



VECTAMAXX™ RSR

Advanced Reverse Osmosis System

OPERATOR'S MANUAL

FOR ALL VECTAMAXX™ RSR COMMERCIAL RO SYSTEMS

THIS MANUAL IS TO BE LEFT WITH THE OWNER OF THE EQUIPMENT FOR REFERENCE PURPOSES AND TECHNICAL GUIDANCE. IT IS STRONGLY RECOMMENDED THAT QUALIFIED DEALER SERVICE PERSONNEL BE CONTACTED IN THE EVENT OF AN UNKNOWN INTERRUPTION OF SERVICE OR APPARENT PRODUCT MALFUNCTION. AN ANNUAL PREVENTATIVE MAINTENANCE INSPECTION BY A WATER PROFESSIONAL IS RECOMMENDED TO ENSURE TROUBLE-FREE AND CONTINUOUS OPERATION.



www.waterite.com



Congratulations!

You have purchased the finest commercial reverse osmosis water system available. It will provide years of reliable service if properly installed, operated and maintained. Please read this entire manual before attempting installation and operation.

Section 1. Frequently Asked Questions

Before getting started, take the time to familiarize yourself with your new Waterite system by reading some FAQs listed below. Call us or ask your dealer if you have any other questions about your system's operation.

Q: How does the VectaMaxx™ RSR Reverse Osmosis System differ from an ordinary water filter?

Ordinary water filters use a screen to separate only particles of dirt and sediment from the raw water source. Reverse osmosis employs a semi-permeable membrane that removes not only particles but also a very high percentage of dissolved contaminants, molecule by molecule, from your raw water. Your system will deliver pure, refined water consistently to the designated storage tank or water distribution equipment.

Q: What is the membrane and how does it work?

The membrane element consists of several thin layers or sheets of film that are bonded together and rolled in a spiral configuration around a plastic tube. As the raw water passes across the surface of the membrane, only pure water molecules are allowed to pass through and collect in the tube, while all other mineral and contaminant molecules are rejected and washed from the surface of the membrane to the drain.

Q: What processes does the VectaMaxx™ RSR RO system use?

VectaMaxx™ RSR systems use two stages of treatment to produce high-purity product water. The feed water first flows through a 5-micron polypropylene filter used to reduce suspended particles. The second stage is the reverse osmosis membrane that separates most dissolved contaminants from the water molecules. These standard processes will probably be augmented with additional pre-treatment processes, depending on your raw water source.

Q: Will reverse osmosis remove sodium chloride and other salts from the water?

Yes. Reverse osmosis was originally developed to make drinking water from seawater. Your system is equipped with a membrane that will be very effective in reducing sodium levels normally found in ground water or softened water. **VectaMaxx™ RSR systems are not designed for use on seawater.**

Q: Does reverse osmosis remove bacteria? Cryptosporidium? Viruses?

Reverse osmosis membranes will virtually eliminate most chemicals, bacteria, viruses and parasites such as Cryptosporidium from the water. Where these conditions exist, pre-filters and other system components located before the membrane will become contaminated from exposure to them. Cross contamination of the entire system may occur when the membrane or filters are changed or disturbed.



THIS REVERSE OSMOSIS WATER SYSTEM IS DESIGNED ONLY TO IMPROVE AESTHETIC PROPERTIES AND IS NOT DESIGNED TO ACT AS A PRIMARY BARRIER TO WATERBORNE MICROBIOLOGICAL OR TOXIC CHEMICAL CONTAMINATION. WHERE THESE CONDITIONS MAY EXIST CONSULT A WATER PROFESSIONAL TO ENSURE SUFFICIENT RAW WATER PRE-TREATMENT AND DISINFECTION.

Q: What other contaminants does reverse osmosis remove?

The combined filtering and RO processes in your system will remove more than 98% of many organic compounds, including THMs (chloroforms), DBCP, lindane, TCE (trichloroethylene), PCE (tetrachloroethylene), carbon tetrachloride and chlorine. Very conservatively, a TFC membrane will remove the following percentages of contaminants:

Barium	97%	Fluoride	90%	Radium	97%	Sulfates	97%
						Total Dissolved	
Bicarbonate	94%	Lead	97%	Selenium	97%	Solids	97%
Cadmium	97%	Magnesium	97%	Silicates	96%	PCBs	97%
Calcium	97%	Nickel	97%	Silver	85%	Insecticides	97%
Chromium	92%	Nitrates	80%	Sodium	92%	Herbicides	97%
Copper	97%	Potassium	92%	Strontium	97%	Detergents	97%

Q: Where is the system installed?

Each application will require access to the feed water source, electrical power and a drain for the wastewater to be routed to. The system should be protected from the elements and at all times protected from freezing. If the system is used to provide water to a critical piece of equipment, you may consider protection from power surges and lightning strikes.

Q: Can the VectaMaxx™ RSR system be connected multiple appliances?

Yes. Many installations will involve providing water to multiple appliances or pieces of equipment simultaneously. Make sure that the peak usage of water for the combined equipment does not exceed the output of your RO system or its product water storage. See your dealer for advice and parts.

Q: What factors affect the quantity and the quality of the water produced?

1. Pressure: The greater the RO system pressure, the greater the water quantity that will be produced by the membrane. Your VectaMaxx™ RSR unit has been equipped with ultra- low energy membrane(s) that are designed to operate at a minimum system pressure of 100 psi. (7.0 kg/cm²) and a maximum of 130 psi (9.0 kg/cm²) for models 1200 and 2400, do not attempt to operate your system at pressures exceeding 150 psi, as damage to the membrane or premature fouling may result.
2. Temperature: Production increases with temperature, standard ratings established at 25°C. Never operate the system from the hot water line or with water exceeding 40°C, as this will damage the membrane and internal components.
3. Membrane type: VectaMaxx™ RSR systems use premium quality TFC (Thin Film Composite) membranes, specially chosen for general commercial applications. Please contact your dealer or Waterite for information on special application or nanofiltration membranes.
4. TDS: The higher the Total Dissolved Solids in the raw water, the lower the rate of output of product water.

Q: How much water does the VectaMaxx™ RSR system produce?

VectaMaxx™ RSR systems use membranes each nominally rated for 1200 or 2400GPD. Actual output will be dependent upon the factors explained above. In optimal applications (low feed water TDS, feed water =25°C, you may expect 700-1000 (RSR1200) and 1600-2100 (RSR 2400) USG from each membrane to be available over 24 hours.

Q: Can the amount of total water produced be increased?

Once the system has been set for optimal operation, the overall water available for consumption over a set period of time will be increased by increasing the storage capacity. This will increase the time available for the unit to produce water in off-peak hours (instead of standing idle), and more storage capacity to be available in peak hours when water usage may exceed production capacity, for short intervals.

Q: What is the standard warranty with the VectaMaxx™ RSR system?

Every VectaMaxx™ RSR system comes with a standard one-year limited warranty on all parts and shop repair labour, freight excluded. See section 5 in this manual for details on components with limited warranty coverage.

Q: What is the maintenance schedule for the VectaMaxx™ RSR system?

A good rule of thumb is to replace the pre-filter every month in commercial applications. Consider changing them biweekly when in continuous use or when used with untreated water sources. Dependent upon feed water quality, your membrane(s) should have a life expectancy of 1-5 years. More severe water conditions (iron, hardness) may shorten this significantly; soft water sources may allow a membrane life of up to 8 years. **See Section 5.**

Q: When should the membrane(s) be cleaned or changed?

If you notice gradually decreasing production from your system, differing taste to your drinking water or water analyses indicate a rising TDS, it probably means that your membrane(s) are deteriorating and is losing effectiveness. You may purchase a pocket or full-featured TDS meter from your dealer - this is the best way to gauge your RO's operation.

Where the RO is used as a pre-treatment for a process requiring water to exact standards, you should adopt a regular ongoing sampling and testing procedure to ensure compliance, as product water will vary with the quality of the RO feed water.

Section 2. Designing your Installation

Your reverse osmosis system is designed to operate with feed water quality parameters that fall in a specific range. The lifespan of the membranes and the ability of the system to produce water in the required volume will depend largely on the feed water that is delivered to the system.

2.1. Start with a Thorough Water Analysis

Every successful installation begins with a full analysis of the raw water source. Testing should measure the following:

- **Total Hardness:** This measures the calcium and magnesium hardness in the water. Hardness in excess of 6 grains/gallon (103 mg/l) must be pre-treated by softening. Failure to do so will cause premature failure of the membrane through lime scaling.
- **Total Iron:** Iron is another common membrane foulant. Found in most water supplies, it's particularly prevalent in supplies drawn from wells. In its ferrous state (Fe^{+2}), it's soluble. However, when it's oxidized to its ferric state (Fe^{+3}), it's insoluble and forms a

precipitate. Concentrations in excess of .05 ppm must be pre-treated with an iron remover (concentrations > 2 ppm) or combination softener* (for iron concentrations < 2 ppm); otherwise premature membrane and system equipment failure through iron deposit fouling will result.

- **Manganese:** Manganese is a commonly occurring mineral found in ground water. Manganese will leave black, scaly deposits and will eventually foul membranes in concentrations greater than .05 ppm. Manganese must be treated with a manganese greensand filter, regenerated with potassium permanganate.
- **Hydrogen Sulfide:** Most commonly, hydrogen sulfide is known for its “rotten egg” odour. In addition to having a objectionable odour, it is highly corrosive and will damage plumbing and equipment. At lower concentrations (< 1 ppm) it can be removed with a Paterson Iron Remover (air injection). At levels exceeding 1 ppm it will need to be treated with a manganese greensand filter.
- **Nitrates:** The presence of nitrates in the water is usually an indicator for other problems with the water source. Nitrates are a by-product of the decomposition of organic material that may include sewage or run-off from septic systems. Surface runoff containing fertilizers will also be high in nitrates. The source of the nitrates should be found and eliminated – feed water should be treated with nitrate-selective ion exchange resins to reduce nitrates to < 5 mg/l.
- **Tannins and Lignin:** These are organic materials that are often contained in surface water and shallow well water. Their origin is the natural decomposition of plant matter and tree barks, leaving a brown colour ranging from a pale yellow to dark amber. Feed water tannins must be pre-treated to levels < .5 mg/l to avoid membrane fouling. This is usually achieved through the use of organic scavenging ion exchange resin (polystyrene or polyacrylic), regenerated with salt.
- **Chlorine:** Feed water should be free of chlorine (< .1 ppm), as TFC membranes are easily damaged by chronic chlorine exposure. This is an important consideration when municipal water is used as the feed water source. Pre-treatment by carbon filtration is very effective for chlorine reduction – carbon eventually becomes exhausted and must be replaced to ensure continuous filtration. If stabilized chlorine is present, size your carbon filter 2 to 3 times larger than for unstabilized chlorine to ensure removal. Consider installing a post-carbon filter test port for ease of sampling.
- **Organic and Microbiological Activity:** Raw water sources, particularly surface water, often contain algae and naturally occurring bacteria. Ground water may contain sulphur or iron reducing bacteria or may be contaminated with other more dangerous strains of coliforms or *E. coli*. These must be treated to avoid contamination or fouling of the pre-treatment systems or membrane element(s).
- **pH:** Most membrane manufacturers recommend a pH range between 3.0 and 11.0 for the membrane element. We recommend that the system operate at between 5.5 and 9.5, to minimize the effects of extremely acidic or scale-forming water at either ends of the range. Extremes in pH will be harder on your system, either causing premature.

* When softeners are used for iron reduction, be sure to fit your softener with a resin bed cleaner to assist in the flushing of iron deposits from the resin bed during backwashing and regeneration.

corrosion on metallic parts or scaling internal components upstream from the membrane, and likely the membrane itself. Keep in mind that reverse osmosis lowers the pH of the feed water, by up to 1.0, depending on the water chemistry. This will be a consideration for the end use of product water and for the vessels and plumbing system that will be used to store and control it.

- **Turbidity:** This is the term to describe suspended particulate in the raw water. Turbidity is treated by the sediment cartridges that your RO system has been equipped with. Reduction of turbidity is necessary to avoid fouling your membrane and damaging your drive pump. Make sure that your pre-filters are changed regularly and that quality Excelpure 5-micron cartridges are used as replacements. The SDI (silt density index) on feed water reaching the membrane must be kept < 5 to assure long membrane life.

2.2. Plan Your Pre-treatment Strategy

Pre-treating feed water can lengthen the life of membrane elements, improve the quality of the water produced and reduce the amount of maintenance and cleaning a system requires.

The importance of feed water conditions is evident when you examine how crossflow membranes work. In simple terms, a crossflow filtration system separates an influent stream into two effluent streams - the permeate and the concentrate. The permeate is the portion of the fluid that has passed through the semi-permeable membrane. The concentrate stream, on the other hand, contains constituents that have been rejected by the membrane.

An inherent advantage of crossflow filtration is its ability to continuously operate in a self-cleaning mode. It's self-cleaning because suspended solids and rejected solutes are constantly swept away from the membrane surface. Membrane fouling occurs when materials from the feed stream collect on or near the membrane surface and restrict water permeation. Fouling may occur as layers of deposition on the surface of the membrane (cake fouling), a hardened layer on the membrane surface (scale), particle insertion into the pore channel or entrance (pore blockage), or chemical attachment of particles to the membrane (adsorption).

You will note that many of the prescribed treatments for various raw water conditions will be effective in treating more than one problem. Where multiple pre-treatment requirements are necessary, consult with a water treatment professional to design a pre-treatment system that meets the necessary needs most economically.

Use the pre-treatment summary below to prescribe the necessary pre-treatment where your water analysis indicates parameters outside of the recommended range:

Pre-Treatment Summary Chart

Recommended Feed Water Range	Potential Effect	Pre-Treatment Solution	Waterite Models
TDS < 2000 ppm	Reduced production rate Increased salt passage	Contact Waterite/ Replace water source	RSL HP
T. Hardness < 6 grains/gal (103 mg/l)	Scaling of membrane surface Reduced production rate	Automatic Softener	Fusion ² series Gem series
Total Iron < .05 ppm	Reduced production rate Fouling of membrane surface Iron deposits in equipment	Iron Remover (> 5 ppm) Softener (levels < 5 ppm)	FOB series
Tannins < .5 ppm	Reduced production rate Fouling of membrane surface	Softener with organic scavenger resin	Gem series
Chlorine < .1 ppm	Permanent membrane damage Increased salt passage	Carbon Filter	Fusion ² CF series
pH 5.5 – 9.5	Internal corrosion Lime scaling in equipment Plumbing damage	Replace water source Adjust pH	Call your dealer
Organic or Microbiological Activity 0	Reduced production rate Fouling of membrane surface Sliming of pre-treatment equipment, odour	UV Disinfection followed by 1-micron filtration Well chlorination	Excelight UV Excelpure WellPro
Manganese < .05 ppm	Reduced production rate Fouling of membrane surface	Manganese Greensand Filter	Greensand Catalox
Hydrogen Sulphide 0	“Rotten egg” odour Internal corrosion	Iron Remover (<1 ppm) Manganese Greensand Filter (> 1 ppm)	Greensand Catalox
Turbidity SDI < 5.0	Reduced production rate Plugging of membrane Rotary vane pump damage	Multimedia Filter Pre-treatment cartridges	Nextsand Excelpure

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TEST THAT THE PRE-TREATMENT SYSTEM IS DELIVERING RO FEED WATER TO NECESSARY SPECIFICATIONS BEFORE PLUMBING THE RO SYSTEM ONLINE.

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ALWAYS ALLOW A NEW SOFTENER INSTALLED TO PRE-TREAT AN RO SYSTEM TO START ON THE BACKWASH/REGENERATION/RINSE CYCLE. OPERATE THE SOFTENER OFF-LINE UNTIL WATER RUNS CLEAR BEFORE USING IT TO PROVIDE RO FEED WATER. THIS PROCEDURE ALSO APPLIES TO NEW RESIN BED INSTALLATIONS. COLOUR THROW FROM NEW RESIN BEDS MAY DAMAGE OR FOUL RO MEMBRANES.

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WATERITE DOES NOT RECOMMEND THE USE OF A GRANULAR CARBON CARTRIDGE IN THE PRE-TREATMENT FILTER HOUSINGS SUPPLIED, FOR THE PRIMARY REDUCTION OF CHLORINE. IT WILL REQUIRE REPLACEMENT TOO OFTEN, LIMIT FLOW RATES AND LIKELY LEAD TO CHLORINE BREAKTHROUGH TO THE MEMBRANE ELEMENT. WE RECOMMEND THAT THIS HOUSING BE RESERVED FOR 5-MICRON OR 1-MICRON SEDIMENT CARTRIDGES, FOR THE REDUCTION OF SUSPENDED PARTICULATE.

2.3. Plan Your Water System

1. Using a Pressure Storage Tank and Pressure Switch

Your RO system will produce permeate (product water) at a pressure capable of pressurizing a bladder tank, though tank recovery time will be limited by the production rate of the membrane(s). Rates of water production for Vectapure™ RSR systems are, at maximum (feed water @ <1000 TDS):

RSR1200	0.8 USG/min. (3.0 liters/min.)
RSR2400	1.6 USG/min. (6.0 liters/min.)

For many systems, this rate of recovery will be insufficient in periods of peak usage. It will be necessary for you to provide product water storage in a non-pressurized tank from which you may re-pressurize the water for delivery to your appliances or plumbing system.

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IF THE SYSTEM IS CONNECTED DIRECTLY TO A PRESSURE TANK, MAKE SURE THAT A CHECK VALVE IS INSTALLED ON THE PRODUCT WATER LINE BETWEEN THE MACHINE OUTLET AND THE PLUMBING SYSTEM PRESSURE SWITCH, TO ELIMINATE BACKPRESSURE ON THE MEMBRANE(S). FAILURE TO DO SO WILL CAUSE PERMANENT DAMAGE TO THE RO MEMBRANE(S).

If a pressure tank and pressure switch is used, be sure that the pressure switch is capable of carrying the full load amperage of the pump motor. For reference, the motor full load amperages are:

	120VAC
RSR1200	15 A
RSR2400	15 A

Consult your electrician to determine the proper sized breaker for your installation. Other motor voltages are available as a factory option. Consult with your dealer for availability and pricing.

The pressure switch will be used to turn off the RO unit at the cut-off pressure and turn it on at the cut-in pressure, in the same way one is used to control a water well pump. Set the pressure switch to a maximum shut-off pressure of 60 psi.

The pressure switch must be wired to break the current on the power line between the power source and the RO unit's switchbox. Do not break the current at the pump motor, as this will cause the inlet solenoid to remain activated and open when the machine is shut down. Waterite offers an optional factory-installed permeate high pressure cut-off (Waterite P/N RSRPSO) for this application.

2. Using an Atmospheric Pressure (non-pressurized) Storage Tank and Float Switch

Your VectaMaxx™ RSR RO may be wired to a float control shut-off switch that shuts the system down when a non-pressurized storage tank is filled. Make sure that the tank size is selected to provide adequate water storage for your peak demand period. Keep in mind that atmospheric water storage vessels are subject to contamination by airborne bacteria – they should include a lid, be sanitized before use and periodically disinfected. RO product water will have no chlorine residual and will be subject to contamination at all stages in the plumbing system. Consider UV disinfection as an inline option for all water being pumped from the storage tank into the plumbing system. An overflow bulkhead drain fitting should always be installed in the tank and connected to a floor drain to protect from a failed level switch.

If the inlet bulkhead fitting to the non-pressurized tank is below the maximum water level in the tank, make sure that a check valve is installed in the product water line between the RO unit's outlet and the tank inlet. This will ensure that backpressure from the tank will not damage the membrane(s). To eliminate this problem, install the bulkhead fitting above the level switch.

Consult your ***Waterite Commercial RO Systems Price List*** for information and availability on a wide variety of water system components including storage tanks, repressurization pumps, bulkheads, tube, pipe, pressure switches, fittings, UV disinfection systems and float valves.

Section 3. Installation

Your system includes:

- The main RO/filter assembly frame with one assembled pre-filter, booster pump, membrane housing(s), flow controls, pressure gauges, flow meters and RO controller.
- One membrane (in a sealed plastic bag and one 5-micron polypropylene sediment cartridge;
- One sediment filter housing wrench;
- One Owner's package including owner's manual and warranty certificate.

3.1. Selecting the System Location

1. The filter housing will need periodic maintenance - easy access must be maintained. Do not install in a location with high humidity, direct sun or a direct source of heat. Typically, a commercial mechanical room is ideal. Never expose the RO unit to freezing temperatures.
2. Use the threaded feet at the base of the RO stand to level the unit.
3. The unit will need to be installed in a location that has ready access to 120V power, the feed water line and near a drain capable of handling the waste flow from the machine.



Figure 1.

A Note on Fittings

Your RO system has been equipped with quality compression and push on fittings throughout. Any compression fittings should be hand-tightened and then tightened $\frac{1}{4}$ turn further with a wrench. Always use the ferrule and tube stiffener provided for each joint. Check that all fittings are snug, as they may have loosened in transit.

Completing and securing a push-on connection is simple. First, the tubing should be cut square and any burrs or rough edges removed. Insert the tube firmly and push until the tube end contacts the stop. Gently tug the tube backwards to assure a secure connection. To disconnect, pull the tube while pushing in the collet ring. Fittings may be reconnected over and over again, if necessary. See figure 2. below.

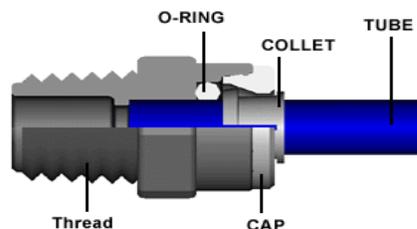


Figure 2.

3.2. Install the Feed Water Supply Connection

1. Inspect the cold water supply line and the condition of the pipe. Ensure that the supply pipe is in good overall condition and is capable of delivering the system's necessary feed water flow rate. See Section 8 for specified feed water flow rate requirements.
2. Turn the water supply line to your plumbing OFF.

3. Plumb a connection from the **COLD** water supply line, ensuring that the feed line is at least 1/2" in diameter. Install a shut off valve on the connection, so that the RO system can be isolated from the main water supply. Note that the inlet connection to your RO system is 1/2". We recommend that you also install a pipe union near the RO to allow easy disconnection should it be required for maintenance.
4. Make sure the feed water source is a reliable one and will constantly deliver feed water between 40 psi and 60 psi maximum. Your RO system has been equipped with an emergency low pressure shut-off, in the event that the line pressure to your RO inlet falls below 20 psi. This will keep the drive pump from running dry and damage occurring to its internal components.

3.3. Installing the Drain Line

1. A 3/8" poly tube (minimum) should be used for the drain line. **For systems equipped with the fast flush option a 1/2" drain line should be installed.** Position the drain line over the drain and secure it in place. Do not elevate the drain line over 10 feet above the unit. If connection to a sewer line is necessary, check the local code or a plumbing professional for guidance and the required parts. Usually a trap with a 2" air gap will suffice.

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ALWAYS MAINTAIN OR INSTALL A 2" AIR GAP ON ALL DRAIN LINES TO PREVENT SEWAGE BACK-SIPHONAGE.

2. **DO NOT** use a residential septic field for receiving the RO waste from VectaMaxx™ RSR systems. If used to 24-hour capacity, these systems (depending on the model and settings) will produce between 763 to 3456 USG (2880 to 12960 liters) per day of wastewater and will waterlog septic beds.

The amount of waste produced by your system is determined by a fixed, drain line flow control (DLFC) that has been factory-installed. Do not attempt to restrict or alter the rate of waste flow as this will cause premature membrane failure or loss of permeate production.

3.4. Installing the Filter Cartridge and Membrane (s)

1. Remove the filter housing by turning counter-clockwise with the housing wrench supplied. Remove all protective wrapping from the 5-micron filter cartridge. Insert the 5-micron white sediment filter in the housing and reassemble. The housing is seated with o-rings – DO NOT OVERTIGHTEN – 1/4 turn or less after hand tight is usually sufficient.

Skip (2.) below if the factory has pre-loaded your membrane elements.

2. Remove the wrapping from the membrane element(s). Lightly lubricate the membrane brine seal and all o-rings located in the membrane housing caps with a good quality, silicone o-ring lubricant (do not use petroleum-based lubricants). Disconnect the connections on the membrane housing's top end cap. Remove the end cap from the membrane housing by loosening the band clamp nuts and bolts. The membrane housing is mounted vertically on the system's stand. See Figure 1. Insert the membrane element into the housing, so that the brine seal of the membrane will seat at the inlet side of the membrane housing (this is indicated by the direction of flow label on the housing). See

Figure 3. Gently push and slowly twist until the membrane product adapter seats snugly inside the housing cap still in place at the bottom of the housing. Re-install the disassembled housing cap - be sure that o-rings do not roll out of their grooves, get pinched or cut. Re-install the band clamp snugly and reconnect the connections to the cap.

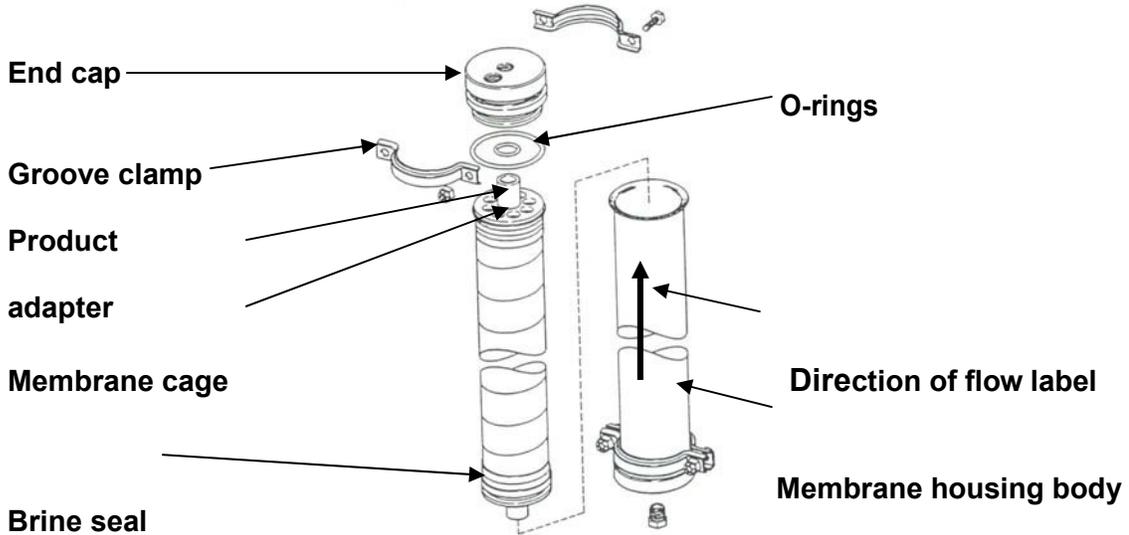


Figure 3. (Stainless membrane housing)

- To remove the membrane from the housing, remove the top housing end cap and gently pull the membrane out of the housing body. You may need to lightly grip the membrane cage with needle-nose pliers to free it from the housing, after extended use. With each disassembly, always check the end cap o-rings and the membrane brine seal to make sure that they are in good condition and are secure in their seating grooves. While the housing is disassembled, clean all components thoroughly to remove any debris or scaling. When re-assembling, make sure that that membrane element is installed with the brine seal facing in the same direction as was previously. See direction of flow label on each membrane housing.

3.5. Complete the Electrical Connection

- VectaMaxx RSR systems operate using a 120V 20A service and a grounded receptacle. Assure that the power source is rated to the necessary amperage (see page 8) and that the connection meets the local electrical code. See the electrical diagram on page 20.

GROUNDING INSTRUCTIONS – This appliance must be grounded. In the event of a malfunction or breakdown, grounding will reduce the risk of electric shock by providing a path of least resistance for electric current. This appliance is equipped with a cord having an appliance – grounding conductor and a grounding plug. The plug must be plugged into an appropriate outlet that is installed and grounded in accordance with all local codes and ordinances.

WARNING – Improper connection of the appliance – grounding conductor can result in a risk of electric shock. Check with a qualified electrician or service representative if you are in doubt whether the appliance is properly grounded. Do not modify the plug provided with the appliance; if it will not fit the outlet, have a proper outlet installed by a qualified technician.



DO NOT START THE SYSTEM UNTIL THE NEXT STEP IS COMPLETE.

Section 4: System Set-Up

Set-up of your RO system will be dependent upon the TDS of your feed water. **Make sure that you specify the TDS of your feed water at the time the unit is ordered.** The system has been shipped with a waste control orifice that will be intended for feed water of less than TDS of 1000.

This orifice has been selected to operate at the correct waste flow rate for your system without the need for a waste throttling valve. For systems configured for <1000 TDS, the recovery rate will be a maximum of 60%. For systems configured for >1000 -1500 TDS, the recovery rate will be a maximum of 35%.

4.1. RO Controller Set-Up

1. System Controller Specifications

Inputs

Tank level switch	(1) Normally-Closed. RO runs on switch closure.
Inlet pressure switch	Normally-Open. Switch opens on low pressure.
Pretreat lockout switch	Normally-Open. Pretreat lockout active with switch closure. NOTE: All switch inputs are dry contacts. Voltage applied to the switch inputs will damage the controller
Controller Power	120/240 VAC, 60/50Hz (Range: 96-264 VAC) The switching power supply automatically adjusts to supply voltage. Voltage applied to the input is the same voltage the motor and valves will operate on.

Relay Output Ratings

Feed Solenoid	12A. Output Voltage is the same as motor/supply voltage.
Flush Solenoid	12A. Output Voltage is the same as motor/supply voltage. <i>The solenoid relay ratings above reflect the capacity of the relays only. The current capacity of each circuit is 2A.</i>
Motor	1.0 HP @ 120V, 2.0 HP @ 240V.
<i>Circuit Protection</i>	
Controller Power Fuse	F1 5x20mm 1/4(0.25) Amp Little Fuse 0218.250MXP <i>Branch circuit protection, motor and valve protection must be provided externally.</i>

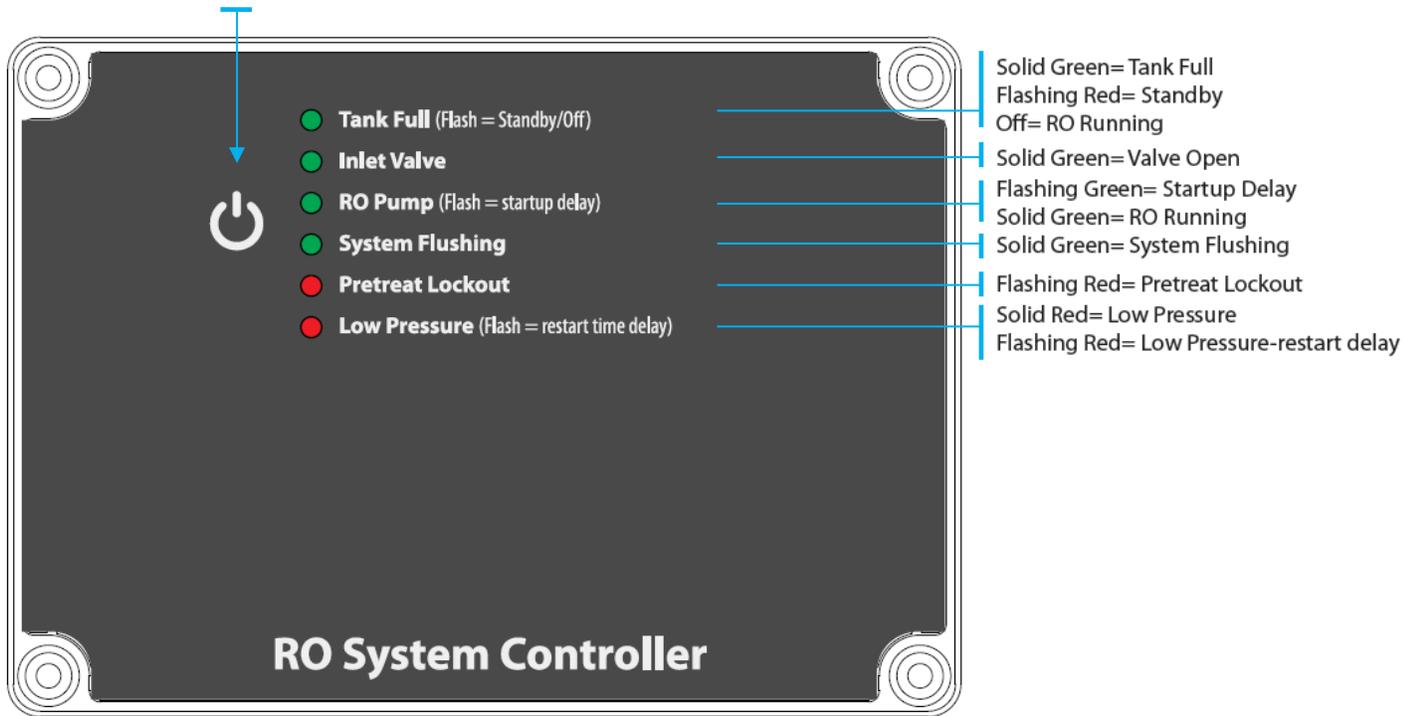
Other

Dimensions	7" tall, 5" wide, 2.375" deep. Nema 4X Polycarbonate Enclosure.
Weight	1.1 lb.
Environment	0-50°C, 10-90%RH (non-condensing)

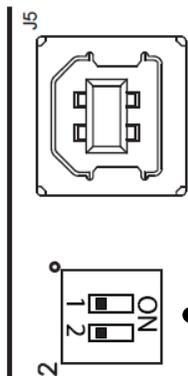
2. RO Controller Interface

Standby/ON Switch

Capacitive touch switch. Tank Full LED turns Red to confirm button contact. To use switch to switch states, hold for 1-2 seconds.



- DIP Switch Settings



RO Program Settings

Switch 1	Switch 2	Program
ON	OFF	1
OFF	OFF	2

3. RO Controller Programming

The controller has 2 separate user-selectable sets of settings for configuring the RO. The factory default settings are shown below. The settings are identical except for variations in the flush behavior.

Program 1, No Flush (Standard)

Program 2, High Pressure Flush (Optional)

See "DIP Switch Settings" for instructions on how to select these programs

Parameter	Value	Program 1	Program 2
Tank Level Switch delay (actuation and de-actuation)	Seconds	2	2
Pressure Switch delay (actuation and de-actuation)	Seconds	2	2
Pretreat Switch delay (actuation and de-actuation)	Seconds	2	2

Pump start delay	Seconds	10	10
Inlet Solenoid stop delay	Seconds	1	1
Pump start retry interval (restart delay after LP fault)	Seconds	60	60

Low pressure fault shutdown, # of faults	faults	5	5
Low pressure fault shutdown, time period to count faults	Minutes	10	10
Low pressure fault shutdown, reset after shutdown	Minutes	60	60
Low pressure timeout fault	Seconds	60	60

Flush Behavior		No Flush	High Pressure
Startup Flush: Minutes from last flush	Minutes	0	0
Startup Flush: Duration	Seconds	0	0
Periodic Flush: Interval	Minutes	0	60
Periodic Flush: Duration	Seconds	0	60
Shutdown Flush: Time from last flush	Minutes	0	10
Shutdown Flush: Minimum operation	Minutes	0	30
Shutdown Flush: Duration	Seconds	0	60

Timed Manual Run	Minutes	5	5
Timed Manual Flush	Minutes	0	5

4.2 Starting Up and Flushing the System

- 1.0 Turn on the feed water valve to the system and check all connections for leaks. Do not proceed further until any leaks are fixed. Water will flow to the pre-treatment housings but will not pass the inlet solenoid (see Figure 4.) until the system has been started. The available line pressure should now register on the line pressure gauge. Purge any air from the pre-filter housing by pressing the Red valve on top of the housing
- 2.0 Open the recirculation valve to the fully open position.
- 3.0 The system pump must be initially primed and at any time that the system has been drained, prior to start-up. **THE PUMP MUST NOT BE RUN DRY OR DAMAGE WILL RESULT.** Please refer to the pump manual (included) for priming instructions.

4.0 Once the pump is primed, connect the power plug to the electrical source. The system will start in the ON position. Let the system operate for about 5 minutes with the valve fully open. The system is now flushing and clearing any dust or debris from the lines. There should be little or no water production from the machine during this process. All water, including permeate, should be discarded and sent to drain.

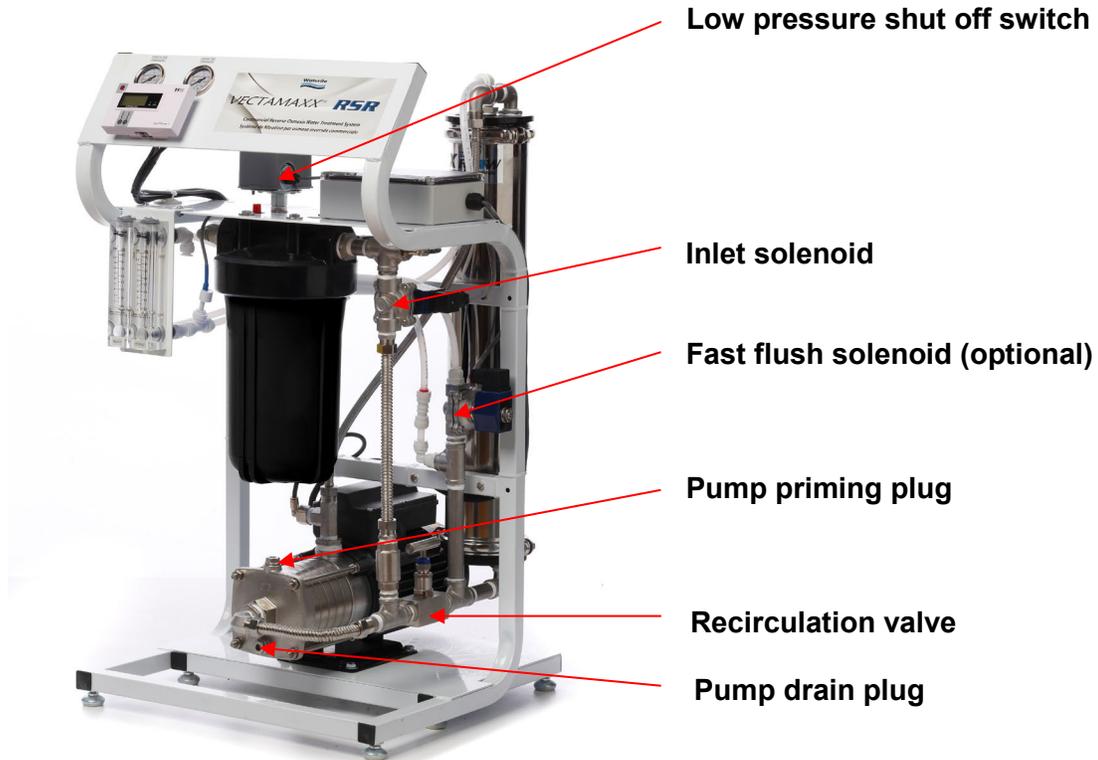


Figure 4.

5.0 The system is designed to normally operate at 130 psi. At this pressure, the proper waste/production ratio is established. Next, begin to close the recirculation valve slowly until the operating pressure gauge registers 130 psi (9.1 bar). **DO NOT ALLOW THE SYSTEM TO OPERATE IN EXCESS OF 150 PSI AS MEMBRANE AND SYSTEM DAMAGE MAY RESULT.** You may wish to lock the valve in the proper position by removing the handle to discourage tampering. Your system is now set up to operate at its design settings.

!

YOUR MEMBRANES MAY HAVE BEEN SHIPPED WITH AN ANTI-BACTERIAL PRESERVATIVE. OPERATE THE SYSTEM FOR 1 HOUR AT DESIGN SETTINGS BEFORE BRINGING THE SYSTEM ONLINE TO ASSURE MEMBRANE HAS BEEN COMPLETELY FLUSHED. DO NOT USE WATER PRODUCED DURING THIS RUN-IN PERIOD.

6.0 A Note on Recovery Rates

Your VectaMaxx™ RSR is designed to operate at a recovery rate (percentage of product water to total water used) at maximum of 60% for feed water of <1000 TDS and 35-40% for feed water with TDS ranging from 1000 to 1500. **DO NOT ATTEMPT TO OPERATE THE SYSTEM AT HIGHER RECOVERY RATES. AS THIS WILL CAUSE PREMATURE MEMBRANE FAILURE OR INTERNAL SCALING AND EQUIPMENT FAILURE.**

You may wish to operate your system at lower recovery rates where your dealer has identified water conditions that may stress your membrane or where recommended pre-treatment feed water conditions are not met. You may do so, though this must be accomplished by a combination of increasing the flow of concentrate to waste and reducing the recirculation valve flow. This, done in balance, will maintain the overall system pressure at previously stated normal operating pressures.

Where your system is equipped with flow meters, simply open the concentrate valve to the desired flow rate and close the recirculation valve until the pressure registers normal operating pressure. Using the formula:

$$\% \text{ Recovery Rate} = \frac{\text{Flow rate of Permeate (Product Flow)}}{\text{Flow rate of Permeate} + \text{Flow rate of Waste}}$$

adjust the valves until the appropriate balance is met. Once the new balance has been established at normal operating pressure, you may wish to lock the valves in position by removing the handles by loosening the setscrews located on the valve handle.

Section 5: System Maintenance

Changing Pre-filter Cartridges

The pre-filter cartridge should be changed, as a rule of thumb, every month, biweekly in heavy use applications. It is critical that this be done to ensure that pre-treatment cartridge allow necessary flow and that suspended particulate is removed from the feed water.

To change the cartridge, turn off the system's power and as a safety precaution, close the water supply to the unit. Repeat Step 7 (1) from the installation instructions above. Thoroughly flush and clean the filter housings while they are disassembled. Always use Waterite factory cartridges as replacements.

Monitoring your System Performance

Your system will be operating at its peak performance after about 24 hours of operation. You should develop a daily log to track line pressure, system pressure, feed water TDS, permeate TDS, permeate flow rate and waste flow rate. This will allow you to see any developing performance trends or alert you to system changes that will require you to intervene. It will also be helpful for your dealer or Waterite technical personnel to have this information available to help troubleshoot your system, should it become necessary. The table provided in the last few pages of this manual (Section 9) will help you get started.

Fast Flushing your VectaMaxx™ RSL

Consider ordering your system with the automatic auto flush option, which can be set for a periodic fast flush automatically. (Waterite P/N RSRAF) This option should be considered for any application with over 4 grains/gallon of hardness, any measurable iron in the raw water source or raw water TDS that exceeds 500ppm. This will substantially increase the life of the membrane element.

Cleaning your Membrane Element

As your membrane begins to age, it will gradually lose some output performance. This is normal and may result in an overall permeate flow loss of 5% after about 1 year. Your membrane(s) may eventually begin to lose production due to fouling or scaling in its interior. Symptoms of this may be continuously falling production rates or elevated TDS levels in the product water. **Do not attempt to operate the system above specified pressures to compensate for output loss.**

Total **D**issolved **S**olids may be measured by a professional or by use of a simple hand-held TDS monitor. These are available from your dealer.

Pocket TDS meter
(Waterite P/N HMTDS3)



The membrane element life will range from 1 to 5 years, depending on the quality of the raw water. See S.3 (7)(2) for membrane removal and installation instructions.

If you suspect your membrane element requires cleaning or replacement, contact Waterite or your dealer. Do not attempt to clean the element yourself, as it requires specialized chemicals, procedures and equipment. If you remove your membrane from the housing, make sure that you keep it wet, preferably in a sealed and sterile plastic sleeve.

It is a good idea to always keep an extra membrane on hand to avoid system downtime when replacement is necessary. Never allow a membrane to dry out (if wet variety) or freeze while in storage.

A Word on your Warranty

Keep your bill of sale and your warranty certificate, included in this kit. This is needed to claim any parts or repair service during the warranty period. Read the document completely for warranty claim instructions.

Your VectaMaxx™ RSR system comes with a limited one-year warranty covering materials and workmanship for one year from date of installation, subject to user's compliance with these maintenance and operating instructions. Membranes are excluded by the warranty and the seller's responsibility is limited to any warranty carried by the manufacturer. It is the purchaser's responsibility to immediately notify Waterite in the event that defects are detected. Seller shall not be liable for any special, incidental or consequential damages and will at its option repair or replace any defective components. Warranty excludes O-rings, membranes, pre-filter cartridges, freight charges, labour to remove or re-install equipment, use with feed water in excess of 1500 TDS, use of feed water that does not meet recommended conditions and with system alterations made, without a written approval from Waterite.

Section 6: Trouble Shooting Guide

Problem	Possible Cause	Solution
Low or Declining Permeate Production	Water supply valve closed. Crimped poly product line Raw water TDS too high	Open valve. Repair or replace tube Consult dealer – may need pre-treatment.
	Membranes fouled.	Clean or replace membrane. Fast flush system.
	Membrane installed upside down. Low operating pressure.	Install element correctly See “Low System Pressure”.
	Brine seal rolled out of groove.	Re-install membrane using lubricant. Check brine seal for damage.
	Feed water content has changed. Pre-treatment cartridges plugged.	Review pre-treatment. Replace cartridges.
Leaking Joints	Fittings not seated.	Disconnect fitting and reseal tube.
	Filter housing leaking.	Tighten with housing wrench. Inspect o-rings for cuts or crimps.
Low System Pressure	Clogged pre-filter or fouled pre-treatment.	Replace pre-filter cartridges.
	Low feed water pressure.	Check feed water source for restrictions.
	Inlet solenoid closed.	Check solenoid circuit- replace if necessary.
	Drive pump malfunctioning. Malfunctioning pressure gauge.	Call dealer. Replace gauge.
High System Pressure	Plugged or restricted concentrate. and/or recirculation valves.	Clean or replace valves.
	Crimped product line.	Repair or replace tube.
	Malfunctioning pressure gauge.	Replace gauge.
Permeate TDS Rising	Scaled, perforated or fouled membrane(s).	Clean or replace membranes. Fast flush membrane.
	Pre-treatment system failure. O-rings on product adapters cut or damaged.	Check feed water quality. Check and replace damaged o-rings.

Section 7: Common Replacement Parts

Part Description	Part Number
Excelpure 10" BB 5 Micron PP Spun Cartridge	PP10B05
Excelpure 10" BB 1 Micron PP Spun Cartridge	PP10B01
1/2" Inlet Solenoid	ROSD110
Low Pressure Cut-off Switch	FRG22
1½" Pressure Gauge, 0-200 psi	AG06
Pre-filter Housing Wrench	HAN13W
Recirculation Valve, ½", SS	IVISBFF8
Membrane Product Adapter O-ring	N70210
Membrane Housing End Cap O-ring	N70342
Pre-Filter Housing O-ring	RKE0013HLB
Black Max 4021 Membrane, TFC, XLP	BME4021SL
Black Max 4040 Membrane, TFC, XLP	BME4040SXL
Orifice Plate Flow Control 0.37 gpm RSR 1200	5865041
Orifice Plate Flow Control 0.5 gpm RSR 2400	5865051

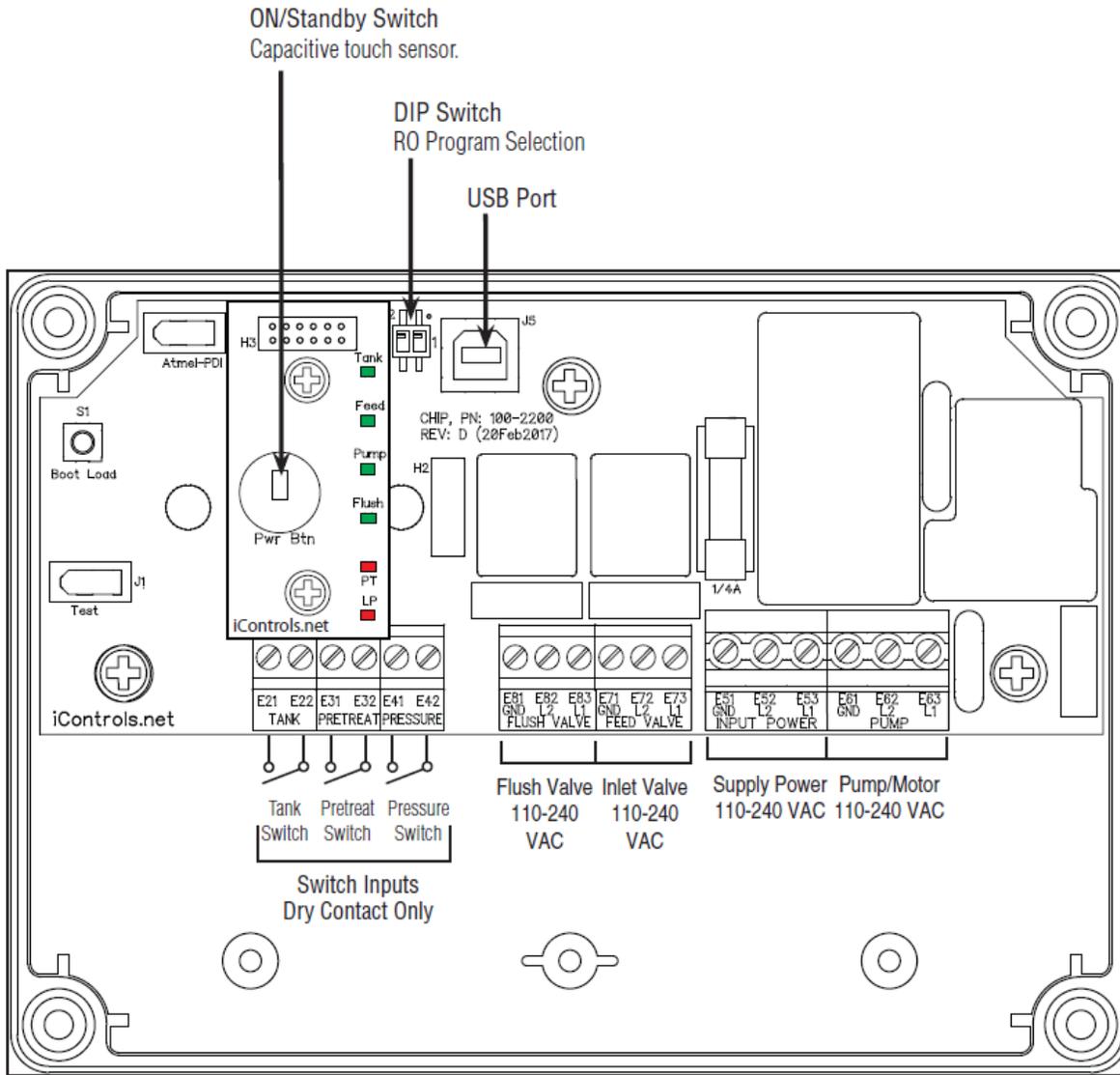
Section 8: Feed Water Flow Requirements

RSR1200:	3.2 USGPM minimum	<i>includes 20% safety factor on 1000 TDS feed water.</i>
RSR2400:	6.4 USGPM minimum	

Feed water must be available at a minimum of 40 psi and a maximum of 60 psi at the specified flow rate.

When auto flush is active, unit will require 10 gpm at a minimum feed pressure of 30 psi.

VECTAMAXX™ RSR Electrical Wiring Schematic



120VAC 60Hz All Models 15A.

230VAC 60Hz All Models 8A.



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VectaMaxx RSL Feed Water Quality

Owner: _____
Installation Date: _____
Serial # _____
Model # _____

Contact: _____
Ph# _____
Dealer: _____

CATIONS

Barium _____
Calcium _____
Iron _____
Potassium _____
Magnesium _____
Manganese _____
Sodium _____
Ammonium _____
Strontium _____

ANIONS

Bromide _____
Chloride _____
Fluoride _____
Bicarbonate _____
Sulphate _____
Nitrate _____
Phosphate _____
Silica _____

OTHER

Total Alkalinity _____
Total Dissolved Solids _____
Temperature _____
Silt Density Index (SDI) _____

Turbidity _____
pH _____
Total Hardness _____

Comments: _____

Please fax copy to: **(204) 783-1599**

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