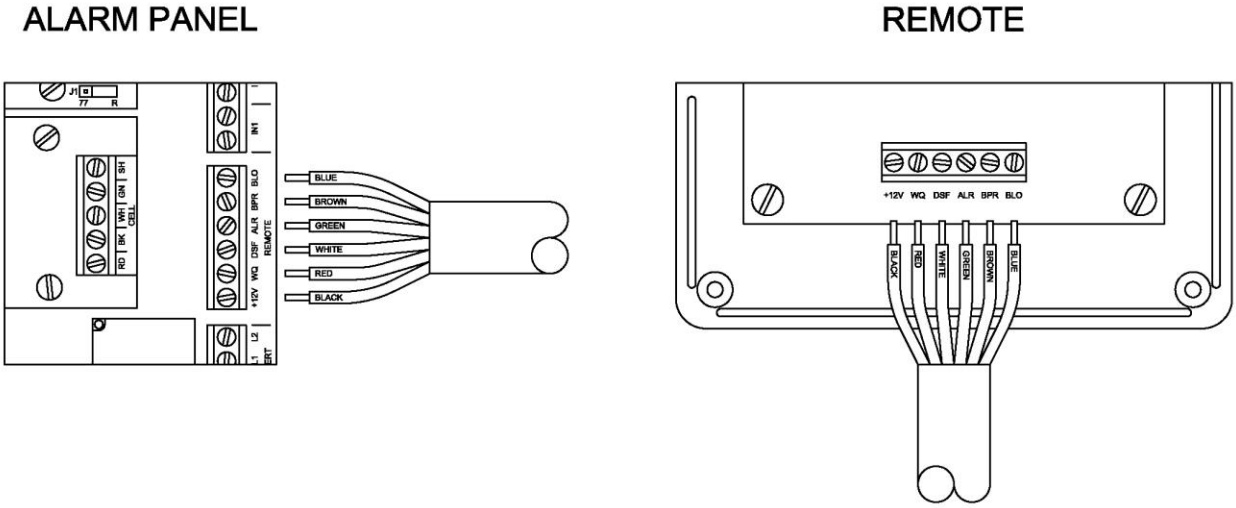
2. Bring in the alarm dry contact from the RO through one of the open strain reliefs on the bottom of the alarm panel. Route this wire to the terminal labeled IN1. Strip the insulation back about ¼" on each wire and secure into terminal IN1.

3. To monitor a low storage tank condition, bring in a dry contact from the storage tank low float into the alarm panel. Route this to the terminal labeled IN2. Strip the insulation back about ¼" on the wires and secure into terminal IN2.

4. To monitor the resistivity. Install the resistivity sensor wiring into the upper resistivity expander board as shown below:



5. Install the remote alarm in a highly visible location and run low voltage wire from the alarm panel to the remote box location. Connect the alarm panel to the remote by connecting the wires as shown below:



Wire	Color
+12V	Black
WQ	Red
DSF	White
ALR	Green
BPR	Brown
BLO	Blue

Terminate the free end of the provided wire in the alarm panel in a like manner.

6. AmeriWater supplies all remote panels with 100’ of connection cable for the remote. If distances between the remote and the alarm panel are greater than 100’ up to 500’, contact AmeriWater to order the exact length of cable you will need.

2.13 Final Install Steps

Install provided valve tags and system labeling where necessary. Valve tags should be installed in accordance with the P&ID for the site.

3 SYSTEM START-UP PROCEDURES

3.1 RO

WARNING: This Reverse Osmosis System (RO) contains a preservative solution to prevent microbiological growth and freezing. Discard all product water for at least two hours of operation before placing the RO in service.

1. Lock the two front casters so that the RO will remain stationary during start-up.

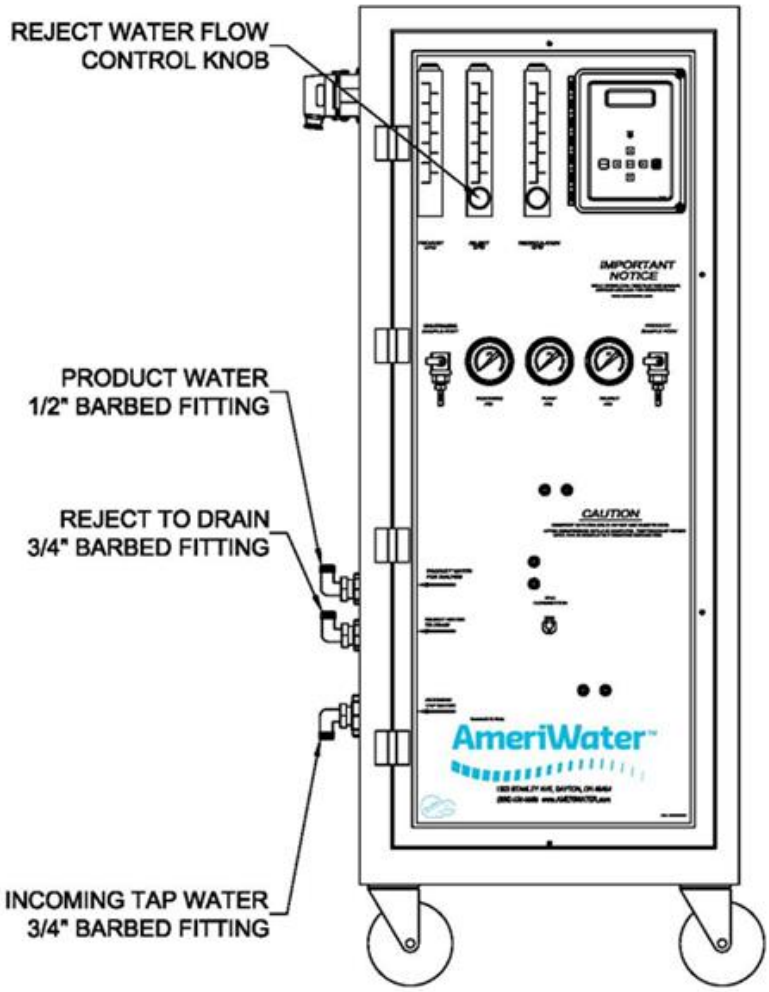


Figure 2. HCRO3/4/3X Connections

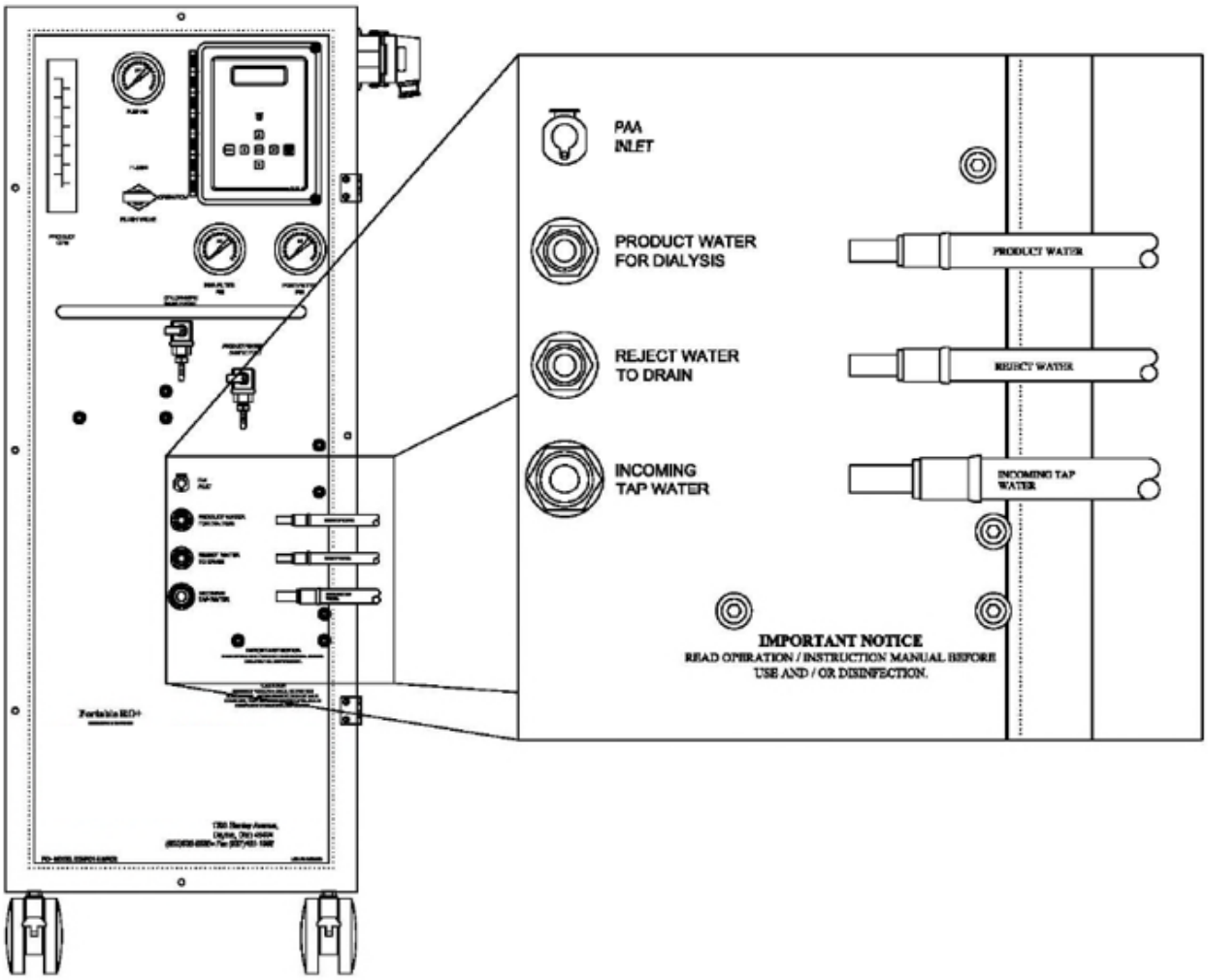


Figure 3. HCRO2/S Connections

NOTE: The incoming, product, and reject hoses were installed on the RO in the install steps.

NOTE: Before connecting incoming feed water to RO, ensure feed water line is routed to drain and until the water is clear to prevent rusty water from clogging the system.

2. Connect the RO incoming tap water hose to the potable cold water supply using the incoming tap water hose and fittings supplied. If utilizing a blending valve, ensure hot and cold water lines are flushed prior to operating the RO. Adjust blend valve to 77°F (25°C). Do not exceed 82°F (28°C).

3. The reject water to drain hose coming out of the RO system is for reject water. The water from this hose will go down the sink or drain. Leave at least a 2" air gap between the hose and the drain to prevent contamination or siphoning.

4. The product water hose should also be secured to the drain until the start-up flush and initial disinfection cycle are completed, and the water quality is in the good range (below the conductivity set-point, and not in alarm).

5. Open the access cover and make sure that the “CIP” switch is in the “ON” position.

6. Plug the power cord into a dedicated 115-volt, 20-amp GFI receptacle.

7. Plug the pump power cord into power (requirements vary by model).

8. For 3-phase applications, the 3-wire connections must be verified to give the correct rotation on the RO pump. If not, specified pressure cannot be obtained, and the pump will quickly overheat.

WARNING: Before start-up, membranes on the RO will need to be wetted in order to prevent damage caused by air pressure.

Use steps 9-12 to wet membranes on ROS or RO2 and see steps 13-16 for RO3, RO4, & RO3X.

9. Turn on the potable water supply to the RO.

10. Inorder to allow the membranes to fill with water, press the power button and allow the 10 second pump timer to count down to 2 seconds before turning it off. This will allow water to be pushed through the system at a low pressure.

11. Repeat previous step up to 10 times. This may take up to 5 minutes. Ensure water is flowing through the drain and flowmeters.

12. Open the access cover and switch the “CIP switch to the “OFF” position.

Use steps 9-12 to wet membranes on ROS or RO2 and see steps 13-16 for RO3, RO4, & RO3X.

13. Turn off high voltage to the pump. This will allow the pump to run at a low pressure.

14. Turn on the potable water supply to the RO and press the power button. Allow the membranes to fill with water. This may take up to 5 minutes. Ensure water is flowing through the drain and flowmeters.

15. Open the access cover and switch the “CIP switch to the “OFF” position.

16. Turn on high voltage to the pump.

17. Turn on the RO by pressing the POWER key, and allow it to run making sure the water is properly flowing out the Reject and Product hoses.

18. With the RO operating, adjust the valve on the reject flowmeter until the flow rate is equal to the product flow rate of the RO; this will be 50% recovery. Operating the RO at higher recovery percentage may reduce the life span of the RO membranes. Recovery is calculated via the following equation:

$$\frac{Product\ Flow\ (GPM)}{Feed\ Flow\ (GPM)}\ x\ 100\% = RO\ Recovery$$

19. With the RO Operating, adjust the valve on the recirculation flowmeter until the recirculation flow rate is approximately one-third of the reject flow rate.

20. The user can verify that the RO is operating correctly by checking the flowmeters, the controller and the inlet and outlet pressure gauges. The flowmeters will show movement on the flow bobbers in the flowmeters. The flowmeters should be reading 50% product / 50% reject and 33.3% recirculation. The controller will show on the screen operating parameters, such as quality of water and temperature of water. The incoming and outlet gauges will show pressure reading on the gauge. There will be a differential of pressure between the two gauges (outlet subtracted by the inlet).

21. At this point, the preservative in the RO and the membranes needs to be completely flushed from the RO.

22. Turn the reject flow control knob located at the bottom of the reject flowmeter counter-clockwise to allow the RO to run in full-flow reject flush for about fifteen minutes. Afterwards, turn the same knob clockwise so that the reject flow is approximately equal to the product water flow and run for an additional 2 hours. Check for leaks during this time.

NOTE: The RO conductivity alarm may sound, which is normal when it is in FLUSH. Press the ALARM SILENCE key on the RO controller to silence the alarm. The alarm will restart after a 3-minute delay.

23. The conductivity value, after flushing and being put back into the service mode, must be within the acceptable limit.

24. After a thorough flushing of the preservative, the RO **must** be disinfected prior to being put into service for use.

25. When all disinfection procedures have been completed, turn on the feed water supply.

26. Press the power key (the display will show operating after a ten second delay).

NOTE: The conductivity may alarm for a few seconds before dropping into the desired range.

27. Press the power key (the display will show standby). Connect the product water hose to the direct feed loop or storage tank inlet (be sure to connect the product water hose aseptically).

28. Refer to the Monitoring Log in Section 5. Complete the log, making sure that the system is operating within all the required ranges.

WARNING: Do not use the RO until all specifications are met.

CAUTION: Although the water treatment system may produce water of sufficient quality to meet the requirements of AAMI standards, distribution of the water may degrade its quality to the point where it no longer meets the requirements of this standard. AmeriWater offers information about ultra-pure water piping to prevent the degradation of product water in a water loop.

3.2 Silex

If you received a Silex, ensure the system has been first disinfected before installing resin bags.

1. Install the resin packs in the Silex.

   a) Lock the front wheels. Remove the cover plates by unscrewing the four black knobs on each plate. To break the seal between the cover plates and the upper plates, use a slotted screw driver in the pry notch located in the top of each upper plate. Open the drain valve at the bottom of each column.

   b) Remove the resin pack from the shipping box and open the tied end of the plastic sleeve. DO NOT remove the resin pack from the plastic sleeve at this time.

   c) Stretch the resin pack over your arm to elongate the pack, and feed it into the column allowing the pack to slide out of the plastic sleeve. Save the plastic bag for future exchange.

   d) Verify that the O-ring is clean and in place and replace the cover plates. Tighten the black knobs evenly by turning the knobs at opposite corners at the same time. Repeat for the other two corners.

CAUTION: Failure to tighten the knobs completely may cause the cover plate to separate from the system when pressurized.

   e) Close the drain valve at the bottom of the column.

   f) Repeat steps a) through e) for each of the columns.

2. Open the air vents located on the top of the cover plates and turn on the water supply and the RO. Tighten the air vents closed when water begins to escape through the vents.

3. Ensure that the Silex quality light is plugged into a GFI receptacle.

4. Take product hose (from Silex to storage tank) and route to drain. Turn on RO to allow water to circulate and fill Silex to rinse the DI to quality. Turn off RO upon completion.

NOTE: When the resin is changed and first powers on, the light may indicate red initially, but should switch to green, indicating good quality.

3.3 Divert to Drain Manifold

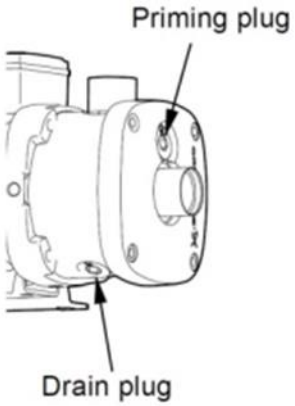
If you received a Divert to Drain DI Manifold, refer to Section 2.8 for installation. Ensure the bypass ball valve is closed and both the DI inlet & outlet ball valves are open. Turn on RO to allow water to circulate and fill Silex or DI tanks in order to rinse the DI to quality.

3.4 Storage Tank

1. Lock the casters on the DI Polisher and connect the product hose to the storage tank inlet.

2. Verify that the storage tank distribution pump is plugged into a single phase 208-230V / 60Hz / 15A dedicated outlet.

3. Remove priming plug in the pump sleeve (see Figure).



4. Slowly open the tank-to-pump valve until a steady stream of liquid runs out of the priming port.

5. Replace priming plug and tighten securely.

6. Power the pump and slowly open the system outlet valve until fully open.

7. Completely open the tank-to-pump valve.

8. Using a wrench for the bolt on the pressure relief valve, adjust the setting to 25PSI.

9. Isolate system loop by closing valves to relevant utilities, such as faucets. Close loop return isolation valve to prevent water from entering the tank. Open loop return drain valve located on storage tank flowmeter and rinse system via RO. Once debris is clear, turn off RO.

3.5 PT401 priming procedure

WARNING: Do not use the PT401 anti-scalant if your system has softened water. Turn off the system by depressing the on / off button on the PT401 pump.

AmeriWater RO products featuring the PT401 anti-scalant system are equipped with a priming valve. The following procedure should be followed during the initial start-up of the RO system, and whenever the PT401 pump loses its prime:

1. Open the priming valve by turning it to counterclockwise three times.

2. Verify that the RO is on and running.

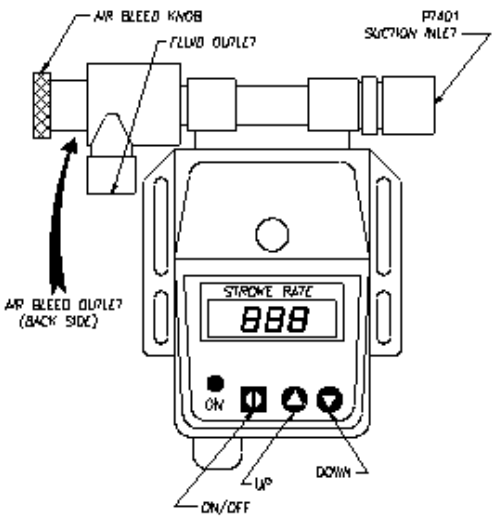
3. Be sure the injection pump's suction line is immersed in solution in the PT401 container.

4. Press the ON key to turn on the PT401 injection pump.

5. Press the "DOWN" key to cycle the STROKE RATE to approximately 360.

6. Run the injection pump until a stream of PT401 without air bubbles flows out of the air bleed tube.

7. Close the adjustment knob completely by turning clockwise until the knob stops, making sure there is no liquid flow out of the air bleed tubing.



If the pump does not prime, repeat the foregoing steps.

Once the pump has been primed, and is pumping the chemical through the head into the water stream, adjust the stroke rate to the recommended settings below.

STROKE SETTINGS					
HARDNESS (Grains Per Gallon)	**ROS**	**RO2**	**RO3**	**RO4**	**RO3X**
1-6 GPG	2	4	9	10	12
7-20 GPG	3	5	11	13	15
21-40 GPG	4	6	13	15	17

For water with hardness greater than 40 GPG, contact AmeriWater for consultation.

At the stroke rate of ten, the PT401 injection pump will put about 300 milliliters (approximately 10 liquid ounces) per hour into the RO incoming water stream.

Repeat these steps as necessary when the system is started after sitting for extended periods or the PT401 Bottle is empty and air has drawn into the pump. The priming may not take as long as the initial time.

WARNING: Overdosing PT401 will adversely affect (blind) the membrane causing a decrease and/or loss of permeate flow.

WARNING: If softened water is supplied, turn off the PT401 system by depressing the on/off button on the chemical feed pump and emptying the PT401 jug.

3.6 Endotoxin Filter

1. It is now acceptable to insert endotoxin filters upon loop disinfection (see Section 6). Loosen and remove clamp atop system.

2. Remove cap and O-ring and set aside.

3. Loosen and remove wingnut and filter plate and set aside.

4. Place filters inside slots in housing, ensuring a snug fit.

5. Replace plate, ensuring plate extrusions on underside set into filter holes.

6. Replace all components, ensuring air is bled out of system before use by allowing sample port to remain open until no air remains.

4 OPERATION

Once the system has been started, the RO will continue to make water until the high-level float switch is tripped on the storage tank. At this point, the RO will be placed into standby (tank full) until the mid-level float switch is tripped. Once the mid-level float is tripped, the RO will re-initialize and begin to produce water again.

In the event that the conductivity is above the pre-determined set-point, an alarm will sound from the alarm panel. The storage tank will still operate as normal while there is water in the tank; however, there will be no water flow from the RO through the DI Polisher until the alarm condition is corrected.

4.1 Bypass Procedure

1. Turn off the POWER to the RO and Distribution Pump.

2. Shut off the water supply to the system.

3. Remove the RO water inlet hose from the source.

4. Retrieve the bypass hose and install to the incoming water supply.

5. Connect the CPC connector into the fitting just after the pump on the storage tank.

6. Turn on the water to begin bypass operation.

5 SYSTEM MONITORING

Reference the Operational Manual for the individual component to see recommended maintenance.

Under AAMI TIR34 and ST108 requirements, the below listed items need to be monitored on varying intervals.

Water Quality Measurements				
Measurement	**Units**	**Critical Water**	**Type of Testing**	**Frequency**
pH @ 77°F	pH	5.0-7.5	pH meter or Colorimetric dipsticks	Monthly
Conductivity	uS/cm	<10	Conductivity	Daily
Total Alkalinity	mg CaCO3/L	<8	Colorimetric dipsticks	Monthly
Total Hardness	mg CaCO3/L	<1	Determination of ppm CaCO3 or Colorimetric dipsticks	Monthly
Bacteria	CFU/mL	<10	Heterotrophic plate count	Monthly
Endotoxin	EU/mL	<10	LAL test	Monthly

Fill out the monitoring log prior to each use. Having this information available will help to quickly diagnose issues related to performance. Failure to carry out the daily monitoring and maintenance at the indicated intervals will result in reduced performance of the RO system and may void the warranty. The follow page shows a sample log.

FEED WATER QUALITY	**Parameters**	**Results**	**Date**	**Initials**
Conductivity (uS)	Record			
Hardness (GPG)	Record			
Chlorine (ppm)	Record			
pH	Record			
PRE-FILTRATION	**Parameters**	**Results**	**Date**	**Initials**
Blend Valve Temperature	77°F ± 5°F			
Chlorine Test	≤ 0.1PPM			
RO OPERATION	**Parameters**	**Results**	**Date**	**Initials**
Pre-filter Inlet Pressure	> 25PSI			
Pre-filter Outlet Pressure	> 25PSI			
**Pre-filter Delta Pressure (Subtract Inlet by Outlet)	≤ 10PSI			
Pump Pressure	100 – 230 PSI			

Reject Pressure (PSI)	> 25PSI			
Product Flowrate (GPM)	See Table			
Reject Flowrate (GPM)	See Table			
Recirculation Flowrate (GPM)	See Table			
Conductivity	< 50 uS			
*Percent Rejection	> 90%			
Amount of Hours in Operation	Record			
POST RO	**Parameters**	**Results**	**Date**	**Initials**
Distribution Pump Outlet	> 50PSI			
Storage Tank Loop Return Pressure	> 25PSI			
Storage Tank Loop Return Flowrate	> 8 GPM			
DI Packs / Tank Providing Adequate Resistance	Green Light≥ 1 Meg			
UV Intensity	> 50%			
**Endotoxin Filter Delta Pressure	< 10PSI			
Verify System Normal Display on Main Alarm Panel	Record			
Verify Good Quality Light on Remote Alarm Panel	Green Light			
Verify Resistivity Display on Main Alarm Panel	> 1 MEG			
EXCHANGE	**Frequency**	**Date**		**Initials**
Carbon Block Filter Cartridges				
Clean or Replace the Membrane				
Add PT401 (Anti-scalant) > ½ Full				
DI Polisher Resin Change				
Endotoxin Replaced	Annually			
UV Lamp/Quartz Sleeve Replacement	Annually			
Storage Tank Vent Filter	Annually			
Chemical or Ozone Disinfection	Monthly			

*The RO system can operate below percent rejection parameter due to post deionization treatment.
** From established new filter DP

Assembly Number	RO OPERATION	Parameters
00HC-0015 (HROS)	Product Flowrate (GPM)	.3 - .9
	Reject Flowrate (GPM)	N/A
	Recirculation Flowrate (GPM)	N/A
00HC-0045 (HRO2)	Product Flowrate (GPM)	1.5 – 2.3
	Reject Flowrate (GPM)	N/A
	Recirculation Flowrate (GPM)	N/A
00HC-0060 (HRO3)	Product Flowrate (GPM)	2.75 – 4.00
	Reject Flowrate (GPM)	Equal Product
	Recirculation Flowrate (GPM)	.5 – 1.25
00HC-0075 (HRO4)	Product Flowrate (GPM)	3.00 – 5.25

00HCRO3X402 (HRO3X)	Reject Flowrate (GPM)	Equal Product
	Recirculation Flowrate (GPM)	.5 – 1
	Product Flowrate (GPM)	3.85 - 5.25
	Reject Flowrate (GPM)	Equal Product
	Recirculation Flowrate (GPM)	1.00 - 3.5

5.1 AAMI Monitoring

Reference the Association for the Advancement of Medical Instrumentation (AAMI), for detailed guidelines on addressing water treatment equipment, water quality specifications, and procedures for monitoring water quality.

6 DISINFECTION

AmeriWater recommends that all systems should be disinfected monthly. Additionally, the system should be disinfected if it has not been flushed at least every 8 hours or "preserved". The following sections will outline the disinfection steps for various systems. Refer to Section 5.1 for AAMI standards for disinfection. Disinfection is the procedure of destroying greater than 95% of bacteria and removal of endotoxin. Improper disinfection of an RO can be worse than no disinfection at all because endotoxin are created if the dwell time is not long enough, or the disinfectant not strong enough. The following procedures are designed to kill bacteria and flush out endotoxin in your storage tank and loop.

6.1 Storage Tank / Loop Disinfection

NOTE: It is necessary to have new resin bags for the Silex during the disinfection process; see Section 3.2 for installation instructions.

Since the storage tank contains a spray device installed in the top of the tank, it washes down the top and sides of the tank. This enables the water level in the tank to be lowered during disinfection, which reduces the chemicals required and reduces the rinse out time.

1. Determine the volume of water in the tank and loop. The length of the loop can be estimated by measuring the general path of the loop in the facility, then adding 50% more length for safety. Below is a chart showing the number gallons in various sizes of pipe. Example: 450 feet of 1" pipe; 450 / 24 = 18.75 gallons. Add the loop volume (gallons) to the volume in the storage tank. If you have a 185-gallon tank without a spray device, use the full 185 gallons. With a spray device, use less of the volume (185 / 4 = 46.25 for a tank that is ¼ full or the lowest level for that allows the tank to function). Example: 46.25 gallons + 18.75 gallons from the loop = 65 gallons.

PIPE SIZE	FEET OF PIPE TO CONTAIN 1 GAL OF WATER
½"	98
¾"	43
1"	24
1 ¼"	15

1 ½"	10

2. Prior to disinfecting system loop, ensure disinfection is necessary by taking bacteria and endotoxin samples at various system sample ports. If bacteria and endotoxin levels do not meet the requirements listed in the table below, or it is a period of time in which the loop has not been frequently used (such as initial installation), it is required to disinfect the loop.

Type of Water		**Utility Water**			**Critical Water**
Water Use		**Flushing**	**Washing**	**Rinse**	**All**
Bacteria	cfu/mL	N/A	N/A	<10	<10
Endotoxin	EU/mL	N/A	N/A	<20	<10

3. Determine the dilution and amount of chemical to use. The following are the recommended dosages of chlorine and PAA (Peracidin, Minncare) for disinfection. Choose a disinfectant compatible with the loop material of construction.

Chemical	**Instructions**
Chlorine	500 PPM. Dilute one (1) gallon of chlorine bleach in 100 gallons of water in the system. Based on the example on the previous page: 65 gallons / 100 = 0.65 gallons of bleach. Add to the system by removing the tank lid and pouring in the chlorine bleach solution. **Endotoxin filter must be removed, if applicable.**
PAA	500 PPM. Dilute one (1) gallon PAA in 100 gallons of water in the system. Based on the example on the previous page: 65 gallons / 100 = 0.65 gallons of PAA. Add to the system by removing the tank lid and pouring in the PAA solution. **Not to be used as disinfectant on systems with UV.**
Ozone	0.5 PPM. Add to the system by running the ozone disinfection system until the desired level is reached. Hold at this level for at least 10 minutes. **Reference Ozone manual, 98-0121, for disinfection steps. UV must be unplugged.**

WARNING: If the UV light is used, DO NOT use PAA to disinfect system!

WARNING: DO NOT use chlorine (bleach) with endotoxin filter's installed in housing; filters are not approved to be used with bleach.

4. Verify that the disinfectant is present at the connections to the loop (each point of use).

5. Disconnect inlet connections from storage tank.

6. Recirculate the disinfectant in the loop via distribution pump until it is verified at each point of use that the above requirements have been met.

7. Turn off the distribution pump and allow the disinfectant to soak inside the loop for one hour. Replace connection to storage tank after adequate time has passed.

8. Turn the distribution pump back on, ensuring the dump valve on the loop return is opened and the spray bar isolation valve is closed. Drain remaining disinfectant from the tank when the pump is off. Empty the tank entirely via tank dump valve.

9. Fill the storage tank enough to recirculate and rinse the loop via the spray bar fixed to the storage tank (loop return dump valve closed and spray bar isolation valve opened).

10. Continue rinsing and dumping the system until all disinfectant is rinsed out by verifying at each usage point. Use a chlorine test strip to verify the residual chlorine level or a PAA test strip to verify the residual PAA level. Repeat this step until the test strip indicates a residual level at or below 1.0 ppm chlorine and PAA.

6.2 Ultraviolet System

WARNING: If the UV light is used, DO NOT use PAA to disinfect system!

WARNING: Never allow Chlorine (bleach) to be exposed to PAA. Doing so will cause a severe chemical reaction.

1. Since UV is connected to tank via system loop, the chlorinated water will flow through the UV, thus disinfecting the lamp.

2. Ensure the controller is plugged in for entire disinfection process.

3. DO NOT use water for 30 minutes. Flush the system until no chlorine smell is detectable.

7 VALIDATION

Validation is required including disinfection, water sampling, and performance to be completed prior to system being put into service. Contact your Ameriwater representative for more information.

8 SPARE PARTS

For spare parts on systems other than the UV, reference the system operation manual as found in Section 1.1.

Assembly	Description	P/N
30 GPM System (HCROS, HCRO2, HCRO3, & HCRO4)	UV Disinfection Bulb	76-0020
	UV Quarts Sleeve	76-0021
	UV Sensor	76-0017
70 GPM System (HCRO3X)	UV Disinfection Bulb	76-048
	UV Quarts Sleeve	76-049
	UV Sensor	76-050

CALIFORNIA PROPOSITION 65

⚠ WARNING

This product can expose you to chemicals such as vinyl chloride (used in the production of PVC) or Nickel (used in the production of stainless steel), that are known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.

Dear Valued Customer,

California Proposition 65 (Prop 65) is the Safe Water and Toxic Enforcement Act of 1986. The State of California began enforcing amendments to California Prop 65 at the end of August 2018. Prop 65 requires manufacturers to provide a clear and reasonable warning to residents of California about chemicals used in products that they purchase that are included on the Prop 65 Chemical List. The chemicals included on the list are chemicals that are known to the State of California to cause cancer, birth defects, or other reproductive harm. One such chemical is Vinyl Chloride, a compound used to produce Polyvinyl Chloride (PVC). The AmeriWater system you have purchased may contain PVC or stainless steel parts.

While warnings are only required in the State of California, AmeriWater has initiated the use of Prop 65 labeling for all products to ensure compliance with California regulations. Please note that the above warning does not necessarily mean that the product that you have purchased is unsafe. Products that have been cleared for market by FDA have been determined to be safe and effective by the United States Food and Drug Administration. The warning is simply a requirement by the State of California. If you wish to obtain additional information, please visit: p65warnings.ca.gov. You may also contact your AmeriWater representative if you have any questions.

Thank you for your understanding and we look forward to continuing to serve you.