

Operation Manual



UPT Medical Reverse Osmosis System K-RO-UPT Series

1020 Industrial Drive, Orinda, TN 37141

615-654-4441

sales@specialtyh2o.com

615-654-4449 fax



TABLE OF CONTENTS

Section 1	GENERAL	
1.1	Warnings and Cautions.....	1
1.2	Theory of Operation.....	2
1.3	System Illustration	3
1.4	System Components.....	4
Section 2	SPECIFICATIONS	
2.1	General Requirements	5
2.1	Dimensions & Specifications	5
Section 3	OPERATION	
3.1	Start-Up (TANK FEED)	6
3.2	Start-Up (DIRECT FEED)	8
3.3	Chlorine Timer (TANK & DIRECT FEED)	10
3.4	Permeate Sample	12
3.5	Monitoring	14
3.6	Shut Down	14
3.7	System Maintenance.....	15
3.8	Alarms.....	16
Section 4	ROUTINE MAINTENANCE	
4.1	Troubleshooting Guide	18
4.2	Routine Maintenance.....	19
4.3	Sanitizing Sample Port / Valve.....	20
Section 5	CLEANING / DISINFECTING	
5.1	Cleaning Procedure.....	21
5.2	Disinfecting Procedure.....	29
5.3	Timer Function.....	37
Section 6	EVENT LOGS	
5.1	Event Logs	38
Appendix A	Glossary	41
Appendix B	Sample Quality Assurance Checklist	43
Appendix C	Sample Cleaning Log/Checksheet.....	44
Appendix D	Factory Default Parameters.....	45
Appendix E	Warranty Information	47

WARNINGS 

- Read this manual in its entirety before operating the UPT Medical Reverse Osmosis System.
- Misuse, improper operation, and/or improper monitoring of this system could result in serious injury, death, or other serious reactions to patients undergoing hemodialysis treatment.
- A regular cleaning/disinfection schedule for the water treatment components including the Reverse Osmosis System should be outlined by the Governing Body of the facility. If the system is opened, a complete cleaning/disinfection must be completed before dialysis treatments can be initiated.
- Misuse, improper use or handling of chemical cleaning solutions could result in serious injury or even death. You must comply with the information contained in the Material Safety Data Sheet (MSDS) for the chemical being used.
- To avoid electrical shock hazard, do not operate this device when the covers or panels are removed.

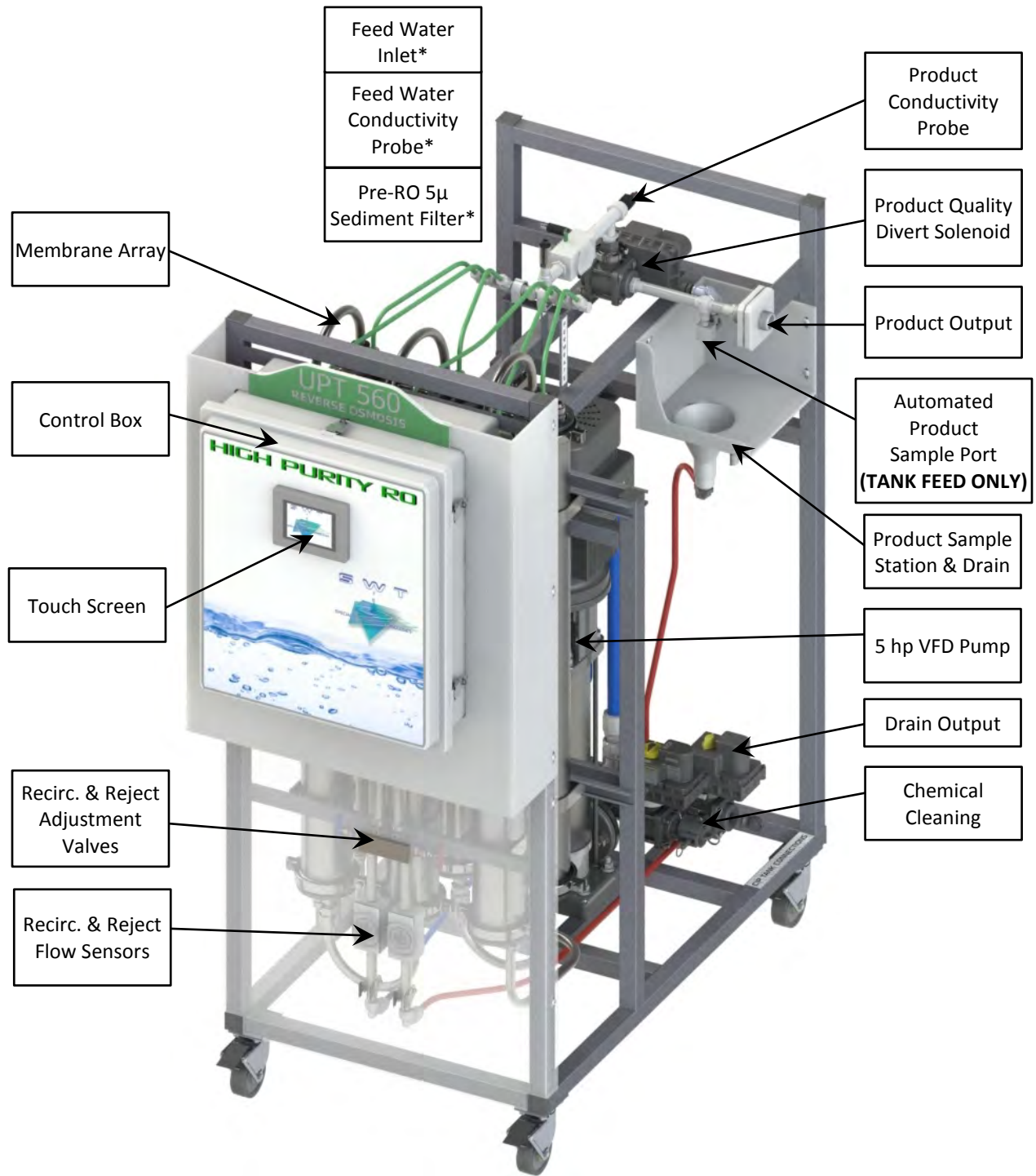
CAUTIONS 

- When used as a medical device, Federal law restricts this device to sale by or on the authority of a physician. Per CFR 801.109 (b)(1).
- Improper operation of this device could result in a low or no-flow alarm on the dialysis machines.
- It is the responsibility of the governing body of the facility to ensure that all applicable regulations regarding the installation and operation of this system are observed.
- Only authorized personnel can install, perform service, or perform maintenance to the Reverse Osmosis System.
- Electrical and plumbing connections must adhere to local statutes and any facility codes. Connect this device to a proper ground connection in accordance with the National Electrical Code. Do not remove the ground wire or ground plug. Do not use an extension cord with this equipment.
- Do not remove any Caution, Warning or any other descriptive labels from the device.

The UPT Medical Reverse Osmosis System is the primary process used for the purification of water used for hemodialysis. It utilizes a membrane separation process to remove Total Dissolved Solids (TDS) from the feed water. The process is accomplished by applying pressure to the feed water, forcing it through the membrane that has two outlet streams. The first is referred to as the Concentrate stream. This is the stream that contains the contaminants removed from the tap water, which exits the R.O. machine and is sent to the drain. The second stream is referred to as the Product stream. This is the purified water that is ready to be sent to the post-treatment of the system for storage, final filtration and ultimately, patient use.

The R.O. utilizes many monitors, alarms and controls to meet all necessary water quality and patient safety standards. These include but are not limited to:

- Percent Rejection
- Feed and Product TDS (By Conductivity)
- Low Pressure Alarm
- Low Tank Level Alarm
- High Temperature Alarms
- Cleaning Capabilities
- Product Divert-to-Drain
- Indications for Flows and Pressures



* NOT SHOWN – Located on left rear corner

The UPT Medical RO System is a semi-automated system comprised of several components that provide monitoring and control capabilities.

- PLC:** The UPT Medical RO System operations are controlled by a Programmable Logical Controller (PLC). Using the Operator Interface Terminal (OIT), the operator can select and monitor unit operation, review logs and trends or view setup system parameters. It processes all the information (analog and digital inputs) and generates output signals to direct the operation of the unit. The PLC supplies the data to be displayed on the OIT. The PLC is located inside the control box. The Operator cannot operate the PLC directly.
- OIT:** The Operator Interface Terminal (OIT) is used to display the system parameters and process parameters, to send control commands to the PLC, to setup/change set-points and display alarms or other information to the operator. This is a touch-screen interface for PLC's. It allows the operator to view the input and output values and current status of the system.
- ALARMS:** An audible alarm will sound whenever an alarm condition is detected by the device during operation.
- SOLENOIDS:** All solenoids are 24VDC controlled with visual indicators showing the current flow orientation.
- VFD PUMP:** The single 5HP pump uses a Variable Frequency Drive (VFD) that allows the pump to operate at the maximum efficiency based on the demand. It is also is energy efficient helping to reduce costs.
- PRESSURES:** The device has a pressure switch that will detect too high a pump pressure that will shut the device down preventing damage and/or injury. It also has incoming pressure sensor, via the PLC, acts to shut down the pump in the event of insufficient water flow to the pump thus preventing a pump failure.
- DIVERT:** Equipped with a conductivity monitoring system that will immediately detect changes in the product and inlet water conductivity and will divert all product water to drain and sound an alarm that does not meet the required level thus protecting patients.

GENERAL REQUIREMENTS:

- Water Requirements:** A properly pre-treated water supply:
 Chlorine/Chloramines <0.1 ppm
 Hardness <10 ppm (0.6 gpg)
 SDI (Silt Density Index) <5
 Water temperature between 70 - 92°F
 Inlet pressure of 30 - 100 psi
- Electrical Requirements:** 230 VAC, 30 Amp, 60 Hz, Three Phase
- Drain Requirements:** Must facilitate 20 gpm or better

SPECIFICATIONS:

Models	UPT 540	UPT 550	UPT 560	UPT 570	UPT 580	UPT 590
*Rated Production GPD	9600	12000	14400	16800	17700	19100
*Rated Production GPM	6.64	8.30	9.96	11.62	12.28	13.24
# of Membranes	4	5	6	7	8	9
Overall Dimensions	30" W X 59" L X 70" H					
Pump/Motor	5 HP (Variable Frequency Drive)					
Recovery	50 - 75% (Variable)					
Pre-RO Sediment Filter	Yes					
Sample Ports	1 Outlet (Automated/Manual)					

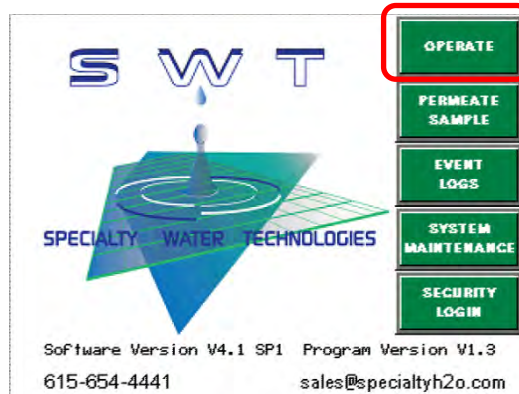
MEMBRANES

Membranes	4" x 40" Spiral Wound, Polyamide Material
Max. Applied Pressure	600 psi
Max. Operating Temp.	113°F
Feed Water pH Range	4 - 11
Optimum pH Range	5.0 - 8.5
Chlorine Tolerance	<0.1 ppm
Average Salt Rejection	99.5%
Minimum Salt Rejection	98.5%

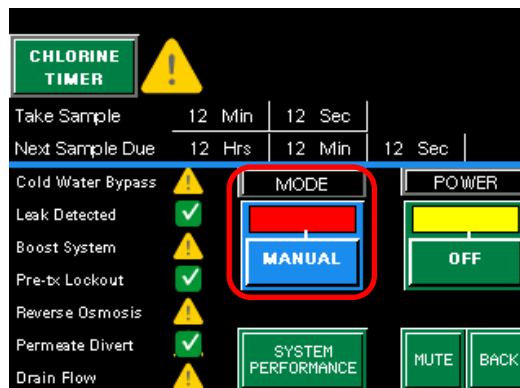
* 75°F Feed, 225 PSI, +/- 15%

START-UP (TANK FEED)

1. From the Home screen, press the OPERATE button, this changes the screen to the operate screen.

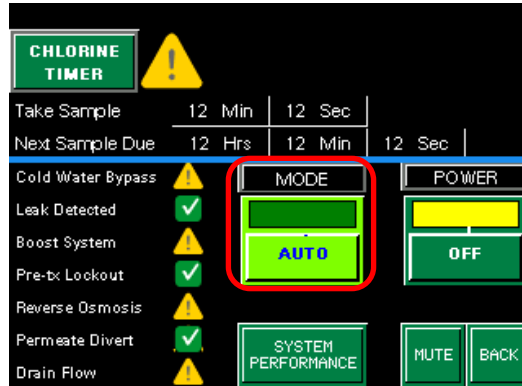


2. Choose whether to start in the MANUAL or AUTO mode. To change, press the button under the word MODE. This will toggle the desired mode between MANUAL and AUTO.

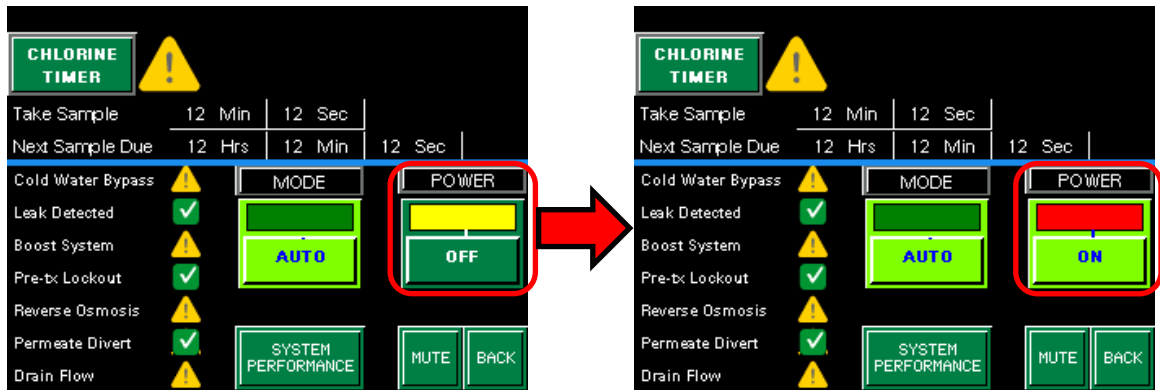


3. The MANUAL mode will run the RO continuously, not monitoring the tank sensors, it will stop upon a pretreatment tank regeneration, loss of incoming pressure, or if high water temperature is detected.

- If in the AUTO mode, the button will be green and the indicator will be dark green.



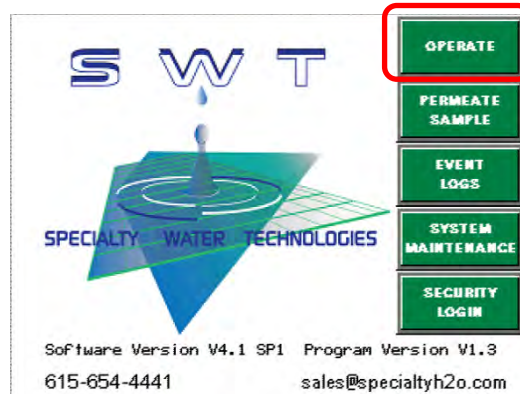
- Once the proper mode is selected, press the button marked OFF. The button will change to green and say ON and the indicator above will change from yellow to red.



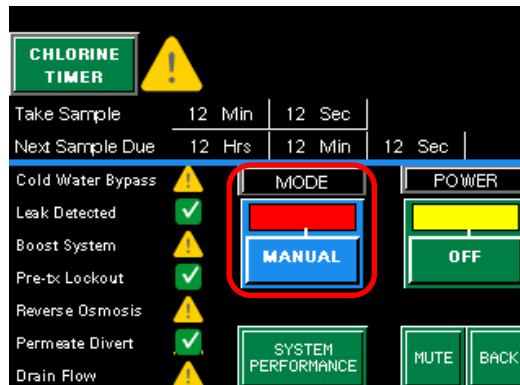
- Once the RO is in the ON mode, the product divert valve will shift to the drain position, the inlet water valve will energize, the city boost start signal is sent and the air purge valve will energize. After purging the system for 15 seconds, the pump will start. After draining the system for 2 minutes the system will check the permeate conductivity. If it is 20uS or below, the product divert valve will shift to the product position.

START UP (DIRECT FEED)

1. From the Home screen, press the OPERATE button, this changes the screen to the operate screen.

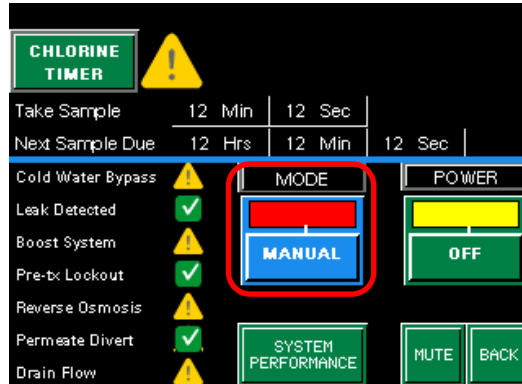


2. Choose MANUAL mode. To change, press the button under the word MODE. This will toggle the desired mode between MANUAL and AUTO.

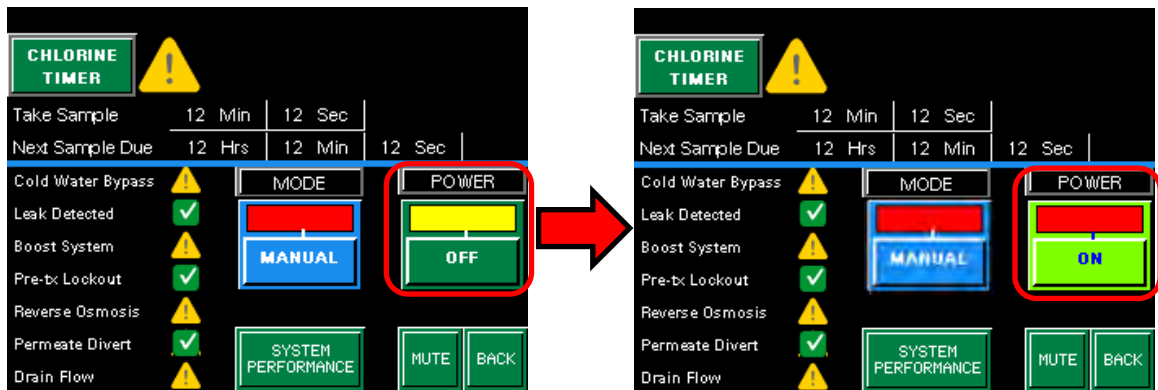


3. The MANUAL mode will run the RO continuously, it will stop upon a pretreatment tank regeneration, loss of incoming pressure, or if high water temperature is detected.

4. RO must always be in MANUAL mode; the button will be blue and the indicator will be red.



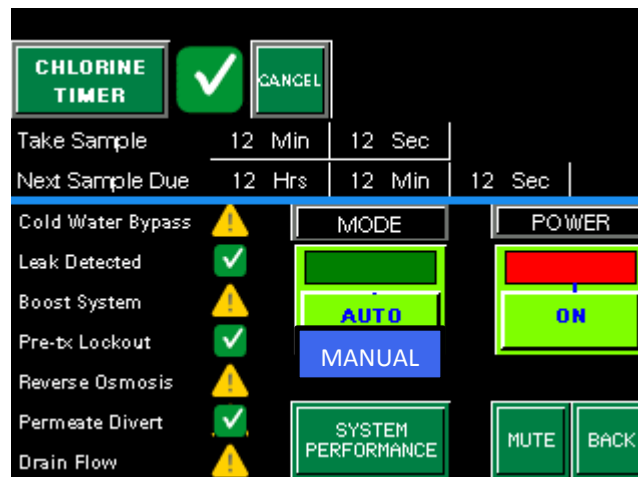
5. Once the proper mode is selected, press the button marked OFF. The button will change to green and say ON and the indicator above will change from yellow to red.



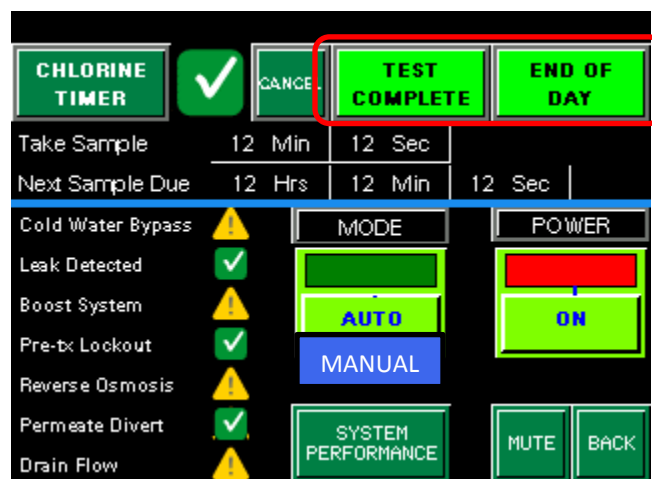
6. Once the RO is in the ON mode, the product divert valve will shift to the drain position, the inlet water valve will energize, the city boost start signal is sent and the air purge valve will energize. After purging the system for 15 seconds, the pump will start. After draining the system for 2 minutes the system will check the permeate conductivity. If it is 20uS or below, the product divert valve will shift to the product position.

CHLORINE TIMER (TANK & DIRECT FEED)

1. From the Main Operate Screen press the CHLORINE TIMER button to turn on the chlorine timer. The exclamation point will change to a green check mark and a cancel button will appear. At any time during the chlorine timer mode, the cancel button can be used to stop the process.

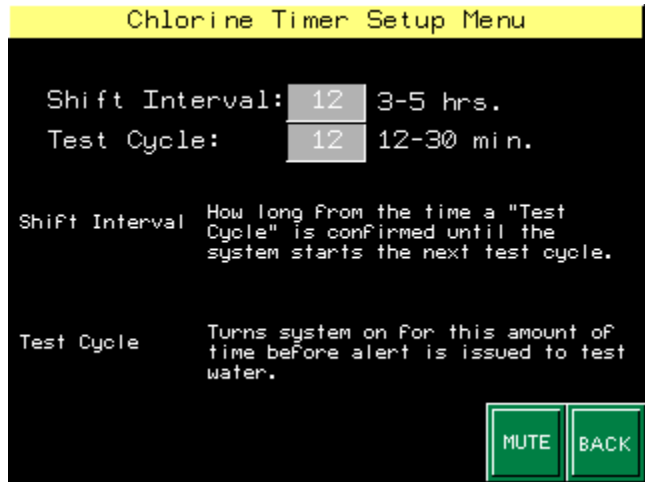


2. Once the chlorine timer has counted down (settable from 12-30 min), an audible alarm will sound prompting the user to collect sample at sample station. The screen will also display TEST COMPLETE and END OF DAY buttons.



The 'Test Complete' button will reset the chlorine timer and start the shift interval timer for the next scheduled chlorine test (settable from 3-5 hours). The 'End of Day Button' will reset the alarm and turn the chlorine timer off. This is typically done at the last chlorine test of the day.

3. The SHIFT INTERVAL and TEST CYCLE timers can be changed by entering the SYSTEM MAINTENANCE menu and selecting the CHLORINE TIMER SETUP MENU button.



PERMEATE SAMPLE (TANK FEED ONLY)

1. From the Home screen, press the PERMEATE SAMPLE button, this changes the screen to the permeate sample screen.



2. To begin the sample mode, press the START button. After the divert cycle, the sample mode is activated and the RO will start and begin the Fast Flush timer. The screen will automate water coming from the sample port and the CANCEL button will appear. At any time during the sample mode, the CANCEL or the BACK button will stop the process and return the screen back to the Home screen.



- Once the Fast Flush timer has timed out, the pump will ramp down to a slower speed, the TEST COMPLETE button will appear, and the system alarm will sound. After taking a sample, press the TEST COMPLETE button. The sample mode will stop and the system alarm will reset.

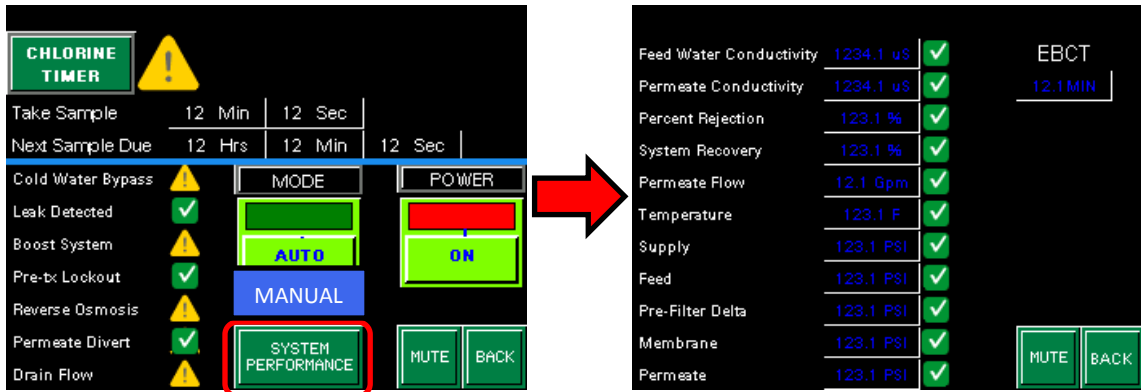


PERMEATE SAMPLE (DIRECT FEED ONLY)

- Open the sanitary sample port by opening it clockwise until flow begins.
- Collect sample.
- Close sanitary sample port by closing it counter-clockwise.

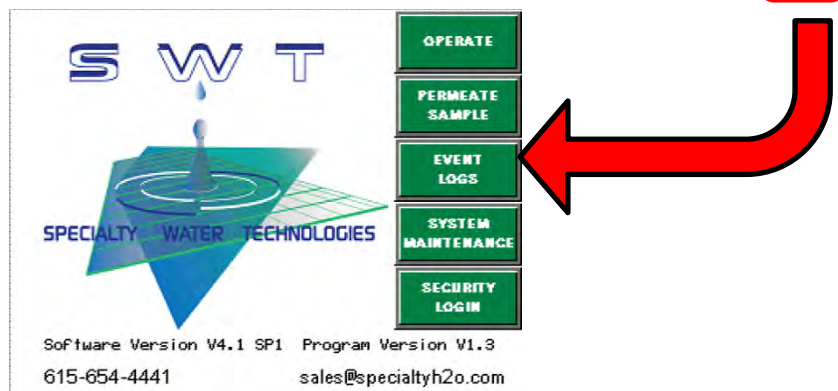
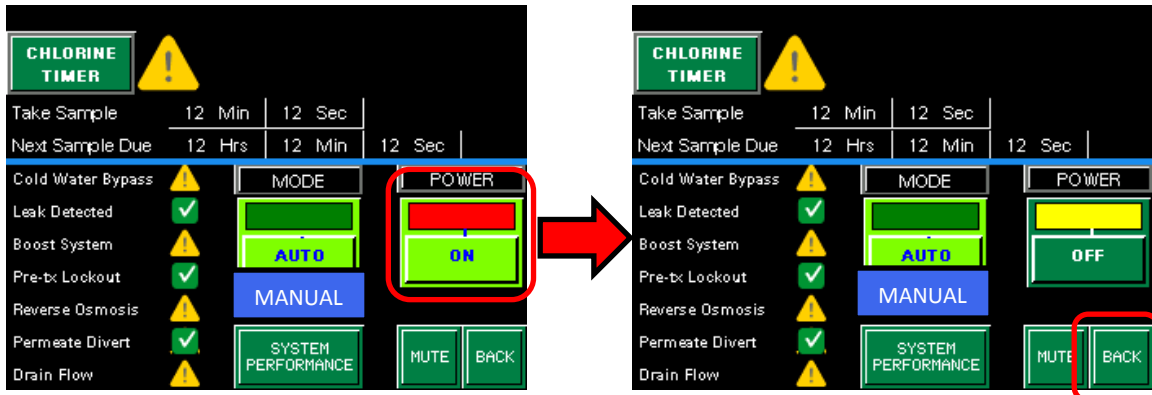
MONITORING (TANK & DIRECT FEED)

1. From the Main Operate screen press the SYSTEM PERFORMANCE button to bring up the operating values.



SHUT-DOWN

1. From the Main Operate screen press the Power ON button to toggle it to OFF then press the BACK button to return to the Home Screen.

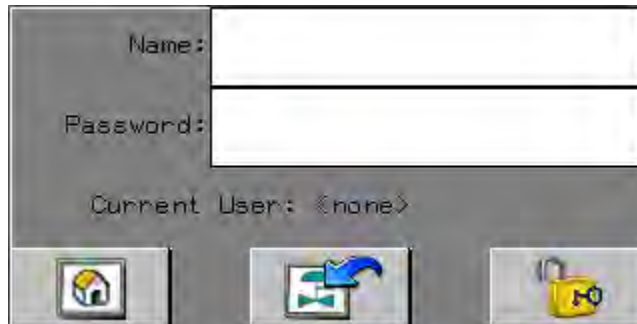


SYSTEM MAINTENANCE

1. From the Home screen, press the SECURITY LOGIN button, this changes the screen to the System Login Panel.



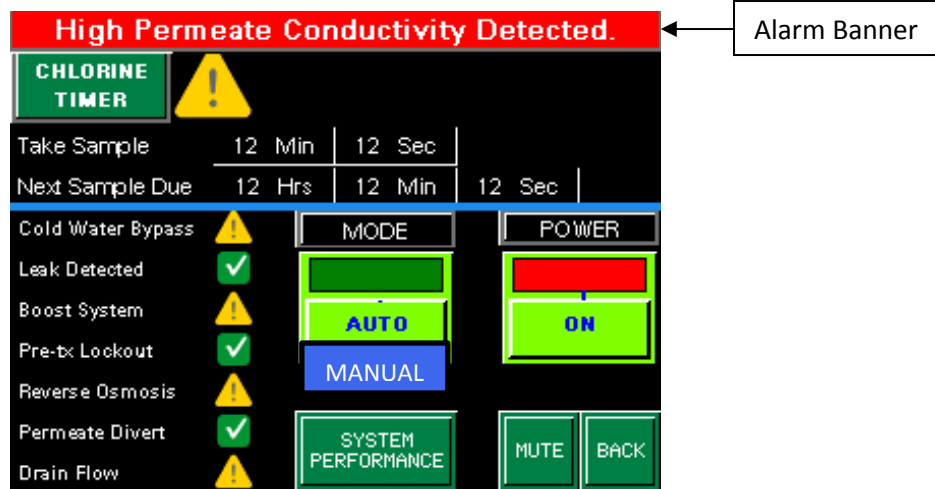
2. To enter in the User Name, press the panel beside Name: to bring up the keypad.



3. To enter in the Password, press the panel beside Password: to bring up the keypad.
4. If the name and password are successful, the user name will be displayed beside Current User:.
5. Press the Unlock button in the bottom right of the screen.
6. Press the Return button in the bottom center of the screen, this will take you back to the Home screen. The SYSTEM MAINTENANCE button will now be available.

ALARMS (TANK & DIRECT FEED)

1. The Alarm section of the screen (Top Banner) allows the operator to view the nature of the alarm and access information to assist in correcting the condition.



2. The alarms are listed in the table on the following page by priority/severity of the alarm condition. Critical alarms may mask Operational alarms until the critical condition is corrected first.
3. Once activated, the alarm banner and audible alarm will remain ON until the cause of the alarm condition is corrected.
4. The audible alarm may be muted for no more than 180 seconds while in an alarm condition then it will begin sounding again until the alarm condition is corrected or muted again.

Alarm Level	Critical Alarms (System Will Not Produce Permeate)	Description	RO Alarm	Remote
1	Flow Data Corrupt	An incoming power anomaly has caused the PLC to load corrupted data into the flow sensor k-factors. * Cycle Power to Reset*	X	X
	Leak Detected at Municipal Boost	A leak has been detected in the water room	X	X
	Pretreatment Lockout	Media tank in a backwash or regeneration cycle		
	Permeate Pressure Exceeded - Check Product Hose	Pressure >50 psi was detected indicating permeate hose not connected or kinked	X	X
	Low System Pressure Detected	Feed water pressure below 'Low Pressure Set Point'	X	X
	High Permeate Conductivity Detected	Diverted to drain. 'Conductivity Set Point' exceeded	X	X
	High Water Temperature Detected	'Temperature Set Point' exceeded	X	X
	Drive Error Present	An incoming power anomaly has caused a non-recoverable error in the variable frequency drive * Cycle Power to Reset *	X	X

Operational Alarms				
2	System Recovery Too High	When recovery rate >75%	X	X
	System Recovery Too Low	When recovery rate <50%	X	X
	EBCT has Been Exceeded	When value drops below 'EBCT Set Point'	X	X
	Drain Flow Fault Detected - Check Flow	System compares drain flow to expected drain volume based on # of membranes. Alarms when the minimum drain flow is not met	X	X
	Percent rejection Too Low	When % Rej. Drops below 'Percent Rejection Set Point'	X	X
	Low Tank Level Detected (TANK FEED ONLY)	When tank level drops below low level sensor	X	X
	Please Remove CIP from RO	Locks RO from turning on in "Operate" while the CIP tank is connected. Disconnect tank to operate system		
	RO in Speed Override - Check Membrane Pressure Sensor	When 'RO Membrane Pressure Set point' has been exceeded. System is running in manual mode at a pre-set pressure. User must cycle power to reset condition	X	
	Feed Conductivity Variance Exceeded	When 'Feed Conductivity Variance Set point' has been exceeded. RO continues to run w/ audible alarm	X	

TROUBLESHOOTING GUIDE

Problem	Possible Solutions
Suction Pressure Low	<ul style="list-style-type: none"> • Supply pressure is low • Pre-Filter is fouled • Feed valve failed to open • Pressure signal is lost
Feed Temperature High	<ul style="list-style-type: none"> • Supply temperature is high • Temperature signal is defective
Feed Temperature Low	<ul style="list-style-type: none"> • Improperly adjusted blend valve • Faulty blend valve • Inadequate hot water supply • Temperature signal is defective
Permeate Conductivity High	<ul style="list-style-type: none"> • Feed water conductivity high • Recovery set too high • Membranes need cleaning • Membranes need replacing • Permeate conductivity meter needs calibration
Tank Level Low (<i>TANK FEED ONLY</i>)	<ul style="list-style-type: none"> • Water usage too high • RO Production too low
Percent Rejection Low	<ul style="list-style-type: none"> • Recovery too high • Membranes need cleaning • Membranes need replacing
No Power	<ul style="list-style-type: none"> • Power utility outage • Unit not plugged into electrical outlet • Outlet circuit breaker tripped • Circuit breaker in control box tripped

1. Only install manufacturer recommended reverse osmosis membranes.

Task	Frequency	Notes
Check the Device For Leaks	Daily	Visual Inspection
Monitor the Device For Unusual Sounds	Daily	Visual/Auditory
Clean External Surfaces	Weekly	Use Soft Damp Towel or Sponge. (DO NOT USE BLEACH)
Record Operational Values (Flows, Pressures, Temp, etc)	Daily or more often as required by facility	Record on Daily (Shift) Checklist
Change 5-micron Pre-Filter	Every 30 Days or when $\Delta P \geq 15$ psi	See Operator's Manual on Cleaning
Clean Device (membranes)	Every 30 Days	See Operator's Manual on Cleaning
Perform Chemical, Microbial and Endotoxin Testing On Feed and Product Water As Per AAMI Requirements	Every 12 Months (Chemical)- 30 Days (Microbial) or more often as required.	Submit Samples To A Qualified Testing Laboratory
<u>Baldor Motors Only!</u> Check pump motor lubrication	Every 12 Months	1. Clean the grease zerk (fitting) 2. Add no more than 17 grams (4 teaspoons) of Polyrex EM grease.

SANITIZING STAINLESS STEEL SANITARY SAMPLE PORT / VALVE *(If Equipped)*

Sanitize the valve immediately after installation and after each sampling operation.

1. Flush the valve by turning the valve stem to the left and allow a full flow of liquid to pass out of the valve for 1-2 minutes, then close the valve by turning the stem to the right.
2. Fill a 20 mL plastic polypropylene syringe with at least 10 mL of 70% ethanol, 90% isopropyl alcohol, or 3% hydrogen peroxide solution. Attach the valve needle to the male Luer tip of the syringe.
3. Insert the needle all the way into the valve through the Luer opening and express the sanitizer into the valve. Allow a few milliliters to flow out of the valve outlet.
4. As the needle is removed from the opening, squirt a few milliliters of the sanitizer over the outer surface of the male, Luer-slip connection.
5. Fill the blue plastic cap with sanitizer and slip it snugly over the Luer outlet of the valve. This will keep the valve sanitized between sampling operations.

CLEANING

To perform at peak efficiency, the R.O. must be periodically cleaned with chemical cleaners to remove mineral deposits from the membranes and other internal surfaces.

Operator will periodically perform a manual cleaning of the system to maintain maximum performance.

Membrane fouling is indicated when:

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

This procedure covers the mechanical steps required to clean the Reverse Osmosis Machine Membranes. The preparation of the chemical cleaning solution must be in accordance with the specifications established for the selected cleaning chemical agent. The chemical agent must be stored and handled in accordance with the manufacturer's Material Safety Data Sheet (MSDS).

NOTE: The following instructions are for SWT supplied cleaners. When using other than SWT supplied cleaners, the target pH values are as follows:

Low pH: 2 - 3 (or per manufacturer's instructions)

High pH: 10 - ≤12 (pH above 12 may damage membranes)

NOTICE

Factors such as changes in the tap water pH, Temperature or Pressure can cause significant changes in the overall performance of the R.O.

CHEMICALS

Tri-Clean 210 LOW pH CLEANER

Low pH Application: For removing mineral scale in membrane applications. Tri-Clean 210 must be used before Tri-Clean 214TF.

Dilution: 2 pounds Tri-Clean 210 to 20 gallons of RO water.

Target pH: 2-3

Duration: Circulate 30 minutes, dwell 30 minutes then flush completely.

Tri-Clean 212TF HIGH pH CLEANER

High pH Application: For removing grime, grease, oil and biological matter on Thin Film Composite Membranes.

Dilution: 2 pounds of Tri-Clean 212TF to 20 gallons of RO water.

Target pH: 11 - ≤12 (pH above 12 may damage membranes)

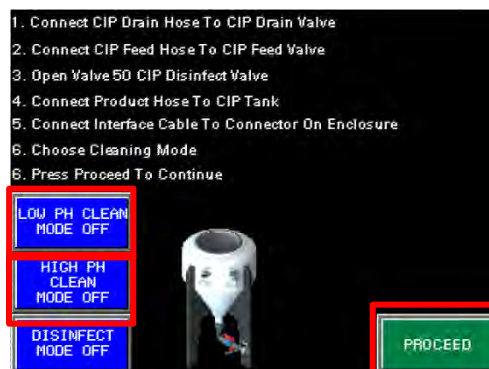
Duration: Circulate 30 minutes, dwell 30 minutes then flush completely.

PROCEDURE

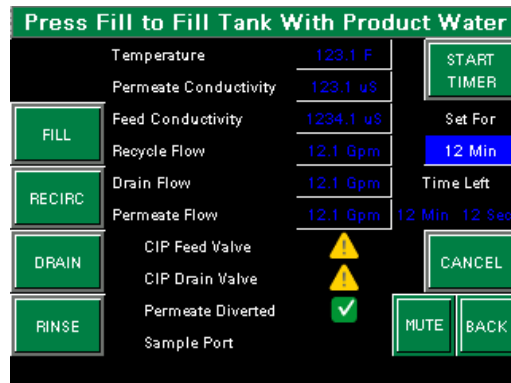
1. From the System Maintenance screen, press the CLEAN SYSTEM button.



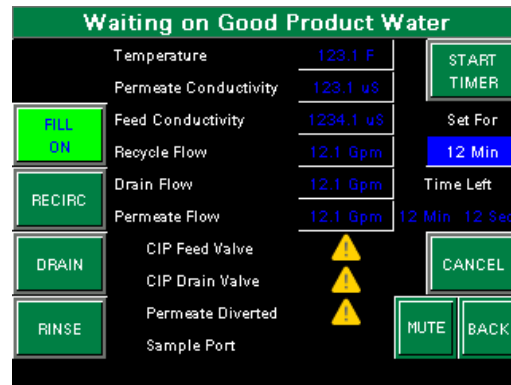
2. Follow the connection procedure on the screen, ensure blue toggle button is in CLEAN MODE then press the PROCEED button.



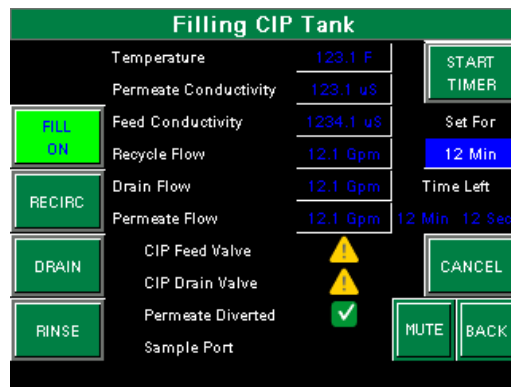
- Press the FILL button to fill the cleaning tank with product water.



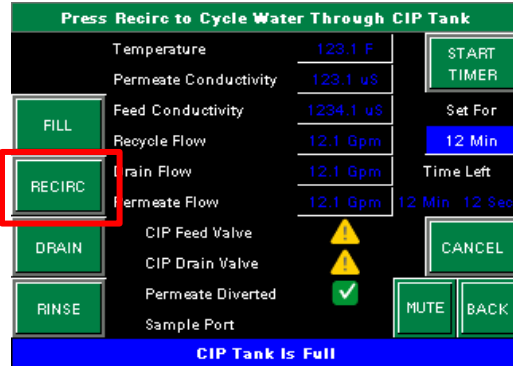
- The FILL button will change from aqua to green and display FILL ON. The RO will cycle water through drain until QA parameters are met.



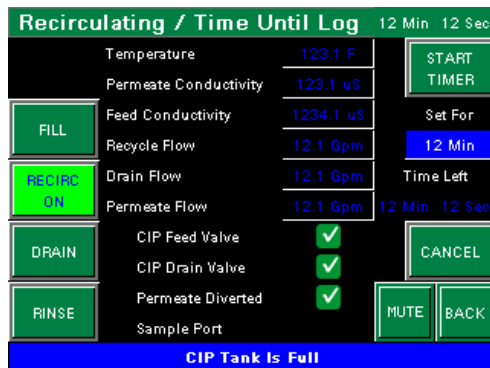
- Once the water conductivity falls below product divert setpoint, the product divert valve will energize and allow water to enter the cleaning tank.



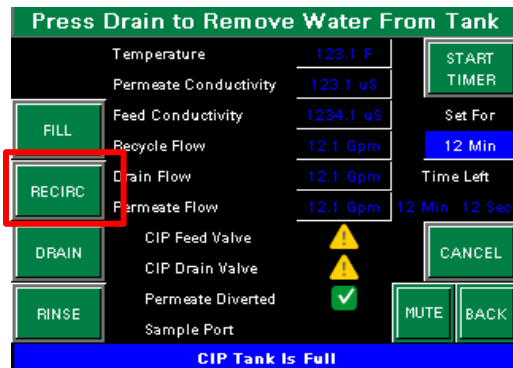
- Once the tank has reached a level of 20 gallons, the pump will turn off automatically and the system alarm will sound indicating that the tank is full. Press the RECIRC button.



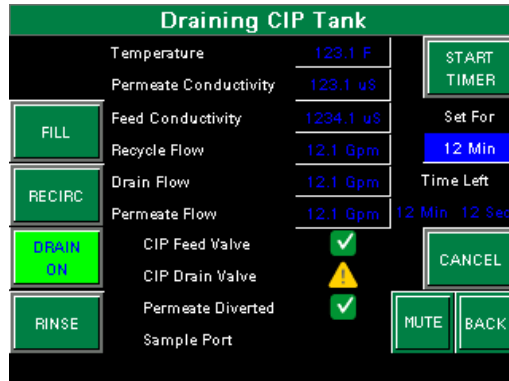
- The RECIRC button will change from aqua to green and display RECIRC ON. The CIP Feed Valve and the CIP Drain Valve will energize and the pump will start recirculating water through the cleaning tank.



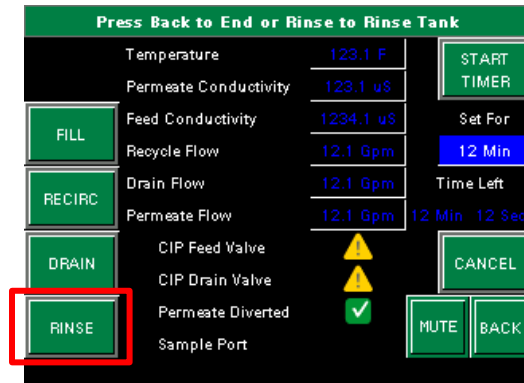
- Add TRICLEAN 210 / (Low pH Cleaner) to the cleaning tank and allow to recirculate while checking the pH for between 2-3. If too high add more TRICLEAN 210 / (Low pH Cleaner). Allow to recirculate for 30 minutes. Once the chemical has recirculated, press the RECIRC ON button to stop the recirculation process. Dwell for 30 minutes. Press the DRAIN button.



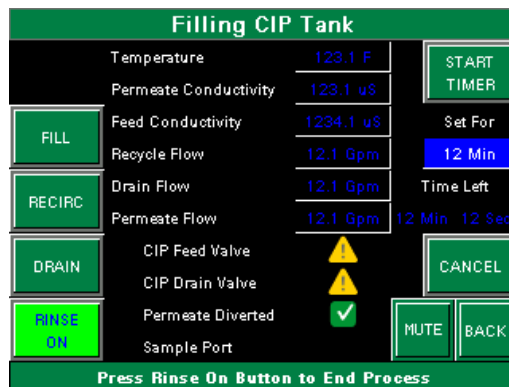
- The DRAIN button will change from aqua to green and display DRAIN ON. The CIP Drain Valve will turn off and the pump will start draining the chemical solution from the tank.



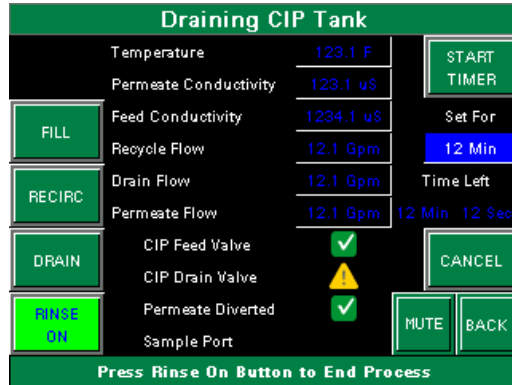
- When the tank is empty, the pump will turn off automatically. Press the RINSE button.



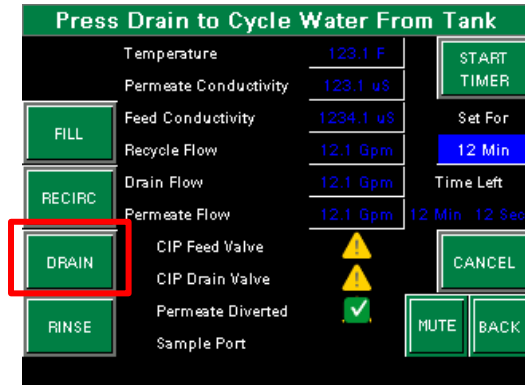
- The RINSE button will change from aqua to green and display RINSE ON. The fill cycle will start adding water to the cleaning tank after the water conductivity falls below product divert setpoint,



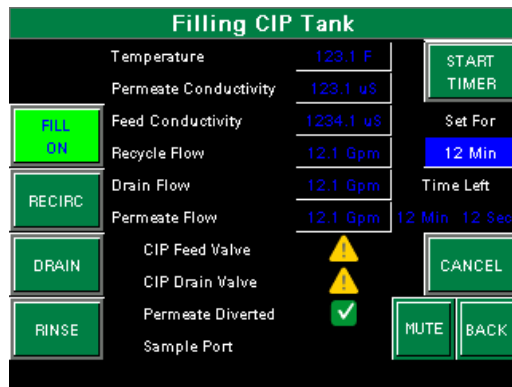
12. Once the tank is full the drain process will start removing water from the tank. This fill / Drain process will continue.



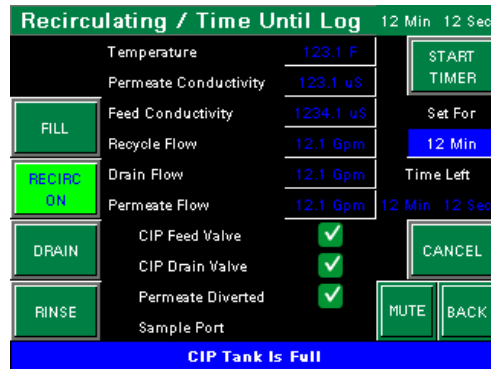
13. When the conductivity has reached an acceptable level, press the RINSE ON button to stop the rinse process. If the tank has water still present, press the DRAIN button to remove.



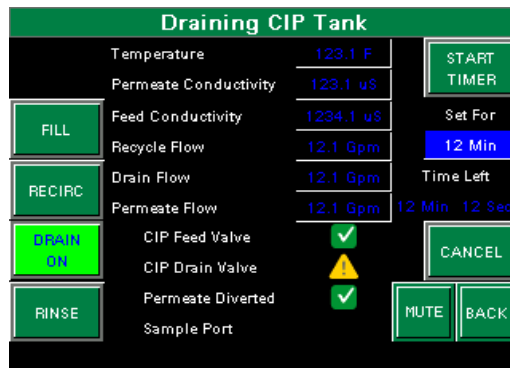
14. Once the tank is empty, press the FILL button to start the filling process.



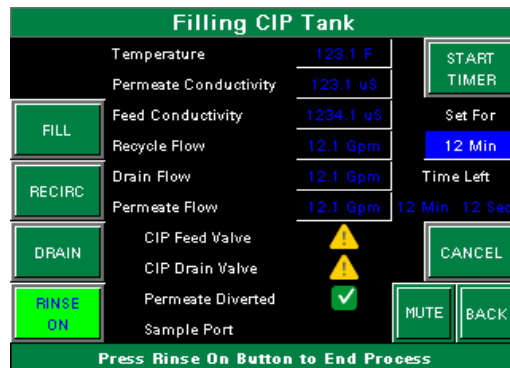
15. Once the tank has reached a level of 20 gallons the pump will turn off automatically and the system alarm will sound indicating that the tank is full. Press the RECIRC button.



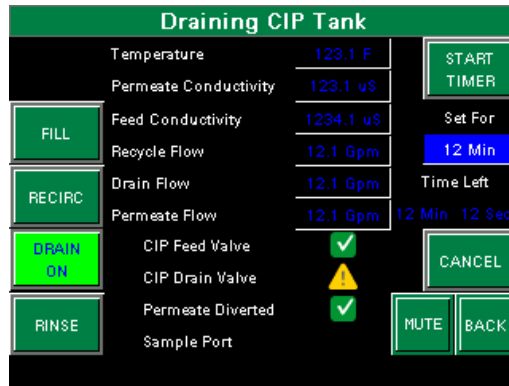
16. Add TRICLEAN 212TF / (High pH Cleaner) to the cleaning tank and allow to recirculate while checking for a pH between 11 - ≤12. If too low add more TRICLEAN 212TF / (High pH Cleaner). Allow to recirculate for 30 minutes. Once the chemical has recirculated, press the RECIRC ON button to stop the recirculation process. Dwell for 30 minutes. Press the DRAIN button.



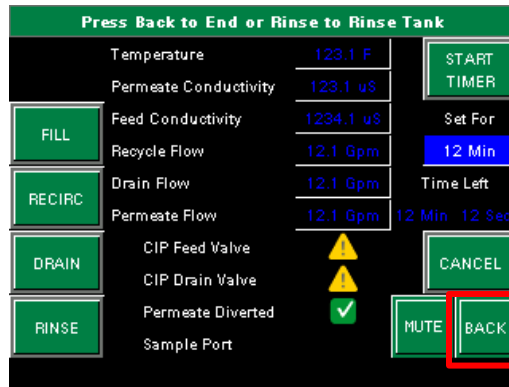
17. When the tank is empty, the pump will turn off automatically. Press the RINSE button. The fill / drain process will start rinsing the chemical from the system.



18. When the conductivity has reached an acceptable level, press the RINSE ON button to stop the rinse process. If the tank still has water present, press the DRAIN button to remove.



19. Once the tank is empty the pump will turn off automatically. Remove the hoses from the cleaning tank and replace to their normal operating locations. Press the BACK button to exit the clean mode.



CHEMICALS

Micro-X (Cold Sterilant)

Sterilant Application: For removing organisms and biological matter on Thin Film Composite Membranes. Same chemical properties and intended use as Renalin™.

TANK FEED SYSTEM

Dilution: See chart below (RO only) to mix with 20 gallons of RO water, based on number of membranes of unit.

Duration: Add amount of Micro-X for RO ONLY, circulate. Check potency with test strips and add more Micro-X if needed. Allow to dwell for minimum of 36 minutes to a maximum of 12 hours, then flush completely. Contact time should be based on the bacterial load in the RO system.

DIRECT FEED SYSTEM

Dilution: See chart below (RO only) to mix with 20 gallons of RO water, based on number of membranes of unit.

Duration: Circulate for 15 minutes, add additional amount for loop length and circulate for another 15 minutes. Check potency with test strips and add more Micro-X if needed. Allow to dwell for minimum of 36 minutes to a maximum of 12 hours, then flush completely. Contact time should be based on the bacterial load in the RO system.

Dilution Chart		DIRECT FEED SYSTEM ONLY For Loop Add (+)			
		250'	500'	750'	1000'
# RO Membranes	RO Only	mL	mL	mL	mL
	mL				
4 - 6	1175	300	590	880	1180
7 - 9	1375	300	590	880	1180

NOTE: If using other than SWT supplied sterilant please follow manufactures instructions as to dilution ratio to prevent possible membrane damage.

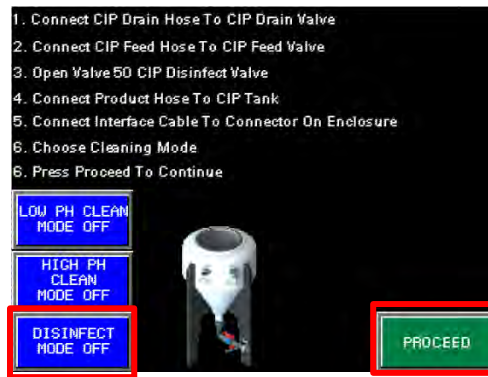
PROCEDURE

1. Mineral deposits should be removed with TRICLEAN 210 / (Low pH Cleaner) **PRIOR** to disinfecting of the membranes. The presence of iron or other transition metals in conjunction with the hydrogen peroxide in Micro-X could cause membrane degradation. See Cleaning Section.

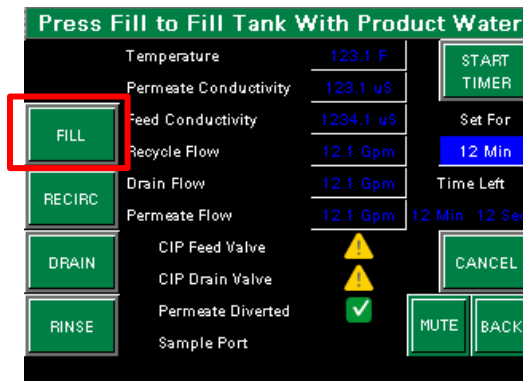
- From the System Maintenance screen, press the CLEAN SYSTEM button.



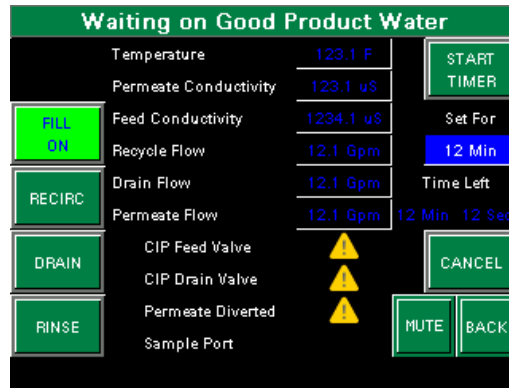
- Follow the connection procedure on the screen, ensure toggle button above the PROCEED button is in DISINFECT MODE then press the PROCEED button.
- NOTE:** The difference between the CLEAN and DISINFECT modes is that in DISINFECT mode the sediment filter is bypassed to eliminate needing to remove filter prior to disinfection of Reverse Osmosis device. All other operations are similar as in the CLEAN mode.



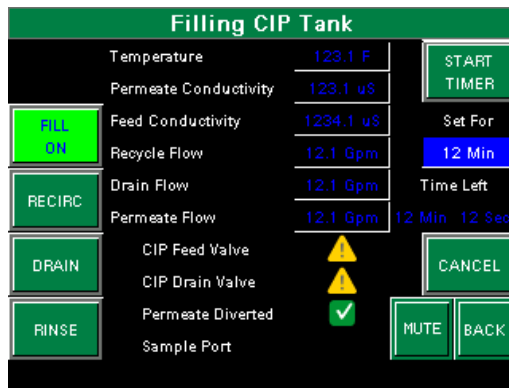
- Press the FILL button to fill the cleaning tank with product



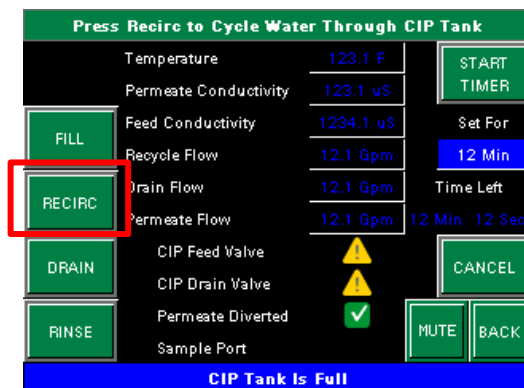
- The FILL button will change from aqua to green and display FILL ON. The RO will cycle water through drain until QA parameters are met



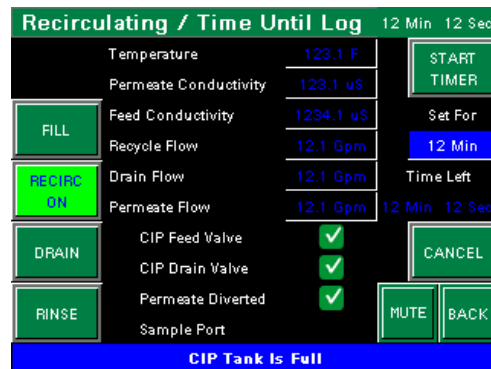
- Once the water conductivity falls below product divert setpoint, the product divert valve will energize and allow water to enter the cleaning tank.



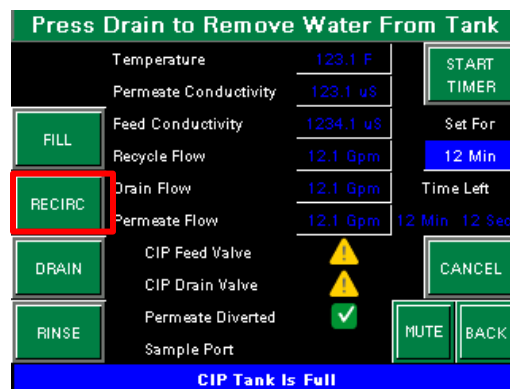
- Once the tank has reached a level of 20 gallons, the pump will turn off automatically and the system alarm will sound indicating that the tank is full. (Direct Feed only connect permeate hose to loop feed connection, ensure loop return valve is in the return position) Press the RECIRC button.



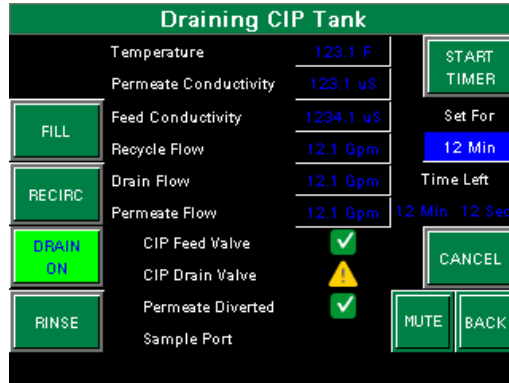
9. The RECIRC button will change from aqua to green and display RECIRC ON. The CIP Feed Valve and the CIP Drain Valve will energize and the pump will start recirculating water through the cleaning tank.



10. **Tank feed System:** Add Micro-X / (Cold Sterilant) to the cleaning tank and allow to recirculate for at least 5 minutes. Once the chemical has recirculated, press the RECIRC ON button to stop the recirculation and begin dwell cycle. At the end of desired dwell time press the DRAIN button.
11. **Direct Feed System:** Add appropriate amount of Micro X to the cleaning tank utilizing the Dilution chart **RO Only** and allow to recirculate for at least 15 minutes. After 15 minutes add additional Micro X see dilution chart. Add appropriate amount according to loop length. Allow system to recirculate an additional 15 minutes. While RO is recirculating open all sample ports and points of use momentarily to ensure each point of use is positive for Micro X. Once the chemical has recirculated, press the RECIRC ON button to stop the recirculation and begin dwell cycle. At the end of desired dwell time press the DRAIN button.



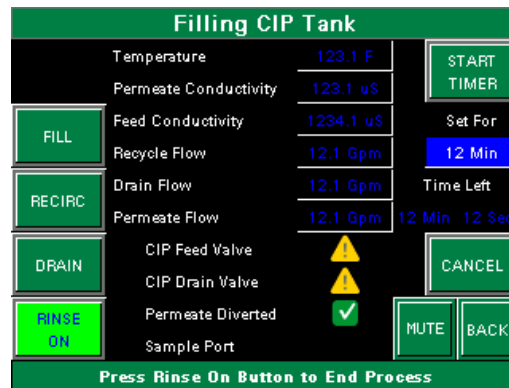
12. The DRAIN button will change from aqua to green and display DRAIN ON. The CIP Drain Valve will turn off and the pump will start draining the chemical solution from the tank.



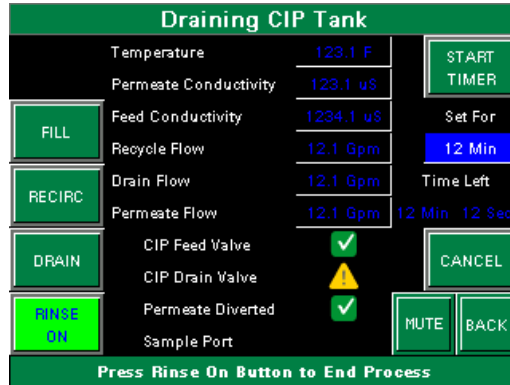
13. Tank Feed System: When the tank is empty the pump will turn off automatically. Press the RINSE button.

Direct Feed System: When the tank is empty connect permeate hose to the CIP tank. Press the RINSE button

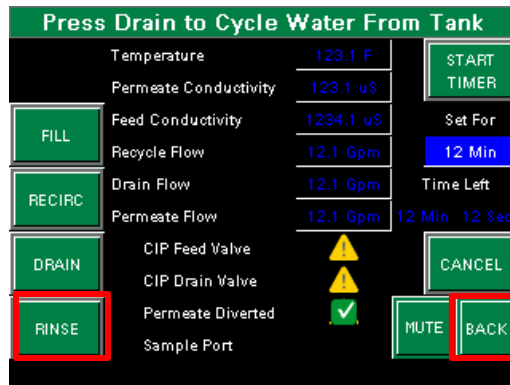
14. The RINSE button will change from aqua to green and display RINSE ON. The fill cycle will start adding water to the cleaning tank after the water conductivity falls below product divert setpoint.



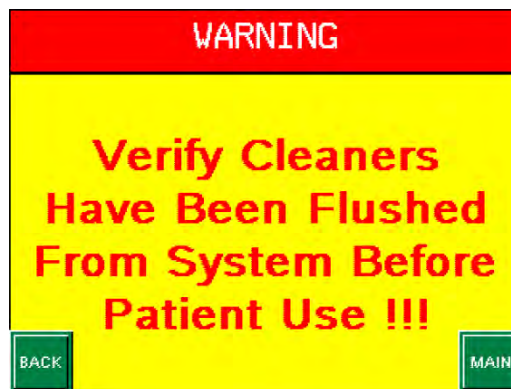
15. Once the tank is full the drain process will start removing water from the tank. This fill / Drain process will continue.



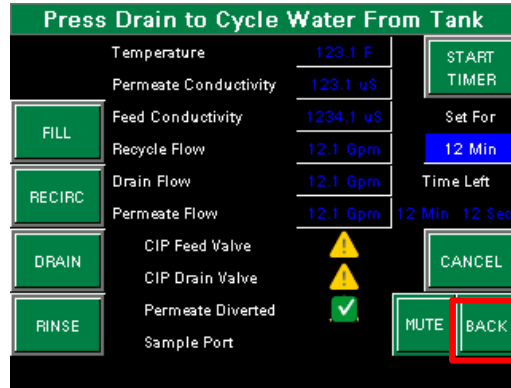
16. When the conductivity has reached an acceptable level, press the RINSE ON button to stop the rinse process. If the tank has water still present, press the DRAIN button to remove.



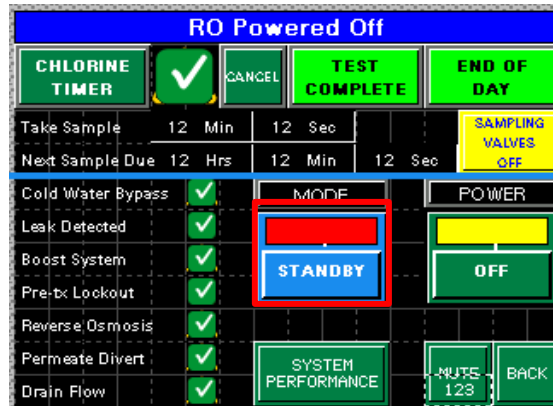
17. Tank Feed System: Once the tank is empty the pump will turn off automatically. Remove the hoses from the cleaning tank and replace to their normal operating locations. Press the BACK button to exit the clean mode.



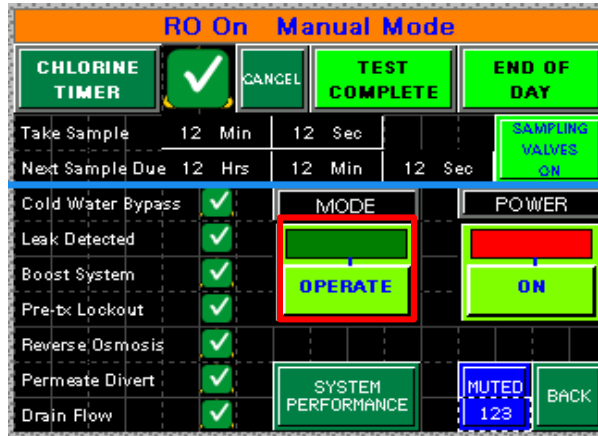
18. Direct Feed System: Once the tank is empty the pump will turn off automatically. Remove Permeate hose and connect to loop feed connection. Open loop return valve to drain. Press BACK Button to exit clean mode.



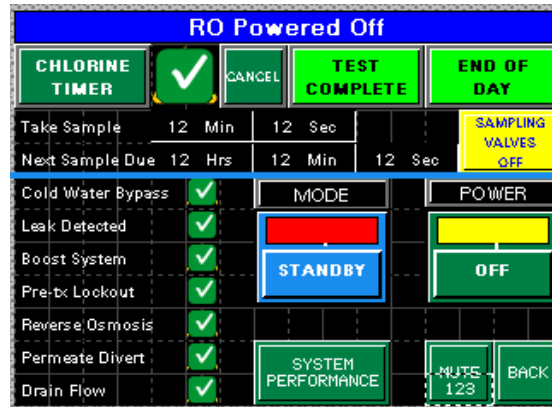
19. Direct Feed System: Press the STANDBY button to turn on RO and rinse the loop to drain. Open all sample ports and points of use. Allow RO and loop to rinse for at least 30 minutes.



20. Direct Feed System: Check the loop return sample port for residual Micro-x, if negative press the OPERATE button to turn RO pump off and turn the loop return valve to the Return Position.

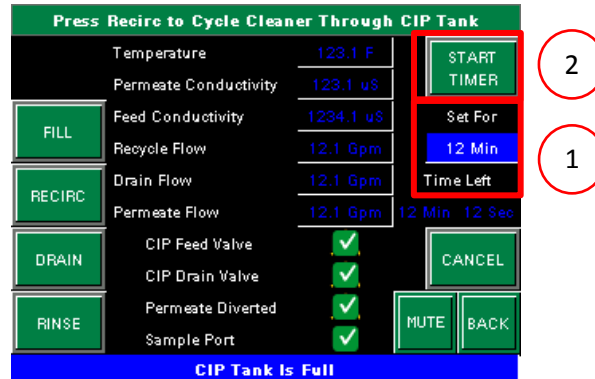


21. Direct Feed System: Press Standby on the RO allowing the RO to run for 30 minutes then check all sample ports and points of use for residual Micro- X. If all the sample are negative the disinfect is complete.



TIMER FUNCTION

1. Press the blue box directly under the START TIMER button to enter the amount of time to count.



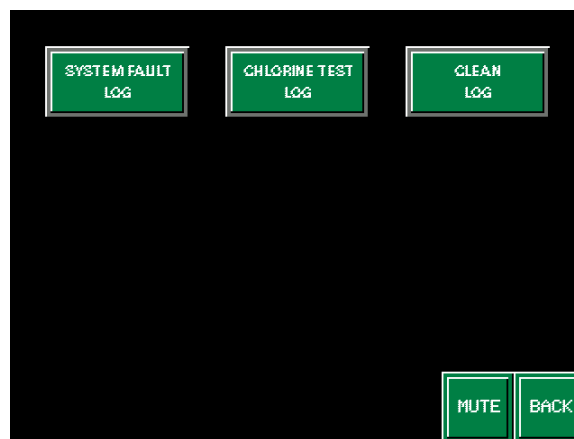
2. Press START TIMER button to start timing the process.
 - Button will change to TIMER ON
 - Time left will start to count down.
3. Once timer is complete the CANCEL button will change to RESET TIMER, and a banner will appear at the bottom of the screen and alarm will sound.
4. CANCEL will reset the timer at any time.
5. Press RESET TIMER, alarm will reset, timer will reset and buttons return to original status.

EVENT LOGS

There are 3 Event Log screens, accessible from the Main Menu.



- System Fault Logs 200 events total, (alarms, system condition, warnings, etc.) then newer data will replace the oldest data.
- Chlorine Test Logs 30 events total, (scheduled chlorine tests) then newer data will replace the oldest data.
- Clean Logs 30 events total, (low pH Cleaning, high pH cleaning and disinfecting) then newer data will replace the oldest data.



1. The System Fault Log screen will display the date, time and a message stating what the condition/alarm was at that time. Dragging the side bar up and down to view all the records as desired. The message will scroll left to right if it is longer than the area on the screen.

	Date	Time	Message
▶	mm/dd/yy	12:00am	XXXXXXXXXX
	mm/dd/yy	12:00am	XXXXXXXXXX

SYSTEM FAULT LOG

BACK

2. The Chlorine Test Log screen will display the date, time and a message showing the status of a chlorine test. Dragging the side bar up and down to view all of the records as desired. The message will scroll left to right if it is longer than the area on the screen.

	Date	Time	Message
▶	mm/dd/yy	12:00am	XXXXXXXXXX
	mm/dd/yy	12:00am	XXXXXXXXXX

CHLORINE TEST LOG

BACK

- 3. The Clean Log screen will display the date, time and a message showing what action was conducted, low pH cleaning, high pH cleaning or disinfection. Dragging the side bar up and down to view all of the records as desired. The message will scroll left to right if it is longer than the area on the screen.

Date	Time	Message
mm/dd/yy	12:00am	XXXXXXXX
mm/dd/yy	12:00am	XXXXXXXX

CLEAN LOG

BACK

Antiscalant

A chemical added to increase the solubility of sparingly soluble salts. For example, CaCO₃, CaCO₄, SrSO₄, BaSO₄, CaF are commonly a concern in RO systems.

Anti-Telescoping Device (ATD)

A plastic device on the ends of a membrane element that provides structural support to the membrane to prevent unraveling and extension.

Array

The physical arrangement of the RO elements.

Brine Seal

A plastic or rubber device that seals the outside of one end of a spiral wound membrane element against the wall of the RO housing. The Brine Seal prevents the bypass of feed water around the membrane element.

Concentration Factor (CF)

CF represents the degree that feed water dissolved solids are concentrated in the brine solution.

Cross-Flow Concentration

A filtration process where the feed water stream runs parallel to the filter media and a continuously moving concentrate stream removing contaminants from the membrane.

Elements

Elements are the membranes. Some companies consider the housing/membrane assembly an Element. Better Water does not.

Feed Stream

This is the water flow into the first stage of the RO system. The feed stream is separated into permeate (product stream) and a concentrated (brine stream).

Housing

The vessel holding the membrane, can be stainless steel or molded.

Membrane

A membrane is a semi-permeable material that allows water to flow through while other substances are rejected. Membranes are the barrier layer or interface for cross-flow separation.

Membranes are comprised of thin and porous material. RO membranes will typically reject contaminants with molecular weights greater than 200.

O-Rings

Used to seal the water connectors to prevent water seepage from connectors or the intrusion of high pressure feed water (poor quality) into low pressure permeate water (good quality)

Osmotic Pressure

The pressure required to prevent the flow of water across a semipermeable membrane separating two solutions having different ionic concentrations. Osmotic Pressure is the force that must be overcome by the RO unit to produce permeate.

Permeate

Often referred to as product water. Permeate is the portion of the feed water stream that passes through the membrane.

Pressure Vessel

The Housing. A tubular device that contains the membrane elements.

Product Stream

See Permeate

Recovery

Recovery is the percentage of the feed water that is converted into permeate. This is sometimes referred to as conversion.

Salt Passage

The percentage of salt that passes through the membrane into the permeate stream. Salt passage is a function of temperature, velocity and concentration.

Salt Rejection

The percentage of salt removed from the feed water stream.

$$\text{Salt Rejection} = (\text{TDSFEED} - \text{TDSPRODUCT}) / (\text{TDSFEED}) \times 100$$

Total Dissolved Solids (TDS)

TDS refers to any minerals, salts, metals, cations or anions dissolved in water. In general, the total dissolved solids concentration is the sum of the cations (positively charged) and anions (negatively charged) ions in the water. TDS is based on the electrical conductivity (EC) of water. Pure H₂O has virtually zero conductivity. Conductivity is usually about 100 times the total cations or anions expressed as equivalents. TDS is calculated by converting the EC by a factor of 0.5 to 1.0 times the EC, depending upon the levels. Typically, the higher the level of EC, the higher the conversion factor to determine the TDS.

Reverse Osmosis Machine Checklist

ITEM TO BE CHECKED	RO # 1		RO # 2	
	1 st Check	2 nd Check	1 st Check	2 nd Check
DATE				

REVERSE OSMOSIS FLOWS

Product Flow (GPM)				
Reject Flow (GPM)				
Recirculate Flow (GPM)				

REVERSE OSMOSIS PRESSURES

Incoming Water Pressure (PSI)				
RO Pump Pressure (PSI)				
RO Membrane Pressure (PSI)				
RO Product Pressure (PSI)				

RO WATER QUALITY

Feed Conductivity (µS)				
Product Conductivity (µS)				
Percent Rejection (%)				

OTHER

Internal Clock set to Correct Time (Y/N)				
--	--	--	--	--

TECHNICIAN'S INITIALS				
------------------------------	--	--	--	--

User is required to obtain the following data prior to cleaning the RO. The values can be taken from the RO OIT except for pH, which can be taken from the CIP tank after first fill cycle.

These values will provide the baseline which will determine if machine has been adequately rinsed of cleaners.

Record the following parameters.

Baseline

Feed Water Conductivity: _____ μ S Baseline
 Permeate Conductivity: _____ μ S Baseline
 Permeate pH _____ pH Baseline

Step 1 - Low PH Cleaner

After the low PH cleaner has been added to the CIP tank and recirculation has begun test solution for a pH of 2 - 3, if too high add more low PH cleaner until target is reached. Once target is reached set recirculation timer for 30 minutes and start. Record the following:

Record recirculation values:

Feed Water Conductivity: _____ μ S >5000 μ S
 Permeate Conductivity: _____ μ S >100 μ S
 Permeate pH _____ pH 2 - 3

After recirculation and dwell has completed drain and rinse system until system values are near baseline values.

Record the rinsed values:

Feed Water Conductivity: _____ μ S Compare to Baseline Above
 Permeate Conductivity: _____ μ S Compare to Baseline Above
 Permeate pH _____ pH Compare to Baseline Above

Step 2 - High PH Cleaner

After the high pH cleaner has been added to the CIP tank and recirculation has begun test solution for a pH of 11 - \leq 12, if too low add more high pH cleaner until target is reached. Once target is reached set recirculation timer for 30 minutes and start. Record the following:

Record recirculation values:

Feed Water Conductivity: _____ μ S >10,000 μ S
 Permeate Conductivity: _____ μ S >200 μ S
 Permeate pH _____ pH 11 - \leq 12

After recirculation and dwell has completed drain and rinse system until system values are at or below baseline values.

Record the rinsed values:

Feed Water Conductivity: _____ μ S Compare to Baseline Above
 Permeate Conductivity: _____ μ S Compare to Baseline Above
 Permeate pH _____ pH Compare to Baseline Above

System Cleaned By: _____ Date: _____

Serial Number: _____

UPT Series RO Default Parameters

Parameter Name	Screen Location	Security Level	Parameter Range	Factory Setting
User Setup	<i>Button ID</i>	<i>TECH</i>		
*Feed Conductivity Set Point	Conductivity Variation	User	5 - 1500	Site Specific
Feed Conductivity Variation			10 - 50%	20%
Shift Interval	Chlorine Setup		3.0 - 5.0 hrs	3 hrs
Test Cycle			12 - 30 min	12 min
Recycle Flow Meter	Flow Meter Setup		Sensor Specific	Sensor Specific
Permeate Flow Meter			Sensor Specific	Sensor Specific
Drain Flow Meter			Sensor Specific	Sensor Specific
Flow Accumulator Sensor			121	121
Supply Pressure Setpoint			2 - 10 psi	2 psi
Product Flush Time	User Setup		1 - 5 min	1 min
Product Divert Setpoint			5 - 35 μ S	20 μ S
Temperature Setpoint			50 - 105 F	95 F
Auto Flush Interval			1 - 3 hrs	1 hour
Auto Flush Runtime			5 - 20 min	10 min
Delta PSI Limit			1 - 15 psi	10 psi
Percent Rejection			50 - 95%	90%
RO Pump Pressure			175 - 250 psi	215 psi
Contact Time	EBCT Setup		10 - 15 min	12 min
Number of Membranes			4 - 9	Job Specific
Actual Carbon Volume			8 - 45	Job Specific

* Feed Conductivity above 1000 MUST meet AAMI requirements and may require further filtration

UPT Series RO Flow Specifications

75F Feed, 225 PSI, +/- 15%

UPT-540	Feed	Permeate	Recycle	Drain	Recovery
	13.28	6.64	0	6.64	50.00
Factory Default	10.63	6.64	2.65	4.00	62.50
	8.85	6.64	4.43	2.15	75.00
UPT-550	Feed	Permeate	Recycle	Drain	Recovery
	16.60	8.30	0	8.30	50.00
Factory Default	13.29	8.30	3.31	5.00	62.50
	11.06	8.30	5.54	2.75	75.00
UPT-560	Feed	Permeate	Recycle	Drain	Recovery
	19.92	9.96	0	9.96	50.00
Factory Default	15.94	9.96	3.98	6.00	62.50
	13.28	9.96	6.64	3.35	75.00
UPT-570	Feed	Permeate	Recycle	Drain	Recovery
	23.24	11.62	0	11.62	50.00
Factory Default	18.59	11.62	4.65	7.00	62.50
	15.49	11.62	7.75	3.90	75.00
UPT-580	Feed	Permeate	Recycle	Drain	Recovery
	26.56	12.28	0	12.28	50.00
Factory Default	21.26	12.28	4.80	7.50	62.50
	17.71	12.28	8.35	3.95	75.00
UPT-590	Feed	Permeate	Recycle	Drain	Recovery
	29.88	13.24	0	13.24	50.00
Factory Default	23.90	13.24	5.13	8.15	62.50
	19.93	13.24	9.09	4.15	75.00

WARRANTY

Seller warrants that the Equipment will meet all requirements of the Purchase Order and be of high quality, with design, materials and workmanship proper and sufficient for the purposes contemplated and be free from defects due to faulty design, materials, or workmanship. For the period of six months from the date of shipment, Seller will provide replacements for any defective parts. For the period of thirty days from the date of shipment, Seller will pay for the labor to replace defective parts. Buyer must provide Seller with notice of observed defects during such periods for this warranty to apply. This warranty shall be void with respect to any Equipment as to which Buyer has removed or added components to Seller's standard configuration of such Equipment, or as to which Buyer has requested that components be removed or added to Seller's standard configuration of such Equipment. In no event will Seller be responsible for any incidental or consequential damages resulting from defects due to faulty design, materials, or workmanship.

THIS WARRANTY IS THE ONLY WARRANTY APPLICABLE TO THIS PURCHASE OF EQUIPMENT. EXCEPT AS PROVIDED HEREIN, ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED.

Contact

Specialty Water Technologies, Inc.
1020 Industrial Drive
Orlinda, TN 37141
Phone: (615) 654-4441
Fax: (615) 654-4449
Website: www.specialtyh2o.com



UPT RO Operation Manual Rev. 5_2019
Manual P/N: OM-K-RO-UPT

1020 Industrial Drive, Orlinda, TN 37141

615-654-4441

sales@specialtyh2o.com

615-654-4449 fax