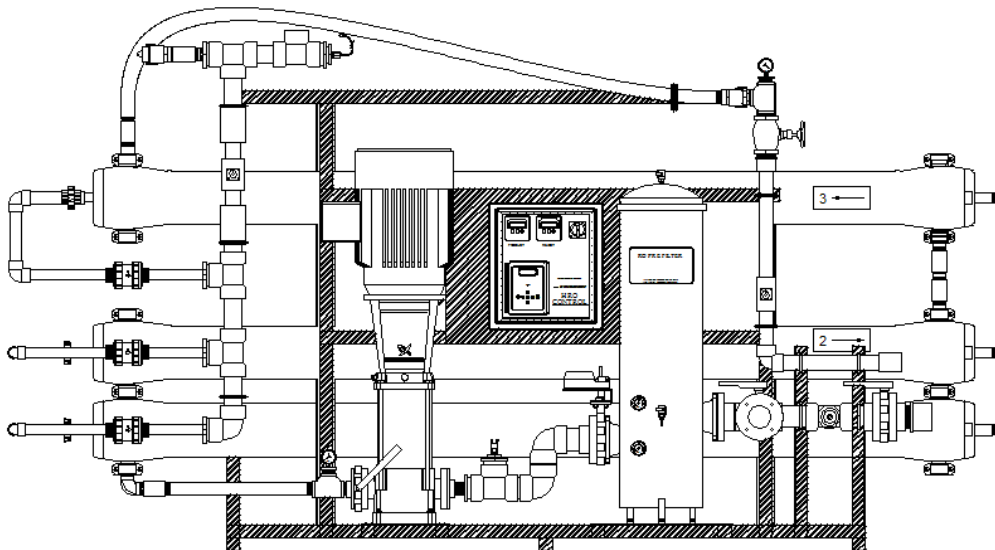




AMERIWATER INDUSTRIAL RO (MODEL: 00HRO64800)

OPERATION & MAINTENANCE MANUAL



**Manufactured With Pride
In The USA**

www.ameriwater.com • 800-535-5585

AmeriWater • 3345 Stop 8 Rd. • Dayton, OH 45414

TABLE OF CONTENTS

SECTION 1, GENERAL INFORMATION.....	2
1.1 CAUTIONARY SYMBOLS.....	2
SECTION 2, TECHNICAL INFORMATION.....	3
2.1 HRO SPECIFICATIONS	3
2.2 FEED WATER REQUIREMENTS.....	4
SECTION 3, COMPONENTS AND SCHEMATICS	5
3.1 HRO COMPONENT IDENTIFICATION.....	5
3.2 HRO FLOW DIAGRAM	7
3.3 HRO ELECTRICAL SCHEMATIC.....	8
SECTION 4, RO+ STARTUP & OPERATION	9
4.1 INSTALLATION	9
4.2 START-UP	10
4.3 SYSTEM SHUTDOWN	11
4.4 STARTUP LOG	12
SECTION 5, RO+ CONTROLLER	13
5.1 FRONT PANEL CONTROLS AND INDICATORS	13
5.2 CONTROLLER OPERATION.....	14
5.3 CONTROLLER ADJUSTMENTS	17
5.4 STANDARD SETPOINTS	20
5.5 TO DISPLAY OR CHANGE SETPOINTS	23
SECTION 6, MAINTENANCE.....	24
6.1 MAINTAINING THE SYSTEM.....	24
6.2 SYSTEM PREPERATION	24
6.3 HRO FILTER EXCHANGE	25
6.4 CIP	25
6.5 HRO MEMBRANE EXCHANGE	26
SECTION 7, TROUBLESHOOTING AND REPAIR	27
7.1 TROUBLESHOOTING CHART	27
7.2 CONTROLLER TROUBLESHOOTING CHART	29
7.3 CONDUCTIVITY CELL REPLACEMENT	31
7.4 INLET SOLENOID VALVE TEST / REPLACEMENT	31
7.5 CONTROLLER REPLACEMENT.....	32
7.6 PUMP REPLACEMENT	33
SECTION 8, WARRANTY	34
SECTION 9, REPLACEMENT PARTS	35
9.1 ROUTINE REPLACEMENT ITEMS (NON-DURABLE COMPONENTS)	35
9.2 SPARE PARTS LIST	36

SECTION 1, GENERAL INFORMATION

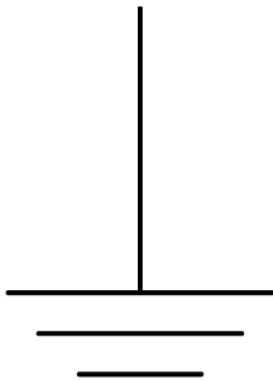
1.1 CAUTIONARY SYMBOLS



Caution, risk of electrical shock!
Attention, risque de choc électrique!

Open by qualified service personnel only!
Ouverture par le personnel qualifié seulement!

Refer to this Operation and Maintenance Manual for instructions and safety considerations. **Référez-vous au manuel des Opérations et Entretien pour instructions et mesures de sécurité.**



Earth Ground terminal
Borne de mise à la terre

SECTION 2, TECHNICAL INFORMATION

2.1 HRO SPECIFICATIONS

MODEL	00HRO64800
PERFORMANCE:	
Nominal Rejection	95-98%
Production (GPD)*	64,800
Product Flow (GPM)*	45
Recovery:	50% - 75% (adjustable)
ELECTRICAL:	
Three Phase	00HRO64800: 460V / 3-PH
Horsepower	15 HP
MEMBRANES:	
Size (in)	8" Dia. X 40" Long
Quantity	9
Type	Polyamide Spiral-Wound
FEED WATER REQUIREMENTS:	
Chlorine Tolerance	<0.1
Temperature	50-90°F (1-45°C)
Operating pH Range	6-9
Cleaning pH	2-11
Pre-filtration	5 Micron
Pressure Range (PSIG)	120-225
Max. Fouling Index (SDI)	< 5
DIMENSIONAL DATA:	
Connections	3" Inlet - 3" Product - 2" Reject
H x W x D	90"H x 230"W x 42"D
Ship Weight	2950#

- Product flow rate varies with temperature, all models are rated at 77°F (25°C) with feed water of 2000 mg/L NaCl @ 225 PSI

2.2 FEED WATER REQUIREMENTS

The quality of the feed water to the reverse osmosis unit must meet the following requirements:

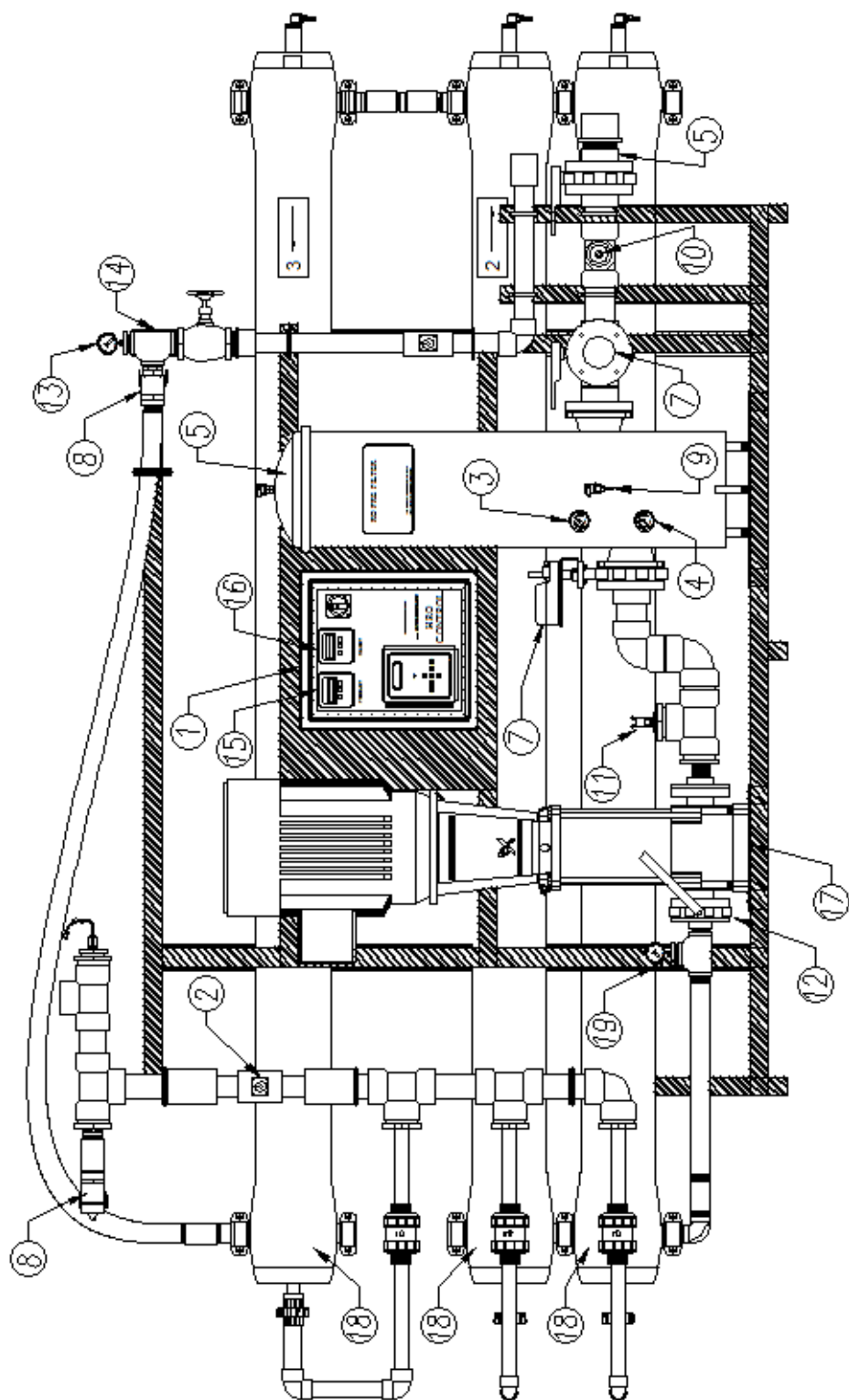
- Hardness, max..... 0.5grains
- Free Chlorine, max 0.01 ppm
- Turbidity, max 1 NTU
- Silt Density Index (SDI), max 5

Hardness: If the feed water exceeds 0.5 grains, use a softener to reduce the hardness.

Free Chlorine: If the feed water exceeds the free chlorine limit, remove the chlorine with a carbon filter. Chlorine is destructive to RO membranes.

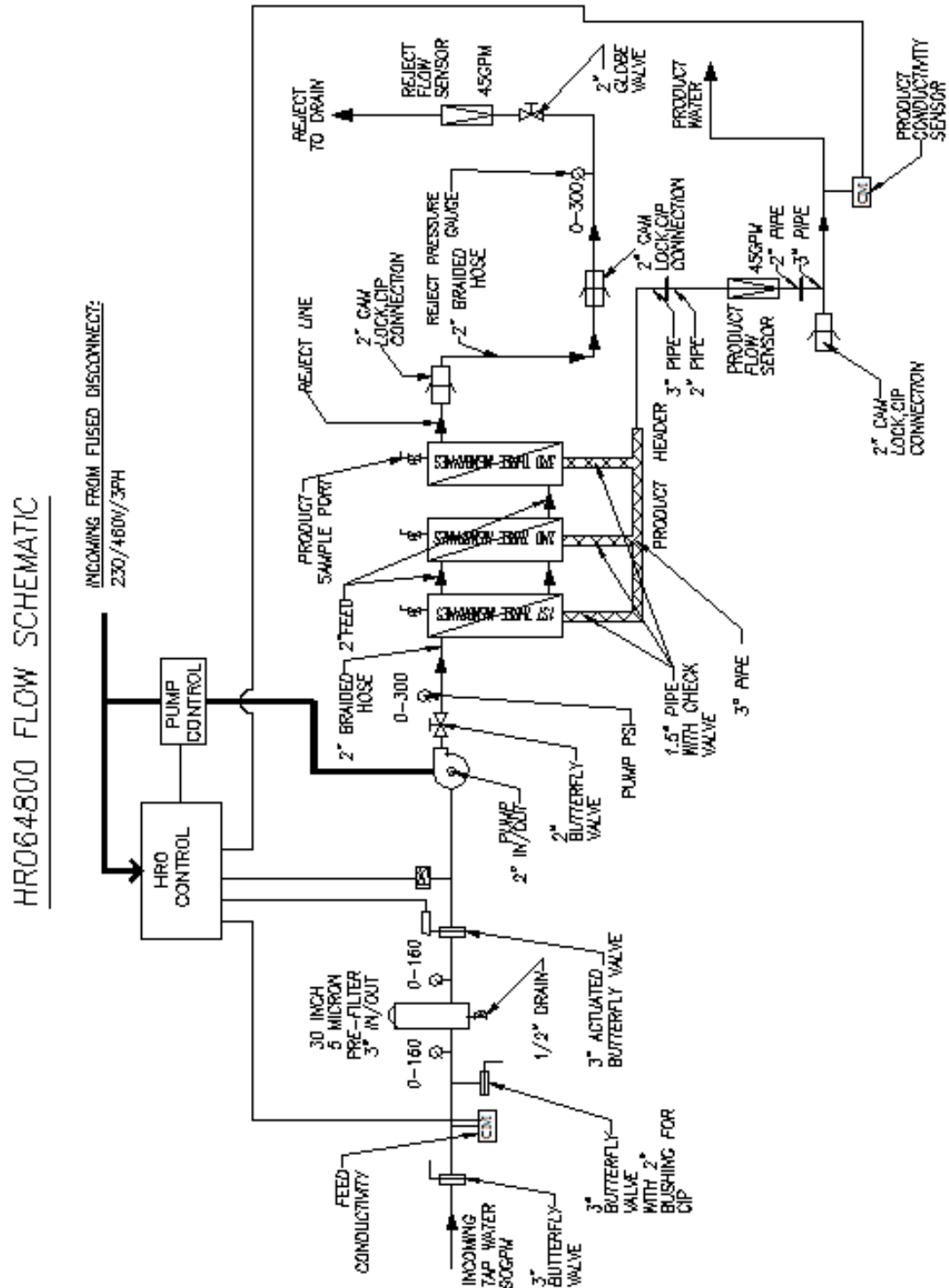
Particulates: The feed water should always be processed through an inlet filter of no greater than 5 microns to remove any particles or silt that may potentially clog the membranes.

SECTION 3, COMPONENTS AND SCHEMATICS
3.1 HRO COMPONENT IDENTIFICATION

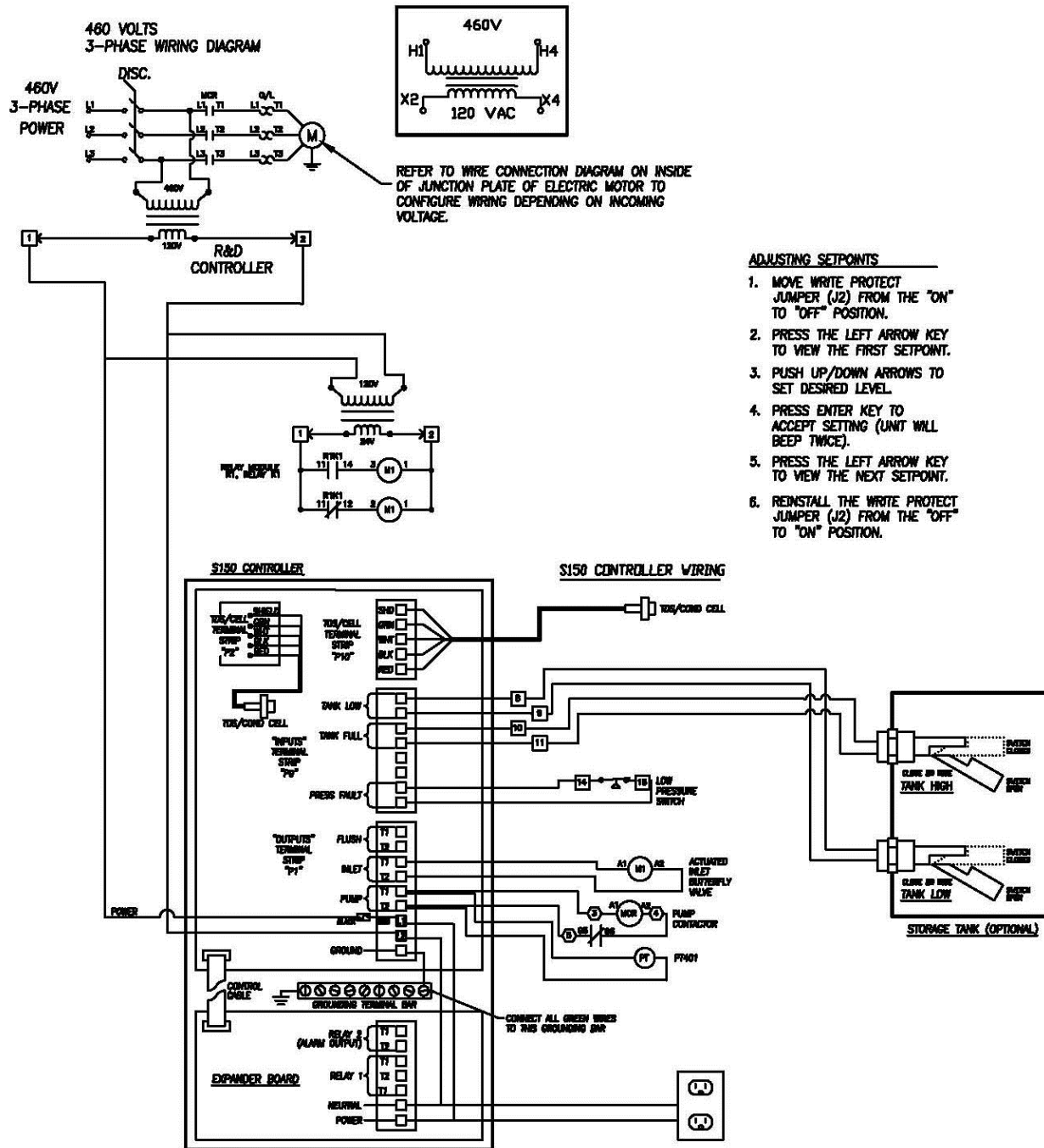


1. **CONTROLLER:** Control mechanism for the RO.
2. **PRODUCT CONDUCTIVITY SENSOR:** Cell that reads the quality of the product water.
3. **PREFILTER INLET GAUGE:** Gauge measuring the water pressure on the filter inlet in PSI.
4. **PREFILTER OUTLET GAUGE:** Gauge measuring the water pressure on the filter outlet in PSI.
5. **SYSTEM PRE-FILTER:** Pre-filter for the system to remove particulate from the water prior to the RO system.
6. **INCOMING TAP WATER:** Connection point for the incoming tap water.
7. **INLET SOLENOID:** Opens when the RO system is on to allow water to feed through the system, closes when the system is OFF.
8. **CIP CONNECTIONS:** Connections for the optional membrane clean in place system.
9. **FILTER SAMPLE PORT:** Used to check the quality of water after the pre-filter.
10. **INCOMING CONDUCTIVITY SENSOR:** Cell that reads the quality of the feed water.
11. **LOW PRESSURE SWITCH:** Switch to protect the pump if there is low feed pressure.
12. **PUMP THROTTLE VALVE:** Valve that is used to throttle the output of the pump.
13. **REJECT PSI:** Gauge that measures the pressure of the water coming from reject side of the membranes in PSI.
14. **REJECT THROTTLE VALVE:** Valve that can be used to control the reject flow.
15. **PRODUCT FLOW METER:** Measures the flow of the Product Water in gallons per minute (GPM).
16. **REJECT FLOW METER:** Measures the water being sent to the drain, in gallons per minute (GPM).
17. **PUMP:** Provides the driving pressure for the reverse osmosis system.
18. **MEMBRANE ASSEMBLY:** Membrane for reverse osmosis.
19. **PUMP PSI GAUGE:** Gauge that measures the discharge of the pump in PSI.

3.2 HRO FLOW DIAGRAM



3.3 HRO ELECTRICAL SCHEMATIC



SECTION 4, RO+ STARTUP & OPERATION

4.1 INSTALLATION

NOTE: This entire Operations Manual should be read before operating or servicing the RO. The Operations Manual should then be kept near the system and used as a reference and troubleshooting guide.

1. Feed water to RO must not contain chlorine, iron, manganese, oil, or large quantities of organic matter. Common waterworks water will normally meet these requirements.
2. Normally the water temperature must not exceed 80°F
3. The installation location must be dry and frost-free.
4. The pressure at the industrial RO inlet, when in operation, must be 20 PSI, minimum, and must not exceed 90 PSI. If the pressure exceeds the maximum stated pressure, or it fluctuates to pressures exceeding 90 PSI, install a pressure-reducing valve on the inlet.
5. The flow of inlet water supplied to the RO unit shall be an uninterrupted flow at 20 PSI, minimum, and at a minimum flow rate of twice the rated Product Water flow of the RO unit purchased.
6. A floor drain close to the unit is required that is capable of carrying away the reject water flow for the RO unit. The reject flow is approximately the same as the rated Product Water flow.
7. The piping, faucets, valves etc. for the Product Water outlet of the Reverse Osmosis unit must be made of PVC or corrosion resistant stainless steel.
8. The electrical power shall be provided to the RO through a 60 amp disconnect located near the unit. The voltage and phase must match and be verified to the RO unit that was purchased. Control voltage is provided within the RO unit controller via a transformer.
9. Local plumbing codes and electrical regulations must be observed and followed.

4.2 START-UP

Important Note: RO membranes cannot be started cold, they must be filled with feed water and allowed to soak for a minimum of 30 minutes.

1. Connect the RO+ to your potable water supply. If blending both warm and cold water to improve product flow rate, do not exceed 25°C (77°F).
2. Install the pre-filter cartridge(s) inside its housing (if not already factory installed).
3. The Reject To Drain hose coming out of the RO+ system is for reject water. The water from this hose will go down the drain. Leave at least a 1" to 2" of air gap between the hose, and the drain to prevent siphoning or reverse contamination.
4. Connect the storage tank float switch(es) into the appropriate terminal connector on the RO's controller board.
5. The Product Water hose should temporarily be placed near the drain to flush any initial impurities from the RO before connecting the Product Water hose to the point of use or storage tank.
6. Connect the RO to its electrical power supply through the disconnect switch on the main control enclosure. Refer to the electrical schematic for proper voltage connections.
7. Open the RO's feed water inlet valve located near the left side as facing the front of the unit.
8. Turn the RO control master switch to ON that is located at the upper right on the face of the electrical enclosure.
9. Press the RO controller switch to the ON position. An 80 second delay will occur before the pump starts. Once pump starts, turn off RO controller and allow membranes to fill with water with city water pressure. Let the membranes soak for a minimum of 30 minutes.

Important Note: RO membranes can not be started cold, they must be filled with feed water and allowed to soak for a minimum of 30 minutes.

10. Re-press the RO controller switch to the ON position. An 80 second delay will occur before the pump starts.
11. Once the pump has started, adjust the pump throttle valve located near the discharge of the pump to achieve a pressure at the inlet of the 1st membrane to about 150 PSI

12. Allow the RO to run for 30 minutes to allow components to fill with water, purge trapped air and to rinse the membranes.
13. Begin to close the Reject throttle valve and adjust to a 50:50 ratio flow through the Reject flowmeter compared to the Product flowmeter.
14. Continually watch the pump pressure gauge located at the inlet of the 1st membrane and keep adjusted to around 150 PSI.
15. Once the RO has stabilized and all impurities have been flushed, the water will have stabilized, also. Set the water quality value at the desired limit (Refer to the controller adjustments in section 5).
16. When the RO is running stable and within desired water quality limits, Product hose can be connected to your process water system or storage tank.
17. Make copies of the log sheet in section 4.4. Record initial operating conditions on the Log Sheet, and then, periodically afterwards as determined by your Quality Department or Facilities Manager. The operating conditions should be recorded at least once each day the RO is operated.

4.3 SYSTEM SHUTDOWN

1. Press the POWER key (the display will show STANDBY).
2. Turn off the main power switch to the system.
3. Turn off the potable tap water supply to the RO.

4.4 STARTUP LOG

Reverse Osmosis System Log								
Date	Softener Hardness Gr.	Chlorine ppm	RO Filter DP	RO Pump PSI	Conductivity uS	Reject GPM	Product GPM	D.I. (if app) Red/Green

SECTION 5, RO+ CONTROLLER

5.1 FRONT PANEL CONTROLS AND INDICATORS

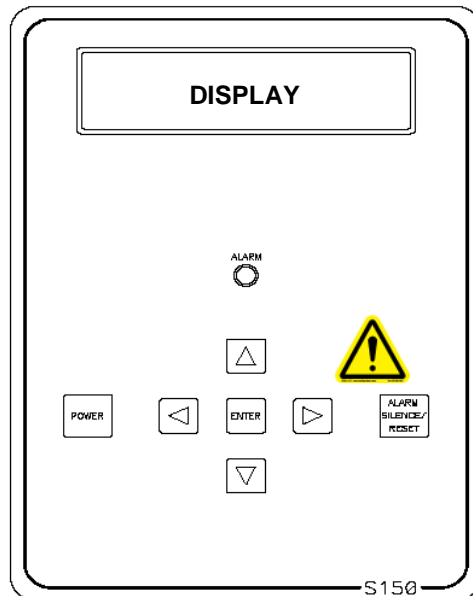


FIGURE 5.1

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 first Setpoint.
RIGHT ARROW KEY	- Scrolls through Setpoints starting with last Setpoint.
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 shut down has occurred.
ACCESSING DISINFECT MODE	- Push and hold the left arrow key, and then push the right arrow key. (Not normally used)
NOTE: The J2 jumper must already be installed to make this an active mode.	
DISINFECT	- Push the ENTER key and hold until all of the solution is drawn into the MRO.

5.2 CONTROLLER OPERATION

General Operation

The unit has 2 modes of operation, a standby mode and an operating mode that are controlled by the POWER key. In the standby mode, the unit is effectively off. All outputs are turned 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.

Display

The display is a 2 line x 20-character backlit liquid crystal display. System operating status and sensor readings are shown on this display. Set point information can, also, be shown on this display.

Operating Status Messages

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.

STANDBY - The unit is in the STANDBY mode.

DELAY 99 - 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 99 - 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.

PRETREAT - The unit is shut down due to a pretreat lockout condition.

PRESS FAULT - The unit is shut down due to a pressure fault condition.

MEMB FLUSH 99 – Membrane Flush is active. The number is the minutes remaining in the flush cycle.

CONDUCTIVITY

The Conductivity is shown on the top line after the unit operating status. When the unit is in STANDBY, because of a shut down condition, the reading is replaced with '----'. If the reading is over range, the reading is shown as '^^^' when in the OPERATE mode.

Operating Hours

The current operating hours are shown on the bottom line.

Temperature

The current water temperature is shown on the bottom line to the right of operating hours. When the unit is in STANDBY due to a shut down 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.

HI COND - The Conductivity reading has exceeded the programmed limit.

Tank Full Operation

The unit 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 99. 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 99 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.

Tank Full Restart

The tank full restart is the delay before the 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.

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 9 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.

Pressure Fault

If the pressure fault input becomes active (closes) and stays active for the delay programmed in the PF Delay Setpoint, the unit will shut down for a pressure fault. The display will show PRESS FAULT, the alarm lamp will flash and the audible alarm will sound. The pressure fault can be cleared by pressing the Alarm Silence/Reset key twice.

Auto Reset

If a pressure fault shut down occurs and the Auto Reset Setpoint is programmed to 0, the unit will remain shut down until manually reset. If the Auto Reset Setpoint 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.

Alarm Silence

When a shut down occurs that causes the audible alarm to sound, the alarm can be silenced by pressing the Alarm Silence/Reset key once. The alarm will remain silenced for 3 minutes. If the Alarm Silence Setpoint is programmed to a value other than 3, the alarm will resound after this delay times out. Pressing the Alarm Silence/Reset key will silence the alarm and reset this delay.

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.

High Conductivity

If the Conductivity reading exceeds the limit programmed the Cond Limit Setpoint for the delay programmed in the Cond Delay Setpoint, the alarm lamp will light and the HI COND warning message will show on the display. This warning will clear when the Conductivity drops below the Setpoint.

When the High Conductivity warning message is active, the RO will alarm, until the Product water conductivity goes back into the acceptable quality range.

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.

5.3 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 937/461-1988 if you have any questions regarding the procedure.

CONDUCTIVITY CALIBRATION

Refer to Figure 5.2 for adjustment location (SPAN). To calibrate the Conductivity, place the cell in a known standard solution. Adjust the span adjustment for the correct reading. If the cell is installed, the unit can be calibrated by taking a sample from the PRODUCT TEST PORT and testing it with a known, calibrated meter. Adjust the span control until the reading matches the meter.

Refer to figure 5.1 for adjustment location. To calibrate the 2nd TDS / Conductivity, place the cell in a known standard solution. Adjust the span adjustment for the correct reading. If the cell is installed, the unit can be calibrated by taking a sample of the water and testing it with a known, good meter. Adjust the span control until the reading matches the 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.

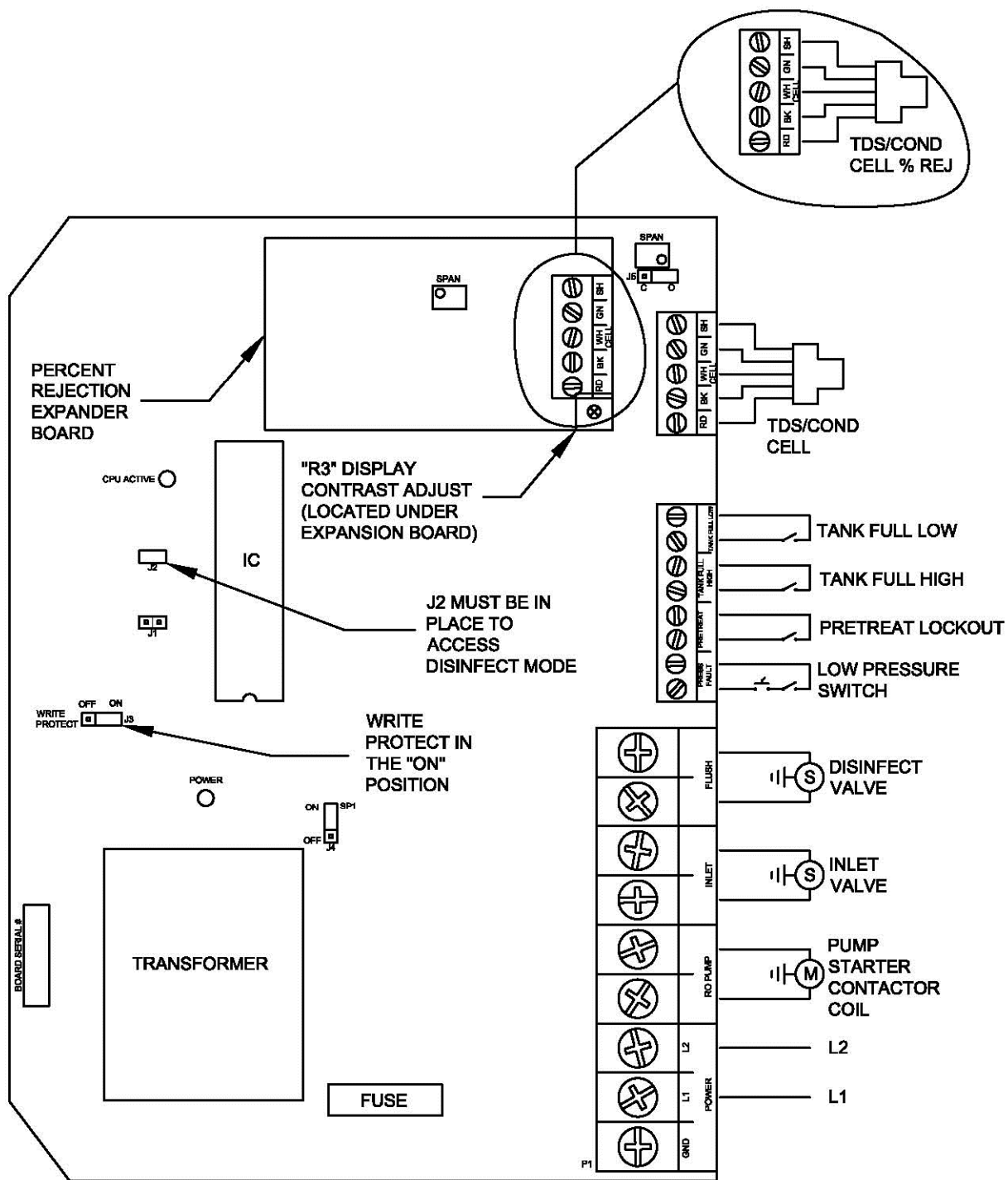


FIGURE 5.2

RIBBON CABLE
FROM MAIN BOARD
CONNECTION

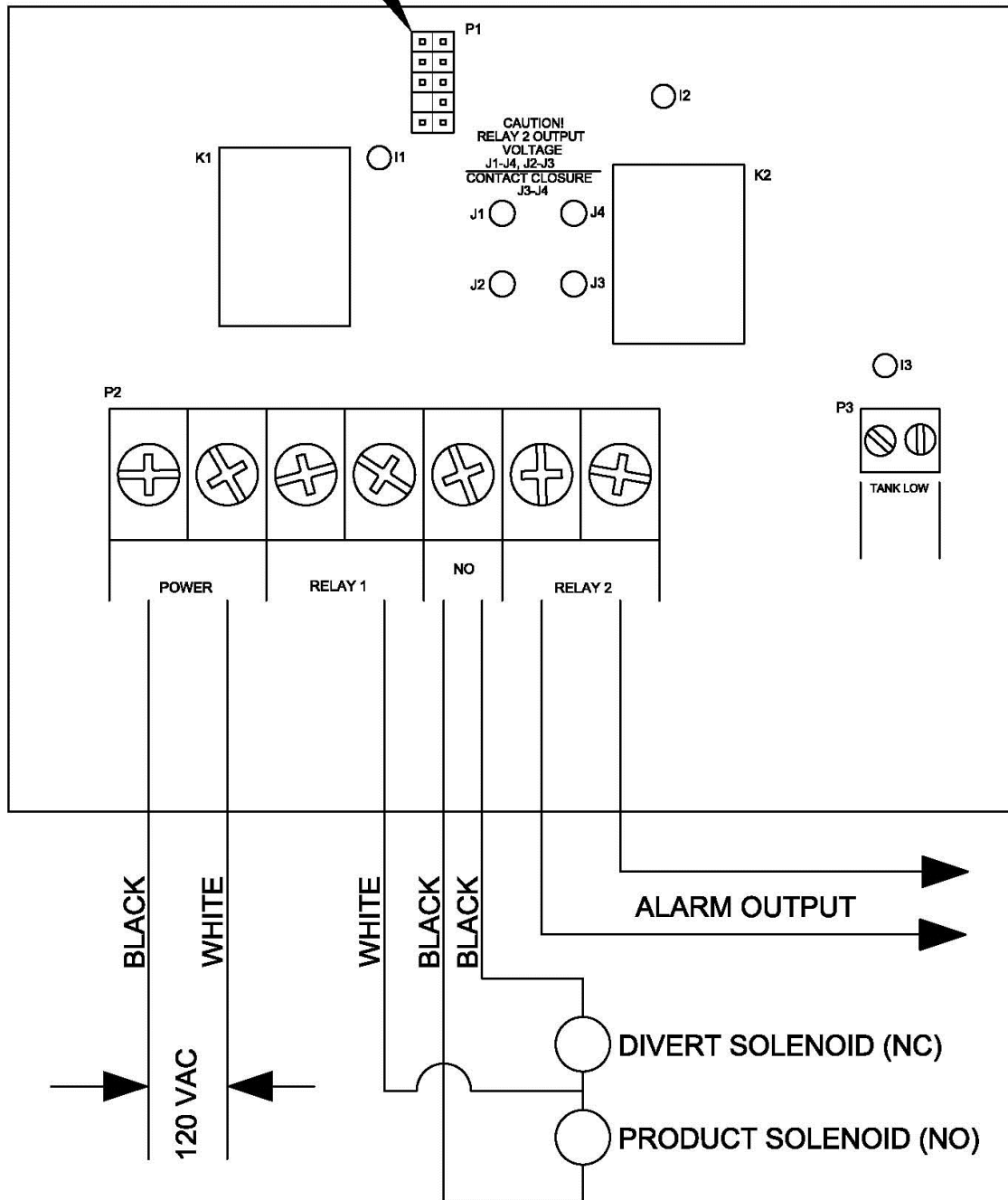


FIGURE 5.3

5.4 STANDARD SETPOINTS

SETPOINT	DESCRIPTION	RANGE	FACTORY SETTING	AS SHIPPED
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*	Based on water analysis.	45
TDS/Cond Delay	When the limit Setpoint is exceeded, no alarm will be given until this time has expired.	0-999 seconds	10	180
RO Start Delay	The amount of time between the inlet valve opening and the RO pump. start.	0-99 Seconds	10	80
Press Fault Delay	The time a pressure fault must be active before a pressure fault shut down occurs.	0-99 Seconds	10	30
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	60
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	0
TF Restart Delay	When a tank full condition clears, the system will restart after this delay.	0-99 sec/min	5	5min
TF Restart	Selects whether the tank full restart delay is in seconds or minutes. 0=seconds, 1=minutes.	0-1	0	0
TFO Time	The amount of time that a tank full override lasts.	0-9 Minutes	3	5min
Tank Lo Restart	Not Used			15min
Flush Type	Selects the type of flush. Set to 0 to disable.	0-8	0	0
Flush Time	The length of time a membrane flush cycle will last when flush is active.	0-99	0	0

SETPOINT	DESCRIPTION	RANGE	FACTORY SETTING	AS SHIPPED
Flush Interval	The interval between flush cycles. Only valid with operation hour, elapsed time or off flush types.	0-99 minutes	0	24
Flush Mode	Selects if the inlet and RO pump relays operate during flush.	1-4	0	0
Maximum Hours	If the current operating hours exceed this limit, the operating hours warning will occur. To disable, set to 0.	0-65000 hours	0	0
Current Hours	Current number of hours of RO system operation.	0-65000 hours	0	2
Expander Mode	Not Used			-
Temp Offset	Allows adjustment of temperature reading by +-5 degrees.	± 5	0	0
Temp UOM	Selects display of temperature in °F or °C	0-1	0	0
Switch Select	Selects if switch inputs are normally open or normally closed.	0-32	0	0
TDS/Cond UOM	Selects display of water quality in uS or PPM NOTE: If this Setpoint is changed, the unit must be recalibrated.	0-1	0	0
TDS/Cond Range	Selects range of TDS/Conductivity monitor 0-50, 1-100, 2-250, 3-500, 4-1000, 5-2500, 6-5000 NOTE: If this Setpoint is changed, the unit must be recalibrated.	0-6	1	1
C2 Range	Selects range of TDS/Conductivity monitor 0-50, 1-100, 2-250, 3-500, 4-1000, 5-2500, 6-5000 NOTE: If this Setpoint is changed, the unit must be recalibrated and range components may need to be changed.	0-6	4	4

FACTORY AS

SETPOINT	DESCRIPTION	RANGE	SETTING	SHIPPED
C2 Limit	When this valve is met or exceeded, the alarm lamp will light and high TDS/Cond will show on the display. To disable, set to 0.			0
%Rej	The 2 nd TDS/Conductivity is used to monitor feed water, programming this setpoint to 1 allows the % rejection to be displayed.	0-1	1	1

* μS = microsiemens; PPM = Parts Per Million

5.5 TO DISPLAY OR CHANGE SETPOINTS

NOTE: Please contact your AmeriWater representative prior to changing set points.

1. Refer to Figure 5.1 for the location of the keys used to display or change the Setpoints and Figure 5.2 for the location of the write protect jumper, J3. For the unit to be able to accept a change in a Setpoint, the shorting jumper must be in the WRITE PROTECT OFF position (center and left pins).

NOTE: Setpoints cannot be changed if the write protect jumper is in the ON position.

2. Use the LEFT and RIGHT ARROW keys 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 and the Right arrow key starts with the last Setpoint.
3. The Up and Down arrow keys are used to increase or decrease the Setpoint value. The value will change by 1 count each time a key is pressed. If the key is pressed and held for >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 set point value to 0.
4. Pressing the ALARM SILENCE/RESET key at any time will cancel the operation and return the display to the main screen.
5. To accept the new set point value, press the ENTER key.
6. The unit will beep twice if the change is accepted. If the write protect jumper is on, the unit will show WRITE PROTECTED on the display and one long beep will sound.
7. When finished changing Setpoints, the write protect jumper should be placed in the ON position (center and right pins).

SECTION 6, MAINTENANCE

WARNING: If any component of the water treatment system is changed or replaced, the user should conduct appropriate tests to ensure that the revised system meets all standards to which it was initially tested.

WARNING: Always remove the RO+ from the power source and turn off the water prior to any maintenance activities!

6.1 MAINTAINING THE SYSTEM

1. A Startup Log for the RO+ system has been provided by AmeriWater in Section 4.4. This must be filled out completely each time the system is used.
2. The hardness of the inlet water should be checked daily. If this is above 0.5 grains, the membrane will foul.
3. The membranes and carbon or micron prefilter are non-durable components and will need to be exchanged periodically.
 - a) The membranes will need to be cleaned or replaced when the flow of product water decreases more than 10% while the water temperature remains constant (see temperature correction table in section 2.4).
 - b) If using a micron pre-filter, this will need to be replaced whenever the differential pressure on the outlet is 10 PSI or greater than the pressure on the inlet of the filter housing.
4. The accuracy of the Conductivity display should be verified with a calibrated, hand-held meter at least annually. If the conductivity display is not within 5% of the hand-held meter readings, the controller should be calibrated in accordance to the procedures in Section 5.

6.2 SYSTEM PREPARATION

1. Press the POWER key (the display will show STANDBY).
2. Turn off the main power switch to the system.
3. Switch the main fused disconnect to OFF.
4. Turn off the potable tap water supply to the RO.
5. Relieve the pressure from the system by opening the sample port on the filter as well as the sample ports on the end of membrane housings.

6.3 HRO FILTER EXCHANGE

1. Prepare the system as per the instructions in section 6.2.
2. Depress the vent on top of the housing to ensure that all pressure is relieved.
3. Loosen the banding strap by turning the bolt counter-clockwise.
4. Remove the top from the filter housing and slide out and discard the exhausted cartridges.
5. Partially unwrap the plastic from the new filters. Holding the end covered with plastic, place the new filters into the housing. Discard the remaining plastic after installation.
6. Replace the top on the filter housing and secure in place with the banding strap by turning the bolt clockwise.

6.4 CIP

An alternative to changing the membranes when their performance degrades would be to clean them using AmeriWater's optional clean-in-place (CIP) system. Doing so will extend the life of the membranes and reduce the frequency of membrane exchanges.

The CIP system can also be used to draw PAA disinfectant into the RO if you are having bacteria issues. Contact AmeriWater for details.

1. Remove the prefilter(s).
2. To enter CIP mode on the controller, simultaneously press the POWER and RIGHT ARROW keys.
3. Follow the CIP instructions for connecting the drum to the RO+.
4. Follow the instructions provided in the manual with your CIP system to clean the membranes.

WARNING: **DO NOT** place the RO+ in service until all operational parameters are within specification. Consult the STARTUP LOG (See section 4.4) to verify that all specifications are met.

6.5 HRO MEMBRANE EXCHANGE

1. Prepare the system as per the instructions in section 6.2.
2. Loosen the Victaulic fittings on the inlet portion of the housing. This will allow the water to drain.
3. Loosen the union for the product water.
4. Remove the clamps that hold this membrane to the skid.
5. Pull the quick release spring on the cap to allow removal of the end caps.
6. Remove the existing membrane from the housing.
7. Load the replacement membrane into the housing ensuring that the brine seal is towards the inlet.
8. Replace the end caps and secure in place with the quick release spring. It may be necessary to use a rubber mallet to gently tap the second cap to get the spring to seat fully.
9. Replace the membrane on the skid and secure with the clamps.
10. Re-connect the product water union.
11. Replace any additional membranes at this time by following steps 2-10.
12. Re-connect all Victaulic fittings.
13. Return the device to service and allow it to run for 30 minutes with the reject throttle valve completely open to flush the preservative out of the membrane.

SECTION 7, TROUBLESHOOTING AND REPAIR

7.1 TROUBLESHOOTING CHART

WARNING: Only those persons who have read the complete operations manual or who have received authorization from the medical facility director should attempt to troubleshoot and/or repair the RO+ system.

<u>PROBLEM</u>	<u>POSSIBLE CAUSE</u>	<u>CORRECTIVE ACTION</u>
RO+ will not start	RO+ not plugged in	Plug into electrical outlet.
	Circuit breaker blown	Reset the breaker.
	RO+ in a FAULT condition	Check RO+ controller display for FAULT condition and correct the FAULT.
System has power but no water flow	Feed source not open	Open Incoming Tap Water valve.
	Feed pressure < 20 PSI	Increase pressure to ≥ 20 PSI.
	Prefilter clogged	Check the prefilter gauges for pressure drop; replace the prefilter if the pressure drop is 10 PSI greater than initially recorded.
	Feed solenoid is not operating	Test the solenoid (see Section 7.4). Replace the valve if it is defective.
Pump making excessive noise	Low pressure or flow rate feeding the RO+	Check the prefilter outlet gauge PSI (must be ≥ 20 PSI), and verify that the product flow (flowmeter) is within range (see Sections 2.1 & 2.2)
	Pump motor or impeller failing	Check PUMP PSI GAUGE to verify that it is within operating parameters. Replace the pump assembly if necessary (see Section 7.6).

	Pump loose in cabinet	Isolate pump from frame.
<u>PROBLEM</u>	<u>POSSIBLE CAUSE</u>	<u>CORRECTIVE ACTION</u>
Poor quality product water	High Chlorine levels	Replace the Carbon Filters.
	RO+ not rinsed thoroughly	Rinse membrane (see Section 4.2).
	Fouled membrane	a. Clean or replace membranes (Section 6).
	Conductivity cell out of calibration	Verify the conductivity cell accuracy with a known good meter. Follow the calibration procedures in Section 5.3 or replace cell if necessary.
Low product flow rate	Low pressure feeding membrane	Verify that the incoming tap water supply is fully open.
	Low pump PSI	Pump should be operating at 200 PSI.
	Reject GPM flow rate too high	Turn reject flow to product flow with the throttle valve.
	Excessive PRODUCT line backpressure	Check for restrictions in the PRODUCT line.
	Low temperature incoming tap water	Consult temperature correction chart in Section 2.4 to determine if the flow rate is normal in relation to the feed water temperature.
	Prefilter clogged	Check the prefilter gauges for pressure drop. Replace the prefilter cartridge if the pressure drop is ≥ 10 PSI from the initial value.
	Fouled Membrane	Clean or replace membranes (Section 6).

7.2 CONTROLLER TROUBLESHOOTING CHART

CAUTION: Hazardous voltages are present when power is applied to the unit. Care should be taken when troubleshooting any of the input power or output circuits. When disconnecting or connecting any board or accessory, be sure power is unplugged.

Before contacting AmeriWater for technical help, verify the programming of all Setpoints, Check the display and the status of all lights and indicators. The more information available when you contact us, the easier it will be to determine the source of the problem.

<u>PROBLEM</u>	<u>INVESTIGATION</u>	<u>CORRECTIVE ACTION</u>
System Inoperative	Is the yellow CPU active LED blinking?	If power is applied to the power terminals and the other checks are OK, the pc board is defective and should be replaced.
	If no, is the green power LED, DS1 Lit?	
	If no, is the fuse OK?	
	If no, replace the fuse.	
Display Blank	If yes, with a voltmeter, verify power is applied to the power terminals L1 and L2.	If no, refer to the system inoperative section.
	Is the green power LED, DS1 lit?	
	If yes, is the CPU active LED, DS9 blinking?	
	If yes, adjust the display contrast adjustment, R3. Is the display still blank?	
Inlet Valve Will Not Operate	Is the system in standby?	If no, replace the board.
	If no, are any shut down conditions active?	
	If no, is the inlet LED, DS8 lit?	
	If yes, with a voltmeter, verify if there is power on the inlet terminals. Is there power?	
		If yes, check the valve and wiring.

<u>PROBLEM</u>	<u>INVESTIGATION</u>	<u>CORRECTIVE ACTION</u>
RO Pump Will Not Operate (Cont.)	Is the system in standby?	
	If no, are any shut down conditions active?	
	If no, is the RO LED, DS6 lit?	If no, replace the board.
	If yes, with a voltmeter, verify if there is power on the RO pump terminals. Is there power?	If no, replace the board. If yes, check the pump and wiring.
No or incorrect conductivity reading	Is sensor wired correctly?	If no, correct wiring.
	If yes, is sensor installed inline as shown in the tubing diagram on page 14?	If no, install correctly.
	If yes, verify correct Conductivity range. Range correct?	If no, correct range. If yes, calibrate unit.
	Does unit calibrate OK?	
	If no, disconnect green and white wires of sensor. Does reading show 0?	If no, replace board.
	If yes, reconnect wires and remove sensor from piping and dry. Does reading show 0?	If no, replace cell.
	If yes, short terminals of cell together. Does reading show '^^^' ?	If no, replace board.

7.3 CONDUCTIVITY CELL REPLACEMENT

1. Prepare the RO per section 6.2.
2. Open the RO controller by loosening the screws on the face of the controller.
3. Loosen the screws on the terminal strip for the appropriate conductivity cell (the inlet goes to the expander board while the product goes to the main board. See Figure 5.2)
4. Disconnect the conductivity sensor wiring and remove from the controller.
5. Remove the appropriate conductivity cell by turning it counter clockwise.
6. Apply pipe thread sealant to the replacement cell and thread into the connection.
7. Route the new cells wiring back to the controller.
8. Secure the wiring into the terminal block ensuring that the colors of the wires match the listing on the terminal block.
9. Return the RO to service.
10. Check for leaks around the cell that was replaced.
11. Calibrate the conductivity cell per the instructions in Section 5.3.

7.4 INLET SOLENOID VALVE TEST / REPLACEMENT

1. With the RO+ Off, turn the incoming tap water supply on. If there is water flowing to the drain, the inlet solenoid may be bad. Proceed to Step 3.
2. Turn the RO+ On (with the incoming tap water supply on). If there is no flow to the drain, the inlet solenoid or wiring harness may be bad. Proceed to Step 3.
3. Prepare the RO per section 6.2.
4. Disconnect and remove valve wiring from control box.
5. Loosen and remove bolts and nuts from flanges secured to the valve.
6. Note the orientation of the valve in regards to the flow direction.
7. Slid valve out from header.
8. Slid new valve between both flanges.
9. Install the bolts and nuts to secure valve to header.

10. Route wiring from valve into the controller.
11. Secure the wires to their respective terminals.
12. Return the RO to service.
13. Check for leaks around the solenoid valve that was replaced.

7.5 CONTROLLER REPLACEMENT

1. Prepare the RO per section 6.2.
2. Note the position of all of the wiring leading into the control box.
3. Remove the wires from their respective terminals.
4. Open the main panel to have access to the rear of the RO controller.
5. Loosen the strain reliefs on the controller to allow the wiring to be pulled through.
6. Completely remove the strain reliefs and set aside for re-use with the new controller.
7. Remove the screws that secure the bracket to the controller and main panel and set-aside.
8. Pull the defective controller out of the main panel.
9. Mark the locations for the strain reliefs on the new controller to match where they were located on the old controller.
10. Drill holes for the new strain reliefs using a stepped drill bit, being careful not to make these oversized.
11. Slide the new controller into the main panel and secure in place with the brackets and screws.
12. Install the strain reliefs and route the wires into the controller.
13. Secure the wires to their respective terminals.
14. Return the RO to service.

7.6 PUMP REPLACEMENT

1. Prepare the RO per section 6.2.
2. Open the controller and trace the existing pump power cord.
3. Note the position of the power cord in the terminals on the motor contactor.
4. Remove the existing pump power connections from the motor contactor.
5. Loosen the strain relief to allow the cord to be pulled free.
6. Remove all fittings from the current pump and clean for use in the replacement.
7. Remove the securing bolts and nuts and pull the pump free.
8. Install the fittings into the replacement pump.
9. Secure the pump in place with the bolts and nuts.
10. Route the power cord back through the strain relief and into the motor contactor.
11. Secure to the terminals as initially noted.
12. Return the RO to service.

SECTION 8, WARRANTY

The buyer has a one year warranty on all equipment and parts, excluding non-durable components (e.g., RO membrane, PT401 solution, and micron prefilter); 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 lightning, 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 30 days of the discovery of the defect.

There are no warranties on the RO+ 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.

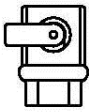
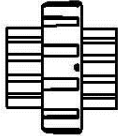
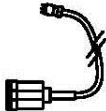
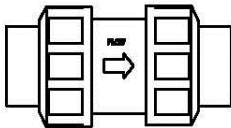
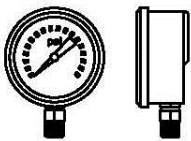
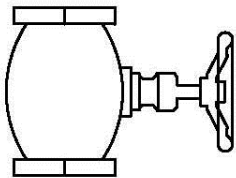

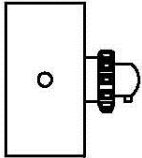



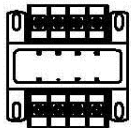
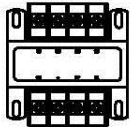
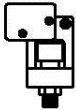
SECTION 9, REPLACEMENT PARTS

9.1 ROUTINE REPLACEMENT ITEMS (NON-DURABLE COMPONENTS)

PART #	DESCRIPTION
R22-8042	HRO Replacement Membrane
97RC22101	WaterCheck RC test strips for Measuring Residual Chlorine
97WS20301	WaterSoft Hardness test strips for measuring Hardness.

*Call AmeriWater or your AmeriWater distributor for pricing.

9.2 SPARE PARTS LIST

<p>SAMPLE PORT BALL VALVE PN: 041004 (ELBOW, 0.25" MPT X 0.25" FPT)</p> 	<p>UNION PN: 041720101 (1.5" PVC80)</p> 	
<p>CONDUCTIVITY CELL PN: 69-0096, SENSOR, COND, 20' CORD</p> 	<p>HRO CHECK VALVE PN: 041720115</p> 	<p>GAUGE, BOTTOM MOUNT PN: 43-0029 (0-300PSI)</p> 
<p>GLOBE VALVE PN: 044-0099 (VAL, GLOBE, 2", THRD, SST)</p> 	<p>FLOW METER PN: 41-0042 (30-300GPM, 2" NPT) PN: 41-0043 (40-400GPM, 3" SADDLE)</p>  <p>METER READ-OUT</p>  <p>PN: 41-0042</p>	<p>GAUGE, CENTER BACK MOUNT PN: 43-0028 (0-160PSI)</p> 
<p>HRO INLET SOLENOID PN: 42-0049</p> 	<p>HRO MOTOR CONTACTOR, 60 AMP PN: 61-0009 HRO MOTOR OVERLOAD, 90 AMP PN: 61-0010</p> 	<p>TRANSFORMER, 120V - 24V PN: 62-0005</p> 
<p>TRANSFORMER, 575/460/230/208V - 120/24V PN: 62-0016</p> 	<p>PRESSURE SWITCH PN: 65-0014</p> 	<p>CONTROLLER PN: 69446010</p> 