Reo-Pure water purification systems

BLS SERIES
reverse osmosis systems

BLS-3000
Optimum Model
USER MANUAL

Installation, Operation & Maintenance

Made In The U.S.A.

Member Water Quality Association

BLS3000OPTIUM-230207

Please read this manual carefully *BEFORE* attempting installation.

Table of Contents

Section 1: Introduction

Thank you for choosing a Reo-Pure™ Reverse Osmosis System! Every Reo-Pure™ RO System incorporates years of experienced engineering, dedicated workmanship, and high-quality components. Each system is built with pride and ensures superior performance. We are confident you will find this system to have quick and simple installation, hassle-free maintenance, and years of reliable, trouble-free operation.

As with all products, the customer has the responsibility to ensure that the Reo-Pure™ System is operated under proper conditions and within design limitations. All installation, startup and maintenance instructions must be followed carefully.

IMPORTANT

TO MAINTAIN THE MANUFACTURER'S WARRANTY, AN OPERATING LOG MUST BE MAINTAINED AND COPIES WILL NEED TO BE SENT TO YOUR LOCAL DEALER OR DISTRIBUTOR FOR REVIEW.

PRIOR TO OPERATING OR SERVICING THE REVERSE OSMOSIS SYSTEM, THIS USER'S MANUAL MUST BE READ AND FULLY UNDERSTOOD. KEEP THIS AND OTHER ASSOCIATED INFORMATION FOR FUTURE REFERENCE AND FOR NEW OPERATORS OR QUALIFIED PERSONNEL NEAR THE SYSTEM.

DO NOT UNDER ANY CIRCUMSTANCE REMOVE ANY CAUTION, WARNING, OR OTHER DESCRIPTIVE LABELS FROM THE SYSTEM.

INSTALLATION MUST COMPLY WITH STATE AND LOCAL PLUMBING, ELECTRICAL, AND SANITATION CODES.

DO NOT USE THIS SYSTEM TO MAKE DRINKING WATER FROM NON-POTABLE WATER SOURCES. DO NOT USE THE SYSTEM ON MICROBIOLOGICALLY UNSAFE WATER, OR WATER OF UNKNOWN QUALITY WITHOUT ADEQUATE DISINFECTION BEFORE OR AFTER THE SYSTEM.

REO-PURE™ RO SYSTEMS WILL OPERATE MOST EFFICIENTLY ON FILTERED WATER WITH A PH OF LESS THAN 6.5, AN SDI OF 5 OR LESS, AND HARDNESS OF LESS THAN 10 GPG. IF THE SYSTEM IS OPERATED WITH LEVELS HIGHER THAN THESE, OTHER FORMS OF PRETREATMENT MAY BE NECESSARY.

FEED WATER MUST NOT CONTAIN FREE CHLORINE, FORMALIN, QUATERNARY GERMICIDES, CATIONIC SURFACTANT, DETERGENTS CONTAINING NON-IONIC SURFACTANT, SUCH AS ALL OR TRITON, OR MEMBRANE ELEMENT CLEANERS OTHER THAN THOSE APPROVED FOR USE.

Safety

The Safety section of this User Manual outlines the various safety headings used throughout this manual.

IMPORTANT

(IMPORTANT) INDICATES STATEMENTS THAT PROVIDE FURTHER INFORMATION AND CLARIFICATION.

CAUTION

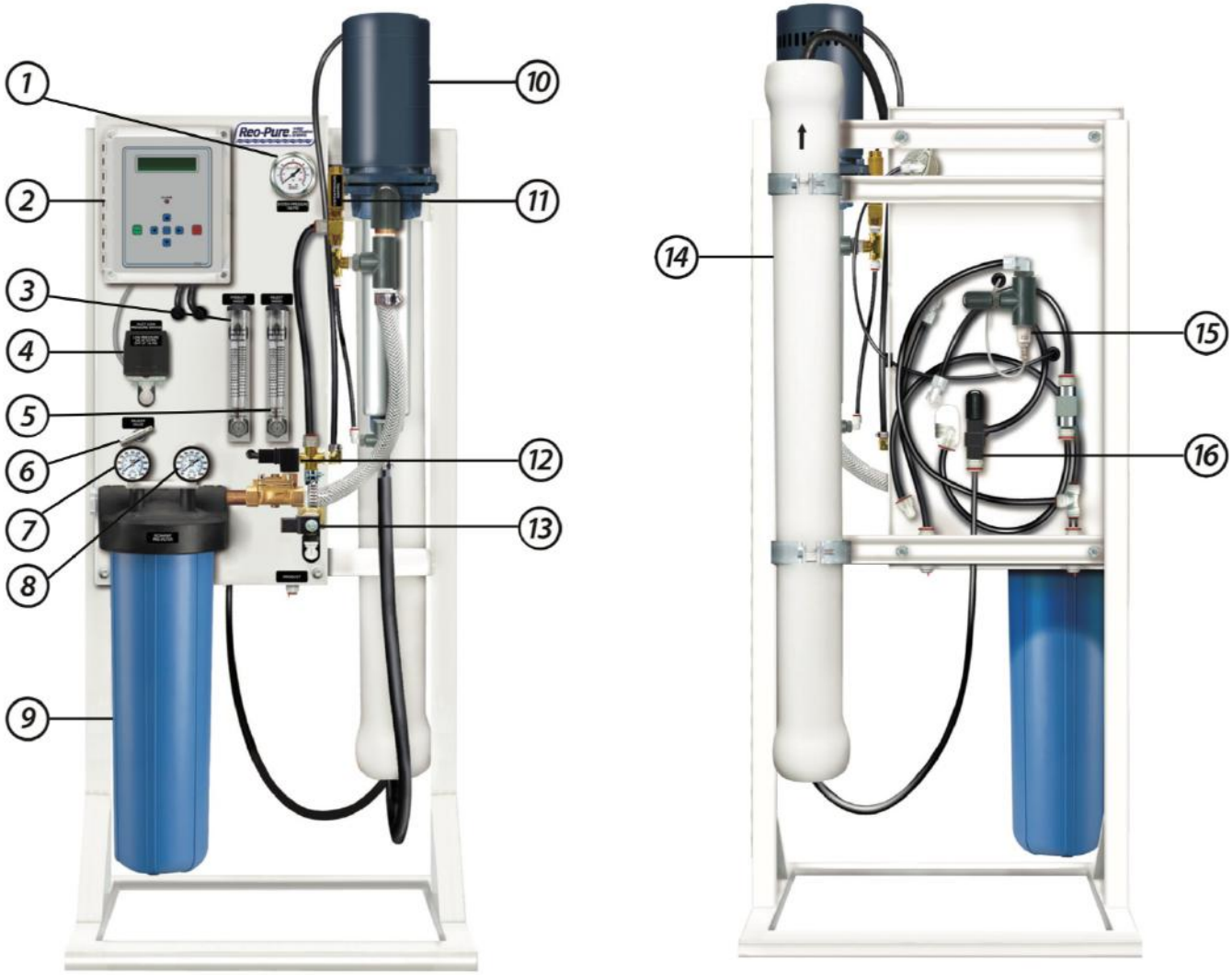
(CAUTION) INDICATES STATEMENTS THAT ARE USED TO IDENTIFY CONDITIONS OR PRACTICES THAT COULD RESULT IN EQUIPMENT OR OTHER PROPERTY DAMAGE.

***(*WARNING) INDICATES STATEMENTS THAT ARE USED TO IDENTIFY CONDITIONS OR PRACTICES THAT COULD RESULT IN INJURY OR LOSS OF LIFE. FAILURE TO FOLLOW WARNINGS COULD RESULT IN SERIOUS INJURY OR EVEN DEATH.**

Section 2: Getting to Know Your Reo-Pure™ RO System

It is important to familiarize yourself with your new Reo-Pure Reverse Osmosis System.

Pictured below is a front and rear view of the system, with the main components identified. These components will be referenced throughout the manual. Noting their location will assist you in the startup and maintenance of the RO System.



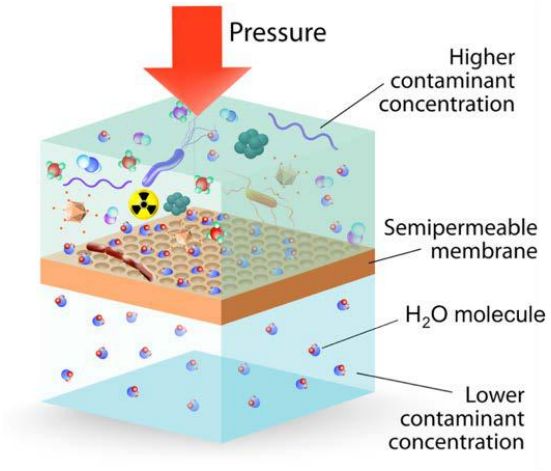
1. System Operating Pressure Gauge
2. S-150 RO Controller
3. Product Water Flow Meter
4. Inlet Feed Water Low Pressure Switch
5. Reject Water Flow Meter
6. Reject Water Control Valve
7. Pre-Filter Inlet Pressure Gauge
8. Pre-Filter Outlet Pressure Gauge
9. Pre-Filter Housing
10. Pump/Motor
11. Pressure Regulator
12. Inlet Solenoid Valve
13. Auto Flush Solenoid Valve
14. Stainless Steel Pressure Vessels
15. Product Water TDS Probe
16. Product Water Check Valve

IMPORTANT **THIS MANUAL COVERS THE INSTALLATION, OPERATION AND MAINTENANCE OF THE REO-PURE™ REVERSE OSMOSIS SYSTEM. IT IS IMPORTANT TO READ THIS MANUAL THOROUGHLY *BEFORE* INSTALLING THE SYSTEM. FOR SYSTEMS THAT ARE EQUIPPED WITH OPTIONAL FEATURES, REFER TO THE APPROPRIATE OPTIONAL FEATURE INSERTS, LOCATED AT THE END OF THE MANUAL.**

Section 3: Background Information

How Reverse Osmosis Works

In the reverse osmosis process, water is forced under pressure through a semi-permeable membrane to reduce the dissolved mineral content of the water. The membrane allows water molecules to pass through, but blocks/hinders the passage of dissolved substances and suspended particles. This process reduces the levels of dissolved salts, minerals, and suspended particles, while improving the taste, odor, and clarity of the water.



Certain contaminants found in water are measured as Total Dissolved Solids (TDS). Unlike the more common standard filtration systems, reverse osmosis systems divide the feed water into two streams: product water ("permeate") and drain/reject water ("concentrate"). The product water is the desired outcome of the RO System – much cleaner and fresher tasting water! The drain/reject water is vital for carrying away the dissolved salts, minerals, and suspended particles. Unlike conventional filtration systems, most contaminants removed from your water are not held onto within the system, but instead flushed away.

Factors Affecting System Performance

Feed Water: The incoming water to be processed by the Reo-Pure System.

Product Water (Permeate): The portion of the feed water that has passed through the membrane element. It is the desired result of a Reo-Pure System.

Concentrate Water (Reject or drain water, plus recirculation): Used to describe the portion of feed water that has flowed across the membrane (not through), and has not been converted to product water. This water now contains a higher concentrate of dissolved solids and may also contain organic matter and suspended particles rejected by the membrane. The concentrate is then split into two streams, reject and recirculation. The recirculated water is mixed with the feed water on the inlet side of the pump. The reject water is sent down the drain. This design is used to minimize the amount of water sent to drain.

Recovery: The percentage of feed water that becomes product water. The recovery rate is determined by the number of gallons (or liters) of product water divided by the total gallons (or liters) of feed water, and multiplied by 100.

Percent Rejection: The percentage of dissolved solids in the feed water that does not pass through the membrane. The membrane prevents passage of dissolved solids and other contaminants into the product water.

Conductivity: The property of a substance to conduct or transmit electricity. The unit of measure is in mhos and is commonly used to determine the purity or quality of water. In the water treatment industry, it is often converted to PPM TDS (Parts Per Million Total Dissolved Solids).

Feed Water Temperature: The volume of product water increases with higher feed water temperatures, and decreases with lower feed water temperatures. Temperatures below 35°F could crack the membrane element, and temperatures exceeding 90°F may cause rapid deterioration. The recommended range is between 45°F and 90°F.

Feed Water Pressure: The recommended range is between 40 PSI and 85 PSI. This is the most common range of municipal water supplies.

Hydrolysis: The natural chemical breakdown of membrane elements when in contact with water. This breakdown is accelerated when the water temperature is above 90°F, when the pH is not within the tolerable range, or when hydrogen sulfide is present. Refer to the System Operating Specifications section of this manual. Additional pre-treatment may be required in these cases.

Bacteria: RO Systems may be exposed to bacteria if operated intermittently. Following a prolonged shutdown or storage period, the system should be sanitized. Refer to the section in this manual regarding sanitization.

Fouling or Surface Coating of the Membrane Element: Fouling is a common problem with membrane elements because of salts, hardness, iron, etc. collecting on the membrane surface. The pores and channels of the membrane element become plugged reducing the water production rate. Pre-treatment equipment, such as a water softener, iron filter, or

activated carbon filter will reduce membrane element fouling and extend its life.

Section 4: System Specifications

Operating Specifications

Production Rates:	3,000 GPD (2.1 GPM)*
	11,356 LPD (7.9 LPM)*
Membrane Element:	4” x 40” (Qty: 1) – TFC Polyamide, High Flux
Rejection Rate:	95-99%
Recovery Rate:	50-70%
Nominal Flow of Feed Water During Operation:	6.3 GPM
Nominal Flow of Feed Water During System Flush:	13 GPM
Low Feed Water Pressure Switch:	System shuts down at 15 PSI ~ System starts at 20 PSI
Product Water Pressure Switch (Optional):	System shuts down at 45 PSI ~ System starts at 25 PSI
System Operating Pressure:	165 PSI
Max Product Water Back Pressure:	50 PSI
Min Pre-Filtration:	5 Micron**

*System production may vary depending upon incoming water temperature and chemistry.
**An activated carbon filter is required with chlorinated feed water.

Feed Water Parameters

Systems are designed for use with potable water sources only

Temperature:	Minimum 40°F – Maximum 85°F
Inlet Feed Water Pressure:	Minimum 35 PSI – Maximum 85 PSI
Chlorine:	Maximum 0.1 PPM
Hardness:	Maximum 10 GPG (Over 10 GPG must be softened)
Oil Tolerance:	0.0 PPM
Silt Density Index (SDI):	5
Turbidity:	Maximum 1 NTU
pH Range:	3 to 10
Hydrogen Sulfide:	Must be removed
Iron:	Maximum 0.01 PPM (Dissolved Only)
Feed Water TDS:	Consult Reo-Pure Manufacturer if TDS exceeds 2,000 PPM
Max Operating Pressure:	180 PSI

Design Test Conditions

Operating Pressure:	165 PSI
Feed Water TDS:	500 PPM as NaCl
Design Temperature:	77°F (25°C)
Design Recovery:	70%

Design Specifications

Operating Pressure	Inlet Conn.	Product Conn.	Reject Conn.	Filter Housing	Membrane Elements
165 PSI	3/4" FNPT	1/2” TUBE	1/2” TUBE	20" BB	4” x 40”

Weight and Dimensions

System Dimensions						
Wgt	Height		Width		Depth	
Lbs	In	Cm	In	Cm	In	Cm
200	60	152	25	64	21	53

Section 5: Installation Instructions

Step 1: Unpack Your Reo-Pure™ RO System

Reo-Pure Systems are carefully inspected, tested, and packaged. They are shipped in proper working order and in excellent condition. Remove the system from the shipping carton/container and inspect it for signs of concealed damage, which may have occurred during shipping. If damage has occurred, immediately contact the delivering carrier and file a claim for damages.

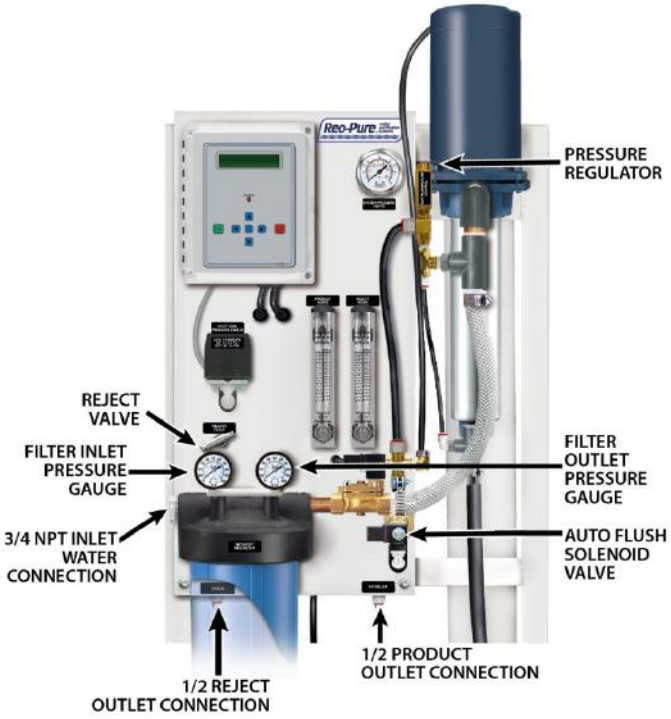
Step 2: Select an Installation Site

Determine a desirable location for your Reo-Pure system. It should be positioned on a hard level surface capable of supporting the entire weight of the system. See SYSTEM SPECIFICATIONS for approximate weight and dimensions.

Step 3: Feed Water Supply Connection

A cold water supply source must be located within proximity to the system. This will be the inlet feed water supply. Feed water pressure must be a minimum of 35 PSI.

Remove the plug from the inlet side of the filter housing marked INLET. Connect a minimum feed water line of 3/4” hose or pipe.



CAUTION **DO NOT CONNECT HOT WATER LINE TO THE RO SYSTEM. FEED WATER MUST BE A COLD WATER SUPPLY.**

Step 4: Product Water Connection

During the initial start-up procedure, after a membrane element replacement, or after sanitization of the system, you will want to divert the product water line to your wastewater drain. This can be done by either installing a 3-way valve in the line or by disconnecting the tubing to your storage tank. It is always important to divert the product water to drain for 30 to 60 minutes of operation, because membrane elements are treated with preservative solution that should be rinsed free.

If an atmospheric storage tank is being used, a tank level float control switch and repressurization system (optional accessories) will be required to shut the system off and to pump the product water to your application.

If a pressurized storage tank is being used, the product water safety pressure switch is factory wired to initiate a pressure fault alarm if the product water back pressure reaches 45 PSI. The dry contact wires are connected directly to the TANK FULL HIGH terminals of the RO controller. The switch will then shut the system off when the tank pressure reaches 45 PSI.

CAUTION **DO NOT INSTALL A VALVE IN THE PRODUCT WATER LINE UNLESS THE PRODUCT PRESSURE SWITCH/PRODUCT PRESSURE RELIEF VALVE OPTION IS INCLUDED WITH THE SYSTEM. SERIOUS DAMAGE CAN OCCUR IF THE SYSTEM IS OPERATED WITH A CLOSED VALVE.**

Remove the plug from the product water outlet (marked PRODUCT). Connect a 1/2” tubing or pipe to this port, but do not connect it to the storage tank or other dispensing system right now. There will be further instructions in the System Start-Up Section regarding additional steps required, prior to connecting the storage. For now, divert this line to your wastewater drain.

Step 5: Drain/Reject Connection

A wastewater drain must be near the installation site. This will be your connection for the reject water (drain) which is carrying a high level of concentrated dissolved salts, minerals, and suspended particles that were rejected by the membrane element.

Remove the plug from the drain water outlet (marked **DRAIN**) on the left-hand side of the system. Using 1/2" tubing or pipe, connect this outlet port to your wastewater drain.

IMPORTANT **IT'S RECOMMENDED TO INSTALL AN AIR GAP CONNECTION TO PREVENT WASTEWATER BACK FLOW.**

Step 6: Electrical Connections

A grounded electrical supply of the proper voltage for your system should be near the installation site. The system will be damaged if connected to a power source other than the voltage, phase and hertz specified on the serial number label. See the wiring diagram at the end of this manual for the correct power connections in the control enclosure.

THIS SYSTEM MUST BE INSTALLED WITH DISCONNECTING MEANS REQUIRED AS PER ELECTRICAL CODE.

CAUTION **A WATER SOFTENER SHOULD NOT BE ALLOWED TO REGENERATE WHILE THE REO-PURE™ SYSTEM IS OPERATING, UNLESS PRE-TREATMENT INTERLOCK SAFEGUARDS ARE USED TO BE SURE THE SYSTEM IS SHUTDOWN.**

CONNECTING THE SYSTEM TO A POWER SOURCE THAT DOES NOT MATCH THE SYSTEM POWER RATING EXACTLY CAN DAMAGE THE SYSTEM AND VOID THE WARRANTY.

Step 7: Tank Level Float Control Switch & Pre-Treatment Lock-Out Switch

On terminal strip P9 of the microprocessor controller PC board, there are terminals labeled TANK FULL HIGH. A jumper was installed across these terminals before the system was shipped. Remove and discard this jumper and connect a Normally Closed (NC) Tank Level Float Control Switch.

On terminal strip P9 of the microprocessor controller PC board, there are terminals labeled PRETREAT. A jumper was installed across these terminals before the system was shipped. Remove and discard this jumper and connect a Normally Closed (NC) switch from the softener of filter which will open during the complete backwash/regeneration cycle.

IMPORTANT **IF YOU ARE NOT USING ONE OR BOTH OF TERMINALS, THE JUMPERS MUST REMAIN IN PLACE OR THE SYSTEM WILL NOT OPERATE.**

CAUTION **SWITCH INPUTS ARE FOR DRY CONTACTS ONLY. APPLYING ANY VOLTAGE TO THESE TERMINALS WILL DAMAGE THE CONTROLLER!**

Step 8: Install Filter Cartridges

Please refer to the FILTER CARTRIDGE INSTALLATION/REPLACEMENT section of this manual.

Step 9: John Guest Safety Locking Clips

To ensure the highest level of reliability and system longevity, red locking clips have been installed on all John Guest tubing connections. This will make the connections more secure and protect the system from accidental disconnects. Two extra locking clips have been included with this manual. These should be attached at the product and drain ports of the system, after you have made your connections.

IMPORTANT **INSTALLATION MUST COMPLY WITH STATE AND LOCAL PLUMBING, ELECTRICAL, AND SANITATION CODES.**

IMPORTANT **PRIOR TO THE START-UP OF SYSTEM, VISUALLY INSPECT THE INLET, DRAIN, AND PRODUCT WATER CONNECTIONS COMPLETELY. ALSO, CHECK TO BE SURE THE SYSTEM IS CONNECTED TO A PROPERLY GROUNDED ELECTRICAL POWER SUPPLY WITH THE APPROPRIATE VOLTAGE, PHASE, AND HERTZ.**

Section 6: S-150 RO Controller Guide

CAUTION **BE SURE TO READ THE RO CONTROLLER SECTION CAREFULLY BEFORE ATTEMPTING TO OPERATE THIS REP-PURE™ SYSTEM, AND BEFORE CHANGING ANY CONTROLLER SETTINGS. DO NOT ATTEMPT TO CHANGE ANY CONTROLLER SETTINGS WITHOUT CAREFULLY READING THIS SECTION OF THE MANUAL.**

IMPORTANT **A TABLE TITLED REO-PURE™ RO CONTROLLER S-150 SET POINTS IS INCLUDED IN THIS MANUAL TO INDICATE WHERE THE SET POINTS HAVE BEEN FACTORY PRESET. THE WRITE PROTECT JUMPER (J3) IS IN THE ON POSITION (CENTER AND RIGHT PINS). TO MAKE ANY CHANGES TO SET POINTS, THE WRITE PROTECT JUMPER MUST BE IN THE OFF POSITION (CENTER AND LEFT PINS). AFTER ANY CHANGE IS MADE, REMEMBER TO PRESS THE ENTER BUTTON TO SAVE CHANGES, AND RETURN THE JUMPER BACK TO THE ON POSITION. FOR FUTURE REFERENCE, A NOTE SHOULD BE ADDED TO THE SET POINT TABLE TO INDICATE ANY SET POINT CHANGES THAT WERE MADE.**

Controller Introduction

Your Reo-Pure™ System is controlled by a Series 150 (S-150) RO Microprocessor Controller. It is a state-of-the-art control system for commercial and industrial RO systems.

The S-150 is a microprocessor controlled system that can monitor pressure and level switches. A TDS/Conductivity monitor/controller with programmable set points also plays an integral part of the S-150. The S-150 displays system status, switch conditions, and sensor readings on an easy-to-read backlit display. User programmable set points are provided to allow fast and easy adjustments of system parameters.

Controller Specifications

Power:	*120/240 VAC -15+10%, 50/60Hz, 25Watts*
Environment:	*-22°F to 140°F, 0-95% RH, noncondensing*
Enclosure:	*8" X 6" X 4" (203mm X 152mm X 102mm) NEMA 4X*
Display:	*2 line X 20 character, alphanumeric backlit LCD*
Front Panel:	*Overlay with LCD window, alarm lamp, 7 key membrane switch*
Switch Inputs, Dry Contact:	*Pressure fault, Pretreat lockout, Tank full high, and Tank full low*
Relay Outputs:	*RO pump relay, 120/240VAC, 1HP** *Inlet valve relay, 120/240VAC, 5A* *Flush valve relay, 120/240VAC, 5A* *Relays supply same output voltage as board power (120 or 240 VAC) 20A maximum total load* ** Based on service factor of 1.0*
Cell:	*TDS/Conductivity cell with digital display, standard range, 0-250PPM or uS. Other ranges available: 50, 100, 500, 1000, 2500, 5000. Wetted parts ABS and 316SS, 3/4" NPTM, 300 PSI max.*
I/O expander (Optional):	*Auxiliary/divert/boost relay, 120/240VAC, 1HP* *Divert/alarm relay, 120/240VAC, 5A* *Tank low switch input, dry contact*

Front Panel Controls and Indicators

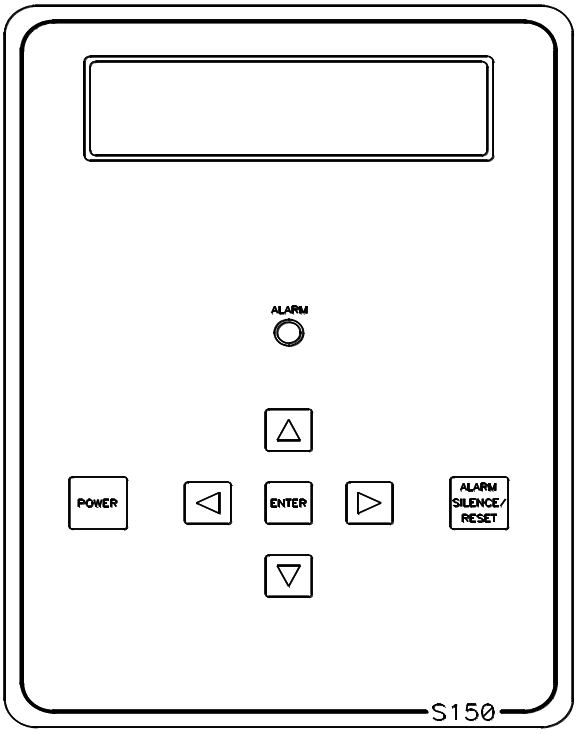


Figure 1

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 shutdown has occurred.

Terminal Strip, Jumper and Adjustment Locations

Refer to the Electrical Schematic for the location of all terminal strips and connectors. The Electrical Schematic also shows all jumper and adjustment locations.

Power Wiring

Refer to the Electrical Schematic for terminal strip and jumper locations. Before applying power to the unit, verify that the voltage jumpers are configured correctly for the voltage that will power the unit. The voltage jumpers are located below the transformer. For 120VAC operation, there should be a wire jumper installed between P2 and P3 and a second wire jumper installed between P4 and P5. For 240VAC operation, a single wire jumper should be installed between P3 and P4.

AC power for the unit is connected to terminal strip P1. Connect the ground wire of the AC power to the terminal labeled GND. For AC power with a neutral and hot wire, the hot wire connects to L1 and the neutral wire connects to L2. For AC power with 2 hot wires, either wire can connect to L1 and L2. On AC power with 2 hot wires, the wire jumper between P6 and P7 should be removed and a fuse (GMA 1/4A) installed in F2.

Pump and Relay Outputs

The S-150 supplies relay outputs to control the RO pump and solenoid valves. NOTE: The relays output the same voltage as the AC power to the board. If the pump and solenoids operate on different voltages, a contactor will need to be supplied to operate the pump.

RO Pump Wiring

The RO pump connects to the L1 and L2 RO pump terminals of P1. This output can operate 120/240VAC motors up to 1HP directly. For motors larger than 1HP or 3 phase motors, this output can be used to operate a contactor.

Inlet and Flush Solenoid Wiring

The inlet and flush valves must operate at the same voltage as supplied to the board. These outputs can supply 5A maximum and are not designed to operate pump motors directly. If these outputs are to be used to operate a boost or flush pump, the output should be used to operate a contactor. The inlet valve connects to the L1 and L2 inlet terminals of P1. The flush valve connects to the L1 and L2 flush terminals of P1.

TDS/Conductivity Cell Wiring

For accurate TDS / Conductivity readings, the cell should be installed in a tee fitting where a continuous flow of water passes over the cell and no air can be trapped around the cell. Refer to figure 5 for example installation. The cell is connected with 5 wires to terminal strip P10. Connect each colored wire to the terminal labeled with the same color.

Switch Inputs

Switch inputs are connected to P9. The connections for these inputs are not polarity sensitive and can be connected to either terminal. The switch inputs should be dry contact closures only.

Switch	N.O.	N.C.	VALUE
Pressure Fault	0	1	1
Pretreat	0	2	2
Tank Full High	0	4	4
Tank Full Low	0	8	0
Tank Low	0	16	0
		TOTAL:	**7**

Table 1

Select the type of switch used for each input and put that number in the value column. Add the values and program the total in the Switch Select Setpoint. For example, if the pressure fault and tank low inputs were normally closed and all others normally open, the value programmed in the Switch Select Setpoint would be 17(1 + 16).

APPLYING VOLTAGE TO THESE TERMINALS WILL DAMAGE THE CONTROLLER. THE SWITCHES CAN BE EITHER NORMALLY OPEN OR NORMALLY CLOSED IN ANY COMBINATION. THE SWITCH CONNECTED TO AN INPUT THAT IS CONFIGURED AS NORMALLY OPEN MUST BE OPEN FOR THE UNIT TO RUN. THE SWITCH CONNECTED TO AN INPUT THAT IS CONFIGURED AS NORMALLY CLOSED MUST BE CLOSED FOR THE UNIT TO RUN. THE SWITCH SELECT SETPOINT ALLOWS EACH INPUT TO BE CONFIGURED AS NORMALLY OPEN OR NORMALLY CLOSED. THE SWITCH SELECT SETPOINT IS DEFAULTED TO 0 WHICH PROGRAMS ALL INPUTS AS NORMALLY OPEN. THIS MEANS THAT ALL SWITCH INPUTS MUST BE OPEN FOR THE UNIT TO RUN. TABLE 1 LISTS THE VALUES USED TO PROGRAM THE SETPOINT TO CONFIGURE THE INPUTS.

Pressure Fault Switch

On systems where a low feed pressure shut down is required, a feed pressure switch can be connected to the pressure fault input of P9. If a high pump pressure shut down is required, a high pressure switch can be connected to this input. If both low feed pressure and high pump pressure shut down are required, both switches can be connected to this input. Both switches must be either normally open or normally closed to operate properly.

IMPORTANT **THE OUTPUT FROM A PRETREATMENT DEVICE MUST BE A DRY CONTACT AND MUST NOT SUPPLY VOLTAGE.**

Pretreat Switch

In systems with pretreatment, a pretreat lockout switch can be connected to the pretreat input of P9. This switch should operate when the pretreatment device is out of service. NOTE: The output from the pretreatment device must be a dry contact and must not supply voltage.

IMPORTANT **THE OUTPUT FROM A PRETREATMENT DEVICE MUST BE A DRY CONTACT AND MUST NOT SUPPLY VOLTAGE.**

Tank Full Switch

In systems with a single tank level switch for controlling the RO pump, the level switch connects to the tank full high input of P9. If dual level switches are used for controlling the RO pump, the upper level switch connects to the tank full high input of P9 and the lower level switch connects to the tank full low input of P9. Remove the red jumper that was shipped with the RO system when this option is used. Refer to the Electrical Schematic for terminal strip and jumper locations.

IMPORTANT **THE OUTPUT FROM THE TANK LEVEL SWITCH MUST BE A DRY CONTACT AND MUST NOT SUPPLY VOLTAGE.**

I/O Expander Board *(Optional)*

If the optional I/O expander board is installed, 2 additional relay outputs and 1 additional switch input are provided. Refer to figure 4 for the location of terminal strips, jumpers and wiring for this board. AC power for the relays is connected to the L1 and L2 power terminals of P1. Relay 1 is connected to this power input and will supply the same voltage. This relay is rated for 120/240VAC at 1HP maximum. Relay 1 can be configured to supply a dry contact by connecting a jumper wire between the L1 and L2 power terminals of P1.

NOTE: If Relay 1 is configured as a dry contact, Relay 2 must be configured as a dry contact also. If Relay 1 is configured to supply voltage, Relay 2 can be selected to supply voltage, 120/240, 5A maximum, or as a dry contact output.

Jumpers J1-J4 are used to select the relay 2 output type. To output voltage, a wire jumper is installed between J1 and J4 and a second wire jumper is installed between J2 and J3. For a contact closure output, a single wire jumper is installed between J3 and J4. The 2 relay outputs can be selected to operate as an auxiliary pump output, a divert output or an alarm output by programming the Expander Mode Setpoint. Table 2 shows the values used to program the relay outputs

EXPANDER MODE	RELAY 1	RELAY 2
0	Auxiliary Pump	Divert
1	Auxiliary Pump	Alarm
2	Divert	Alarm
3	Boost	Divert
4	Boost	Alarm

Table 2

I/O Expander: Auxiliary Pump

If the Expander Mode Setpoint is programmed to 0 or 1, relay 1 operates as an auxiliary pump output. This output is energized when the tank low input is not active. This output will supply power or a contact closure determined by the connections L1 and L2 of the terminal strip P1.

I/O Expander: Boost Pump

If the Expander Mode Setpoint is programmed to 3 or 4, relay 1 operates as a boost pump output. This output is energized when the inlet solenoid output is active. This output will supply power or a contact closure determined by the connections L1 and L2 of the terminal strip P1.

I/O Expander: Divert Output

If the Expander Mode Setpoint is programmed to 0 or 3, relay 2 operates as a divert relay and will operate whenever the unit is in the divert mode. This output will supply voltage or provide a contact closure based on the configuration of relay 1 and on the position of jumpers J1-J4. If the Expander Mode Setpoint is programmed to 2, relay 1 operates as a divert relay and will operate whenever the unit is in the divert mode. This output will supply power or a contact closure determined by the connections L1 and L2 of the terminal strip P1.

I/O Expander: Alarm Output

If the Expander Mode Setpoint is programmed to 1, 2 or 4, relay 2 operates as an alarm relay. When an alarm or warning is active, this relay will supply voltage or provide a contact closure based on the configuration of relay 1 and the position of jumpers J1-J4.

I/O Expander: Tank Low Switch

A tank low switch input can be connected to the tank low input of P2 on the expander board. This input will provide a tank low warning on the unit and if the expander is programmed to provide an auxiliary pump output, will provide low tank level protection for this pump.

Change or Display Setpoints

IMPORTANT **SETPOINTS CANNOT BE CHANGED IF THE WRITE PROTECT JUMPER IS IN THE ON POSITION.**

1. Refer to Figure 1 for the location of the keys used to display or change the Setpoints and Electrical Schematic 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 off position (center and left pins).
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 increment or decrement the Setpoint value. The value will change by 1 count each time a key is pressed. If the key is pressed and held for ~1 second, the Setpoint value will change at a fast rate. When the key is released, the fast rate will be reset. Pressing both the Up and Down arrow keys together will reset the Setpoint value to 0.
4. Pressing the Alarm Silence/Reset key at any time will cancel the operation and return the display to the main screen.
5. To save the new Setpoint 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).

System Operation

The unit has 2 modes of operation, a standby mode and an operating mode. 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. Setpoint information is also shown on this display.

Operating Status Message

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.

TDS/Conductivity

The TDS / Conductivity is shown on the top line after the unit operating status. When the unit is offline because of a shutdown condition, the reading is replaced with '----' If the reading is over range, the reading is shown as '^^^^'.

Operating Hours
The current operating hours are shown on the bottom line.

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 TDS / Cond - The TDS / Conductivity reading has exceeded the programmed limit.

TANK LOW - The tank low input is active.

TANK LOW 99 - The tank low input has cleared, but the tank low restart delay is active. The number is the minutes left in the delay.

OP HOURS EXCEEDED - The current operating hours have 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 clear, the RO unit will run. The RO unit will continue to run when the water level rises and the lower switch becomes active. When the upper switch becomes active, 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. When the lower level switch clears, 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 RO unit starts when a tank full condition clears. This delay can be in minutes or in seconds. The TF Restart Setpoint selects seconds or minutes.

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 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 shutdown 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 if the Alarm Silence Setpoint is programmed to 0. If the Alarm Silence Setpoint is programmed to a value greater than 0, 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 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.

Membrane Flush (For Reo-Pure™ Optimum Models Only)

If the Reo-Pure™ RO System is an "Optimum" or "OPTI" model, a flush solenoid valve has been equipped and the Flush Type set points can be used to enable a membrane flush at different times.

If the Flush Type Setpoint is programmed to 0, flush is disabled. If membrane flush is desired, several types of flush are available. When the RO system enters a flush cycle, the flush relay will activate. The flush cycle will last for the time programmed in the Flush Time Setpoint. Table 3 shows the value that must be programmed in the Flush Type Setpoint for each type of flush.

FLUSH TYPE	DESCRIPTION
0	NO FLUSH
1	TANK FULL
2	OPERATING HOURS
3	OPERATING HOURS AND TANK FULL
4	ELAPSED TIME
5	ELAPSED TIME AND TANK FULL
6	OFF HOURS
7	OFF HOURS AND TANK FULL
8	RO START/STOP

Table 3

TANK FULL - The RO unit will flush each time a tank full condition occurs.

OPERATING HOURS - A flush will occur when the RO pump has operated for the number of hours programmed in the Flush Interval Setpoint.

ELAPSED TIME - A flush will occur after the number of hours programmed in the Flush Interval Setpoint has passed.

OFF HOURS - A flush will occur when the RO has been shut down due to a tank full condition for the number of hours programmed in the Flush Interval Setpoint.

RO START/STOP - A flush will occur each time the RO starts or stops.

The tank full flush can be combined with any of the 3 interval flush types. A manual flush can be initiated by pressing the Alarm Silence/Reset key for 3 seconds.

MEMBRANE FLUSH MODE

The Flush Mode Setpoint can be used to control the operation of the inlet valve and RO pump during flush. Each can be independently programmed to operate during flush. Table 4 shows the values to program into the Flush Mode Setpoint to control the operation of the inlet and RO outputs during flush.

FLUSH MODE	RO PUMP	INLET VALVE
0	OFF	CLOSED
1	OFF	OPEN
2	ON	CLOSED
3	ON	OPEN

Table 4

High TDS/Conductivity Warning/Alarm

If the TDS / Conductivity reading exceeds the limit programmed the TDS / Cond Limit Setpoint for the delay programmed in the TDS / Cond Delay Setpoint, the alarm lamp will light and the HI TDS / Cond warning message will show on the display. This warning will clear when the TDS / Conductivity drops below the Setpoint. If the TDS / Cond Shtdwn Setpoint is programmed to 0, the unit will continue to operate. Otherwise, once a high TDS / Cond warning occurs, after the time programmed in this setpoint, the RO unit will shut down and the alarm will sound. The alarm can be cleared by pressing the Alarm Silence/Reset key twice. NOTE: the auto reset function is not active for this shut down.

Operating Hours Exceeded

If the current hours exceed the limit programmed in the Maximum Hours Setpoint, the alarm lamp will light and the OP HOURS EXCEEDED warning message will be shown. This warning can be cleared by programming the current hours to 0 or by increasing the maximum hours limit.

I/O Expander *(Optional)*

The I/O Expander board adds 2 relays and 1 switch input. The operation and programming of the 2 relays is described in the installation section.

I/O Expander: Auxiliary Output

Relay 1 can be used to control a repressurization pump when relay 1 of the expander board is configured to operate an aux relay. In this mode, this relay will be energized as long as the tank low input is not active. When energized, the relay supplies power to the repressurization pump.

I/O Expander: Tank Low

When the tank low input has been active for 5 seconds, the auxiliary output will turn off. The alarm lamp will light and the TANK LOW warning message will show on the display. When the tank low condition clears, the TANK LOW 99 warning message is displayed. The number is the delay in minutes before the auxiliary relay will energize.

For boost pump operation, when the tank low input has been active for 5 seconds, the boost pump output will turn off, the RO unit will shut down, the alarm lamp will flash and the audible alarm will sound. TANK LOW shutdown message will show on the display. When the tank low condition clears, the TANK LOW 99 shutdown message is displayed. The number is the delay before the RO unit will restart. The shutdown can be manually reset by pressing the Alarm Silence/Reset button twice.

I/O Expander: Boost Pump Output

Relay 1 can be used to control a boost pump when the expander board is configured to operate relay 1 as a boost pump relay. This relay will operate the same as the inlet solenoid relay. This option is used to directly operate a boost pump up to 1HP.

I/O Expander: Divert Output

When relay 1 or relay 2 has been programmed to operate as a divert relay, the relay will energize when the TDS / Conductivity exceeds the TDS / Cond Limit Setpoint. This will occur as soon as the reading exceeds the limit, there is no delay. When the reading drops below the limit and stays below the limit continuously for 5 seconds, the divert relay will turn off.

I/O Expander: Alarm Output

When 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.

Controller Adjustments

TDS/Conductivity Calibration

Refer to the Electrical Schematic for adjustment location. To calibrate the 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 permeate water and testing it with a known, good meter. Adjust the span control until the reading matches the meter.

NOTE: If the TDS / Cond range is changed, the unit must be recalibrated AND some components may need to be changed.

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.

TDS/Conductivity Expander *(Optional)*

The TDS / Conductivity expander board allows a 2nd TDS / Conductivity to be monitored and displayed by the Series 150 controller. The expander board is mounted on the main board to the left of the connector for the 1st cell. Figure 2 shows the wiring and adjustment information for the expander.

Operation

When the TDS / Conductivity expander is installed, the reading will be shown on line 2 and will alternate every 3 to 4 seconds with the hours and temperature. If the % rejection display is enabled, it will be shown on line 2 with the 2nd TDS / Conductivity reading.

If the C2 limit is enabled, and the 2nd TDS / Conductivity reading exceeds the limit programmed the C2 Limit Setpoint for the delay programmed in the TDS / Cond Delay Setpoint, the alarm lamp will light and the HI TDS / Cond 2 warning message will show on the display. This warning will clear when the 2nd TDS / Conductivity drops below the Setpoint.

Calibration

Refer to Figure 2 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.

Set Points

When the expander is installed, 3 additional setpoints are provided to allow features of the expander to be changed. Refer to the Displaying or Changing Setpoints section of the manual for information on changing the setpoints. The additional setpoints are listed below in Table 5.

SETPOINT	DESCRIPTION	RANGE	DEFAULT
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	2
C2 Limit	When this value is met or exceeded, the alarm lamp will light and high TDS / Cond will show on the display. To disable, set to 0.	0-999 uS or PPM	100 uS or PPM
% Rej	If the 2nd TDS / Conductivity is used to monitor feed water, programming this setpoint to 1 allows the % rejection to be displayed.	0-1	0

Table 5

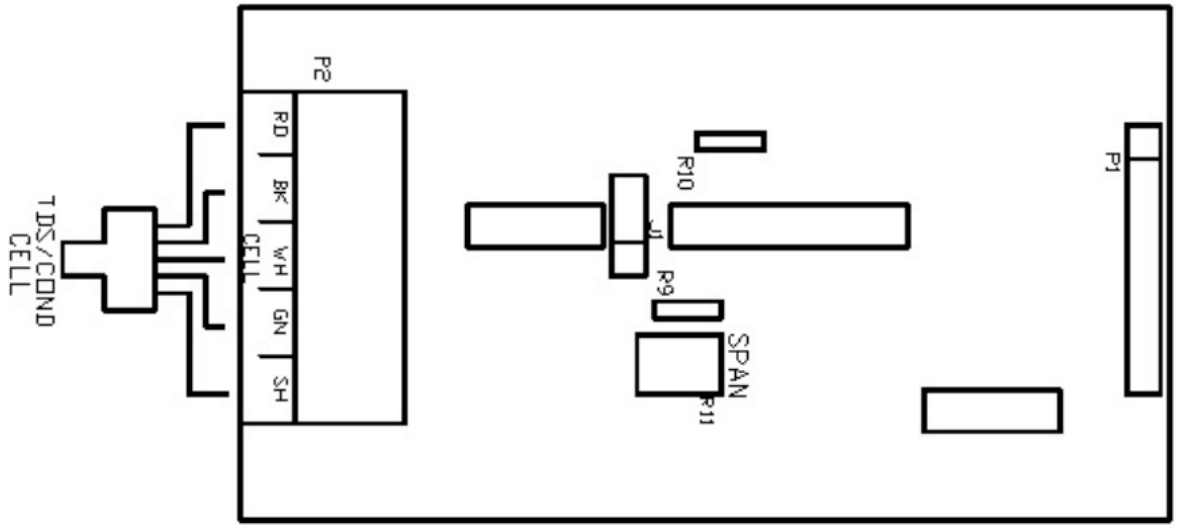


Figure 2

Troubleshooting

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 TURNED OFF AT THE DISCONNECT.**

IMPORTANT **BEFORE CONTACTING YOUR REO-PURE™ DEALER FOR TECHNICAL SUPPORT, PLEASE VERIFY THE PROGRAMMING OF ALL SET POINTS, CHECK THE DISPLAY AND CHECK 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.**

System Inoperative

Is the yellow CPU active LED blinking? If no, is the green power LED, DS1 Lit? If no, is the fuse OK? If no, replace the fuse. If yes, with a voltmeter, verify power is applied to the power terminals L1 and L2. If power is applied to the power terminals and the above checks are OK, the board is probably defective and should be replaced. If no power is applied to the board, check the power wiring to the system.

Display Blank

Is the green power LED, DS1 lit? If no, refer to the system inoperative section. If yes, is the CPU active LED, DS9 blinking? If no, replace the board. If yes, adjust the display contrast adjustment, R3. Is the display still blank? If yes, replace the board.

Inlet Valve Will Not Operate

Is the system in standby? If no, are any shut down conditions active? If no, is the inlet LED, DS8 lit? If no, replace the board. If yes, with a voltmeter, verify if there is power on the inlet terminals. Is there power? If no, replace the board. If yes, check the valve and wiring.

RO Pump Will Not Operate

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.

Unit Not Flushing or Not Flushing Correctly

Verify that flush is enabled and what type of flush is selected. Is flush enabled? If no, enable flush. If yes, press the Alarm Silence /Reset key for 3 seconds. Does the unit show flush on the display? If no, replace the board. If yes, is the flush LED, DS10 lit. If no, replace the board. If yes, with a voltmeter, verify if there is power on the flush terminals. Is there power? If no, replace the board. If yes, check the valve and wiring.

No or Incorrect TDS/Conductivity Reading

Is sensor wired correctly? If no, correct wiring. If yes, is sensor installed as described in the installation section? If no, install correctly. If yes, verify correct TDS / 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 pins of cell together. Does reading show '^^^'? If no, replace board.

Section 7: Reo-Pure™ RO Controller S-150 Setpoints

SETPOINT	DESCRIPTION	RANGE	DEFAULT VALUE	PRESET VALUE
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	0-999 uS or PPM	100	100
TDS / Cond Delay	When the limit set point is exceeded, no alarm will be given until this time has expired.	0-999 seconds	30 sec	30 sec
TDS / Cond Shtdwn	Once a TDS / Cond alarm is active, if the time in this exceeded, a TDS / Cond shut down will occur. To disable, set to 0.	0-99 minutes	0 min	0 min
RO Start Delay	The amount of time between the inlet valve opening and the RO pump start.	0-99 seconds	5 sec	15 sec
Press Fault Delay	The time a pressure fault must be active before a pressure fault shut down occurs.	0-99 seconds	5 sec	5 sec
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	0-99 minutes	60 min	60 min
Alarm Silence	If the audible alarm is silenced, after this delay, the alarm will resound. If set to 0 minutes, the alarm will remain silenced.	0-99 minutes	0 min	0 min
TF Restart Delay	When a tank full condition clears, the system will restart after this delay.	0-99 sec/min	5 sec	5 sec
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	5 min	5 min
Tank Lo Restart	When a tank low condition clears, the auxiliary pump will restart after this delay.	0-99 minutes	15 min	15 min
Flush Type	Selects the type of flush. Set to 0 to disable flush.	0-8	0	0 – for STD 8 – for OPTI
Flush Time	The length of time a membrane flush cycle will last when flush is active.	0-99 minutes	5 min	1 min
Flush Interval	The interval between flush cycles. Only valid with op hour, elapsed time or off flush types.	0-99 hours	24 hrs	24 hrs
Flush Mode	Selects if the inlet and RO pump relays operate during flush.	0-3	0	0 – for STD 3 – for OPTI
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 hrs	0 hrs
Current Hours	Current number of hours of RO system operation.	0-65000 hours	0 hrs	0 hrs
Expander Mode	Selects how the relays on the I/O expander board operate.	0-4	0	0
Temp Offset	Allows adjustment of temperature reading by +-5 degrees.	<5° / +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	7
TDS / Cond UOM	Selects display of water quality in uS or PPM	0-1	0	1
TDS / Cond Range	Selects range of TDS / Conductivity monitor. 0 = 50, 1 = 100, 2 = 250, 3 = 500, 4 = 1000, 5 = 2500, 6 = 5000.	0-6	2	1

Section 8: Start-Up Procedures

Step 1: Installation Follow-Up

1. Visually inspect the water connections.
2. Be sure filter cartridges have been installed.
3. Confirm connection to the proper power source.

NOTE: The membrane element(s) will have been installed in the system during the final testing procedures unless other arrangements have been made with the manufacturer.

Step 2: RO System Pretreatment

A water analysis of your feed water should have been performed to determine what type of pretreatment may be required. See Feed Water Parameters for this system before operating this system.

Step 3: Read Section on the RO System Controller

It is important to read the RO MICROPROCESSOR CONTROLLER section carefully before attempting to operate this Reo-Pure System, and before changing any controller settings.

Step 4: Divert Product Water to Drain

Upon initial system start-up, or after changing membrane elements, it is important to divert all product water to a wastewater drain for approximately 30-60 minutes. Membrane elements are treated with a preservative solution and should be thoroughly rinsed clean before water is retained for use. This can be done either by installing a 3-way valve in the product water line or by diverting your product water line to drain. Do not connect the product water line to a storage tank at this time.

Step 5: Startup the System

1. Turn on the inlet feed water supply source, allowing water to enter the system.
2. Manually adjust (counter-clockwise) the Reject Water Control Valve to the fully open position.
3. Press the POWER key on the RO controller. The inlet solenoid valve will open, and the pump will start after a short delay.

IMPORTANT **THE INLET SOLENOID VALVE IS A SAFETY DEVICE THAT IS USED TO PREVENT WATER FLOW THROUGH THE SYSTEM WHEN IT IS NOT IN OPERATION. LOW INLET FEED WATER FLOW AND LOW PRESSURE CAN RESULT IN DAMAGE TO THE PUMP, MOTOR, AND/OR MEMBRANE ELEMENT. WHEN THE SYSTEM IS TURNED ON, THE SOLENOID VALVE AUTOMATICALLY OPENS. THE VALVE WILL CLOSE WHEN THE SYSTEM IS TURNED OFF. THE SYSTEM WILL ONLY START IF THERE IS SUFFICIENT FEED WATER FLOW AND PRESSURE (MIN 35 PSI).**

Step 6: System Flush

Allow the system to operate for 30-60 minutes to properly flush the RO membranes of their preservation solution. Please note that there are two different ways to execute a membrane flush, based on the model of your RO system:

Standard Models

All “STD” models are equipped with a manual flush valve. To perform a membrane flush, turn this valve to the open position and allow the system to flush for the desired amount of time. Note that this manual flush valve must be in the closed position during system operation.

OPTIMUM Models

All “OPTI” models are equipped with an automatic flush solenoid valve. A 1-minute automatic membrane flush is pre-programmed to initiate each time the system starts and stops. The membrane flush type, frequency, and duration is pre-programmed to the Manufacturer’s default settings. Please see the **Reo-Pure™ RO Controller S-150 Setpoints** section of this manual for more information on the default settings. Note that a manual flush can be initiated by holding down on the “ALARM SILENCE/RESET” key of the RO controller.

Step 7: Adjust System Pressure and Flow Rates

CAUTION **NEVER ALLOW THE REO-PURE™ SYSTEM PRESSURE TO EXCEED 185 PSI.**

The Reo-Pure™ BLS 3,000-9,000 RO systems were designed to operate at 70% recovery. This may vary depending on your feed water conditions and/or application. Adjust the Reject Water Control Valve and Pressure Regulator, while monitoring the Reject Water Flow Meter, Product Water Flow Meter, and System Operating Pressure Gauge. You will need to adjust the Reject Water Control Valve and Pressure Regulator to balance and maintain the 70% product water recovery flow rate. Refer to the GPM flow rates listed below as a guideline.

NOTE: These flow rates should only be used as a guideline! They have been determined based on the Standard Test Conditions. Actual flow rates should be determined based on your specific site conditions.

IMPORTANT **THE MAXIMUM PRODUCT WATER FLOW RATES AND ASSOCIATED REJECT WATER FLOW RATES FOR THE BLS 3000, BLS 6000, AND BLS 9000 ARE SHOWN BELOW. REDUCE THE SYSTEM OPERATING PRESSURE, IF REQUIRED, BY ADJUSTING THE PRESSURE REGULATOR TO MAINTAIN THE MAXIMUM PRODUCT WATER FLOW RATE AND THE ASSOCIATED REJECT WATER FLOW RATE.**

*BLS 3000 Models:	0.9 GPM Reject Water 2.1 GPM Product Water
*BLS 6000 Models:	1.8 GPM Reject Water 4.2 GPM Product Water
*BLS 9000 Models:	2.7 GPM Reject Water 6.3 GPM Product Water

Record all operating parameters on the System Log Sheet, located at the end of this manual. Product and reject water flow rates can be read directly from the flow meters and will become a reference point for future system performance evaluations.

IMPORTANT **THE GALLONS PER DAY OF PRODUCT WATER PRODUCED WILL VARY AT EACH INSTALLATION BASED ON THE FEED WATER TDS, FEED WATER TEMPERATURE, AND THE BACK PRESSURE ON THE SYSTEM. THE PURPOSE OF RECORDING THE DATA ON THE SYSTEM LOG SHEET AT START-UP IS TO HAVE A REFERENCE POINT TO EVALUATE SYSTEM PERFORMANCE DURING THE LIFE OF THE MEMBRANE ELEMENT(S).**

Step 8: Connect RO System to Storage Tank

After 30-60 of system flushing, press the POWER key on the RO controller to stop the system. Connect the product water line to your storage tank. Once product water line is connected to the storage tank, POWER the system back on. The RO system will now automatically run based on the tank full switch.

Step 9: Check Pressure Switches

An inlet feed water low pressure switch is installed on this Reo-Pure™ RO system. It is preset at the factory to cut-out at feed water pressure below 15 PSI and cut-on at pressure above 20 PSI. Its purpose is to prevent damage to the RO system's pump and/or motor if there is inadequate feed water flow or pressure. The following steps are to verify that it is functioning properly:

1. Slowly decrease the inlet feed water supply by closing an installed manual feed water shut-off valve, while watching the Pre-Filter Outlet Pressure Gauge.
2. If you hear the pressure switch open (a quiet, but audible *click*), when the pressure drops to about 15 PSI, then the inlet pressure switch is functioning correctly. After a short nuisance delay, the RO system will go into a pressure fault shutdown.
3. If it is not functioning correctly, please see the SYSTEM PRESSURE SWITCHES section of this manual for more information.

If your RO system is equipped with the optional Product Water Pressure Switch, please refer to the **Maintenance – System Pressure Switches** section of this manual to verify its setpoints and proper function.

Step 10: Final Inspection

Congratulations on the successful installation of your new Reo-Pure™ RO system! We hope it supplies you with many years of reliable operation and trouble-free maintenance. Once all start-up and installation procedures have been completed, please visually inspect all water connections and system readings for proper operation. All connections should be tight, secure, and leak-free.

IMPORTANT **WHEN HUMIDITY IS HIGH, EXPECT CONDENSATION TO FORM ON THE PARTS OF THE SYSTEM WHICH CONTAIN COLD WATER.**

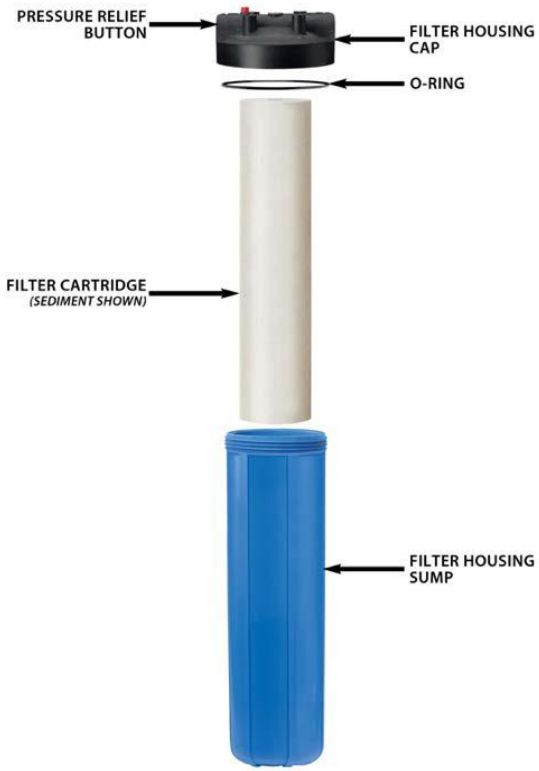
IMPORTANT **FREQUENTLY CHECK THE SYSTEM FOR ANY LEAKS THAT MAY DEVELOP OVER TIME.**

CAUTION **A WATER SOFTENER SHOULD NOT BE ALLOWED TO REGENERATE WHILE THE REO-PURE™ SYSTEM IS OPERATING, UNLESS SAFEGUARDS ARE USED TO BE SURE THE SYSTEM IS SHUT-DOWN OR OPERATING ON AN ALTERNATE SOURCE OF SOFTENED WATER. TERMINALS FOR SHUTTING DOWN THE SYSTEM DURING SOFTENER REGENERATION ARE PROVIDED. A NORMALLY CLOSED CONTACT FROM THE SOFTENER CONTROLLER CAN BE WIRED TO THE PRETREAT TERMINALS IN THE RO CONTROLLER. BYPASSING THE WATER SOFTENER AND FEEDING HARD WATER DIRECTLY TO THE REO-PURE™ SYSTEM WILL CAUSE PREMATURE FOULING OF THE MEMBRANE ELEMENT.**

Section 9: Maintenance – Filter Cartridge Installation/Replacement

IMPORTANT **UPON THE PURCHASE OF A NEW REO-PURE™ RO SYSTEM, THE SEDIMENT FILTER CARTRIDGE HAS BEEN PACKAGED LOOSE INSIDE THE SYSTEM'S CARTON. IT MUST BE INSTALLED PRIOR TO START-UP. NOTE THAT THE MEMBRANE ELEMENT(S) HAVE BEEN PRE-INSTALLED BY THE MANUFACTURER DURING THE FINAL TESTING PROCEDURES, UNLESS OTHER ARRANGEMENTS HAVE BEEN MADE.**

Filter cartridges have a limited service life and should be replaced if you experience noticeable changes in product water taste, color, odor, or flow rate. On average, filter cartridges should be replaced about every 3-6 months. Your Reo-Pure™ RO system is also equipped with pre-filter inlet and pre-filter outlet pressure gauges. An increase in the pressure difference of 10-12 PSI between the two gauges is an indication that the filter cartridge may need to be replaced.



1. Ensure feed water supply is turned OFF and that the RO system is shutdown.
2. Relieve all pressure from the system by opening the Reject Water Valve and pressing the pressure relief button on top of the pre-filter housing.
3. Disconnect the main power supply
4. Unscrew the filter housing sump by turning clockwise. Locate and remove the large o-ring; wipe clean and set aside. It is common for the o-ring to lift out of the sump and stick to the cap. If the o-ring appears to be damaged or crimped, it must be replaced.
5. If you are doing a routine maintenance change of the filter cartridge, remove and dispose the old cartridge. It is also recommended that the sump be properly rinsed clean at this time. To sanitize the sump, fill it 1/3 full of water and add about two tablespoons of original household bleach. Gently scrub the cap and housing with a non-abrasive cloth. Observe the precautions printed on the bleach container. Rinse thoroughly when finished.
6. Ensure o-rings are lubricated with a food grade silicone or glycerin. Place o-rings back into the groove in the sumps and smooth into place with your fingers. This step is important to ensure a proper watertight seal.
7. Remove packaging from the new filter cartridge and place inside the sump. Make sure the filter is seated properly over the standpipe at the bottom of the sump.
8. Replace the filter sump on the filter housing cap. DO NOT OVER TIGHTEN. If your system has multiple pre-filter housings, make sure the correct filter is replaced in the correct position. See system labels and the GETTING TO KNOW YOUR SYSTEM section of this manual for more information.
9. Reconnect the main power supply.
10. Turn on the feed water supply and allow the system to fill with water.
11. Push the 'Power' button located on the face of the RO Microprocessor Controller to restart the system.
12. Check for leaks.
13. Flush the system for a minimum of 5 minutes while diverting the product water to the drain.

IMPORTANT **BEFORE PERFORMING ANY MAINTENANCE ON YOUR REO-PURE SYSTEM, ALWAYS DISCONNECT THE POWER SUPPLY!**

CAUTION **IT IS IMPORTANT THAT THE O-RING BE PROPERLY SEATED EACH TIME THE FILTER HOUSING IS REASSEMBLED OR REMOVED. USE ONLY FOOD GRADE SILICONE OR GLYCERIN TO LUBRICATE THE O-RINGS. DO NOT USE A PETROLEUM-BASED PRODUCT SUCH AS VASELINE.**

CAUTION **THE MANUFACTURER OF THE FILTER HOUSING RECOMMENDS THAT THE FILTER SUMP OF ALL PLASTIC HOUSINGS BE REPLACED EVERY FIVE YEARS FOR A CLEAR SUMP AND EVERY TEN YEARS FOR AN OPAQUE SUMP. DATE THE BOTTOM OF ANY NEW OR REPLACEMENT SUMP TO INDICATE THE NEXT RECOMMENDED REPLACEMENT DATE.**

Section 10: Maintenance – Membrane Flush

The **Manual Flush Valve** is only equipped on the Economy and Standard BLS models. It is recommended to open this valve at least once weekly for 5-10 minutes to flush sediment from the membrane elements. The duration and cycle of this flush can be adjusted based on varying feed water conditions and applications.

The **Automatic Membrane Flush Solenoid** valve is only equipped on the Optimum BLS models. The flush mode is factory set to run the RO pump with the Inlet Solenoid Valve and Flush Solenoid Valve open, for 60 seconds upon system startup and shutdown. These settings can be adjusted based on varying feed water conditions and applications. Please review the section on the S-150 RO CONTROLLER for more information.

Section 11: Maintenance – System Pressure Switches

Inlet Low Pressure Switch

System preset to cut OFF at inlet pressure below 15 PSI.
System preset to cut ON at inlet pressure above 20 PSI.

An Inlet Low Pressure Switch is installed on every Reo-Pure BLS and WMS RO system. The purpose of this switch is to prevent damage to the pump and/or motor if there is inadequate feed water flow or pressure.

Verifying Set-Point of Inlet Low Pressure Switch

To verify the setting, slowly decrease the inlet feed water supply by slowly closing the manual inlet shut-off valve while watching the pre-filter outlet pressure gauge. If the system shuts down when the pressure drops to approximately 15 PSI, then the Inlet Low Pressure Switch is functioning correctly.

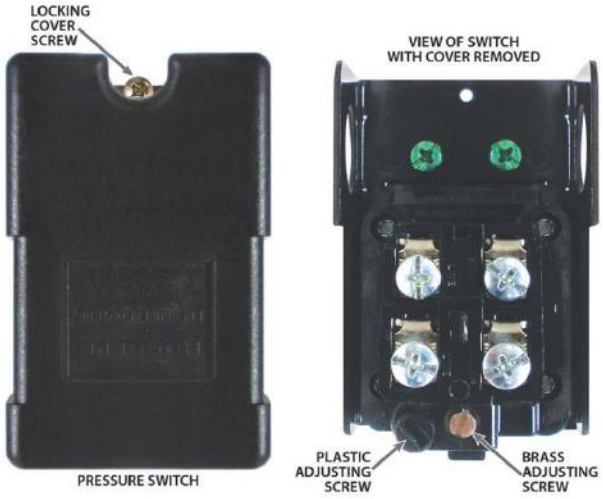
CAUTION **DISCONNECT THE POWER ANY TIME THE COVER IS REMOVED FROM A PRESSURE SWITCH.**

Adjusting the Inlet Low Pressure Switch Set Point

If it is not set correctly, disconnect the power from the System and remove the black plastic cover of the pressure switch labeled “Inlet Low Pressure Switch”. There are two screws for adjusting the switch settings. **Do not adjust the plastic screw.** Turn the brass screw clockwise to increase both the cut-in and cut-out pressure. Turn it counter clockwise to decrease both the cut-in and cut-out pressure. Turn the screw one half turn only. Temporarily replace the cover, reconnect the power and recheck the setting. Repeat as required.

Identifying a Broken Low Pressure Switch

Simply, close the inlet feed water valve, and if the System does not shut down, the pressure switch needs replacing.



Product Water Pressure Switch

System preset to cut OFF at product pressure above 45 PSI.
System preset to cut ON at product pressure below 25 PSI.

A Product Water Pressure Switch is available as an Optional feature on the BLS and WMS Reo-Pure™ RO systems. Its purpose is to stop and start the RO system when a pressurized storage tank is used.

Verifying Set-Point of Product Water Pressure Switch

You will need a ball valve and pressure gauge (0-100 psi) assembly with a tube connection the size of the RO system product tubing. You will also need a container to catch the product water.

Disconnect the power from the System. Close the pressurized storage tank shut-off valve. Open a valve downstream of the pressurized storage tank to relieve the pressure from the system. Disconnect the tubing from the tank shut-off valve. Connect the ball valve/pressure gauge assembly to this tubing. Open the ball valve and put it into the container. Close the downstream valve. Reconnect the power to the RO system. Slowly close the new ball valve. If the RO system shuts down when the pressure gauge reaches approximately 45 PSI, the Product Water Pressure Switch is functioning correctly.

CAUTION **DISCONNECT THE POWER ANY TIME THE COVER IS REMOVED FROM A PRESSURE SWITCH.**

Adjusting the Product Water Pressure Switch

If it is not set correctly, disconnect the power to the RO system and remove the black plastic cover of the pressure switch labeled “Product Water Pressure Switch”. There are two screws for adjusting the switch settings. **Do not adjust the plastic screw**. Turn the brass screw clockwise to increase both the cut-in and cut-out pressure. Turn it counter clockwise to decrease both the cut-in and cut-out pressure. Turn the screw one half turn only. Temporarily replace the cover, reconnect the power and recheck the setting. Repeat as required. When the Product Water Pressure Switch is set, reinstall the cover and tighten the locking screw. Disconnect the power, remove the ball valve or ball valve/pressure gauge assembly, reconnect the System and open the tank shut-off valve.

Identifying a Broken Product Water Pressure Switch

If the system does not shut down when the pressurized storage tank is full, the Product Water Pressure Switch needs replacing. If your system is equipped with a relief valve below the switch, it should also be expected to open and leak/spray water if the product water pressure becomes too high.

Section 12: Maintenance – Servicing the Membrane Elements

NOTE: Determining how long membrane elements will last is nearly impossible. Normally, replacement is necessary whenever the product water production decreases by 20% at the same operating pressure, or when the TDS exceeds acceptable level.

MEMBRANE ELEMENT REPLACEMENT

1. Close the manual feed water shut-off valve.
2. The Reo-Pure System will automatically shut down.
3. Disconnect the main power supply.

IMPORTANT **BEFORE PERFORMING ANY MAINTENANCE ON YOUR REO-PURE SYSTEM, ALWAYS DISCONNECT THE POWER SUPPLY!**

4. Remove the upper clamp from the pressure vessel.
5. Carefully remove the top end cap from the membrane pressure vessel.
6. The membrane element may come with the end cap. If so, carefully remove it.
7. Remove the membrane element from the vessel by pulling on the product water tube. Normally this can be done by hand. If additional leverage is required, carefully use pliers.

NOTE: Observe the arrow(s) on the vessel that shows the direction of flow through the membrane vessel. If the arrow on the vessel points down, then the brine seal on the membrane element should be at the top of the vessel.

8. Check internal and external o-rings on the end caps. If they are worn or damaged, they will need to be replaced.
9. Install the new membrane element in exactly the same manner as it was removed.

NOTE: The brine seal end must always face the pressurized feed inlet to the membrane vessel. Please see illustration for example. Refer to flow labels on RO system for proper feed flow of each membrane vessel.

10. Insert the top end cap. Be careful to keep the rubber o-rings in their grooves while inserting the end cap. Use food grade silicone or glycerin to lubricate the o- rings. Do not use a petroleum-based product such as Vaseline.
11. Replace the upper clamp.

CAUTION **BE SURE YOUR PRODUCT WATER LINE IS DISCONNECTED FROM YOUR STORAGE TANK BEFORE RESTARTING THE SYSTEM. DIVERT PRODUCT WATER TO DRAIN FOR 30 TO 60 MINUTES.**

12. Reconnect the main power supply.
13. Turn on the feed water supply using the manual inlet shut-off valve and allow the system to fill with water.
14. Check for leaks.
15. Open the reject water valve and flush the system for 2 to 3 minutes.
16. Close the reject water valve and divert the product water to drain for 30 to 60 minutes.
17. After diverting to drain for 30 to 60 minutes, you may now reconnect the product water line to your storage tank.

IMPORTANT **DIVERT THE PRODUCT WATER TO DRAIN FOR APPROXIMATELY 30 TO 60 MINUTES AFTER CHANGING A MEMBRANE ELEMENT. THIS IS DONE BECAUSE MEMBRANE ELEMENTS ARE TREATED WITH A PRESERVATIVE SOLUTION AND SHOULD BE THOROUGHLY RINSED CLEAN OF ANY REMNANTS. THIS CAN BE DONE EITHER BY INSTALLING A 3-WAY VALVE IN THE PRODUCT WATER LINE, OR BY DISCONNECTING THE PIPE OR HOSE/TUBE FROM YOUR STORAGE TANK.**

Section 13: Maintenance – Sanitizing the System

The following procedure is recommended for preventive maintenance. It is not intended to be effective in sanitizing highly contaminated systems that have been exposed to excessive amounts of bacteria, or systems that have foul-smelling membrane elements or filters. Such systems require extensive cleaning and sanitizing. Consult your Reo-Pure™ dealer for further information.

1. Turn off the feed water supply to the system.
2. Disconnect the main power supply.

IMPORTANT **BEFORE PERFORMING ANY MAINTENANCE ON YOUR REO-PURE SYSTEM, ALWAYS DISCONNECT THE POWER SUPPLY!**

3. Relieve the pressure from the system by opening the Reject Water Valve and pressing the pressure relief button on the pre-filter housing.
4. Remove filter housing sump(s) by turning clockwise.
5. Remove and discard the used filter cartridges.
6. Rinse out the bottom of each filter sump and fill about 1/3 full of water. Add about two tablespoons of household bleach and scrub the cap and sump with a non-abrasive sponge or cloth. Observe the precautions printed on the bleach container. Rinse the filter sumps.
7. Pour about two tablespoons of bleach into the **Sediment Pre-Filter** sump. Reinstall both filter sump(s) without the filter cartridges, making sure the o-rings are seated properly.

IMPORTANT **IT IS IMPORTANT THAT THE O-RING BE PROPERLY SEATED EACH TIME A FILTER HOUSING IS REASSEMBLED OR REMOVED.**

8. Empty the product water storage tank.
9. Temporarily disconnect the product water connection from the storage tank and run the line to a drain.
10. Reconnect the power supply.
11. Turn on the feed water supply and run the system until the sanitizing solution can be detected (by smell) in the product water flow.
12. Turn off the system and let it sit for 8 hours.
13. Disconnect the main power supply to the system.
14. After 8 hours, remove the filter sump as before. Empty of chlorinated water. Remove the o-ring and wipe it clean. Lubricate it with a food grade silicone or glycerin. Place the o-ring back into the groove in the sump and smooth it into place with your fingers. This step is important to ensure a proper watertight seal.
15. Insert a new filter cartridge over the standpipe in the bottom of the filter sump.
16. Replace the sump by turning counter-clockwise and hand-tighten. DO NOT OVER TIGHTEN.
17. Re-connect the main power supply to the system, and turn on the feed water supply. Allow the system to fill with water.
18. Push the POWER button to start the system.
19. Check for any leaks.
20. Thoroughly flush the system of any residual chlorine by running water to drain for 10-015 minutes.
21. Turn off the system and reconnect the product water line to the storage tank and return the system back to normal operation.

CAUTION **THE ONLY TIME THE MEMBRANE ELEMENT SHOULD COME INTO CONTACT WITH THE CHLORINE IS DURING THIS PROCEDURE.**

IMPORTANT **IF THE PRODUCT WATER STORAGE TANK IS HEAVILY CONTAMINATED, IT WILL NEED TO BE SANITIZED SEPARATELY.**

System Warranty

One-Year Limited Warranty

Warranty Terms

Subject to the terms and conditions set forth hereinafter, Great Lakes International, Inc. (hereafter "Manufacturer") warrants to the original purchaser (hereafter the "Buyer") that the systems and products manufactured by the Manufacturer are free from defects in material and in workmanship for twelve (12) months from the Warranty Commencement Date (as defined below), only when used strictly in accordance with the applicable operating instructions and within the range of the operating conditions specified by the Manufacturer for each such product.

This Warranty does not extend to systems, equipment, or components manufactured by others, nor to systems, equipment, or components manufactured by others and distributed by the Manufacturer. This Warranty does not extend to equipment or components manufactured by others which have been incorporated into the Manufacturer's product but, if allowable, the Manufacturer hereby assigns, without warranty, to the Buyer's interest, if any, under any warranty made by the manufacturer of such equipment or component. This Warranty does not cover disposable items such as filters, fuses, o-rings, regeneration materials/chemicals, or other such disposable items, which must be replaced periodically under the normal and foreseeable operating conditions of the goods warranted hereby. This Warranty does not cover any equipment that is installed or used outside the United States of America and Canada.

Warranty Commencement Date

The Warranty Commencement Date for each Manufacturer product shall be the later of the date of: (1) receipt by the Buyer, or (2) the date of installation at the Buyer's premises provided that such installation must occur within three (3) months of shipment from the Manufacturer's manufacturing facility in Yorkville, Wisconsin. In no event shall the Warranty Commencement Date exceed three (3) months from the shipment from Manufacturer's manufacturing facility. The Buyer shall provide proof of purchase in order to exercise rights granted under this Warranty. If requested by the Manufacturer, the Buyer must also provide proof of the installation date.

Warranty Service

THE MANUFACTURER'S OBLIGATION UNDER THIS WARRANTY IS LIMITED TO THE REPAIR OR REPLACEMENT (AT THE MANUFACTURER'S SOLE DISCRETION) OF ANY PRODUCT, OR COMPONENT THEREOF, PROVED TO BE DEFECTIVE IN MATERIAL OR WORKMANSHIP WITHIN THE COVERED WARRANTY PERIOD.

The Buyer, at the Buyer's risk and expense, shall be responsible for returning such product or component, only after obtaining a Return Goods Authorization (RGA) number from the Manufacturer, arranging for freight prepaid, and in conformance with any special packaging and shipping instructions set forth on the operation documentation or RGA instructions, or as otherwise reasonably required, to the Manufacturer's address set forth below, together with (1) RGA number issued by the Manufacturer at Buyer's request; (2) proof of purchase and, if necessary, proof of installation date; (3) a Return Goods Authorization Form; (4) a description of the suspected defects; (5) the serial number of the Reo-Pure product alleged to be defective; and (6) a description of the type of water and pretreatment equipment which has been utilized in connection with the product, if any. The Manufacturer shall, in the Manufacturer's reasonable discretion, be the sole judge of whether a returned product or component is defective in material or workmanship. Required or replaced products or components shall be returned surface freight. In genuine emergency situations, the Manufacturer will (at the Manufacturer's sole discretion) forward replacement parts to Buyer without waiting for authorized return of the questionable part(s). In such cases, Buyer will issue a purchase order or other payment guarantee prior to shipment. If the returned part is found to have been misused or abused, or the defective part is not received by the Manufacturer within thirty (30) days; the Buyer will be invoiced for the replacement part(s) provided. If the Manufacturer chooses to replace the equipment, the Manufacturer may replace it with reconditioned equipment.

This Warranty does not cover or include labor and/or travel to the Buyer's premise or location or any other location. Charges of $1000 per day plus associated travel expenses will be incurred by the Buyer in providing the Warranty Service at any location other than the Manufacturer's main headquarters; that is if the Manufacturer deems that the product is not covered by said Warranty. The Manufacturer reserves the right to precondition such travel to Buyer's premises upon prepayment of the Manufacturer's anticipated costs of attending such premises.

Voidability of Warranty

This Warranty shall be void and unenforceable as to any Reo-Pure™ product which has been damaged by accident, mishandling, abuse or has been repaired, modified, altered, disassembled or otherwise tampered with by anyone other than the Manufacturer or an authorized Manufacturer service representative; or, if any replacement parts are not authorized by the Manufacturer have been used, or, the product has not been installed, operated and maintained in strict accordance and adherence with the operating documentation and manuals for such product. Any expressed warranty, or similar representation of performance set forth in the operation documentation for a product incorporated into the Manufacturer product shall be void and unenforceable unless the feed water requirements set forth in the operating documentation for such product are unequivocally and strictly adhered to.

Limitations and Exclusions

Under no circumstances will the Manufacturer have any liability for the damage to a facility or property due to floods or leaks caused by or related to the Products provided hereunder, installation, service or otherwise. All water systems must be protected from water hammer, have required safety relief valves, vacuum breakers and leak detectors. Floors and walls must be sealed and sloped to adequate floor drains. In addition, the Buyer is responsible for meeting all federal, state, and local (and foreign, to the extent applicable) laws, rules, and regulations regarding the monitoring of supplied equipment.

THIS WARRANTY AND REMEDIES DESCRIBED HEREIN AND HEREINABOVE ARE EXCLUSIVE AND IN LIEU OF ANY AND ALL OTHER WARRANTY OR REMEDIES, EXPRESSED OR IMPLIED, INCLUDING WITHOUT LIMITATION, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL THE MANUFACTURER BE LIABLE FOR ANY CONSEQUENTIAL, INCIDENTAL OR OTHER SIMILAR TYPES OF DAMAGES, FOR DAMAGES FOR THE LOSS OF PRODUCTION OR PROFITS, OR INJURY TO PERSON OR PROPERTY. NO PERSON HAS ANY AUTHORITY TO BIND THE MANUFACTURER TO OTHER THAN WHAT IS SET FORTH ABOVE. THIS WARRANRTY IS NOT ASSIGNABLE OR TRANSFERABLE.

THIS WARRANTY GIVES THE BUYER SPECIFIC LEGAL RIGHTS AND THE BUYER MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM JURISDICTION TO JURISDICTION. THE PARTIES RECOGNIZE AND AGREE, THAT IN ALL RESPECTS THE LAWS OF THE STATE OF WISCONSIN SHALL APPLY TO AND SHALL GOVERN ANY INTERPRETATION OR LEGAL SIGNIFICANCE OF THIS DOCUMENT.

NO WARRANTY OR OTHER LIABILITY OF THE MANUFACTURER TO BUYER UNDER THIS AGREEMENT OR OTHERWISE WILL IN ANY EVENT EXCEED THE COST OF REPLACEMENT OF THE APPLICABLE PRODUCT, PART, OR ACCESSORY THAT IS SUBJECT TO ANY BREACH OF THE MANUFACTURER'S WARRANTY. THE MANUFACTURER WILL NOT BE LIABLE FOR ANY DAMAGE TO ANY PROPERTY OF BUYER OR TO BUYER'S BUYERS FOR ANY CONSEQUENTIAL, INCIDENTAL, OR ECONOMIC LOSS OR COMMERCIAL DAMAGE WHATSOEVER. REMEDIES HEREIN PROVIDED ARE EXPRESSLY MADE THE SOLE AND EXCLUSIVE REMEDIES FOR BREACH OF ANY WARRANTY OR OTHER OBLIGATION HEREUNDER EXPRESS OR IMPLIED OR FROM THE OPERATION OF LAW.

For more information about Reo-Pure™ Systems, please contact us at:

Address: 5211 S. Colony Ave, Union Grove, WI 53182
Phone: (262) 634-2386
Fax: (262) 634-6259
Email: sales@greatlakesintl.com
Website: www.greatlakesintl.com

Replacement Parts List

BLS & WMS 3000 Standard & Optimum

MEMBRANE ELEMENT		
60240401	Membrane Element, 4" x 40" (CSM)	1
7030404002	Membrane Element, 4" x 40" (FILMTEC)	1
MEMBRANE PRESSURE VESSELS (STAINLESS STEEL)		
100040402	Membrane Pressure Vessel Assembly, S/S, 4" x 40"	1
100041212	Cap 4" for S/S Vessel, with o-rings, 2 Ports	2
000850005	Plug PVC 1/2" for 4" Cap	1
1300342	External O-ring for 4" Cap	4
1300210	Internal O-ring for 4" Cap	4
100041215	Clamp Set for 4" SS Vessel	2
MEMBRANE PRESSURE VESSELS (FRP)		
100040405	Membrane Pressure Vessel Assembly, FRP, 4" x 40"	1
FILTER HOUSINGS & CARTRIDGES		
22150467-2	Filter Housing, 20" Big Blue, 3/4", with pressure relief, D&T	1
22151122	O-ring for Big Blue Housing	1
14815564	Pre-filter 20" 5-Micron Sediment Cartridge	1
SOLENOID VALVES		
00934220E	Inlet Solenoid Valve, w/ Coil, 3/4" Brass, 220/240V, 50/60Hz *– for 230V, 60Hz, 1Ph Systems* *– for 230V, 60Hz, 3Ph Systems*	1
00934120E	Inlet Solenoid Valve, w/ Coil, 3/4" Brass, 220/240V, 50/60Hz *– for 120V, 60Hz, 1Ph Systems* *– for 460V, 60Hz, 3Ph Systems*	1
00938220E	Auto Flush Solenoid Valve, w/ Coil, 3/8", Brass, 220/240V, 50/60Hz *– for 230V, 60Hz, 1Ph Systems* *– for 230V, 60Hz, 3Ph Systems*	1
00938120E	Auto Flush Solenoid Valve, w/ Coil, 3/8" Brass, 110/120V, 50/60Hz *– for 120V, 60Hz, 1Ph Systems* *– for 460V, 60Hz, 3Ph Systems*	1

PUMPS & MOTORS		
3060712	Pump, HP Booster, Cast Iron, 3/4" NPTF 3/4HP, 1Ph, 115/230V	1
3060712SS	Pump, HP Booster, S.S., 3/4" NPTF 3/4HP, 1Ph, 115/230V	1
3060718	Pump, HP Booster, Cast Iron, 3/4" NPTF 3/4HP, 3Ph, 230/460V	1
3060718SS	Pump, HP Booster, S.S., 3/4" NPTF 3/4HP, 3Ph, 230/460V	1
MISCELLANEOUS		
316050	Check Valve, Product Water, 1/2", PVC	1
4819012	Controller, S150 Microprocessor *– for 3/4HP, 230V, 60Hz, 1Ph Systems* *– for 3/4HP, 120V, 60Hz, 1Ph Systems*	1
4819026	Controller, S150 Microprocessor *– for 3/4HP, 460V, 60Hz, 3Ph Systems*	1
48450500	Flowmeter, Product & Reject, 0.5-5 GPM	2
0080016	Gauge, Pressure, Inlet & Filter, 0-100 psi, 2", Bottom Mount	2
008013	Gauge, Pressure, System Operating, 0-300 psi, 2.5", Panel Mount	1
1720138	Pressure Regulator, System Operating, 3/8" In, 3/8" Out	1
17506902	Pressure Switch, Low Level Cut-Out	1
17506905	Pressure Switch, Product Water *(Optional)*	1
312503	Reject Needle Valve, 1/2"	1
0002621007	Inlet Feed Water Manual Shutoff Valve, 3/4" NPTF, PVC (Optional)	1
31400051	3-Way Ball Valve, 1/2" NPTF, PVC, for Product Water Divert (Optional)	1

Reo-Pure™ RO System Troubleshooting

PROBLEM	POSSIBLE CAUSE	SOLUTION
RO SYSTEM WILL NOT START	No electrical power	Check power supply
	Storage tank full	Drain portion of water out of tank
	Low feed water pressure	See LOW FEED PRESSURE
	Pump/motor malfunction	Check, replace if necessary
	Pressure or float switch defective	Check, replace if necessary
LOW FEED PRESSURE	Manual feed water valve not open	Open valve
	Inlet solenoid valve not open	Check, replace if necessary
	Low inlet water pressure	Check, increase pressure
	Filters plugged	Check, replace if necessary
	Obstructed feed line	Check inlet piping
	Inadequate upstream pre-treatment	Check if sized correctly or fouled
LOW OPERATING PRESSURE	Pressure regulator needs adjustment	Check, adjust if necessary.
	Operating pressure gauge broken	Check, replace if necessary
	Pump impellers worn	Check, replace if necessary
	Pump/motor coupling broken	Check, replace if necessary
	Low water volume to pump	See LOW FEED PRESSURE
	Malfunctioning pump	Check, replace if necessary
	Membrane element brine seal is folded or not sealed against housing wall	Check brine seal, use care when reinstalling the membrane into the vessel
	Inlet solenoid valve not opening	Clean solenoid valve or replace
	Membrane element fouled	Check, clean or replace
	Manual flush valve open	Close manual flush valve
THE PUMP DOES NOT RUN	Pump is bound	Manually check pump rotation, replace if necessary.
	Pump/Motor coupling damaged	Remove pump from motor. Check, replace if necessary.
LOW OR NO REJECT WATER / HIGH PUMP PRESSURE	Restricted orifice	Check and clean
	Clogged drain line	Check and clean
	Membrane element clogged or fouled	Check, clean or replace
LOW OR NO PRODUCT WATER	Operating pressure low	Check and adjust
	Membrane element clogged or fouled	Check, clean or replace
	Water temperature too low	Check, consult dealer if necessary
	Product check valve damaged	Check, replace if necessary
	Tank over - pressurized	Check tank air pressure. Relieve to 10 PSI if necessary
	Membrane element installed backward or brine seal damaged/rolled	Check, use care when reinstalling the element into the housing.

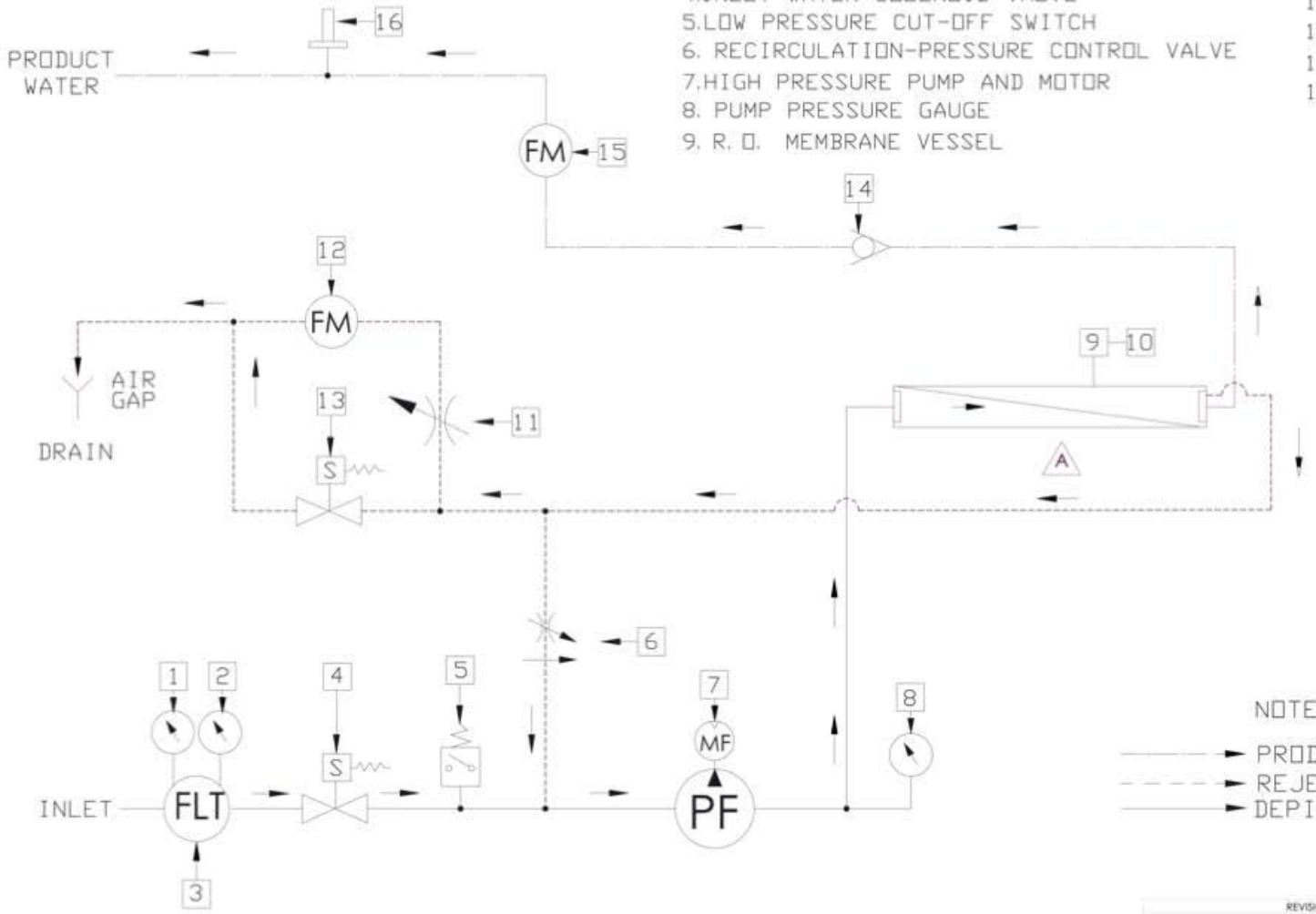
(system troubleshooting continued on next page)

(system troubleshooting continued from last page)

PROBLEM	POSSIBLE CAUSE	SOLUTION
BAD TASTING WATER	Increase in feed water TDS	Check feed water TDS
	Filter cartridges exhausted	Replace filter cartridges
	Tank and system contaminated	Replace filter cartridges and membrane, sanitize system and tank
	Tank contaminated	Re-sanitize tank
	Tank diaphragm ruptured	Replace tank
	Membrane not flushed completely	Flush one or two tanks of product water to drain
CLOUDY WATER	Dissolved air in feed water concentrated in product water	Usually clears up as condition of feed water changes. Letting water stand will allow dissolved air to dissipate
HIGH TDS IN PRODUCT WATER	Membrane element expended	Check, replace if necessary
	Insufficient brine flow rate	Check, reject flow must be at least equal to product flow
	Increase in feed water TDS	Check inlet TDS, see Operating Specifications for rejection rate.
	Product tube o-rings damaged or out of place	Remove membrane element from housing. Re-install or replace o-rings on membrane element product tube

COMPONENT LIST

1. PRE-FILTER INLET PRESSURE GAUGE
2. PRE-FILTER OUTLET PRESSURE GAUGE
3. PRE-FILTER HOUSING & SEDIMENT CARTRIDGE
4. INLET WATER SOLENOID VALVE
5. LOW PRESSURE CUT-OFF SWITCH
6. RECIRCULATION-PRESSURE CONTROL VALVE
7. HIGH PRESSURE PUMP AND MOTOR
8. PUMP PRESSURE GAUGE
9. R. O. MEMBRANE VESSEL
10. R. O. MEMBRANE ELEMENT
11. REJECT VALVE
12. REJECT WATER FLOW METER
13. AUTOFLUSH SOLENOID VALVE
14. PRODUCT WATER CHECK VALVE
15. PRODUCT WATER FLOW METER
16. TDS PROBE



NOTE:

- PRODUCT WATER
- REJECT/RECIRCULATING WATER
- DEPICTS WATER FLOW

REVISIONS:			
DESCRIPTION	NO.	DATE:	BY:
NEW MEM. SYM.	A	8-12-09	RT

PROPRIETARY AND CONFIDENTIAL

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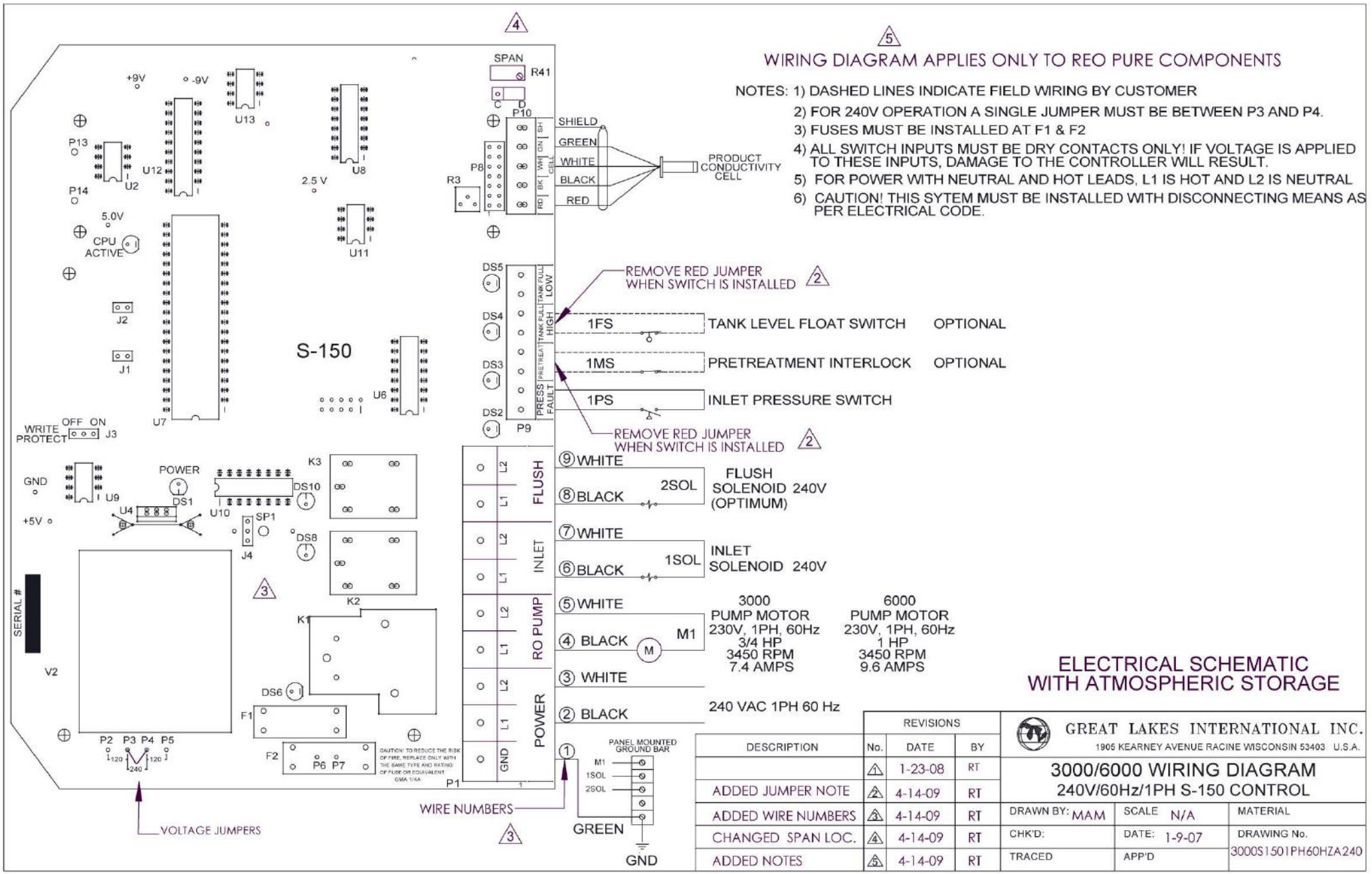
GREAT LAKES INTERNATIONAL INC.
1905 KEARNEY AVENUE RACINE WISCONSIN 53403 U.S.A.

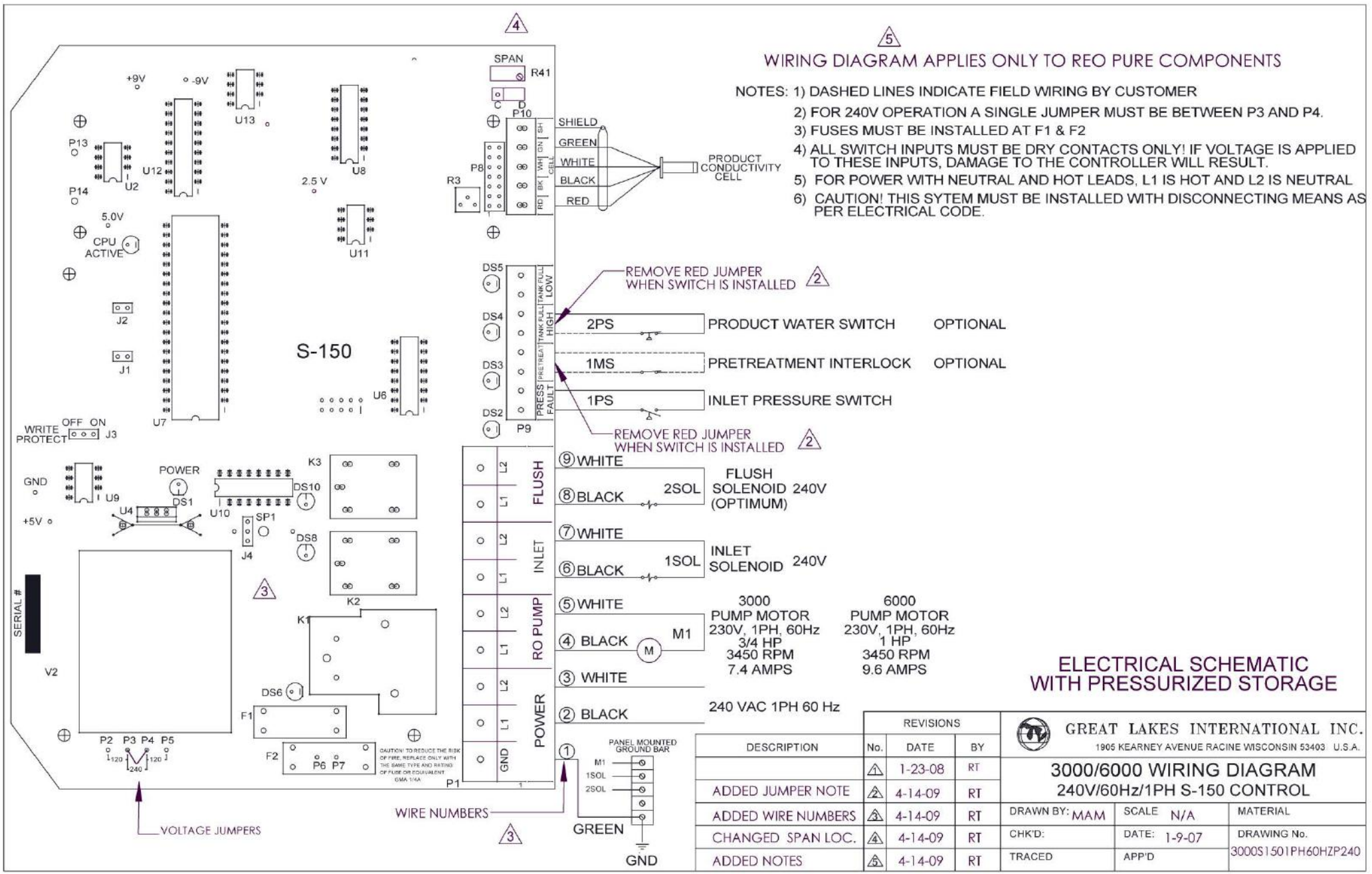
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ANGULAR: ± 1° XX ± .03 XXX ± .005

WMS & BLS 400 950 2400 3000
OPTIMUM SERIES
FLOW DIAGRAM

DATE: 5/8/08
DRAWN BY: R.J.T.
DWG. NO. BLS400-OPTI
SHEET 1 OF 1



DESCRIPTION	REVISIONS No.	DATE	BY
	1	1-23-08	RT
ADDED JUMPER NOTE	2	4-14-09	RT
ADDED WIRE NUMBERS	3	4-14-09	RT
CHANGED SPAN LOC.	4	4-14-09	RT
ADDED NOTES	5	4-14-09	RT



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WIRING DIAGRAM APPLIES ONLY TO REO PURE COMPONENTS

NOTES:
1) DASHED LINES INDICATE FIELD WIRING BY CUSTOMER
2) FOR 240V OPERATION A SINGLE JUMPER MUST BE BETWEEN P3 AND P4.
3) FUSES MUST BE INSTALLED AT F1 & F2
4) ALL SWITCH INPUTS MUST BE DRY CONTACTS ONLY! IF VOLTAGE IS APPLIED TO THESE INPUTS, DAMAGE TO THE CONTROLLER WILL RESULT.
5) FOR POWER WITH NEUTRAL AND HOT LEADS, L1 IS HOT AND L2 IS NEUTRAL
6) CAUTION! THIS SYTEM MUST BE INSTALLED WITH DISCONNECTING MEANS AS PER ELECTRICAL CODE.

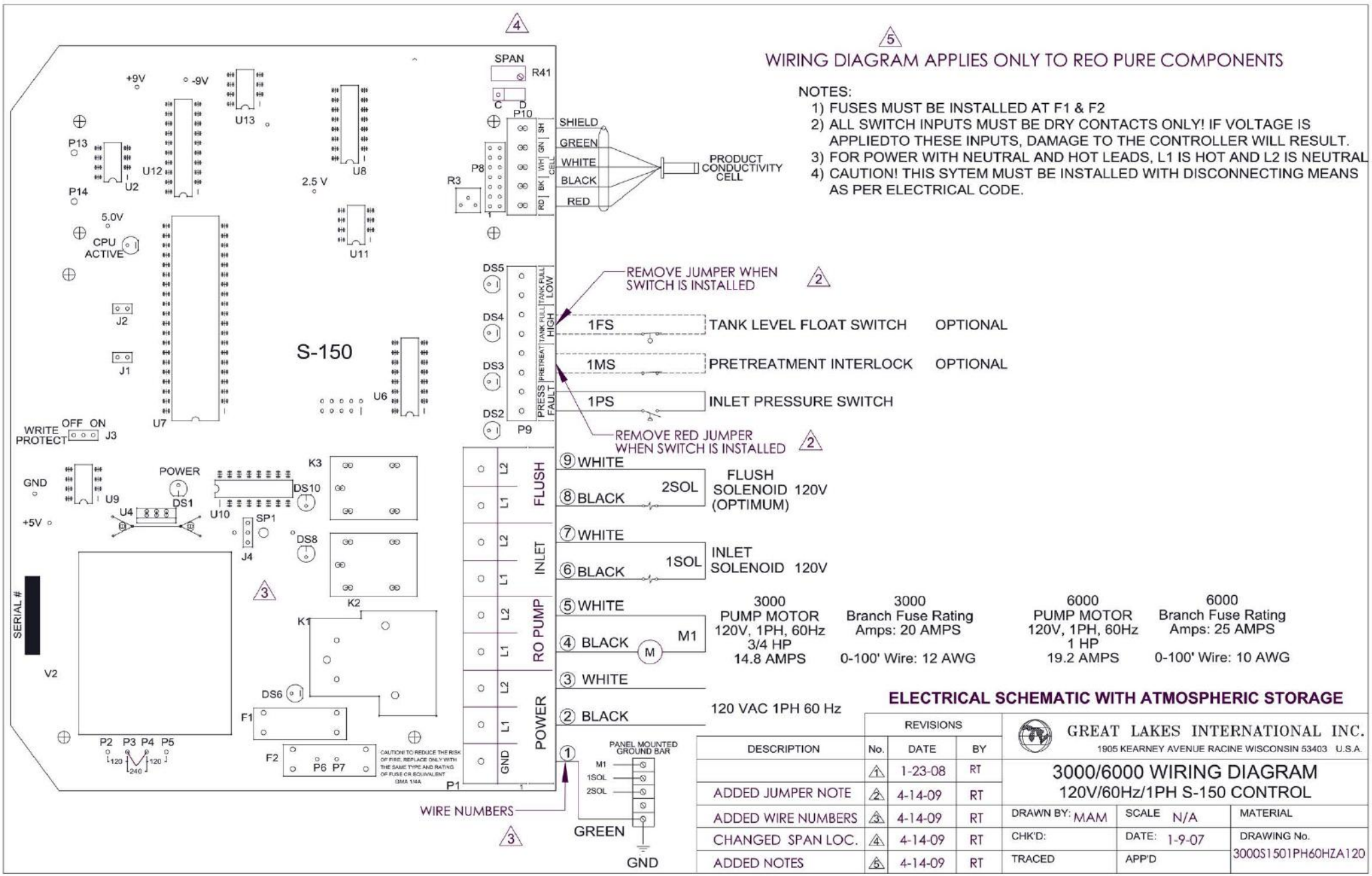
ELECTRICAL SCHEMATIC WITH PRESSURIZED STORAGE

DESCRIPTION	REVISIONS No.	DATE	BY
	1	1-23-08	RT
ADDED JUMPER NOTE	2	4-14-09	RT
ADDED WIRE NUMBERS	3	4-14-09	RT
CHANGED SPAN LOC.	4	4-14-09	RT
ADDED NOTES	5	4-14-09	RT

GREAT LAKES INTERNATIONAL INC.
1905 KEARNEY AVENUE RACINE WISCONSIN 53403 U.S.A.

3000/6000 WIRING DIAGRAM
240V/60Hz/1PH S-150 CONTROL

DRAWN BY: MAM	SCALE N/A	MATERIAL
CHK'D:	DATE: 1-9-07	DRAWING No. 3000S150 1PH60HZP240
TRACED	APP'D	



5

WIRING DIAGRAM APPLIES ONLY TO REO PURE COMPONENTS

NOTES:

1) FUSES MUST BE INSTALLED AT F1 & F2
2) ALL SWITCH INPUTS MUST BE DRY CONTACTS ONLY! IF VOLTAGE IS APPLIEDTO THESE INPUTS, DAMAGE TO THE CONTROLLER WILL RESULT.
3) FOR POWER WITH NEUTRAL AND HOT LEADS, L1 IS HOT AND L2 IS NEUTRAL
4) CAUTION! THIS SYTEM MUST BE INSTALLED WITH DISCONNECTING MEANS AS PER ELECTRICAL CODE.

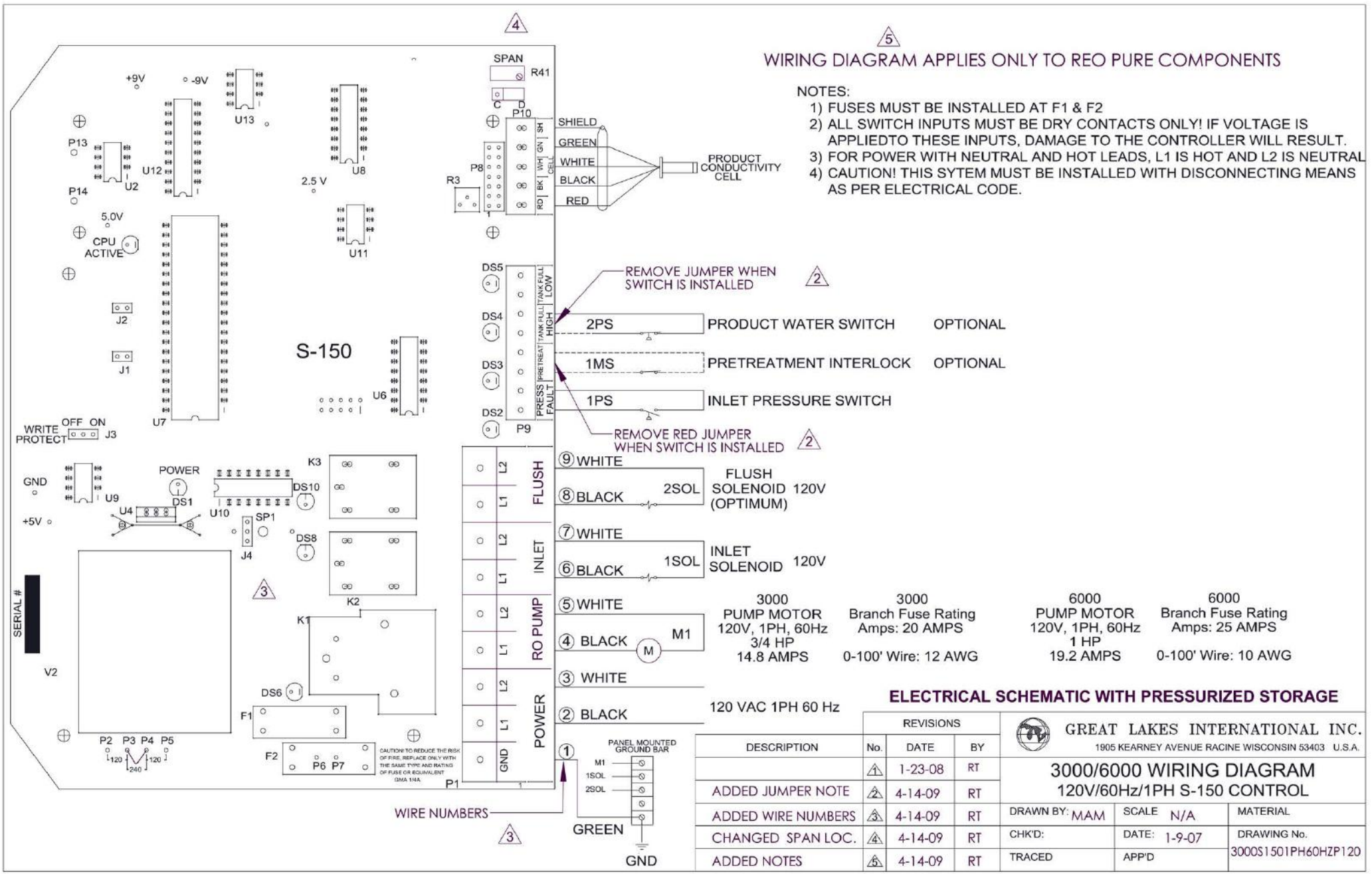
ELECTRICAL SCHEMATIC WITH ATMOSPHERIC STORAGE

DESCRIPTION	REVISIONS No.	DATE	BY
	1	1-23-08	RT
ADDED JUMPER NOTE	2	4-14-09	RT
ADDED WIRE NUMBERS	3	4-14-09	RT
CHANGED SPAN LOC.	4	4-14-09	RT
ADDED NOTES	5	4-14-09	RT

GREAT LAKES INTERNATIONAL INC.
1905 KEARNEY AVENUE RACINE WISCONSIN 53403 U.S.A.

3000/6000 WIRING DIAGRAM
120V/60Hz/1PH S-150 CONTROL

DRAWN BY: MAM	SCALE N/A	MATERIAL
CHK'D:	DATE: 1-9-07	DRAWING No. 3000S1501PH60HZA120
TRACED	APP'D	



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WIRING DIAGRAM APPLIES ONLY TO REO PURE COMPONENTS

NOTES:

1) FUSES MUST BE INSTALLED AT F1 & F2
2) ALL SWITCH INPUTS MUST BE DRY CONTACTS ONLY! IF VOLTAGE IS APPLIEDTO THESE INPUTS, DAMAGE TO THE CONTROLLER WILL RESULT.
3) FOR POWER WITH NEUTRAL AND HOT LEADS, L1 IS HOT AND L2 IS NEUTRAL
4) CAUTION! THIS SYTEM MUST BE INSTALLED WITH DISCONNECTING MEANS AS PER ELECTRICAL CODE.

ELECTRICAL SCHEMATIC WITH PRESSURIZED STORAGE

DESCRIPTION	REVISIONS No.	DATE	BY
	1	1-23-08	RT
ADDED JUMPER NOTE	2	4-14-09	RT
ADDED WIRE NUMBERS	3	4-14-09	RT
CHANGED SPAN LOC.	4	4-14-09	RT
ADDED NOTES	5	4-14-09	RT

GREAT LAKES INTERNATIONAL INC.
1905 KEARNEY AVENUE RACINE WISCONSIN 53403 U.S.A.

3000/6000 WIRING DIAGRAM
120V/60Hz/1PH S-150 CONTROL

DRAWN BY: MAM	SCALE N/A	MATERIAL
CHK'D:	DATE: 1-9-07	DRAWING No. 3000S1501PH60HZP120
TRACED	APP'D	

System Log

MODEL#: _____ OPERATOR: _____

SERIAL#: _____ FROM: _____ TO: _____

DATE	PRE-FILTER INLET PRESSURE (PSI)	PRE-FILTER OUTLET PRESSURE (PSI)	OPERATING PRESSURE (PSI)	FEED WATER TEMP	PRODUCT WATER FLOW	REJECT WATER FLOW	FEED WATER TDS (PPM)	PRODUCT WATER TDS (PPM)	SEDIMENT PRE-FILTER CHANGE DATE	CARBON PRE-FILTER CHANGE DATE	MEMBRANE ELEMENT CHANGE DATE	FEED WATER HARDNESS (GPG)	FEED WATER pH	FEED WATER CHLORINE (PPM)	FEED WATER IRON PPM	NOTES