AmeriWater®
The Water Purification Specialists

Operation & Maintenance Manual

AmeriWater RO

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Manufactured With Pride in the USA

98-0186 Rev A

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1 GENERAL INFORMATION

1.1 Preface

This Operation & Maintenance Manual provides information required to use the device and perform the basic service and maintenance required on the AWRO device.

Please read and understand all the instructions carefully prior to using the device or carrying out any service or repairs.

CAUTION: No person should attempt to operate or service the unit without prior authorization, instruction, and training from AmeriWater, the medical facility director, or an authorized dealer.

WARNING: Before operating the unit always check to see that the water and electrical connections are secure and not likely to cause a trip hazard.

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

1.2 Intended Use

This equipment is intended for indoor use only in a non-hazardous environment to provide purified water for the purposes of water treatment equipment or other equipment.

Any references in this manual to installation requirements/procedures are provided. Installation of the unit should only be carried out by a trained and approved installation technician.

If the unit is used in a manner not specified by AmeriWater or procedures not followed as detailed in this manual, the protection provided by this equipment may be impaired.

WARNING: DO NOT USE THIS EQUIPMENT IN ANY OTHER MANNER THAN THOSE SPECIFIED UNDER THIS SECTION.

CAUTION: Some parts of the system could be under pressure. Always make sure the pressure has dispersed from the unit before repairs and maintenance tasks are carried out.

1.3 Contact Information-

Please read the Operation 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 entire Operation Manual should be read before operating or servicing the system. This Operation Manual should then be kept near the system and used as a reference and troubleshooting guide.

2 HEALTH & SAFETY

These instructions provide information on safe working practices. These should be adopted to ensure safe and continuing operation of the equipment. The manual should be read and understood before the equipment is used.

AmeriWater reserves the right to make engineering refinements to the equipment that may not be described herein. Any questions that cannot be answered specifically by these instructions should be addressed to AmeriWater or their agents for a response.

AmeriWater will not accept any responsibility for any equipment supplied or the actions of such equipment or associated system if un-authorized modifications are carried out that are considered by AmeriWater to compromise the integrity of the original design philosophy.

If the unit's performance becomes impaired and any remedial work appears to be outside the scope of this manual, then seek advice from AmeriWater, quoting the unit's serial number.

The unit must not be disassembled in any way unless carried out by an AmeriWater technician or authorized trained personnel.

During normal operation, the unit must not be operated with the control panel door open.

2.1 Manual Definitions

NOTE: This symbol points out important information for working with the system in a proper manner.

WARNING: This symbol refers to a possible danger that threatens the safety and life of persons.

CAUTION: This symbol refers to a possibly hazardous situation. Failure to observe these references may result in minor injuries and/or damage to property.

2.2 Additional Safety Requirements

National or provincial specific requirements/standards and regulations must be observed.

2.3 Safety Features

Safety Features: The RO is equipped with several safety features for the benefit of the user.

- Labeled inlets and outlets are on the membrane assemblies to avoid mix-ups.
- A light on the control panel illuminates red whenever the water quality drops to an unacceptable level.
- Divert to drain plumbing sends poor quality water to the drain.

2.4 Electrical Leakage Standards

The AmeriWater AWRO water treatment systems comply with the IEC 61010-1 Standards for Product Safety and Construction.

The AWRO is compliant with IEC 61010-1 Safe Current Limits. All major components of the RO (controller, pump, solenoid valve, etc.) are UL listed.

2.5 Unauthorized Conversion and Manufacturing Replacement Parts

Conversion or modification of the system is only permitted with the approval of AmeriWater. Original replacement parts authorized / supplied by the manufacturer enhance safety and ensure design performance. The use of unauthorized parts may void the warranty on the unit, impair its performance or compromise the safety of those operating it.

2.6 Cautionary Symbols

VOLTAGE LE HASARDEUX. LES SOURCES DE POUVOIR MULTIPLES PEUVENT ÊTRE PRÉSENTES. LE RISQUE DE CHOC ÉLECTRIQUE OU BRÛLE. DÉBRANCHEZ TOUTES LES SOURCES DE RÉSERVES AVANT L'ENTRETIEN.

DANGER: HAZARDOUS VOLTAGE
Contact may cause electric shock or burn. Turn off and lock out power before servicing.

HAZARDOUS VOLTAGE
CAUTION: To reduce the risk of electrical shock, do not remove cover. Refer servicing to qualified service personnel.

ATTENTION: Refer to accompanying documents for further information

Protective earth ground.

2.7 Warranty Policy

The buyer has a one-year warranty on all equipment and parts, excluding non-durable components (e.g., filter cartridges, reverse osmosis membranes, filter media, consumable chemicals, etc.); provided that the system is not subject to abuse, misuse, alteration, neglect, freezing, accident or negligence; and provided further that the system is not damaged as the result of any unusual force of nature such as, but not limited to, flood, hurricane, tornado, or earthquake.

The warranty covers the replacement of equipment and/or parts only. The warranty does not cover labor charges or travel expenses resulting from the service of equipment. The manufacturer is excused if failure to perform its warranty obligations is the result of strikes, government regulation, materials shortages, or other circumstances beyond its control.

To obtain warranty service, notice must be given to the manufacturer within thirty days of the discovery of the defect.

There are no warranties on the AmeriWater system beyond those specifically described above. All implied warranties, including any implied warranty of merchantability or of fitness for a particular purpose are disclaimed to the extent they might extend beyond the above periods. The sole obligation of the manufacturer under these warranties is to replace or repair the component or part which proves to be defective within the specified time period, and the manufacturer is not liable for consequential or incidental damages. No dealer, agent, representative, or other person is authorized to extend or expand the warranties expressly described above.

Some states do not allow limitations on how long an implied warranty lasts or exclusions or limitations of incidental or consequential damage, so the limitations and exclusions in the warranty may not apply to you. This warranty gives you specific legal rights, and you may also have other rights, which vary from state to state.

3 SPECIFICATIONS

3.1 About Your System

This system is designed to purify water for use in Central Sterile Processing, Life Science and Industrial applications. Your RO water 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 your system as soon as it is received by you.

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.

Materials that Contact Product Water			
ABS	Acrylic	Carbon	EPDM
Nylon	Polyester	Polyethylene	Polypropylene
PVC	Stainless Steel	TFCM* (Polyimide)	Tygon

*Thin Film Composite Membrane
All the above listed materials meet FDA and/or NSF standards.

3.2 Models

Specification		Value								
		AWRO 1200	**AWRO 2400**	**AWRO 4800**	**AWRO 7200**	**AWRO 9600**	**AWRO 12000**	**AWRO 14400**	**AWRO 16800**	**AWRO 19200**
Electrical Supply	Controller	115V, 50/60 Hz, Single Phase								
	Pump	115/ 230VAC (Pre-wired 230VAC), 60Hz, Single Phase		208-230 / 440-480VAC, 60Hz, Three Phase						
Rated Current	Controller	5 amps								
	Pump	7.6 / 3.9 A		3.4-3.6 / 1.7-1.8 A			6.7-6.5 / 3.3-3.4 A		9.7-9.4 / 4.6 – 4.65 A	
Weight (Shipping/Operating)		195lb / 185lb	210lbs / 195lbs	253lbs / 223lbs	282lbs / 262lbs	310lbs / 285lbs	382lbs / 357lbs	410lbs / 380lbs	425lbs / 395lbs	446lb / 416lbs
Dimensions (W x H x D)		20.4 x 61 x 23.8 inches	20.3 x 61 x 23.8 inches	21.5 x 62 x 25 inches	21.5 x 62 x 25 inches	21.5 x 66 x 23.8 inches	21.5 x 67 x 37.8 inches	21.5 x 66 x 37.8 inches	21.5 x 66 x 37.8 inches	21.5 x 66 x 37.8 inches

All electrical connections shall be in accordance with the National Electrical Code and all applicable local codes.

A dedicated electrical supply with conveniently accessible disconnect switch (supplied by customer) is required. Where single phase supply is required, disconnect system should be properly labeled and located as close as possible to each other and the machine. Where 3 phase supply is required, individual disconnect switch is required and must be properly labeled and located as close as possible to the equipment.

3.3 Water Connections

Connection	Connection Type and Size
Feed Water Connection	1" MHB [1]
Reject Water Connection	3/4" MHB [1]
Product Water Connection	3/4" MHB [1]
Feed Water Hose	1" Hose
Reject Water Hose	3/4" Hose
Product Water Hose	3/4" Hose

[1]MHB =Male Hose Barb

3.4 Feed Water Specifications

Feed Water Specification	Value								
	AWRO 1200	**AWRO 2400**	**AWRO 4800**	**AWRO 7200**	**AWRO 9600**	**AWRO 12000**	**AWRO 14400**	**AWRO 16800**	**AWRO 19200**
Feedwater Pressure	30 PSI to 80 PSI dynamic								
Minimum Feedwater Flow Rate	2.5 gpm	5 gpm	8 gpm	12 gpm	15 gpm	18 gpm	22 gpm	27 gpm	32 gpm
Maximum Water Temperature Adjust blend valve to 75°F to 80°F (24°C to 27°C)	90°F (32°C)								
Design Temperature	77°F (25°C)								
Hardness as CaCO3	12 grains per gallon (gpg)								
Silica	40 ppm								
Silt Density Index	< 5								
Turbidity	< 1 NTU								
pH Range	6.0 to 8.5								
Iron	0.1 ppm								

3.5 Performance Specifications

Specs	AWRO 1200	AWRO 2400	AWRO 4800	AWRO 7200	AWRO 9600	AWRO 12000	AWRO 14400	AWRO 16800	AWRO 19200
Operating Temperature	50 to 90 °F (10 to 32 °C)								
Recovery Percentage	50% (adjustable to 75%)								
Nominal Rejection	95 to 98%								
Rated Production Capacity (Gallons per Day)	1200 GPD	2400 GPD	4800 GPD	7200 GPD	9600 GPD	12000 GPD	14400 GPD	16800 GPD	19200 GPD
Number of membranes	1	1	2	3	4	5	6	7	8

3.6 Environmental Conditions Anticipated

Environmental Specification	Value
Ambient Temperature	41 to 104 °F (5 to 40 °C)
Ambient Pressure	Atmospheric from 0 to 6500 ft (2000 m)
Relative Humidity	10 to 80% for temperatures up to 31°C, decreasing linearly to 50% relative humidity at 40 °C
Voltage Fluctuations – Main Supply	Not to exceed ±10% of nominal voltage
Overvoltage Category	II
Pollution Degree	2

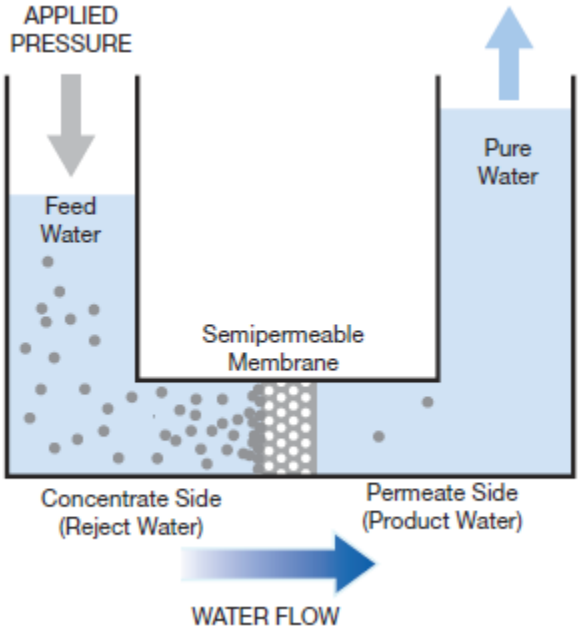
4 OPERATION AND MONITORING

4.1 Theory of Operation

RO Processer

The process of osmosis can be reversed by placing adequately high pressure upon the feed water side (concentrated solution side) of the membrane. Water will be forced through the membrane barrier to yield water that is purer on the lower pressure side of the membrane than on the more concentrated solution side (higher pressure side) of the membrane. The feed water will become more “concentrated” and will be discharged through the reject port known as reject water

(concentrate). Hence, the liberation of purer water (permeate) from its solutions is caused by the reversal of the osmotic pressure; the operation is referred to as “RO”.



Pre-filter

On 4800 GPD units and below, an on-unit 10-micron carbon pre-filter removes chlorine, chloramines, and suspended particles from the feed water supplied to the RO processor. With 7200 GPD and above the on-unit pre-filter is replaced with a 1-micron sediment cartridge, as these units are intended to operate with external carbon tanks for chlorine protection.

Anti-Scalant

This system is equipped with an anti-scalant port that comes with a plugged threaded fitting on the inlet line of the system.

4.2 Overview

The unit has two modes of operation: a standby mode and an operating mode. In the standby mode, the unit is effectively turned off. All outputs are off, and the display shows STANDBY. In the operating mode, the unit operates automatically. All inputs are monitored, and the outputs are controlled accordingly. Pressing the POWER key will toggle the unit from standby to operate or from operate to standby. If power is removed from the unit, when power is reapplied, the unit will restart in the mode it was in when power was removed.

To start the system:

1. Press the POWER key.
   - DELAY [##] is displayed during the RO start delay. The number is the seconds remaining before the RO pump starts. The default value is 10 seconds.

- When the RO unit is operating, OPERATING is displayed.
- The product water quality (TDS in µS) is displayed next to the unit status on the top line of the display.
- The current operating hours and current water temperature are displayed on the bottom line.

2. The unit operates automatically.

Once the system has been started, it will continue to make water until the Tank Full High-level float switch inside the storage tank closes. At this point, the system will be placed into standby (TANK FULL is displayed) and a two-minute flush cycle occurs. When the Tank Full Low-level float switch opens, the system will re-initialize and begin to produce water again.

In the event that the system conductivity is above the setpoint, a high conductivity alarm will trigger and the ALARM light will be steady red.

If the water pressure to the pump is below 10 psi, the inlet pressure switch opens. A pressure fault alarm is triggered, the pump is turned off, and the ALARM light will be steady red.

4.3 System Monitoring

Fill out the monitoring log periodically (daily recommended). 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 water system and may void the warranty. A sample log is shown below.

PERFORMANCE	Parameters	Results	Date	Initials
Incoming Temperature	75 to 80 °F			
Pre-filter Inlet Pressure	> 30PSI			
Pre-filter Outlet Pressure	> 30PSI			
**Pre-filter Delta Pressure (Subtract Inlet by Outlet)	≤ 15PSI			
Reject Pressure	>50psi			
Pump Pressure Gauge	100 – 230 psi			
Product Flowrate (GPM)	**See** Table 1			
Reject Flowrate (GPM)	**See** Table 1			
Recirculation Flowrate (GPM)	**See** Table 1			
Product Conductivity	< 50 uS			
Feed Conductivity				
*Percent Rejection	> 90%			
Amount of Hours in Operation	Record			
Hardness	Record			

Chlorine	Record			
EXCHANGE	**Frequency**	**Date**		**Initials**
10-micron carbon or 1-micron sediment	Quarterly or >15psi dp			
Membranes	As needed			

*The RO system can operate below percent rejection parameter due to post deionization treatment.

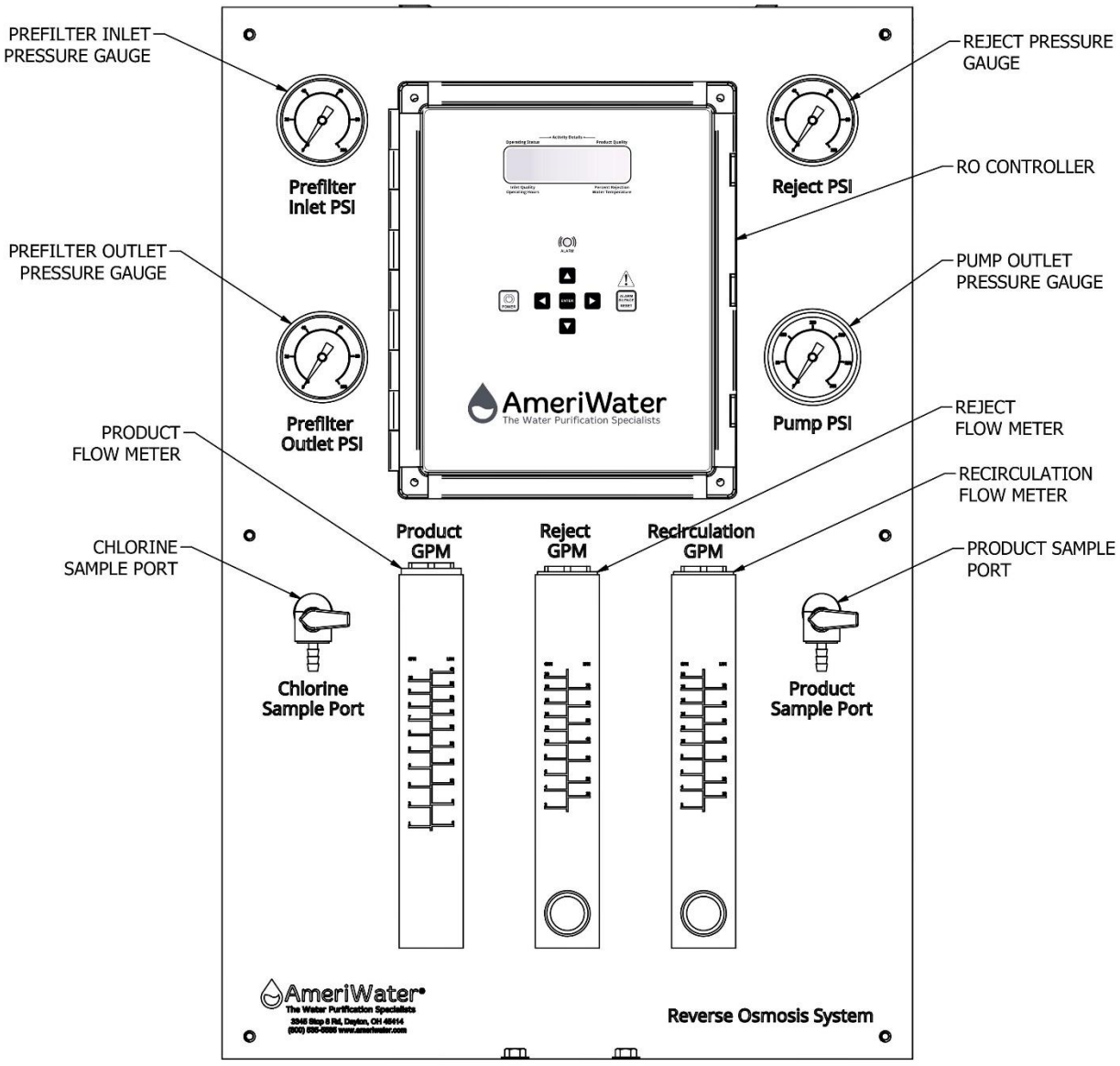
Table 1: Flow Rates by Model of AWRO

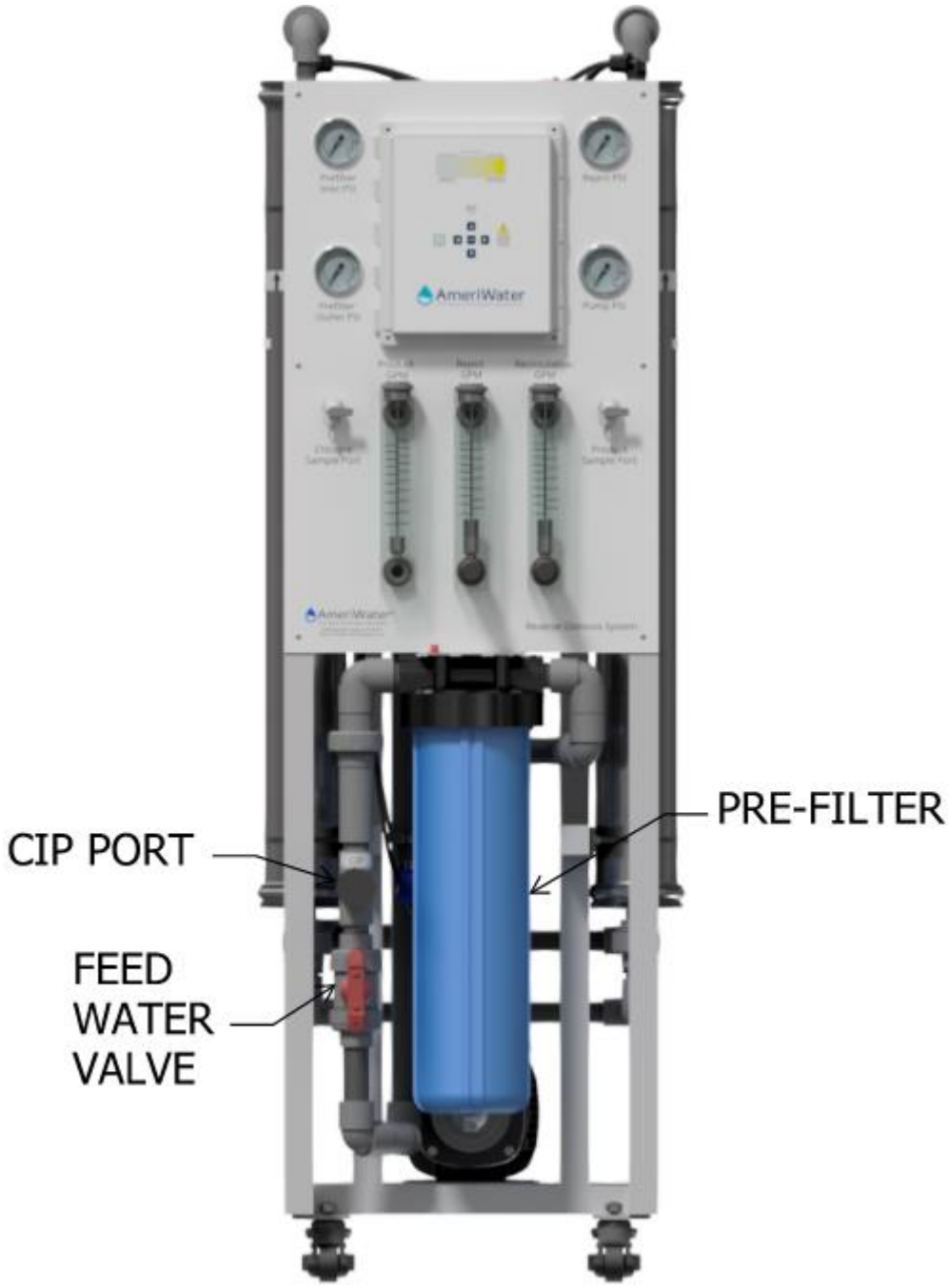
Assembly Number	RO OPERATION	Approximate*	Parameters*
AWRO1200	Product Flowrate (GPM)	0.83	0.75-0.90
	Reject Flowrate (GPM)	0.83	100% of Product
	Recirculation Flowrate (GPM)	0.28	33% of Product
AWRO2400	Product Flowrate (GPM)	1.67	1.50-1.80
	Reject Flowrate (GPM)	1.67	100% of Product
	Recirculation Flowrate (GPM)	0.55	33% of Product
AWRO4800	Product Flowrate (GPM)	3.33	3.00-5.50
	Reject Flowrate (GPM)	3.33	100% of Product
	Recirculation Flowrate (GPM)	1.10	33% of Product
AWRO7200	Product Flowrate (GPM)	5	4.50-7.00
	Reject Flowrate (GPM)	5	100% of Product
	Recirculation Flowrate (GPM)	1.65	33% of Product
AWRO9600	Product Flowrate (GPM)	6.67	6.50-9.50
	Reject Flowrate (GPM)	6.67	100% of Product
	Recirculation Flowrate (GPM)	2.20	33% of Product
AWRO12000	Product Flowrate (GPM)	8.33	8.00-10.00
	Reject Flowrate (GPM)	8.33	100% of Product
	Recirculation Flowrate (GPM)	2.75	33% of Product
AWRO14400	Product Flowrate (GPM)	10	8.75 – 11.00
	Reject Flowrate (GPM)	10	100% of Product
	Recirculation Flowrate (GPM)	3.3	33% of Product
AWRO16800	Product Flowrate (GPM)	11.67	11.00-12.00
	Reject Flowrate (GPM)	11.67	100% of Product
	Recirculation Flowrate (GPM)	3.85	33% of Product
AWRO19200	Product Flowrate (GPM)	13.33	13.00-15.00
	Reject Flowrate (GPM)	13.33	100% of Product
	Recirculation Flowrate (GPM)	4.4	33% of Product

*Note: Flow rates are based on 77°F ± 5°F

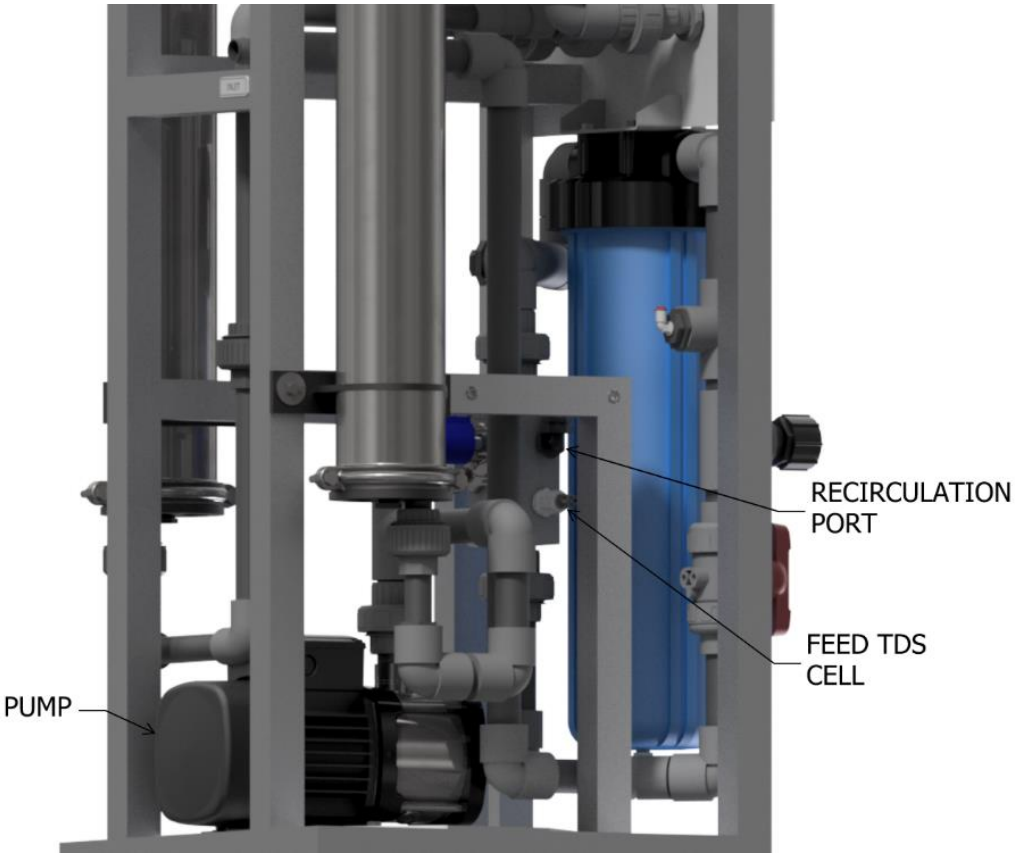
5 COMPONENT IDENTIFICATION AND SCHEMATICS

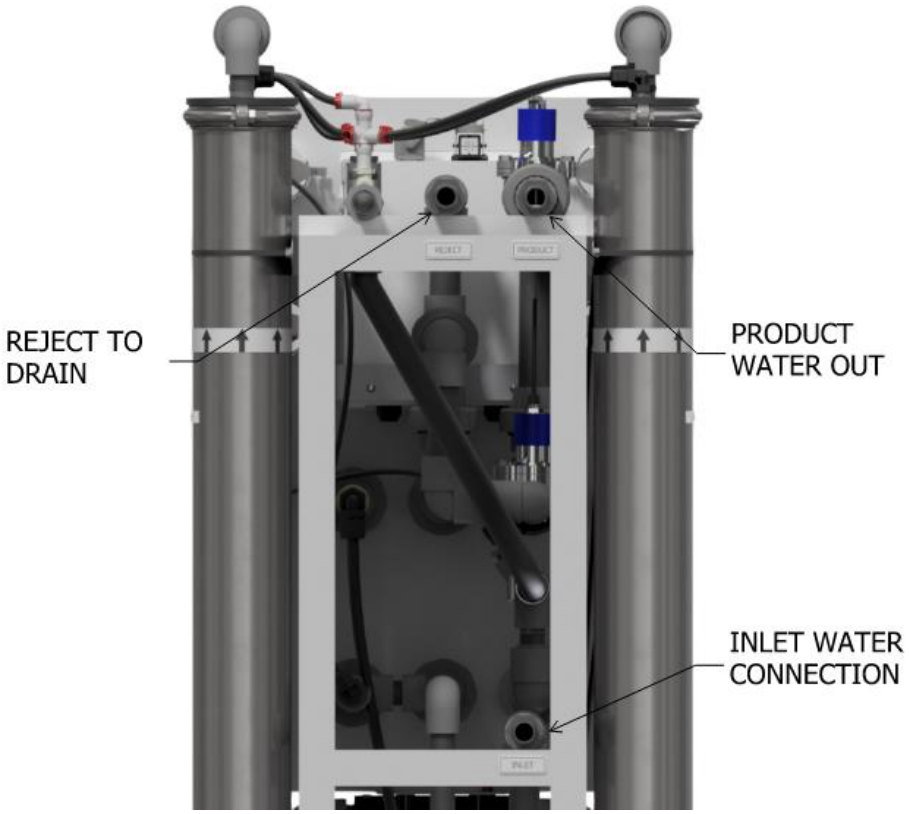
5.1 System Components




CIP PORT
PRE-FILTER
FEED
WATER
VALVE


PRODUCT
VALVE
PRODUCT
TDS CELL
DIVERT TO
DRAIN VALVE

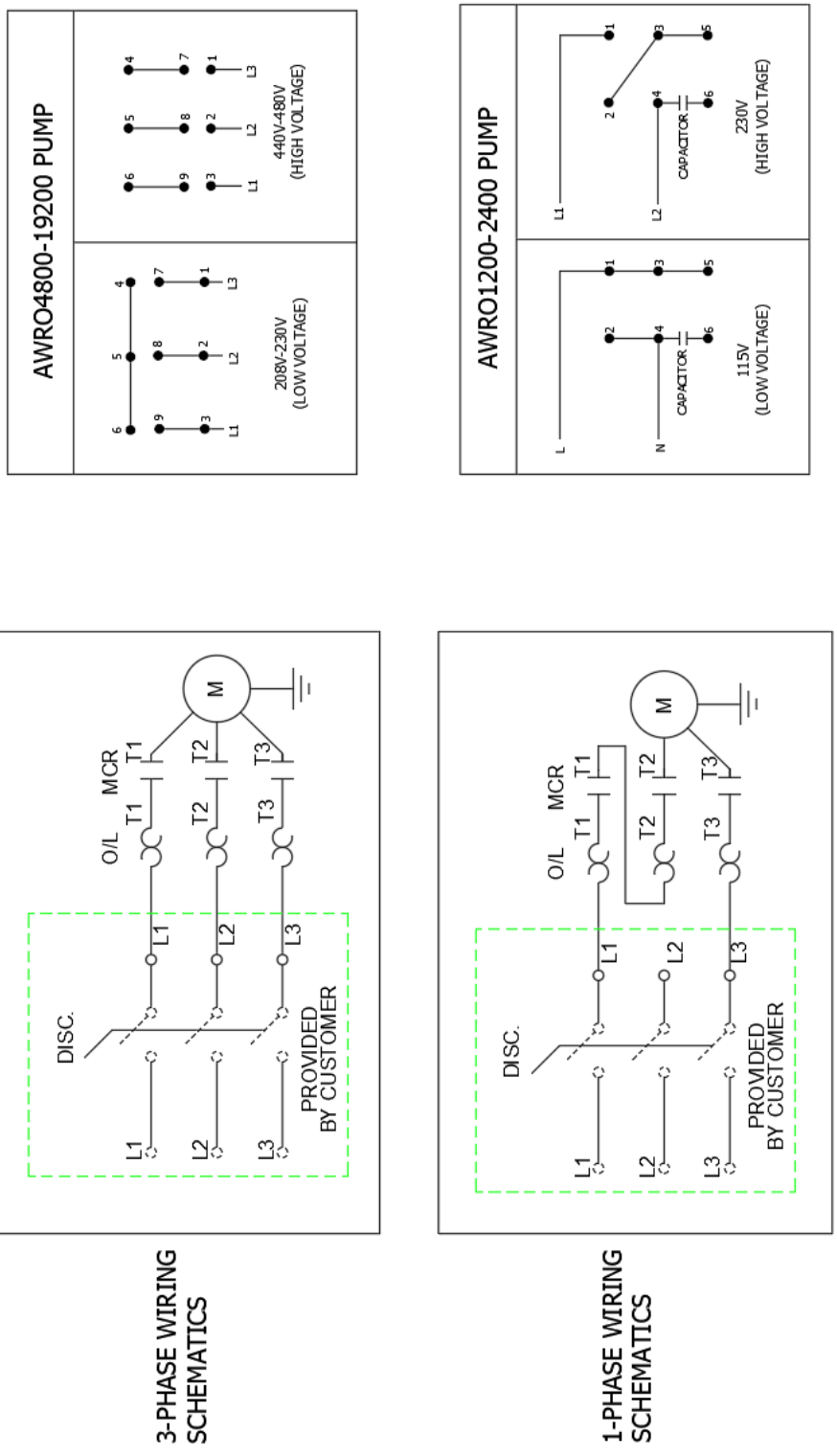

PUMP
RECIRCULATION
PORT
FEED TDS
CELL



NOTE: See section 12 for spare parts list.

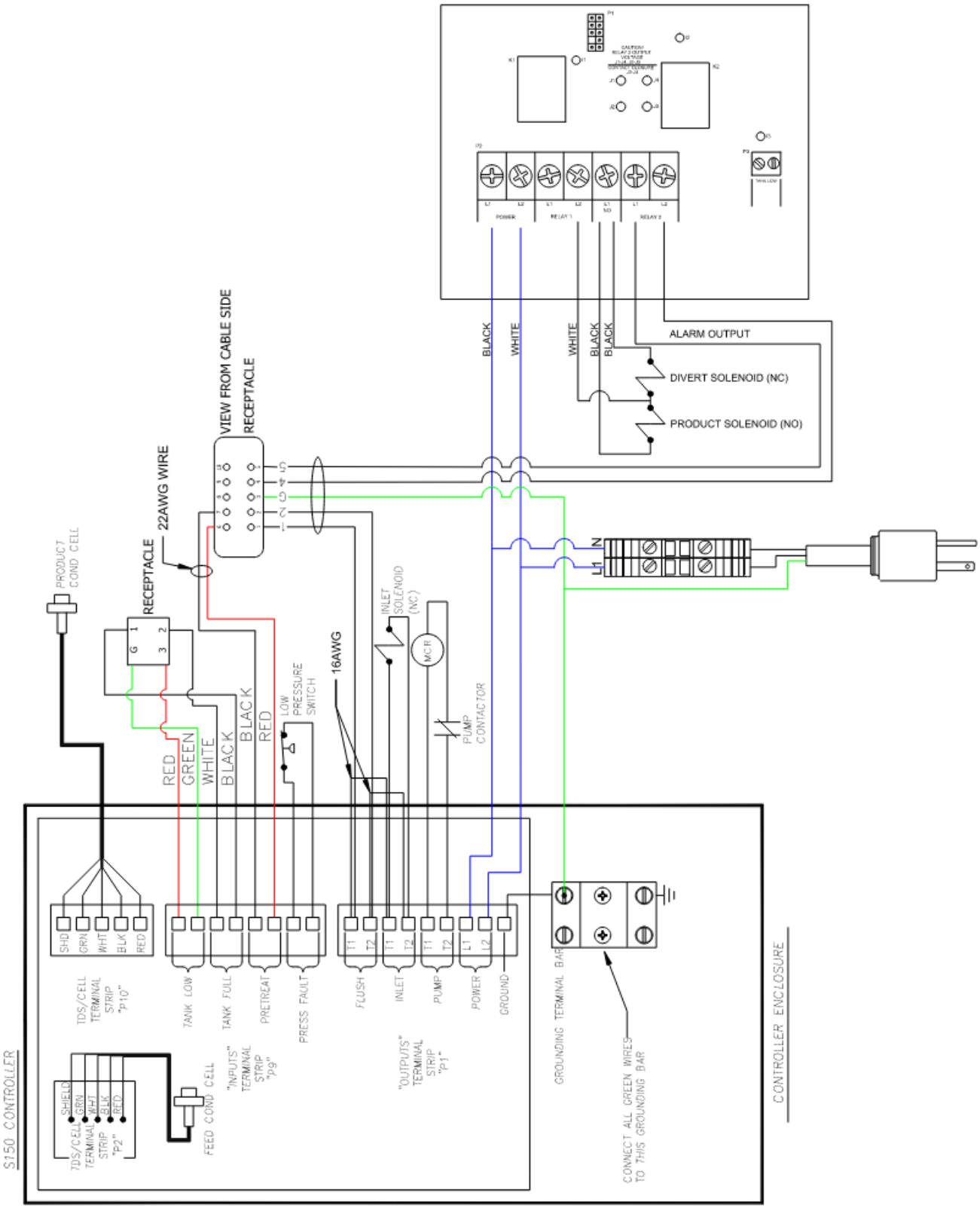
5.2 Electrical Schematic

Pump Wiring Schematics

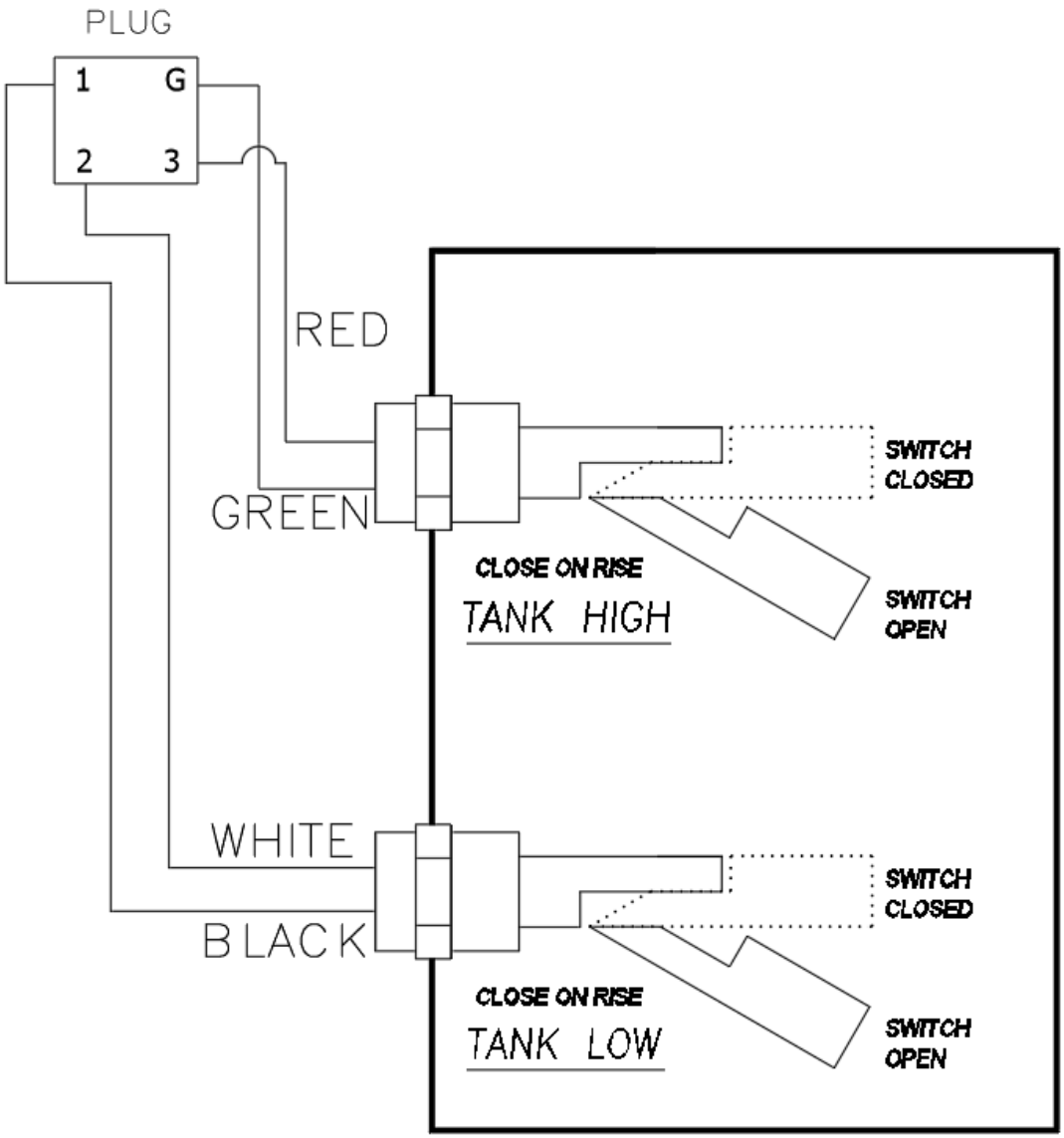


Note: Factory default wiring is 230VAC for AWRO1200-2400 and 208-230VAC for AWRO4800-19200.

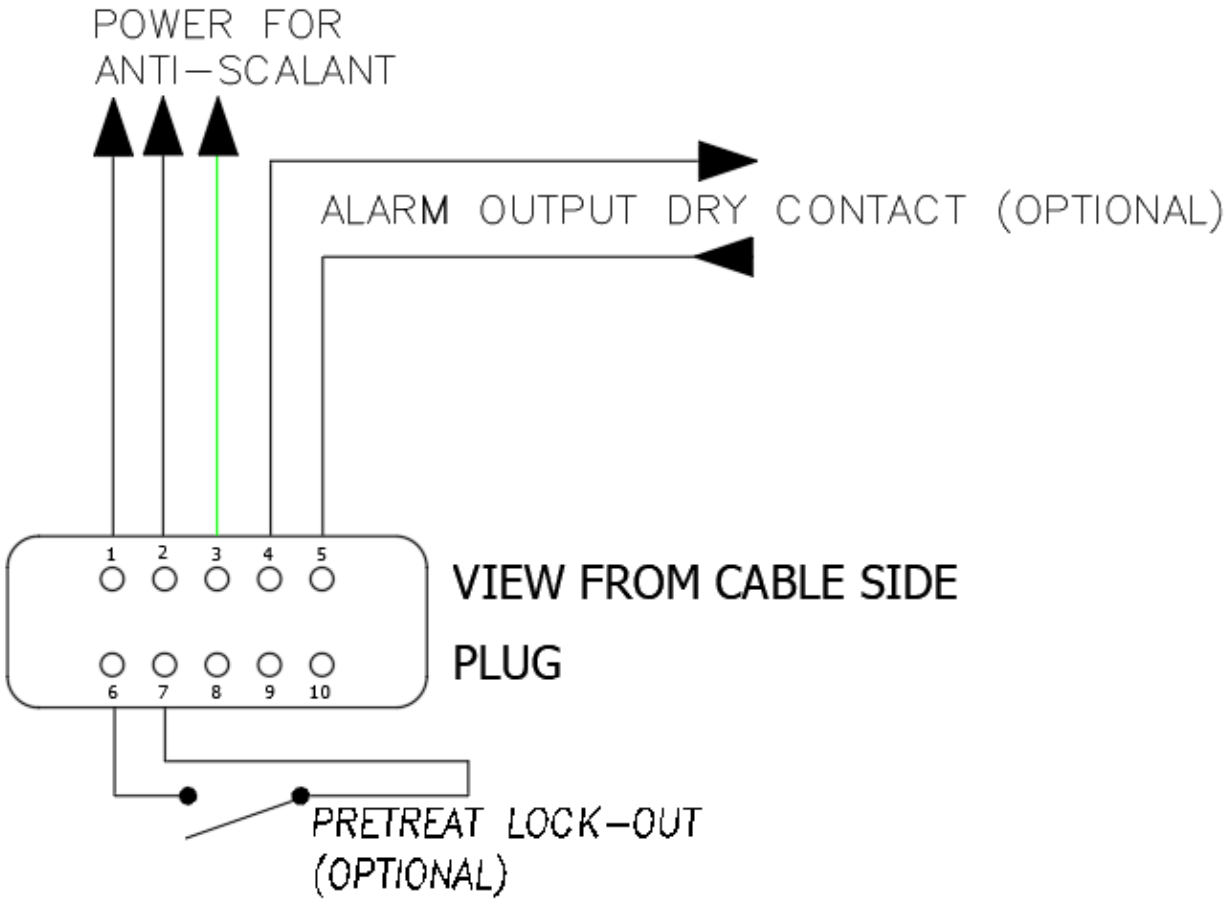
Controller Wiring Schematics



Storage Tank 4-Pin Plug Schematic

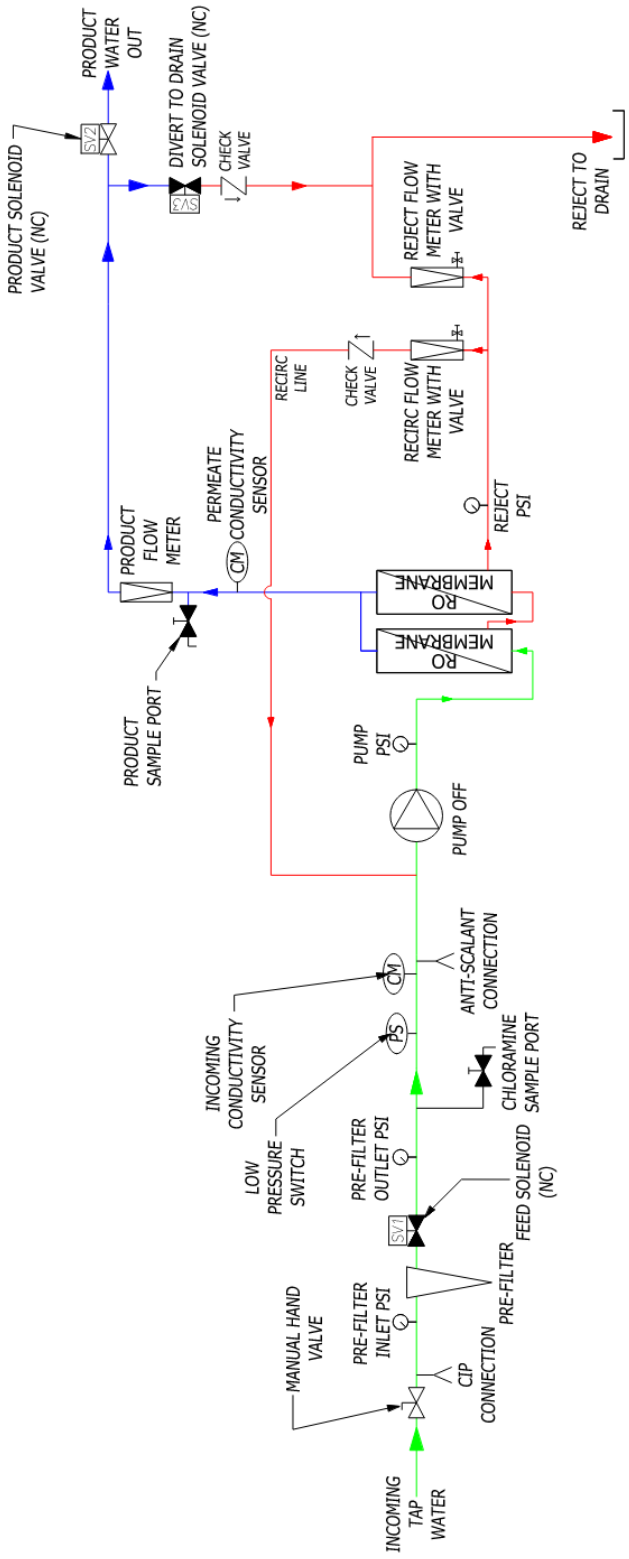


RO Alarm, Pretreatment Lockout, and Anti-Scalant 10-Pin Plug Schematic

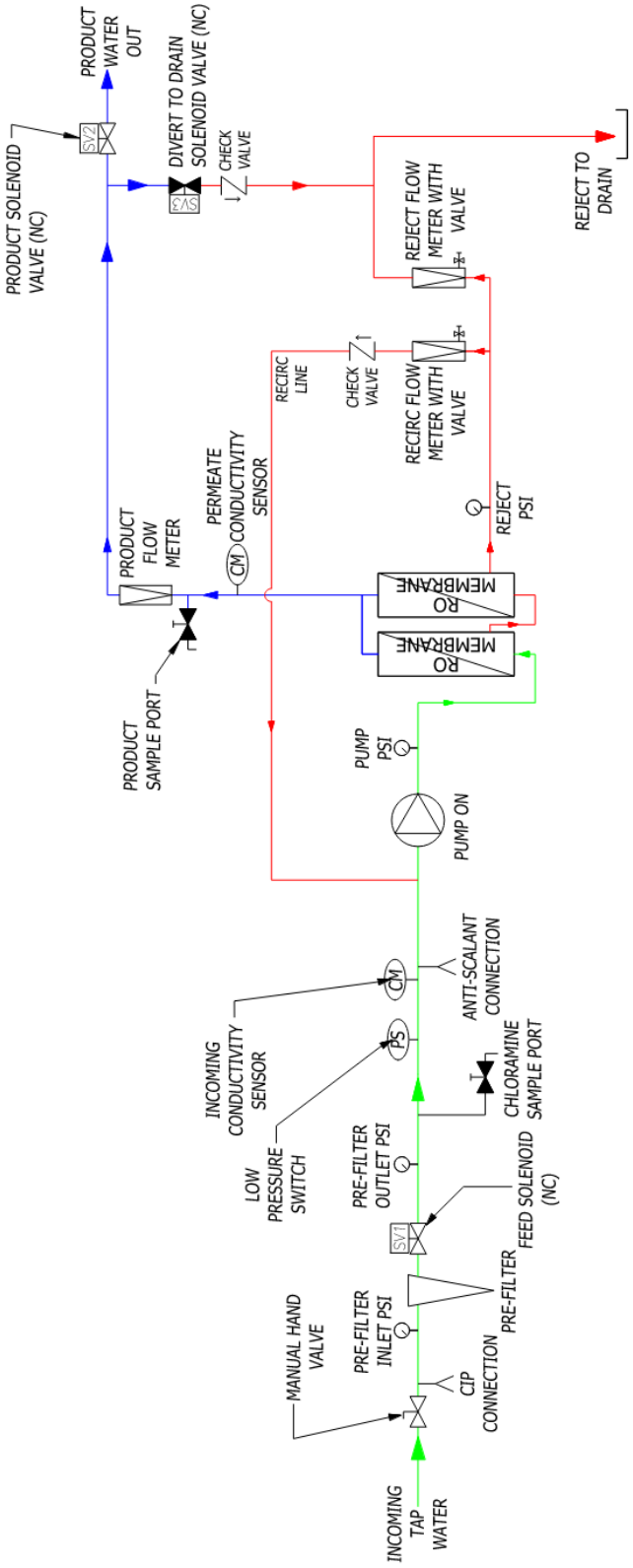


5.3 Flow Schematic

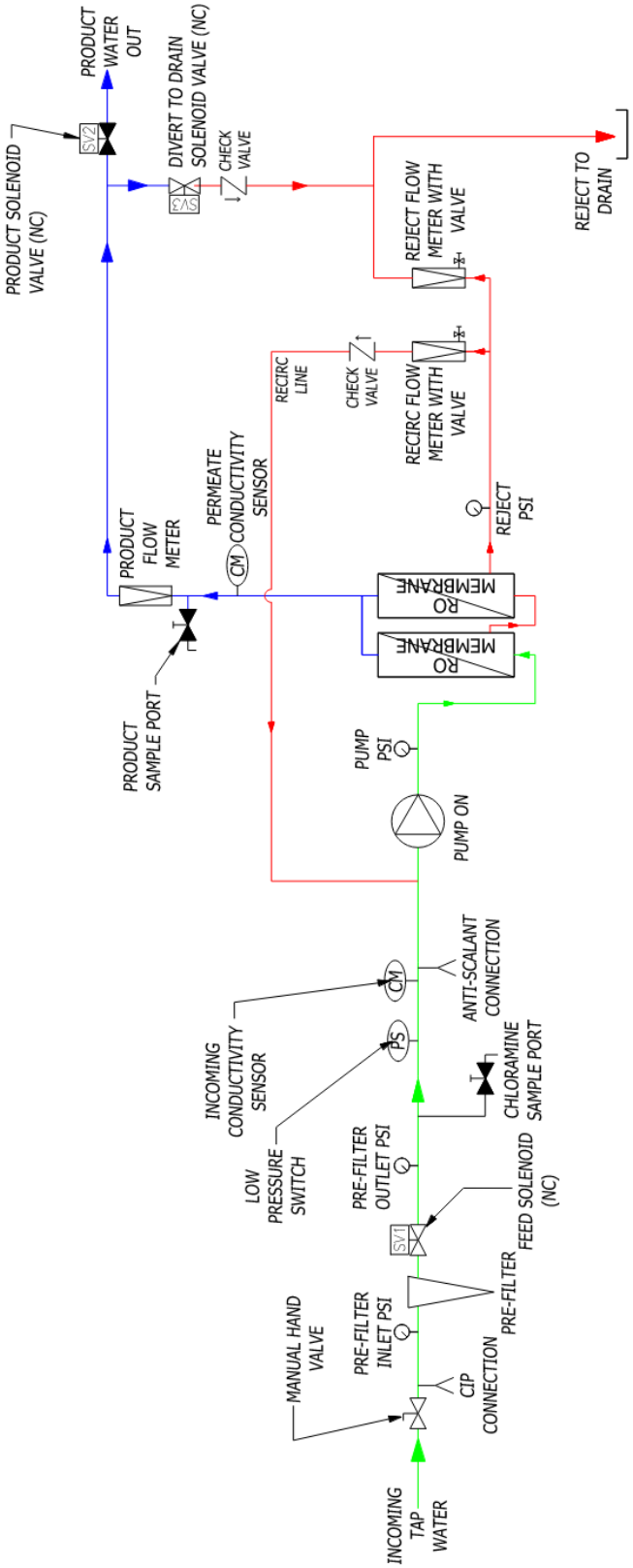
Standby / Tank Full / Alarm / Pretreat



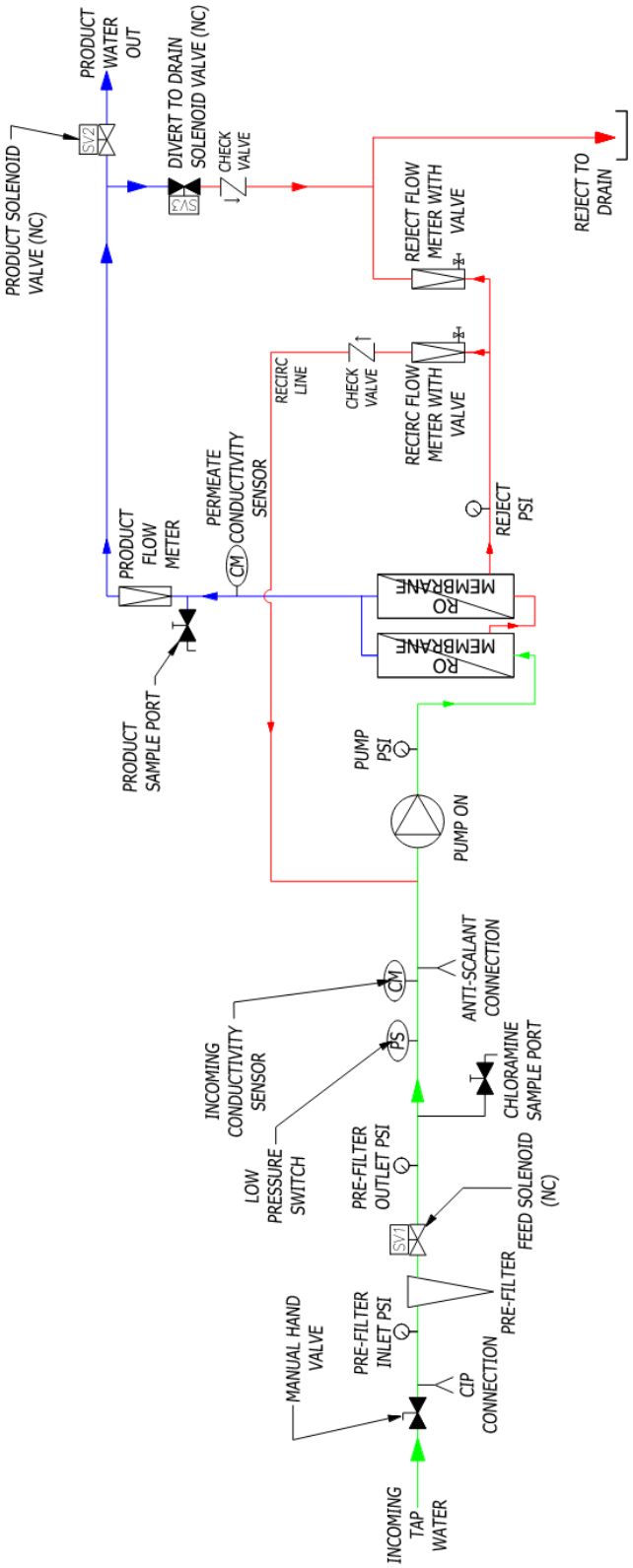
Normal Operation



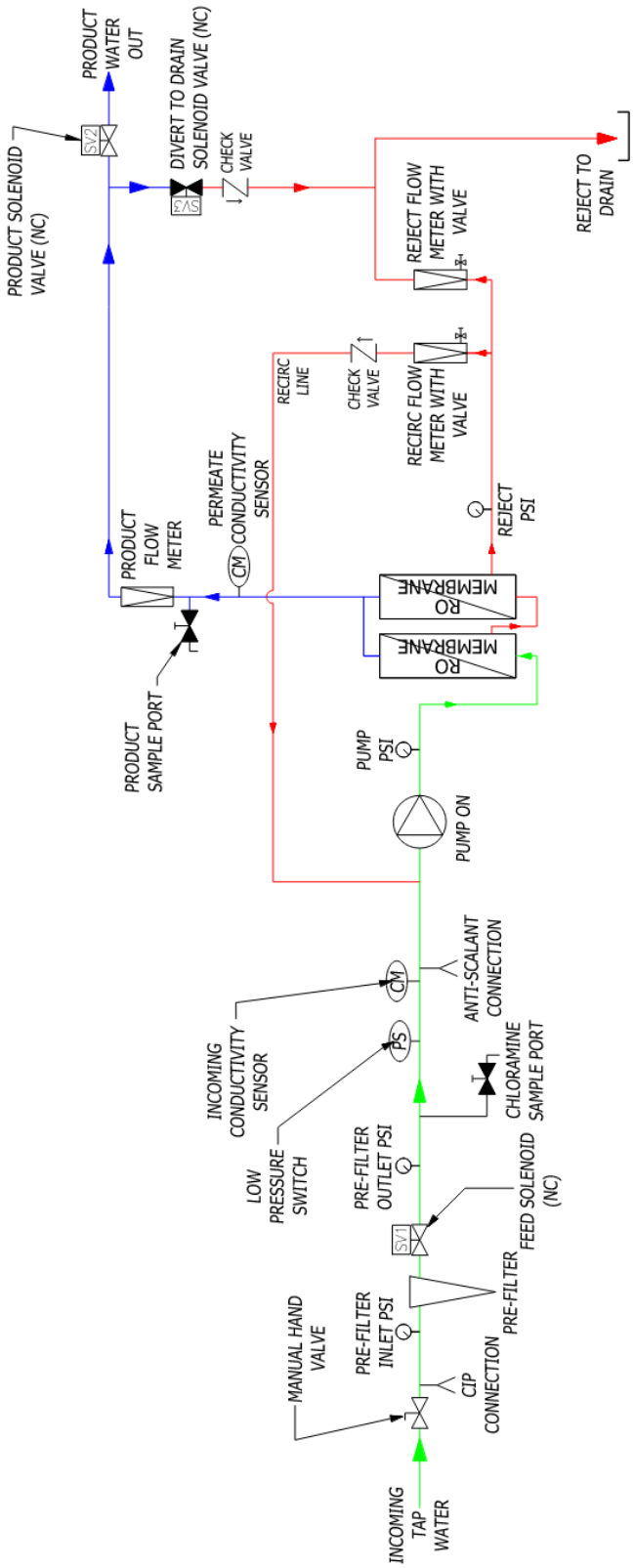
Membrane Flush / Tank Full Override



Disinfect Mode (Using CIP Method)



PAA Disinfect Using Blue Housing



6 SYSTEM INSTALLATION

Your RO water 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 your system as soon as it is received by you. Please notify your representative if you have any questions, or if any problems are encountered.

6.1 Locating the RO

1. The RO should be within 8 feet of any pre-treatment systems installed.
2. Install the pre-filter cartridge and secure the blue housing to the RO processor.
3. The RO should be within 6 feet of a drain for reject flow

6.2 Plumbing Connections

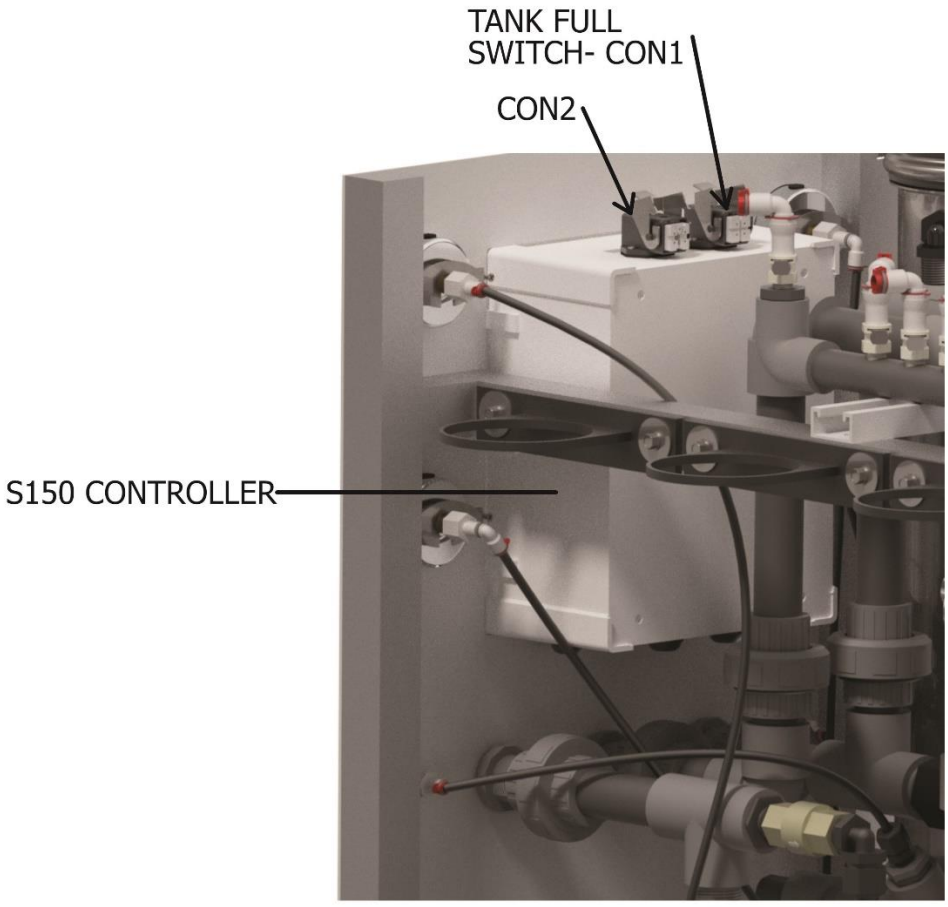
1. Connect the feed water hose from the tempered water outlet of the blend valve to the pretreat on the RO bypass manifold.
2. Connect the product water hose from the outlet of the RO (located on the upper rear side) to the RO bypass manifold.
3. Connect the equipment supply hose to the storage tank outlet.
4. Connect the reject water hose to the reject port and run the hose to the drain, maintaining a 2 inch air gap.
5. An anti-scalant plugged port is present on the front of the unit after the blue housing prefilter. Remove the plug and replace with threaded injector fitting included in the anti-scalant product. See anti-scalant product manual for operation of this unit.

6.3 Electrical Connections

See section 3.2 for supply specifications.

WARNING: To avoid electrical shock, always unplug and disconnect the RO water system power sources before opening the face of the electrical controller.

1. Connect the cable from the Tank Full High and Tank Full Low switches to CON1 on the back of the controller on the RO.



2. Plug the line cord from the RO controller into a grounded outlet.
3. Connect the flying lead of the SJO cable to power which comes terminated to the pump motor starter and overload:
    - For 3 phase pumps you will have a 12/4 SJO cable. These pumps are pre-wired for 230VAC but can be re-configured to 460VAC.
        i. Three-phase wires to L1 (red), L2 (black), and L3 (white).
        ii. Green wire to ground.
    - For 1 phase pumps you will have a 14/3 SJO cable. These pumps are pre-wired for 230VAC but can be re-configured to 115VAC.
        i. Three-phase wires to L1 (red) and L2 (black).
        ii. Green wire to ground.
        iii. To convert the pump to 115VAC,1PH,60Hz you will need to re-wire the internal pump wiring.

WARNING: SHOCK HAZARD: Unplug the power cord before reconfiguring the pump. Line voltage (115, 208-230 or 440-480 VAC) is present on the motor wiring.

6.4 RECONFIGURING PUMP VOLTAGE

WARNING: SHOCK HAZARD: Unplug the power cord before reconfiguring the pump. Line voltage (115, 208-230 or 440-480 VAC) is present on the motor wiring.

1. Unscrew the four screws located on the pump junction box. This is where the wires enter the pump.
2. Follow the wiring diagram on the back of the pump cover or reference the pump wiring schematics in section 5.2 for next steps.
3. Use the existing wire nuts to terminate the wires to the application configuration found in step 2. Note: Additional wires nuts may be required.
4. Do a pull test on each individual wire to it's respective wire nut to ensure that the wires will not come loose.
5. Neatly tuck the wires with the pump junction box and re-apply the cover. Ensure that the cover does not crush any wires during re-application. Tighten each screw so that the cover makes a water tight seal.
6. Adjust the overload, located in the controller, to the approraite dial setting according to the table below.

	Setting (amp)								
Voltage	**AWRO 1200**	**AWRO 2400**	**AWRO 4800**	**AWRO 7200**	**AWRO 9600**	**AWRO 12000**	**AWRO 14400**	**AWRO 16800**	**AWRO 19200**
115	9	9	-	-	-	-	-	-	-
230*	9	9	-	-	-	-	-	-	-
208-230*	-	-	4.2	4.2	4.2	9	9	11.2	11.2
440-480	-	-	4	4	4	9	9	9	9

*Default voltage

7. For 115V only, you can attach a NEMA 5-15 or NEMA 5-20 plug and utilize the same circuit as the RO controller plug. **Note: This will require the controller and pump to be on a dedicated 120V, 20amp circuit breaker.**

7 SYSTEM START-UP PROCEDURES

FLUSHING THE PRE-FILTERS

1. Disconnect pre-filter outlet to solenoid manifold via the provided union.
2. Run a hose from pre-filter outlet to drain using now available union.
3. Turn on water to the pre-filter.
4. Flush the pre-filter for 1 minute or until the water is very clear.
5. Reconnect pre-filter outlet to solenoid manifold via the provided union.

STARTING THE RO SYSTEM

CAUTION: Do not start the delivery pump until it has been filled with liquid. Follow the steps below to purge air from the system before using it to protect the pump.

NOTE: After filling the delivery pump, check the pump rotation.

1. Open the REJECT FLOWMETER valve at least three (3) full turns counter-clockwise.
2. Turn ON the hot and cold water supplies.
3. Check that the pre-filter inlet gauge is 30 to 80 psi.
4. Make sure that the three-phase power supply is OFF. This ensures the delivery pump does not run during the air purge process.
5. Plug the 120V RO controller power cord into the receptacle.
6. Disconnect the product water hose from the product manifold and run hose to drain.
7. Press the POWER button on the controller if to start the flow of water to the drain.
8. Adjust the blend valve to 77°F (25°C).
9. Observe flowmeters and product / reject hoses for air pockets or bubbles indicating the air purge is in process. When these are removed fully the purge is complete.
10. Plug the pump into its power source and press the POWER button to turn the system back on.
11. Allow the RO system to run the product water to drain for 2 hours to remove preservative (the WATER QUALITY light will be red).
12. Press the POWER button to turn OFF the system.
13. Connect the product water to the Silex or DI tanks.
14. Press the POWER button to turn ON the system.

Adjust the REJECT FLOW and RECIRC FLOW meter to achieve the approximate product flow (at 50% recovery), refer to

15. Table 1: Flow Rates by Model of AWRO in section 4.3.

NOTE: The REJECT flow meter setting is calculated by dividing the equipment capacity in gallons per day by 1,440 minutes. For example, the setting for the AWRO 14400 is 14400/1440 which equals 10 gpm. The PRODUCT FLOW and REJECT FLOW meters should be equal. RECIRC flow meter should be set to 1/3 the PRODUCT flow meter.

NOTE: If the pump rotation is backwards (check for low pump pressure), reverse any two (2) power leads to the motor to correct the rotation.

16. Allow the storage tank to fill until the float device turns OFF the RO water system (displays TANK FULL). If system does not operate when tank is low, check that float device is installed correctly.

17. Drain the storage tank until the level drops below the level switch (opening the switch). Ensure the unit starts up again and produces water.

18. Verify the product water quality at your intended point of use.

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

19. Refer to the Monitoring Log (see Section 4.3). Complete the log, making sure that the system is operating within all the required ranges.

7.1 System Shutdown

1. To place the unit in standby, press the POWER key. OFF is displayed.

2. To remove all power from the unit, unplug the power cord from the receptacle.

8 DISINFECTION

AmeriWater recommends that all AWRO 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.

8.1 Disinfection Procedure

The two chemical disinfection methods available on the AWRO are adding chemicals via a Clean-in-Place (CIP) device or via the RO pre-filter housing.

8.1.1 CIP Disinfection – Recommended disinfection method

1. Before work, review Peracidin SDS and conform to all safety requirements including PPE when handling this chemical and operating this disinfection process.
2. Close the feed water shutoff valve.
3. Remove pre-filter cartridge from the housing and reinstall the empty housing.
4. Connect the sanitization equipment to the CIP inlet connection on RO.
5. Disconnect the PRODUCT and REJECT hoses from their current end connections.
6. Connect the PRODUCT and REJECT hoses to the end connections on the Sanitation or CIP Equipment.
7. Sanitize the RO per the sanitization protocol referred to in the CIP manual, 98-0008. Confirm minumum 1% dilution at product sample port (500 ppm).
8. Disconnect the sanitization equipment when finished.
9. Reinstall the pre-filter cartridge.
10. Reconnect the PRODUCT and REJECT hoses to their previous positions.

8.1.2 RO Pre-filter Disinfection – Secondary Disinfection method

1. Before work, review Peracidin SDS and conform to all safety requirements including PPE when handling this chemical and operating this disinfection process.
2. Set unit to ‘DISINFECT MODE’ by quickly holding the left arrow then, at the same time, hold the right arrow key and simultaneously release both buttons, the screen will say “DISINFECT ENABLED”. Additionally, flip the CIP switch located on the back of the controller. The alarm light will illuminate.
3. Close the feed water shutoff valve and open the sample port under the RO pre-filter housing to reduce pressure in the housing.

4. Remove pre-filter cartridge from the housing. Place cartridge in a sanitary location. Close the sample port under the RO pre-filter housing.
5. Disconnect the PRODUCT hose from the point of use and put to drain. Ensure REJECT hose is also to drain if not already, and that both hoses are oriented to reduce splashing or spray.
6. Add PAA specified by the model per the table below to the filter housing and mix with RO water. Lightly agitate for 10 seconds then reinstall the housing.
7. Reopen the feed water shutoff valve and ensure pressure at prefilter inlet is at least 20 PSI. Failure to have sufficient pump inlet pressure can result in unit damage.
8. Hold the Enter button on the front of the controller for the duration listed on the table below. After the duration, check that the dilution from the Product Sample Port is at least 1% (500 ppm).
9. Allow the unit to dwell with PAA in the system for 60 minutes, then run the unit in supply with hoses run to drain to rinse for 60 minutes. After rinse, confirm that the Product Hose water is measuring 0 ppm with Peracidin test strips.
10. Bleed pressure from pre-filter housing and remove from system. Thoroughly rinse the housing and dipose fluid to drain. Replace pre-filter cartridge and reinstall.
11. Reconnect the PRODUCT hose to its previous position. Return the unit to standard operation by flipping the disinfect switch on the rear of the controller.

Model	PAA amount	Time to Run Disinfectant
AWRO1200	200ml / 1.5 Gallon RO Water	30 seconds
AWRO2400	200ml / 1.5 Gallon RO Water	30 seconds
AWRO4800	200ml / 1.5 Gallon RO Water	30 seconds
AWRO7200	200ml / 1.5 Gallon RO Water	30 seconds
AWRO9600	200ml / 1.5 Gallon RO Water	30 seconds
AWRO12000	500ml / 1.5 Gallon RO Water	30 seconds
AWRO14400	500ml / 1.5 Gallon RO Water	30 seconds
AWRO16800	500ml / 1.5 Gallon RO Water	30 seconds
AWRO19200	500ml / 1.5 Gallon RO Water	30 seconds

8.2 A Word about Hydrogen Peroxide/Peroxyacetic Acid

Do not use hydrogen peroxide/peroxyacetic acid concentrate (PAA) after the expiration date. Using outdated PAA may cause incomplete disinfection. PAA loses effectiveness if not kept out of direct sunlight and/or the cap is not tightly sealed. Using ineffective disinfecting solution will cause incomplete disinfection. Using less than the required volume of PAA concentrate will result in incomplete disinfection.

Disposal of Outdated Hydrogen Peroxide/Peroxyacetic Acid:

1. Put on rubber gloves, apron, and goggles.

CAUTION: Exposure to PAA concentrate or solution may cause severe chemical burns to skin or eyes.

2. Start a flow of cold tap water to dilute the PAA as it flows down the sink drain.
3. Slowly and carefully pour the disinfecting solution down the drain, taking care to avoid spills, splashes, or breathing the vapors.

CAUTION: Splashing PAA concentrate may cause severe chemical burns.

4. Rinse the emptied PAA container with tap water to remove all traces of the chemical. **Rinsing emptied containers is needed to protect waste handlers from accidental exposure to the chemical.**
5. Rinse the drain with tap water to remove residual disinfecting solution from the surfaces and flush the chemical from the drains.
6. Discard the emptied and rinsed container in a waste receptacle or set aside for recycling.
7. Inspect the area for spilled or dripped disinfecting solution. Wipe up small spills with a damp paper towel. Larger spills should be either flushed to drain with water or removed with a water bucket and floor mop.

WARNING: Verify that there is no chlorine (bleach) in the water bucket or floor mop. Chlorine (bleach) will cause a severe chemical reaction when it encounters PAA concentrate!

8. Rinse rubber gloves with tap water to remove any residues due to handling.
9. Return rubber gloves, apron, and goggle to their storage area

8.3 MEMBRANE FLUSH FEATURE (Auto Flush)

The AWRO is connected to a storage tank only having 1-2 days of non-use when dialysis procedures are not being carried out. The MEMBRANE FLUSH FEATURE is the preferred means for minimizing bacterial growth during periods when the RO is not being used. The AWRO can be set up to discourage microbiological growth by “flushing” periodically.

The Membrane Flush feature is disabled as a default from the factory for AWRO models. Refer to the descriptions and default set-points in Section **Error! Reference source not found.**. If these default s ettings do not meet your particular need, then they can be changed. See Section9.4 on how to change from the default settings.

FLUSH MODE	RO PUMP	INLET VALVE	DIVERT VALVE
3 (FOR STORAGE TANK APPLICATIONS)	ON	OPEN	ENABLED
4 (FOR DIRECT FEED APPLICATIONS)	ON	OPEN	DISABLED

FLUSH MODE #3 assumes that the **AWRO is connected to a storage tank** and, therefore, will divert the PRODUCT WATER to the drain. This minimizes bacterial growth and directs all the water to

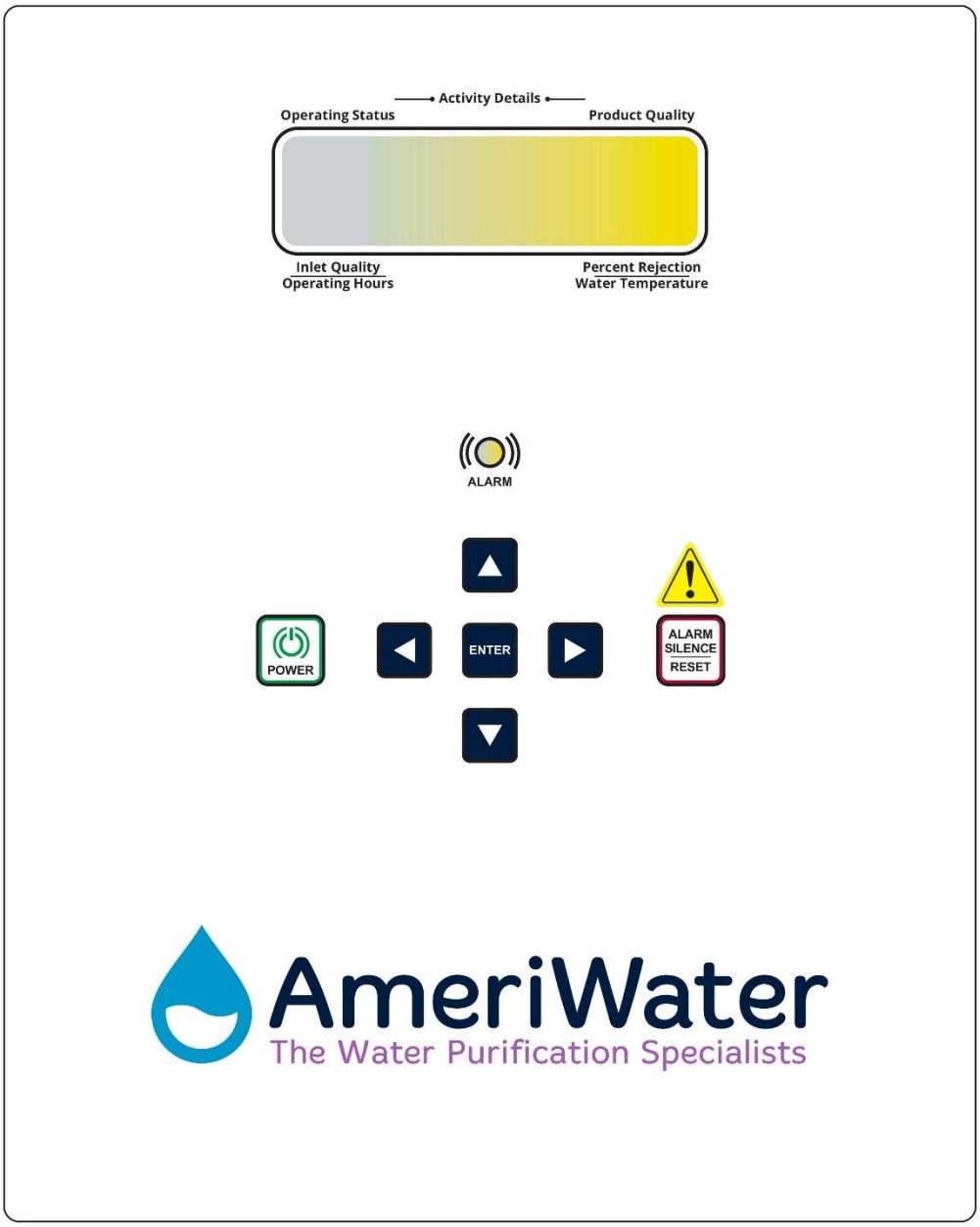
the drain, rather than refill the storage tank. **FLUSH MODE #3** will cause all the water to be diverted to drain for each MEMBRANE AUTO FLUSH cycle.

On the other hand, when an **AWRO is connected to a Direct Feed Loop**, the PRODUCT water should be directed into the loop during the MEMBRANE AUTO FLUSH cycle to keep the water in the loop “fresh”. Setting the **FLUSH MODE for #4** will disable the DIVERT TO DRAIN feature, and the PRODUCT WATER will be circulated through the loop during each MEMBRANE AUTO FLUSH cycle. The MEMBRANE AUTO FLUSH will operate while the AWRO is in the STANDBY mode, while connected to the loop even though no water is being used.

The AWRO must be connected to the electric power source, incoming water supply, and drain at all times for this feature to be operable.

9 CONTROLLER

9.1 RO Front Panel Controls and Indicators



Control or Indicator	Function
DISPLAY	Shows status of system.
ALARM LAMP	Flashes when fault causes an RO system shut down. On steady when a setpoint is exceeded that does not cause an RO system shut down.
POWER KEY	Places controller in operating or standby mode.

LEFT ARROW KEY	Scrolls through setpoints starting with the first setpoint in Section 9.4.
RIGHT ARROW KEY	Scrolls through setpoints starting with the last setpoint in Section 9.4.
UP ARROW KEY	Increases value of setpoint.
DOWN ARROW KEY	Decreases value of setpoint.
ENTER KEY	Confirms entry of new setpoint value.
ALARM SILENCE / RESET KEY	Push once for alarm silence and twice to reset system after a shutdown has occurred.
ACCESSING DISINFECT MODE	Push and hold the left arrow key, and then push the right arrow key.
NOTE: The J2 jumper must already be installed to make this an active mode (Refer to figure in Section9.5).	
DISINFECT DRAW	Push the ENTER key and hold until all of the solution is drawn into the RO.

NOTE: Setpoints can only be changed when WRITE PROTECT is OFF. See section 9.5 for instructions on changing setpoints.

The operating status of the unit is shown on the top line of the display. The following list describes the items shown for the operating status.

Status Message	Indication
STATUS	The unit is in standby mode.
DELAY [##]	The unit is in the RO start delay. The number is the seconds remaining before the RO pump starts.
OPERATING	The RO unit is operating.
TANK FULL	The unit is shut down due to a tank full condition.
TANK FULL [##]	The unit is shut down due to a tank full condition. • If the number is blinking, the tank full high switch has cleared, but the tank full low switch is still active. • If the number is on steady, both tank level switches have cleared and the delay is counting down.
PRESS FAULT	The unit is shut down due to pressure fault condition.
HIGH CONDUCTIVITY	The unit will divert water to drain until water reaches acceptable quality.
MEMB FLUSH [##]	Membrane flush is active. The number is the minutes remaining in the flush cycle.

OPERATING HOURS

The current operating hours are shown on the bottom line.

TEMPERATURE

The current water temperature is shown on the bottom line after the operating hours. When the unit is offline because of a shutdown condition, the reading is replaced with '---'.

WARNING MESSAGES

Warning messages are also shown on the second line. If any warnings are active, the active warnings will alternate with the normal displays for the bottom line. The following lists the warning messages.

ALARM LAMP

The ALARM lamp flashes when a fault causes an RO system shutdown. The lamp is ON steady when a setpoint is exceeded that does not cause an RO system shutdown.

To silence an alarm, press ALARM SILENCE/RESET once. To reset the system after a shutdown, press ALARM SILENCE/RESET twice.

ALARM LOG

Pressing the Alarm Silence and Power keys (hold for 1 second) at the same time allows access to an Alarm Log. Pushing the up arrow key allows the user to cycle through the five most recent alarms. Pressing the Enter Key will clear this log. This log is not time stamped and cannot be exported.

9.2 Controller Operation

TANK FULL OPERATION

The RO can be operated with 1 or 2 level switches. With 1 level switch, the switch is connected to the tank full high input. When this switch has been active for 5 seconds, the unit will shut down on tank full. TANK FULL will show on the display. When the tank full condition clears, the display will show TANK FULL ##. The number is the tank full restart time and the unit will restart when this delay times out.

For 2 level switch operation, the upper switch is connected to the tank full high input and the lower switch is connected to the tank full low input. When both switches are "open", the RO unit will start. The RO unit will continue to run when the water level rises, and while the lower switch becomes active (closed). When the upper switch becomes active (closes), after the 5 second delay, the RO unit will shut down. TANK FULL will show on the display. When the tank level drops and the upper-level switch clears, the display will show TANK FULL ## and the RO unit will remain off. The number is the tank full restart time, and the number will blink until the lower-level switch clears (opens). When the lower-level switch clears (opens), the number will remain steady, and the RO will restart when the delay times out.

NOTE: The Direct Feed setting must be set to "0" for the RO to run off the float switches.

TANK FULL RESTART

The tank full restart is the delay before the RO unit starts when a tank full condition clears. This delay can be in minutes or in seconds. The **TF Restart** setpoint selects seconds or minutes.

PRESSURE FAULT

If the pressure fault input becomes active and stays active for the delay programmed in the **Press Fault Delay** setpoint, the unit will shut down for a pressure fault. The display shows PRESS FAULT, the ALARM lamp flashes and the audible alarm sounds. The pressure fault can be cleared by pressing the ALARM SILENCE/RESET key twice.

Inlet pressure switch is set to 10PSI at factory.

AUTO RESET

If a pressure fault shut down occurs and the Auto Reset set-point is programmed to 0, the unit will remain shut down until manually reset. If the Auto Reset set-point is programmed to a value greater than 0, the unit will automatically clear the pressure fault and attempt to restart after this delay times out.

TANK FULL OVERRIDE

A timed tank full override can be initiated when the RO unit is shut down due to a tank full condition. Pressing the Alarm Silence/Reset key for 3 seconds during a tank full condition will enable the tank full override. The RO will start and TF OVERRIDE # will show on the display. The number is the minutes remaining in the override timer. When the override times out, the unit will return to the tank full shut down condition. The TANK FULL OVERRIDE will divert all water to the drain, whether the water quality is good or bad coming into the RO.

PRETREAT

If the pretreat input becomes active (closes) and stays active for 2 seconds, the unit will shut down in a pretreat lockout condition. PRETREAT will show on the display and the unit will remain shut down as long as the pretreat input is active.

ALARM OUTPUT

The Expansion I/O relay 2 has been programmed to operate as an alarm relay. The relay will energize whenever a warning or alarm condition occurs. The relay will remain energized as long as the warning/alarm condition is active.

MEMBRANE FLUSH

The membrane flush function is configured by the **Flush Type**, **Flush Time**, **Flush Interval**, and **Flush Mode** setpoints.

HIGH TDS/CONDUCTIVITY WARNING/ALARM

If the TDS/conductivity reading exceeds the limit programmed, the **TDS/COND Limit** setpoint for the delay programmed in the **TDS/COND Delay** setpoint, the ALARM lamp lights and the HI TDS/Cond warning message is displayed. The warning clears when the TDS/conductivity drops below the setpoint.

9.3 Controller ALARMS

Warning Message	Description
TANK FULL	The unit is shut down due to a tank full condition.

PRESS FAULT	The unit is shut down for a pressure fault. To clear the pressure fault, press the ALARM SILENCE / RESET key twice.
HI TDS/COND	The TDS/Conductivity reading has exceeded the programmed limit.
TANK LOW	The tank low input is active.

9.4 Standard Setpoints

SET-POINT	DESCRIPTION	RANGE	FACTORY SETTING
TDS/COND Limit	When this value is met or exceeded, the alarm lamp will light and high TDS/Cond will show on the display. To disable, set to 0.	0-999 µS or PPM*	50µS
TDS/COND Delay	When the limit set-point is exceeded, no alarm will be given until this time has expired.	0-999 seconds	10
RO Start Delay	The amount of time between the inlet valve opening and the RO pump start.	0-99 seconds	10
Press Fault Delay	The time a pressure fault must be active before a pressure fault shut down occurs.	0-99 seconds	10
Auto Reset	When a pressure fault shut down is active, the system will attempt to restart after this delay. If set to 0, system must be manually reset.	0-99 minutes	0
Alarm Silence	If the audible alarm is silenced, after this delay, the alarm will resound. If set to 0, the alarm will remain silenced.	0-99 minutes	3
TF Restart Delay	When a tank full condition clears, the system will restart after this delay.	0-99 sec/min	5
TF Restart	Selects whether the tank full restart delay is in seconds or minutes. 0=seconds, 1=minutes.	0-1	0
TFO Time	The amount of time that a tank full override lasts.	0-99 minutes	3
Tank Lo Restart	Not Used.	N/A	0
Flush Type	Selects the type of flush. Set to 0 to disable or 6 to flush during off hours.	0-8	0
Flush Time	The length of time a membrane flush cycle will last when flush is active.	0-99 minutes	0
Flush Interval	The interval between flush cycles. Only valid with operation hour, elapsed time or off flush types.	0-99 hours	0

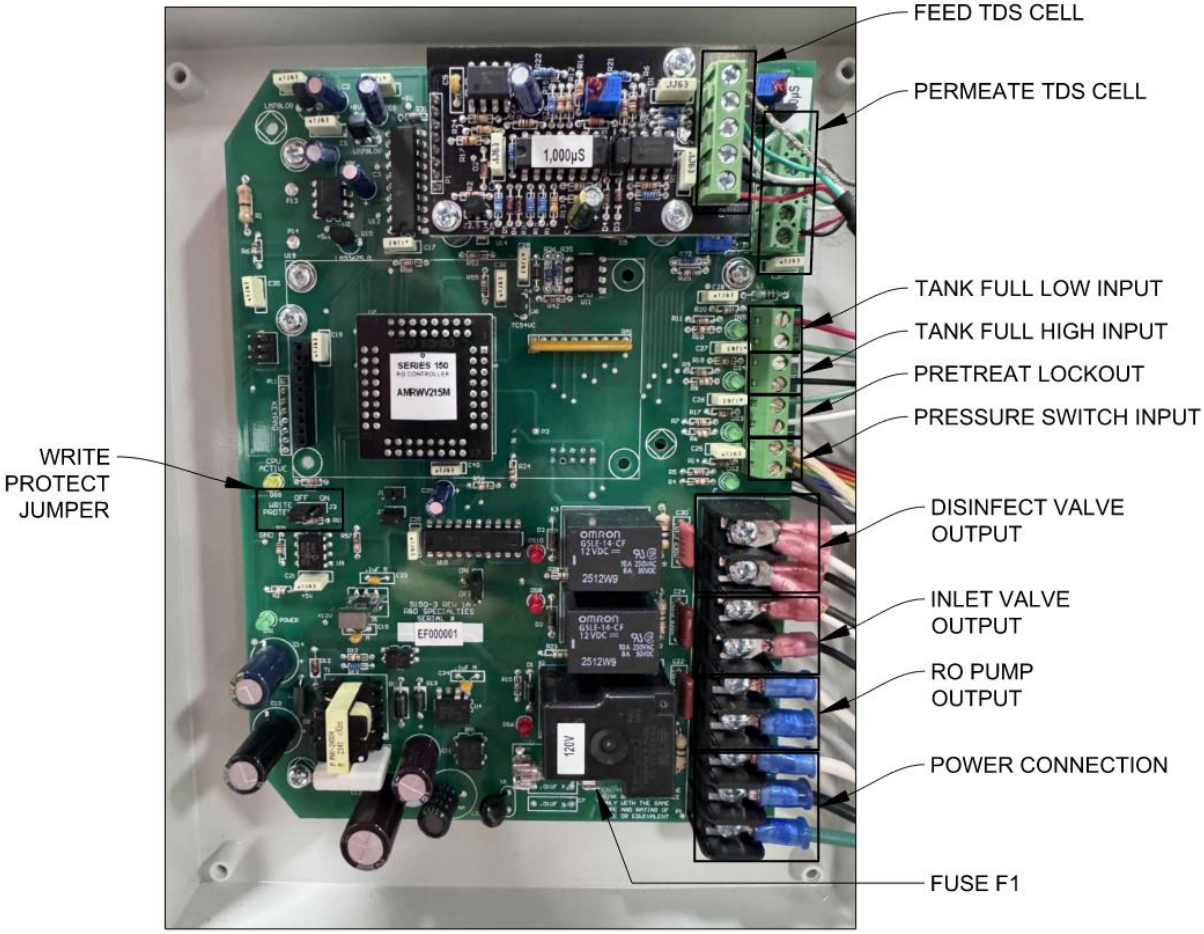
SET-POINT	DESCRIPTION	RANGE	FACTORY SETTING
Flush Mode	Selects if the inlet and RO pump relays operate during flush. Set to 0 to disable. See section 8.3	0-4	0
Maximum Hours	If the current operating hours exceed this limit, the operating hours warning will occur. Set to 0 to disable.	0-65000 hours	0
Current Hours	Current number of hours of RO system operation.	0-65000 hours	0
Temp Offset	Allows adjustment of temperature reading by ±5 degrees.	± 5	0
Temp UOM	Selects display of temperature in °F or °C. 0 = °F, 1= °C.	0-1	0
Switch Select	Selects if switch inputs are normally open or normally closed. Should always be set to 0.	0-31	0
TDS/COND UOM[1]	Selects display of water quality in µS or PPM.	0-1	0
TDS/COND Range[1]	Selects range of TDS/Conductivity monitor 0 = 50, 1 = 100, 2 = 250, 3 = 500, 4 = 1000, 5 = 2500, 6 = 5000.	0-6	1
C2 Range (Feed Water Conductivity)[1]	Selects range of TDS/Conductivity monitor 0 = 50, 1 = 100, 2 = 250, 3 = 500, 4 = 1000, 5 = 2500, 6 = 5000.	0-6	4
C2 Limit	When this value is met or exceeded, the alarm lamp will light and high TDS/Cond will show on the display. To disable, set to 0.	0-999 µS or PPM*	0
%Rej	The 2nd TDS/Conductivity is used to monitor feed water, programming this set-point to 1 allows the % rejection to be displayed.	0-1	1

[1] If this set-point is changed, the unit must be recalibrated. Some setting ranges may require a different resistor to be installed. Reference Section 9.6.

* µS = microsiemens; PPM = Parts Per Million

9.5 To Change Setpoints

To change a setpoint, the WRITE PROTECT jumper, J3, must be moved to the OFF position (center and left pins).



1. Use the left and right arrows to display the setpoints. Each press of an arrow key will advance the display to the next setpoint. The left arrow key starts with the beginning setpoint (**TDS/Cond Limit**) and the right arrow key starts with the last setpoint (**% REJ**).

2. The up and down arrow keys are used to increment or decrement the setpoint value. The value will change by 1 count each time a key is pressed. If the key is pressed and held for about 1 second, the setpoint value will change at a fast rate. When the key is released, the fast rate will be reset. Pressing both the up and down arrow keys together will reset the setpoint value to 0.

NOTE: Pressing the ALARM SILENCE/RESET key at any time will cancel the operation and return the display to the main screen. If the WRITE PROTECT jumper is ON, the unit will show WRITE PROTECTED on the display and one long beep will sound.

3. To accept the new setpoint value, press the ENTER key. The unit will beep twice if the change is accepted.

CAUTION: Incorrect settings may cause the system to malfunction. Setpoints should only be changed by personnel who understand the operation of the system. Write protecting the setpoints is recommended.

4. When finished changing setpoints, place the WRITE PROTECT jumper in the ON position (center and right pins).

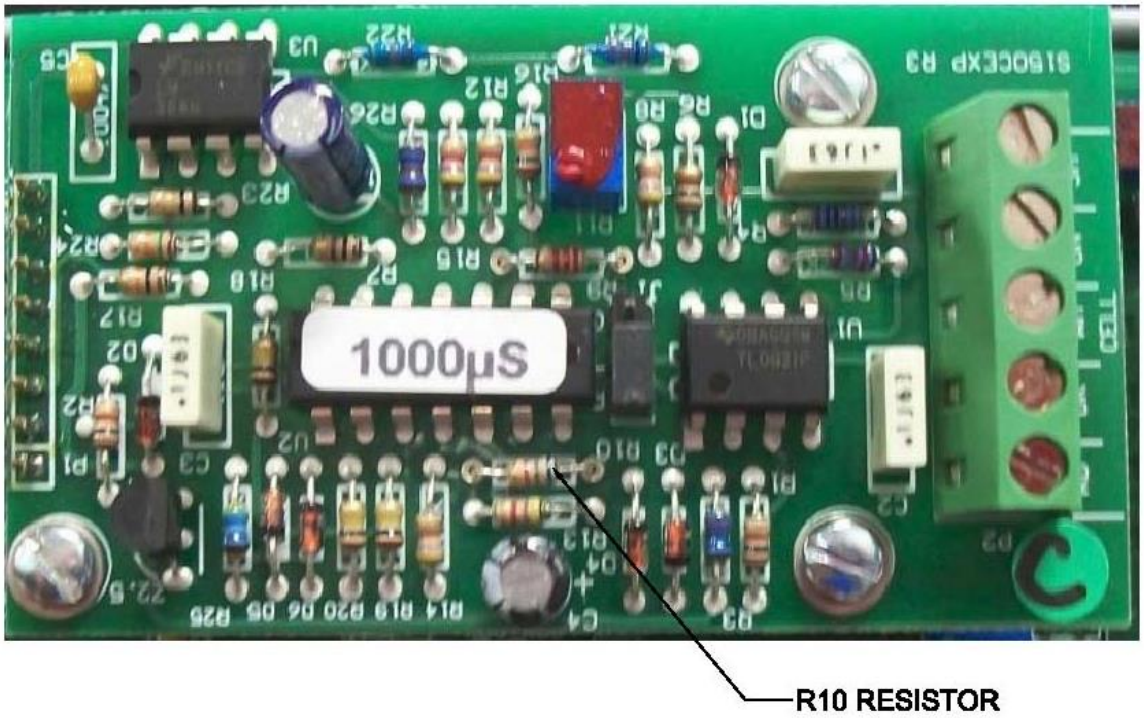
9.6 Changing resistors on the RO Control Board for C2 Range

If your incoming feed conductivity is above the Factory setting C2 range of 0-1000 micro-seimens, then you'll have to swap the resistors on the conductivity board.

1. Switch off the RO by pressing the POWER key (the display will show STANDBY).

2. Turn off all power to RO.

3. Open door on RO controller. The conductivity board you need to get to is on the back of the door.



4. The control system for the RO ships with resistor R10 (see above) that can be identified by its color bands (Red-Violet-Red-Gold). If your feed water conductivity exceeds 1,000 uS/cm, you may want to change out the resistor in the R10 position with a replacement resistor, provided by AmeriWater. This replacement resistor can be identified by its color bands (Blue-Grey-Red-Gold). Alternatively, if you have an ohm-meter, the original resistor can be identified by its resistance value of 2.7 kΩ; the replacement resistor's resistance value is 6.8 kΩ.

5. Remove the R10 resistor with needle nose pliers.

6. Move the replacement resistor to the R10 position.

7. Save the R10 resistor somewhere safe.

8. Close RO controller door.

9. Re-apply power to RO.

10. Go into set-points in the controller (Ref. Section **Error! Reference source not found.**).

11. Change the C2 Range set-point to meet your needs. C2 Range set-point 5 is 0-2500, 6 is 0-5000.

12. Once the set-point has been changed, then you need to calibrate the units by taking a sample of the permeate water and testing it with a calibrated conductivity meter.

9.7 Controller Adjustments

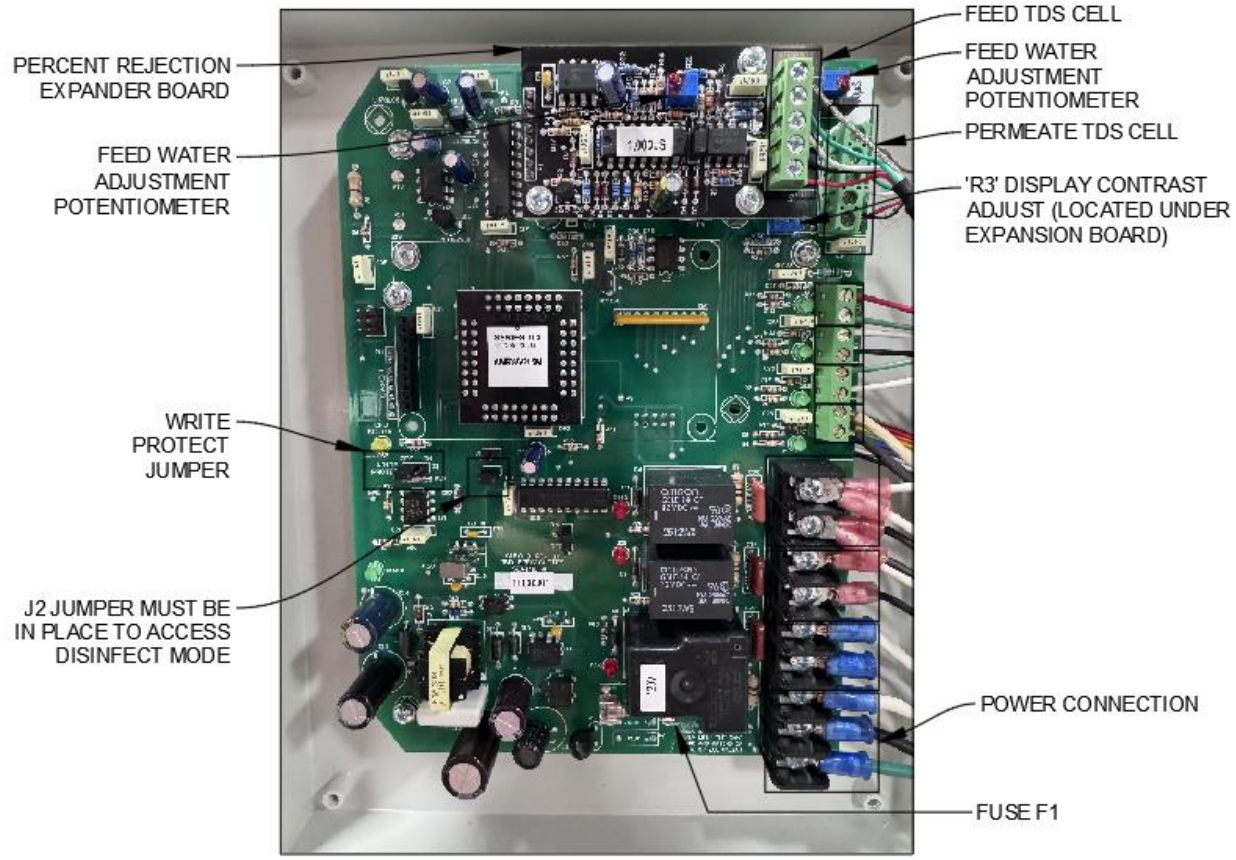
Your controller has been calibrated prior to shipment and the conductivity set-point has been preset based on an analysis of your water provided at the time of sale. It may be necessary to periodically calibrate the Conductivity. If the controller should require calibration, follow the instructions below. Please contact AmeriWater at 800/535-5585 or 937/461-8833 if you have any questions regarding the procedure.

CONDUCTIVITY CALIBRATION

The accuracy of both the feed and the product conductivity displays should be verified with a calibrated, hand-held meter. If the either the feed or the product conductivity display is not within 5% of the hand-held meter reading, the controller should be adjusted by turning the appropriate potentiometer screw (see figure on next page) until the conductivity value displayed matches the calibrated meter.

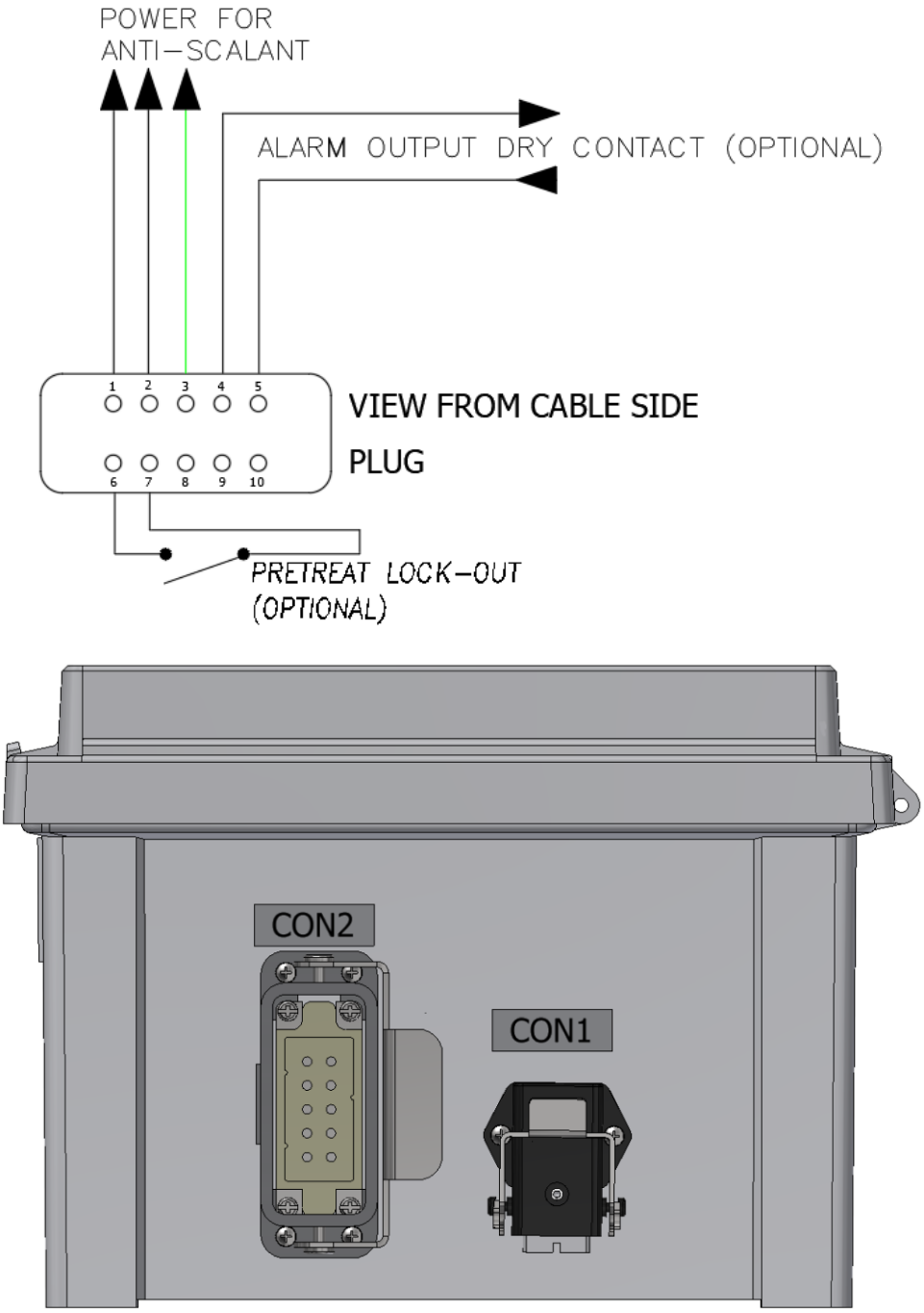
DISPLAY ADJUSTMENT

The display contrast can be adjusted for best viewing by adjusting control R3. This control is located toward the upper right corner of the board, just to the left of the cell connector. Turning the dial counterclockwise will increase the contrast and turning clockwise will decrease contrast.


FEED TDS CELL
FEED WATER ADJUSTMENT POTENTIOMETER
PERMEATE TDS CELL
'R3' DISPLAY CONTRAST ADJUST (LOCATED UNDER EXPANSION BOARD)
PERCENT REJECTION EXPANDER BOARD
FEED WATER ADJUSTMENT POTENTIOMETER
WRITE PROTECT JUMPER
J2 JUMPER MUST BE IN PLACE TO ACCESS DISINFECT MODE
POWER CONNECTION
FUSE F1

EXTERNAL WIRE INSTALLATION

The three external wire connections are: 1) alarm output, 2) pretreatment lockout, and 3) Anti-Scalant. The wires must be connected to the attached 10-pin connector plug. The pretreat lockout must be wired to terminals 6 and 7. The alarm output is a dry contact with ratings of 5A at 250VAC or 5A at 30VDC. The alarm output wires must be connected to terminals 4 and 5. The Anti-Scalant must be connected to terminal 1 (Positive/Black Wire), terminal 2 (Neutral/White Wire), and terminal 3 (Ground/Green Wire).



10 MAINTENANCE

10.1 Planned Routine Checks

It is recommended that regular checks are carried out on the device and its performance to ensure safe and uninterrupted operation. Refer to the table below for details.

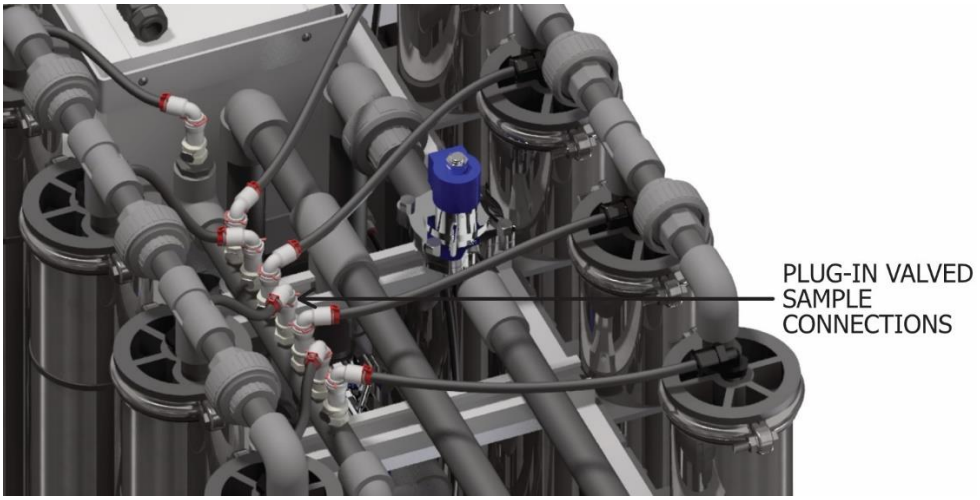
NOTE: The frequency of performing the checks indicated should be considered as a guide only and will depend on how often the device is used.

Frequency	Item	Notes
Daily	Start-up Log	It is recommended that each facility create a system log that is filled out daily to have a timeline of operating parameters.
Monthly or as needed	Pre-filter Cartridge (Sediment)	Change the pre-filter cartridges monthly or whenever the pre-filter gauge has a pressure drop greater than 15 psi from the original pressure indicated.
Quarterly or as needed	Pre-filter Cartridge (Carbon)	Change the pre-filter cartridges quarterly or whenever the pre-filter gauge has a pressure drop greater than 15 psi from the original pressure indicated, or if the filter sees chlorine breakthrough of over 0.1 ppm.
When required	Membrane	The membrane should be replaced when loss in flow rate productions or if product TDS has increased past the set point. Membranes should be cleaned before replacement until cleaning no longer returns membranes to stock performance.
Quarterly	TDS Display Accuracy*	Measure a sample of the product water with a calibrated TDS meter and compare with water quality display on the unit.

*Calibrate TDS sensors annually

10.1.1 Profiling Membranes

Each membrane has a fitting that can provide a sample of the permeate for that membrane. By taking a sample of the permeate and measuring it with a TDS meter, individual membranes can be checked for integrity.



10.1.2 Replacing a Pre-filter Cartridge

1. Turn OFF the RO water system.
2. Turn OFF the incoming tap water supply to the pre-filter.
3. Relieve the pressure from the pre-filters:
    a. Cycle the power OFF and ON twice. A PF alarm will occur. Ignore the alarm.
    b. Verify the pre-filter inlet pressure gauge reads zero.
4. Use the filter wrench to unscrew the filter housing and discard the used filter.
5. Rinse any debris from the filter housing.
6. Unwrap the plastic from the new filter and place the new filter in the housing. discard the plastic after installation. Be sure to install filter cartridges with new gaskets provided the the cartridges.

CAUTION: Make sure the O-ring is in groove and not pinched. Hand-tighten only.

7. Screw the pre-filter back on.

10.2 Maintenance and Repairs

NOTE: The RO must be disinfected whenever a component post membrane is repaired.

10.2.1 Membrane Replacement Procedure

1. Unplug the power cord from the AC outlet & disconnect 3 phase power.
2. Turn OFF the incoming tap water supply to the pre-filter.
3. Relieve the pressure from the pre-filters:
    a. Cycle the power OFF and ON twice. A PF alarm will occur. Ignore the alarm.
    b. Verify the pre-filter inlet pressure gauge reads zero.
4. Disconnect the unions that secure the plumbing to the ends of the membrane.
5. Remove the outer portion of the plastic clamp holding the membrane assembly.
6. Lift the membrane assembly from the frame.
7. Remove the steel retaining clamp on inlet side membrane cap (refer to the flow arrow) to slide old membrane out of the housing, then discard the old membrane.
8. Install the new membrane in the housing **with the brine seal at the inlet end of the housing**, replace the cap and refasten the steel retaining clamp. Note the direction of the flow arrows, the membrane is inserted from the non-seal end in the direction of the arrows.
9. Reconnect the unions at the bottom of the new membrane housing in the same way the system was initially connected. Secure the new membrane assembly into the frame and reconnect the remaining fittings at top of membrane housing.
10. After the exchange is complete, it is important to run the system to flush the preservative out of the new membrane(s).
11. Disconnect the product water hose. Place the hose over a drain. Disconnect the pump power supply.
12. Turn the power to the system ON. This will purge air from the membrane(s) without the pump running. Run until bubbles are no longer appearing in product and reject output. Turn system OFF, reconnect pump power supply, then turn system ON.
13. Allow water to run through the system for a minimum of 2 hours even if the water is clear. This will rinse the preservative out of the new membrane.

CAUTION: The membrane is not rinsed thoroughly if the water is not clear!

14. Allow the RO water system to run until the total dissolved solids (TDS) is below the setpoint. Turn the RO water system OFF.
15. Reconnect the PRODUCT WATER hose.
16. Turn the RO water system ON. The rinse out is now complete, and the system is ready for

use.

10.2.2 Replacing Pressure Switch

Inlet Pressure Switch (R65-0014)

NOTE: The inlet pressure switch is factory set to close at ~10 psi.

1. Turn off the system
2. Unplug the power cord from the AC outlet & disconnect 3 phase power.
3. Disconnect the cable from the switch.
4. Remove the switch from the piping.
5. Install the replacement switch.
6. Reconnect the cable to the pressure switch.

10.2.3 Replacing Valve

WARNING: SHOCK HAZARD: Unplug the power cord before replacing the valve. Line voltage (120 VAC) is present on the solenoid coil.

Replacing Inlet or Flush Valve

1. Turn off the system
2. Unplug the power cord from the AC outlet & disconnect 3 phase power.
3. Disconnect the cable from the solenoid valve.
4. Remove the valve from the piping.
5. Install the replacement valve.
6. Reconnect the cable to the solenoid valve.

10.2.4 Replacing Conductivity Cell

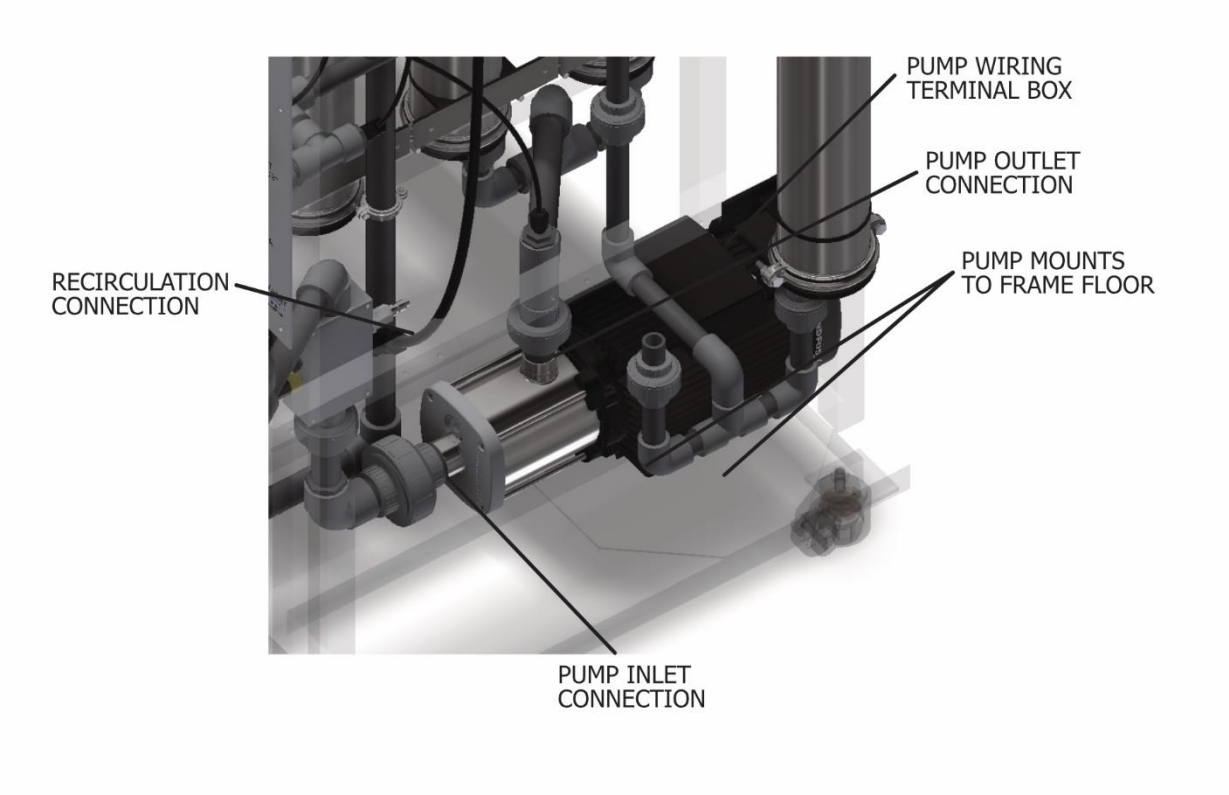
1. Turn off the system
2. Unplug the power cord from the AC outlet & disconnect 3 phase power.
3. Disconnect the cable from the TDS cell.
4. Remove the sensor from the piping.
5. Install the replacement sensor.

6. Reconnect the cable to the TDS cell.

10.2.5 Replacing Pump

WARNING: SHOCK HAZARD: Unplug the power cord before replacing the pump. Line voltage (208-230 or 440-480 VAC) is present on the motor wiring.

1. Disconnect the pump wiring from the motor starter.

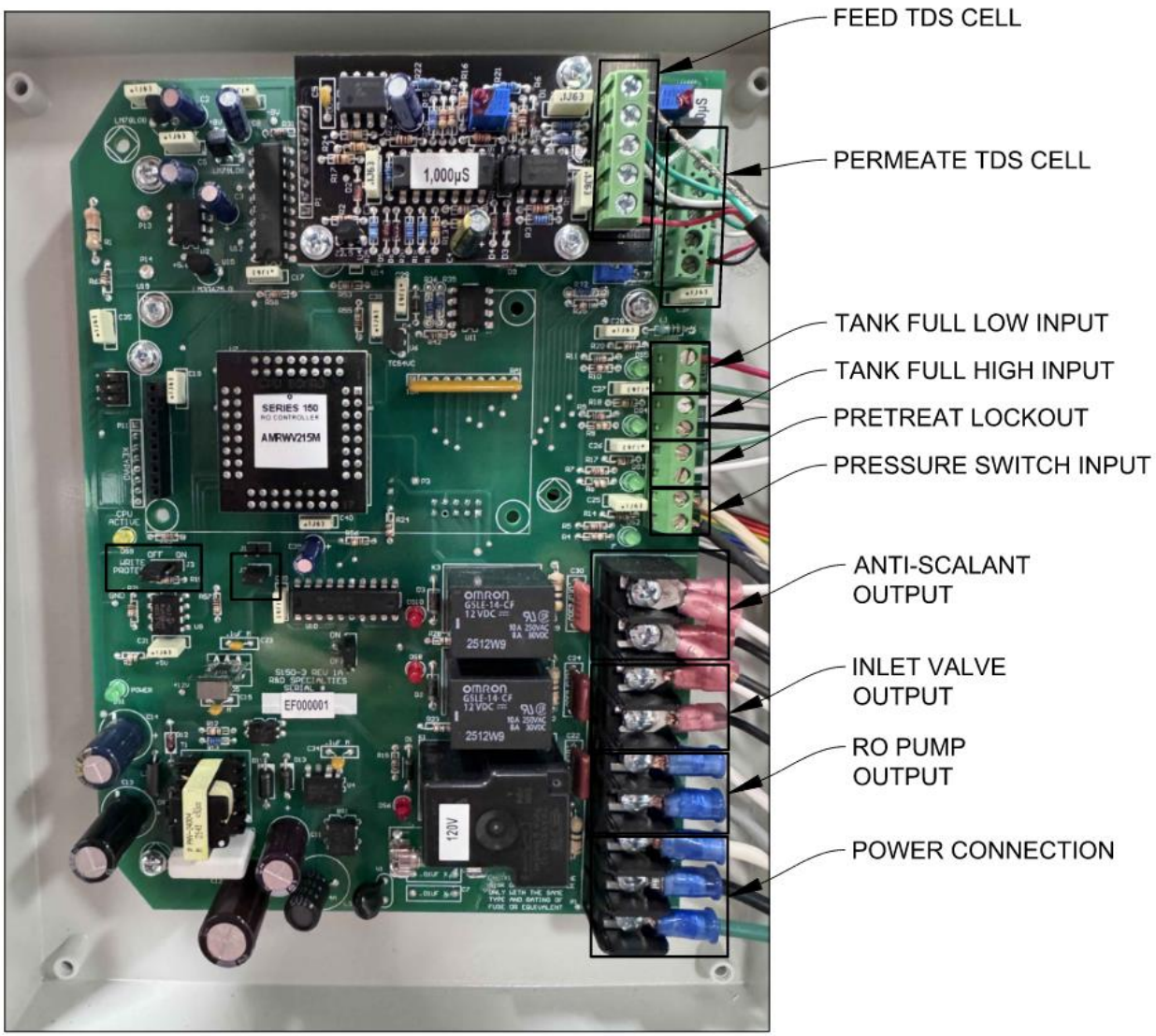


2. Remove the pump from the piping and mounting clamp.
3. Install the replacement pump.
4. Connect the three-phase pump wiring to the motor starter per the electrical schematic on the back of the pump cover or the pump wiring schematic in section 5.2.
5. Use the existing wire nuts to terminate the wires to the application configuration found in step 2. Note: Additional wires nuts may be required depending on voltage.
6. Do a pull test on each individual wire to it's respective wire nut to ensure that the wires will not come loose.
7. Neatly tuck the wires within the pump junction box and re-apply the cover. Ensure that the cover does not crush any wires during re-application. Tighten each screw so that the cover makes a water tight seal.

10.2.6 Replacing Controller Door

1. Unplug the power to the controller and the pump (turn off 3-phase power on applicable models).

2. Loosen the two captive screws and swing open the controller.



3. Disconnect all wires from door.

4. Remove the two brackets on the back of the front panel that holds the controller in place and let the controller come out as much as the connectors/strain reliefs allow.

5. Open the door as much as possible to allow the metal rod from the hinge to be removed, using a screwdriver or pliers.

6. Install the replacement door via the metal rod through the hinges. Reconnect all of the wires

following the next steps, referencing the previous image above or the electrical diagram (section 5.2) as needed.

NOTE: For AC power with 2 hot wires, either wire can connect to L and N terminal blocks.

1. Attach the AC power cable:
    - ground to grounding bar (GND)
    - hot to L terminal block (L)
    - neutral to N terminal block (N)
2. Connect the inlet valve to relay output inlet L1 and inlet L2 of P1.
3. Connect the anti-scalant (optional) to relay output flush L1 and flush L2 of P1.
4. Connect the jumper wire from the old controller door from flush L1 to inlet L1.
5. Connect the jumper wire from the old controller door from flush L2 to inlet L2.
6. Connect the permeate TDS cell to P3. Connect each colored wire to the terminal labeled with the same color. Connect the shield to SH.
7. Connect the feed TDS cell to C2. Connect each colored wire to the terminal labeled with the same color. Connect the shield to SH.

NOTE: The connection for the switch inputs is not polarity sensitive and can be connected to either terminal.

8. Connect the pressure switch to the PRESS FAULT dry contact input of P9.
9. Connect the tank full high switch to the TANK FULL HIGH dry contact input of P9 (These wire come from CON1).
10. Connect the tank full low switch to the TANK FULL LOW dry contact input of P9 (These wire come from CON1).
11. Connec the pretreat switch wire to the PRETREAT dry contact input of P9 (These wire come from CON2).
12. Connect all green wires to the grounding terminal bar.
13. Turn ON power to the system.
14. Verify the setpoints are configured for the factory settings in section 9.4.
15. Verify the system operation.

10.2.7 Replacing Controller I/O Expander Board

1. Loosen the two captive screws and swing open the controller.
2. Remove the wires from the relay card in the back of the controller.
3. Disconnect the ribbon cable from the relay card.
4. Remove the 3 screw from the black board and remove from the board.

5. Put the new board in the controller and re-establish screws.
6. Re-connect all wires and ribbon cable.
7. Ensure all wires are secure and not accidently jumping to the wire(s) next to it.

10.2.8 Replacing Motor Controls

1. Unplug the power to the controller and the pump (turn off 3-phase power on applicable models).
2. Loosen the two captive screws and swing open the controller.
3. Take note of all wire locations.
4. Remove all wires from the motor controls.
5. Locate the screw(s) from the bottom of the motor controls that is fastening it to the back plate and remove these screws.
6. Slightly pull the bottom of the motor controls from the back plate.

7. Pull the motor controls down to remove the top part of the motor controls from the permanent bracket to remove the motor controls.
8. Install the new motor controls in reverse operation of removing the old motor controls using the exisiting screw(s).
9. Reconnect all wires from the notes you took in step 1 or follow the steps below.
10. For 1 phase pumps,
    a. If there is a jumper wire on the old motor controls remove it and install from T1 on the bottom to L2 on the top.
    b. Connect the wires from the pump to the bottom of the motor controls (T2 and T3).
    c. Connect the wires from the disconnect or power cable to the top of the motor controls (L1 and L3).
11. For 3 phase pumps,
    a. Connect the wires from the pump to the bottom of the motor controls (T1, T2 and T3).
    b. Connect the wires from the disconnect or power cable to the top of the motor controls (L1, L2, and L3).

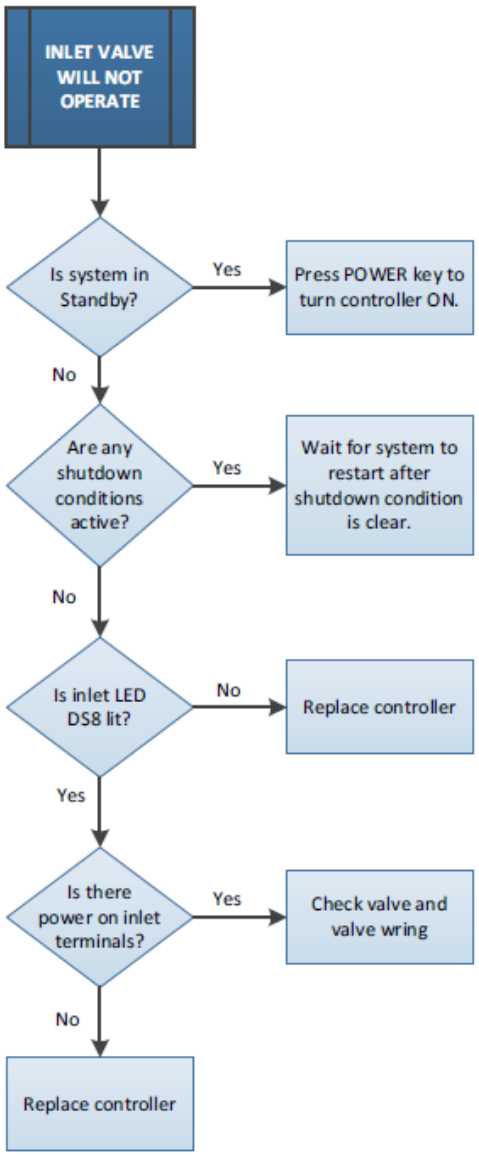
NOTE: There will only be one wire be termination on the motor controls.

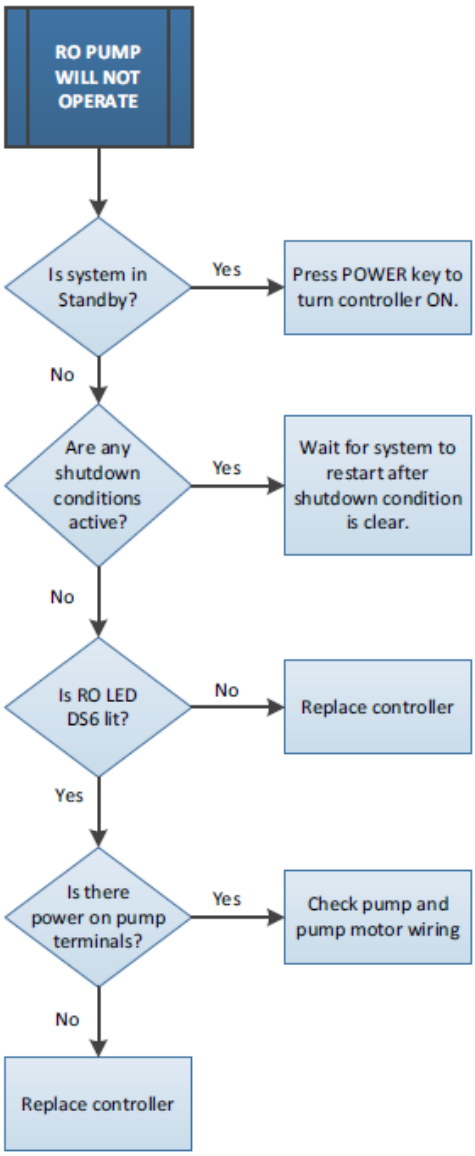
11 TROUBLESHOOTING AND REPAIR

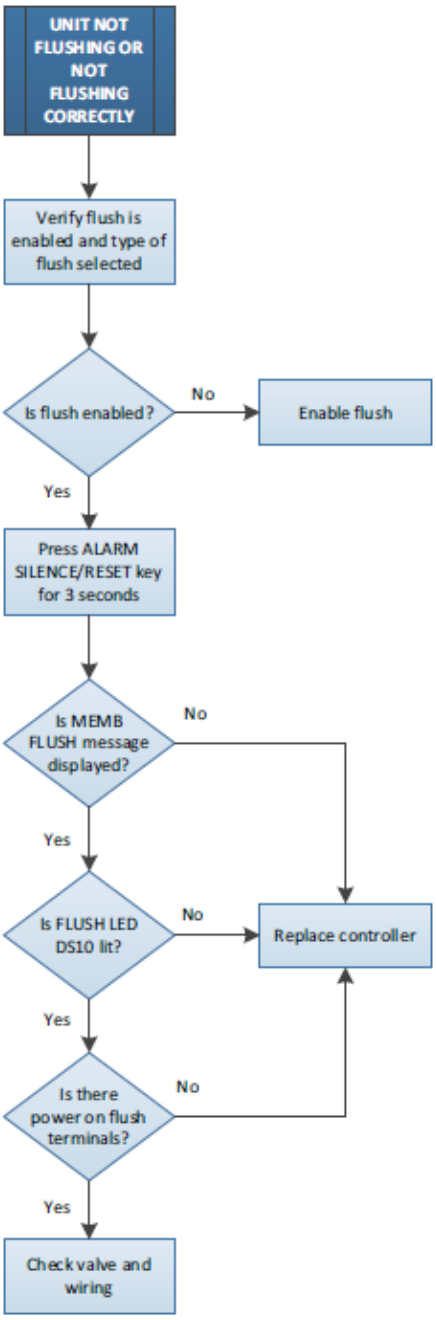
Problem	Possible Cause	Corrective Action
System will not start	System not plugged in	Plug into electrical outlet.
	Circuit breaker tripped	Reset the breaker.
	System in a FAULT Condition	Check the controller display for FAULT condition and correct the FAULT.
	Storage Tank float switch	Check/Repair/Replace
System has power but no water flow	Feed source not open	Open incoming tap water valve.
	Feed pressure less than 10 PSI	Increase feed pressure to greater than or equal to 10 PSI.
	Pre-filter clogged	Check pre-filter gauge for pressure drop; replace filter if the pressure drop is 15 PSI or greater.
	Inlet solenoid not operating	Test the solenoid. Replace the valve if defective.
Low product flow rate	Low pressure feeding membrane	Verify that the incoming tap water supply is fully open. The pressure on the pre-filter inlet gauge should be greater than or equal to 30 PSI when the RO water system is operating.
	Low pump PSI	Check inlet water flow and pressure. Check pump for proper operation.
	Reject GPM flow rate too high	Adjust REJECT FLOW meter valve to reduce flow.
	Excessive PRODUCT line back pressure	Check for restrictions in the PRODUCT WATER hose.
	Low temperature incoming tap water	Adjust blend valve as close as possible to 77 °F (25 °C).
	Pre-filter clogged	Check pre-filter gauge for pressure drop; replace filter if the pressure drop is 15 PSI or greater.
	Membrane needs replaced	Replace the membrane.
RO pump making excessive noise	Low pressure or flow rate feeding the system.	Check the pre-filter gauge PSI (must be greater than or equal to 30 PSI).
	Inlet solenoid is not operating	Test the solenoid. Replace the valve if it is defective.
	Pump motor or impeller failing	Check PUMP PSI gauge to verify that it is within operating parameters. Replace the pump assembly if necessary.
Poor quality product water	High chlorine levels	Check and/or replace any carbon filtration used before the system.

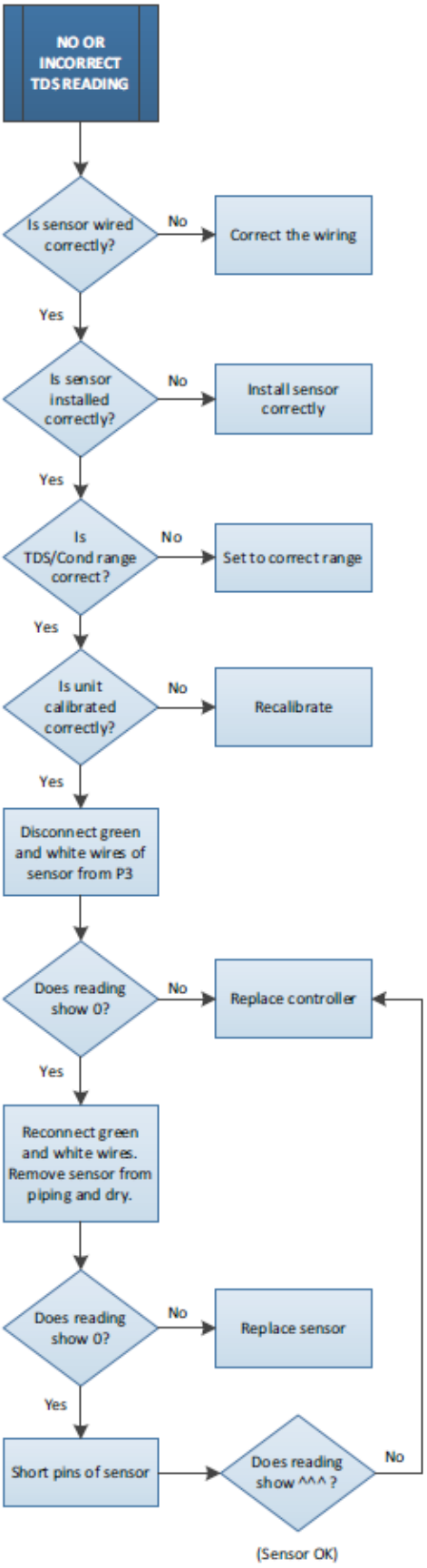
	Fouled membrane	Clean and sanitize system. Replace membrane and pre-filters.
	Incoming water hardness above allowable limit.	Condition the incoming water.
	Incoming pH (High/Low)	Condition the incoming water.
	TDS cell bad	Verify the TDS cell accuracy with a known good meter. Follow the calibration procedure or replace cell if necessary.

11.1 Troubleshooting Charts






UNIT NOT FLUSHING OR NOT FLUSHING CORRECTLY
Verify flush is enabled and type of flush selected
Is flush enabled?
No
Enable flush
Yes
Press ALARM SILENCE/RESET key for 3 seconds
Is MEMB FLUSH message displayed?
No
Yes
Is FLUSH LED DS10 lit?
No
Replace controller
Yes
Is there power on flush terminals?
No
Yes
Check valve and wiring


NO OR INCORRECT TDS READING
Is sensor wired correctly?
No
Correct the wiring
Yes
Is sensor installed correctly?
No
Install sensor correctly
Yes
Is TDS/Cond range correct?
No
Set to correct range
Yes
Is unit calibrated correctly?
No
Recalibrate
Yes
Disconnect green and white wires of sensor from P3
Does reading show 0?
No
Replace controller
Yes
Reconnect green and white wires. Remove sensor from piping and dry.
Does reading show 0?
No
Replace sensor
Yes
Short pins of sensor
Does reading show ^^^?
No
(Sensor OK)

Mode configuration

Status	Feed Solenoid (SV1) (NC)	Product Solenoid (SV2) (NO)	Divert to Drain Solenoid (SV3) (NC)
STANDBY / TANK FULL / DELAY / PRESS FAULT	Closed	Closed	Closed
OPERATING / MEMBRANE FLUSH	Open	Open	Open

12 SPARE PARTS LISTING

Yearly PM Kits available with necessary components to meet maintenance recommendations:

- Cartridge filter (Qty 4) and replacement o-rings (Qty 4)
- Vent filter on Storage Tank (Qty 1)
- Delivery Check Valve on Storage Tank (Qty 1)
- Membrane (Qty 2-6, based on model) and replacement o-ring (Qty 2-6)
    - There are kits available with no membranes

Model	Part Number	
	Membrane Kits	Kits Without Membranes
AWRO1200	R188-0081	R188-0082
AWRO2400	R188-0083	R188-0084
AWRO4800	R188-0083	R188-0084
AWRO7200	R188-0085	R188-0086
AWRO9600	R188-0085	R188-0086
AWRO12000	R188-0085	R188-0086
AWRO14400	R188-0085	R188-0086
AWRO16800	R188-0085	R188-0086
AWRO19200	R188-0085	R188-0086

Consumables:

Part Number	Description	Notes
R22-4044	Membrane Replacement for AWRO1200	
R22-4045	Membrane Replacement for AWRO4800-AWRO19200	
R22-4046	Membrane Replacement for AWRO2400	
0024-0010	O-Ring Replacement Kit For AWRO	
20-5105	Carbon Pre-filter for AWRO1200-4800	
20-1016	1 micron Sediment Pre-filter for AWRO1200-19200	
21530239	O-ring, BB Filter Housing	
21675187	Filter Wrench, 4.5” X 10-20”, 6 nubs	
97WS20301	Test Strips Water Soft, Water Hardness (6 bottles of 100 strips each)	
97PH20901	Test Strips pH (6 Bottles of 100 Strips each) For Measuring pH/Water/Acid, Base/Bicarbonate	
97RC22101	WaterCheck RC (6 Bottles of 100 Strips each) For Measuring Residual Chlorine	
97CM20201	WaterCheck 2 (6 Bottles of 100 Strips each) For Measuring Low Level Chlorine/Chloramine	

Spare Parts:

Part Number	Description
80-0313	Pump Replacement for AWRO1200 & AWRO2400
80-0314	Pump Replacement for AWRO4800, AWRO7200 & AWRO9600
80-0315	Pump Replacement for AWRO12000 & AWRO14400
80-0316	Pump Replacement for AWRO16800 & AWRO19200
R69446021	S150 Controller Door Replacement
69-0096	Conductivity Sensor for S150 controller
63-0046	Fuse, 5A Time Delay, for AWRO Controller
R65-0014	Inlet Pressure Switch, Adjust 3-40 PSI, ¼" NPT
59-0027	Inlet/Flush Solenoid Valve, 1", NC, 120V, DIN
41-0054	Recirc Flowmeter with valve, 0.2-2 GPM, AWRO1200-2400
41-0054	Reject Flowmeter with valve, 0.2-2 GPM, AWRO1200
41-0053	Product Flowmeter, 0.2-2 GPM, AWRO1200
41530611	Reject Flowmeter with valve, 0.5-5 GPM, AWRO2400
41530608	Product Flowmeter, 0.5-5 GPM, AWRO2400
41-0035	Reject/Recirc Flowmeter with valve, 1-10 GPM, AWRO4800-9600
41-0034	Product Flowmeter, 1-10 GPM, AWRO4800-9600
41-0025	Reject/Recirc Flowmeter with valve, 2-20 GPM, AWRO12000-19200
41-0032	Product Flowmeter, 2-20 GPM, AWRO12000-19200
43530714	Pump/Reject Pressure Gauge, 0-300, CBM, U-Clamp
43-0023	Pre-filter Pressure Gauge, 0-160, BM
12677135	Hose, Medical, 1", Style 5000 (sold by foot)
21675190	Filter Housing, 4.5" X 20", 1.5" I/O, DOE
R0153-0229	Replacement Controller for AWRO1200-2400
R0153-0230	Replacement Controller for AWRO4800-19200
60-0076	Motor Controls Replacement for AWRO1200-2400 and 12000-19200
60-0077	Motor Controls Replacement for AWRO4800-9600
69-0228	I/O Expander Board Replacement for AWRO Controller
69-0096	Conductivity Sensor Replacement AWRO with 10' cable

NOTE: See section 5.1 for referencing some spare parts.

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.