Waterite VERSION III Advanced Reverse Osmosis System Instruction Manual

Waterite VERSION III Advanced Reverse Osmosis System


Waterite
RO System Controller
Waterite VECTAMAXX™ RSL
REJECT
PRODUCT

Contents

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.

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

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.

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Q: How does the VectaMaxx™ RSL 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™ RSL RO system use?
VectaMaxx™ RSL 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(s) 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™ RSL and RSLHP 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%	Sulphates	97%
Bicarbonate	94%	Lead	97%	Selenium	97%	Total Dissolved 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, a storage vessel for the permeate 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™ RSL 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.

   a. Your VectaMaxx™ RSL 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 135 psi (9.0 kg/cm²) for models 2400 and 4800, 140 psi (9.8 kg/cm²) for models 7200 and 9600. Do not attempt to operate your RSL system at pressures exceeding 150 psi, as damage to the membrane or premature fouling may result*.

   b. The RSLHP units use a brackish water membrane that is rated for 225 psi. All units are designed to operate to a maximum pressure of 250 psi.
2. Temperature:

   a. Production increases with temperature, standard production ratings are established at 25°C. Never operate the system from the hot water line or with water exceeding 35°C, as this will damage the membrane and internal components.
3. Membrane type: VectaMaxx™ RSL 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.

- Units equipped with an optional CIP are equipped to operate at a maximum of 160 psi (11.3 kg/cm²)

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

1. The VectaMaxx™ RSL systems use membranes each nominally rated for 2400GPD.
   Actual output will be dependent upon the factors explained previously. In optimal applications (low feed water TDS, feed water =25°C, you may expect 1600-2200 USG from each membrane to be available over 24 hours.
2. The VectaMaxx™ RSLHP units use membranes each nominally rated for 2000GPD. Actual output will be dependent upon the factors explained previously. In optimal applications, feed water =25°C, you may expect 1300-1800 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™ RSL system?

Every VectaMaxx™ RSL and RSLHP 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™ RSL 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 5.5

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 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.

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.

Step 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 Sulphide:** Most commonly, hydrogen sulphide 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.

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. 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 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 prefilters 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.

Step 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 Mode ls**
TDS < 2000 ppm	Reduced production rate Increased salt passage	Contact Waterite/ Replace wate r source	RSL HP
T. Hardness < 6 grains/gal (103 mg/l)	Scaling of membrane surface Reduc ed production rate	Automatic Softener	Fusion² series Gem series

Total Iron < .05 ppm	Reduced production rate Fouling of membrane surface Iron deposits in e quipment	Iron Remover (> 5 ppm) Soften er (levels < 5 ppm)	FOB series
Tannins < .5 ppm	Reduced production rate Fouling of membrane surface	Softener with organic scavenge r resin	Gem series
Chlorine < .1 ppm	Permanent membrane damage Incr eased salt passage	Carbon Filter	Fusion² CF seri es
pH 5.5 – 9.5	Internal corrosion Lime scaling in eq uipment Plumbing damage	Replace water source Adjust p H	Call your dealer
Organic or Microbi ological Activity 0	Reduced production rate Fouling of membrane surface Sliming of pre-tre atment equipment, odour	UV Disinfection followed by 1 m icron filtration Well chlorination	Excelite UV Ex celpure WellPr o
Manganese <. 05 ppm	Reduced production rate Fouling of membrane surface	Manganese Greensand Filter	Greensand Cat alox
Hydrogen Sulphide 0	“Rotten egg” odour Internal corrosion	Iron Remover (<1 ppm) Manga nese Greensand Filter (> 1 pp m)	Greensand Cat alox
Turbidity SDI < 5.0	Reduced production rate Plugging of membrane Rotary vane pump dama ge	Multimedia Filter Pre-treatment cartridges	Nextsand Excel pure

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

! 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.

! 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.

Step 2.3. Plan Your Water System

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 maximum production water for Vectapure™ RSL systems are, (feed water @<1000 TDS):

RSL2400	1.6 USG/min. (6 litres/min.)	**RSLHP2400**	1.4 USG/min. (5.3 litres/min.)
RSL4800	3.2 USG/min. (12.1 litres/min.)	**RSLHP4800**	2.8 USG/min. (10.6 litres/min.)
RSL7200	4.8 USG/min. (18.1 litres/min.)	**RSLHP7200**	4.2 USG/min. (15.9 litres/min.)
RSL9600	6.6 USG/min. (24.2 litres/min.)	**RSLHP9600**	5.6 USG/min. (21.2 litres/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.

! 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 are used for storage, be sure that the pressure switch is capable of carrying the full load amperage of the system. For reference, the motor full load amperages are.

	230/208VAC 1 PH		230/208VAC 1 PH
RSL2400	8.7/9.4 A	**RSLHP2400**	15.0/16.5 A
RSL4800	8.7/9.4 A	**RSLHP4800**	15.0/16.5 A
RSL7200	10.4/11.5 A	**RSLHP7200**	15.0/16.5 A
RSL9600	10.4/11.5 A	**RSLHP9600**	15.0/16.5 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 50 psi.

Using an Atmospheric Pressure (non-pressurized) Storage Tank and Float Switch
Your VectaMaxx™ RSL 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 alid, 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 with a drain line should be installed in the tank above the float switch water line, and be connected to a floor drain to protect against a failed level control 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, re-pressurization pumps, bulkheads, tube, pipe, pressure switches, fittings, UV disinfection systems and float valves.

Installation

Your system includes:

✓ The main RO/filter assembly frame with one assembled pre-filter, booster pump, membrane housing(s), flow controls, pressure gauges and flow meters.
✓ One, two, three or four membrane(s) (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.

Step 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 230/208VAC power, the feed water line, and near a drain capable of handling the waste flow from the machine.

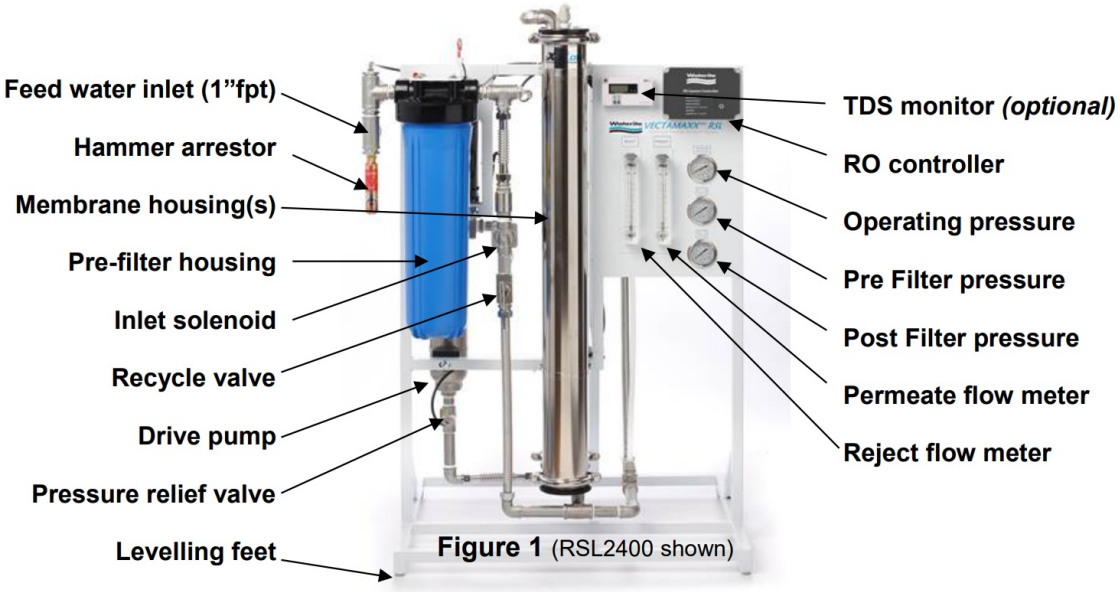
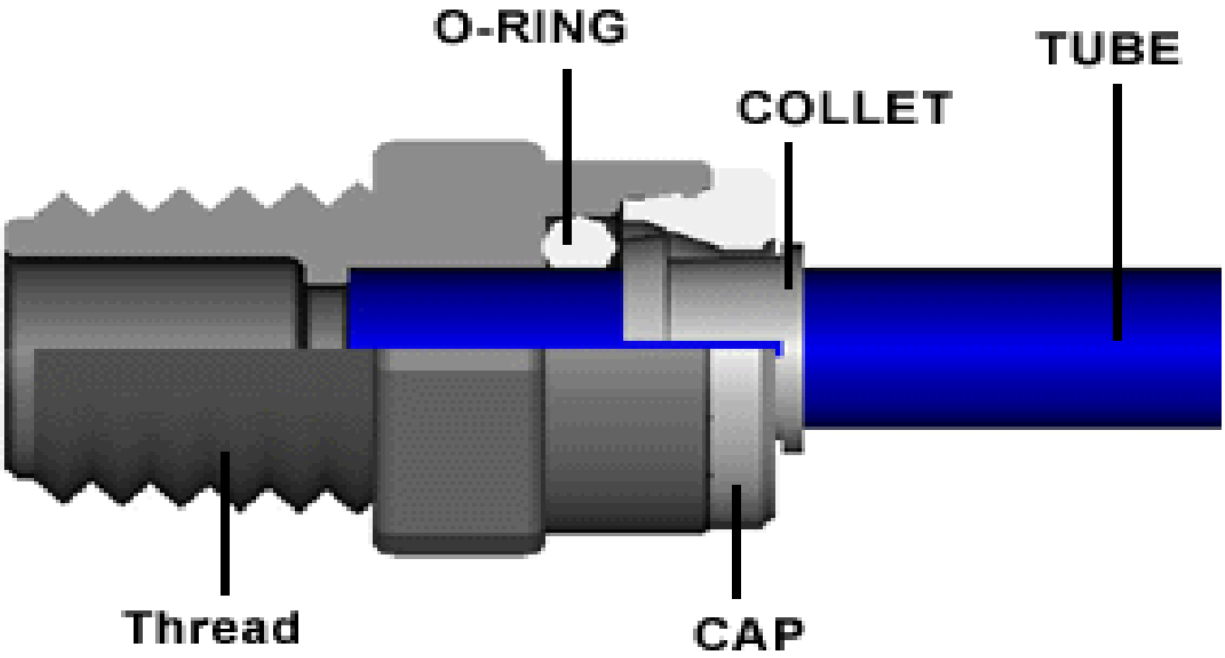


Figure 1 (RSL2400 shown)

A Note on Fittings

Your RO system has been equipped with quality compression and push on fittings throughout.
All compression fittings should be hand-tightened and then tightened ¼ turn further with a wrench.
Check that all fittings are snug, as they may have loosened in transit. Do not over-tighten as damage may occur to the internal gasket on the sst threaded hose assemblies.
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.

Figure 2.



Step 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 can deliver 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 ¾" in diameter (1" for RSL 9600 and RSLHP9600). Install a shut off valve on the connection, so that the RO system can by isolated from the main water supply. Note that the inlet connection to your RO system is 1". 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, if 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.

   The RO Controller will wait 60 seconds and try to restart the system. Should it fail to restart
   - the controller will try again in 60 seconds, to a maximum of 5 times in 10 minutes. If the unit has failed to continue to run then it will go into alarm and will require a power re-set.

Step 3.3. Installing the Drain Line

1. A 1/2" poly tube (minimum) should be used for the drain line. Attach the drain line to the ½" fitting on top of the Reject Flow Meter. 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. For systems equipped with the fast flush option a ¾" drain line should be installed.

! 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™ RSL systems. If used to capacity, these systems (depending on the model and settings) will produce between 1670 to 9820 USG (6,336 to 37,440 litres) per day of wastewater and will waterlog septic beds.
3. **RSL24-9600 Only**

   3. 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 Drain Line Flow Control (DLFC) that is intended for feed water of less than 1000 TDS. For TDS above 1000 please consult the parts list at end of this booklet.
4. Make sure that you have the DLFC installed in your system. These orifices have been selected to operate at the correct waste flow rate for your system, at an optimum pressure of 130psi. For systems configured for <1000 TDS, the recovery rate will be a maximum of 60%. For systems configured for >1000 TDS, the recovery rate will be a maximum of 40%.
5. The DLFC (Figure 4) is mounted internally in the coupling on the lower connection of the Reject Flow Meter, and has been designed to give a constant system recovery rate at 130 psi operation pressure, @ 15 C water temperature.
6. If requiring replacement of the orifice plate, the installation is quick and simple:

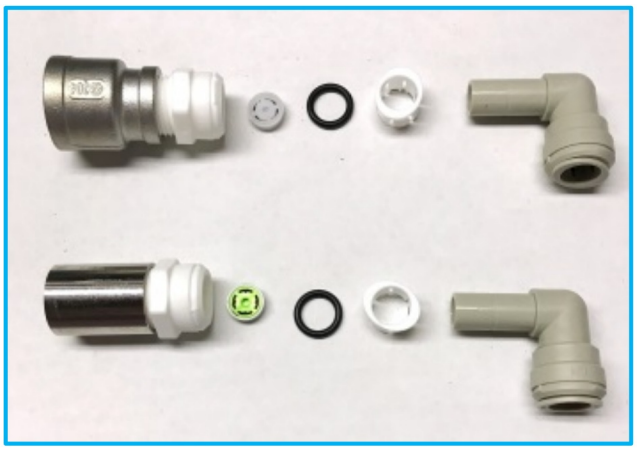
Fig. 4

1. Use Table 1 to find and order the right orifice assembly for the system.
2. DISCONNECT THE POWER TO THE SYSTEM, TURN OFF THE WATER SUPPLY AND ENSURE THE SYSTEM PRESURE HAS BEEN RELEASED.
3. Remove the assembly from the flow meter
4. Remove the locking ring from the collet and retract tubing
5. Remove the fitting attached to the Assembly by pushing the collet towards the assembly while pulling the fitting away from the assembly. (Figure a).

a)

6. Disassemble the fitting by pulling the collet out, removing the o ring, and DLFC. (Figures b and c).

b)



c)

7. Insert the new DLFC so that it faces towards you. Replace the o-ring and the collet back into the fitting.
8. Re-attach the fitting to the flow meter and re-insert the tubing. Re-Install locking clips

Table 1

RSL MODEL #	Raw Water TDS	Color	Part #
RSL-2400	**<1000 TDS**	Lime/White	5878301
	>1000 TDS	Pink	5861041
RSL4800	**<1000 TDS**	Pink	5861041
	>1000 TDS	Dark Green/White	5878321
RSL7200	**<1000 TDS**	Dark Green/White	5878321
	>1000 TDS	Lilac/White	5878361
RSL9600	**<1000 TDS**	Lilac/White	5878361
	>1000 TDS	Grey/White	5878351

Your VectaMaxx™ RSL 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 40% for feed water with TDS ranging from 1000 to 2000.

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 recycle 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 change the DLFC to the desired flow rate (See Step 6-Table 1) and close the recycle valve until the pressure registers normal operating pressure. Using the formula:

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

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

Step 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 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.

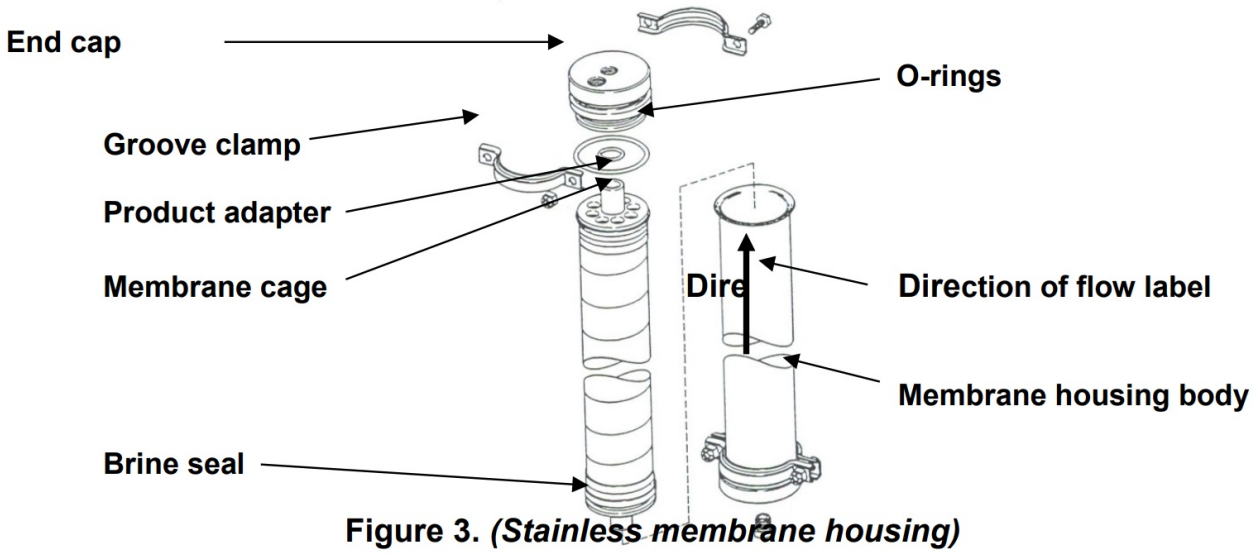


Figure 3. ***(Stainless membrane housing)***

3. 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 reassembling, make sure that that membrane element is installed with the brine seal facing in the same direction as it was previously. See direction of flow label on each membrane housing.

Step 3.5. Complete the Electrical Connection

1. Connect the 14ga. 3 wire cable on the back of the control box to an approved electrical breaker or a disconnect switch.(See Step 4.4 – Figure 5 for main power location)

   NOTE: Local electrical codes vary. Check with an electrician for appropriate device connection in accordance with local codes. 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.

! DO NOT START THE SYSTEM UNTIL STEP 4.5.1 IS COMPLETE.

System Controller

Step 4.1. RO Controller Set-Up

System Controller Specifications

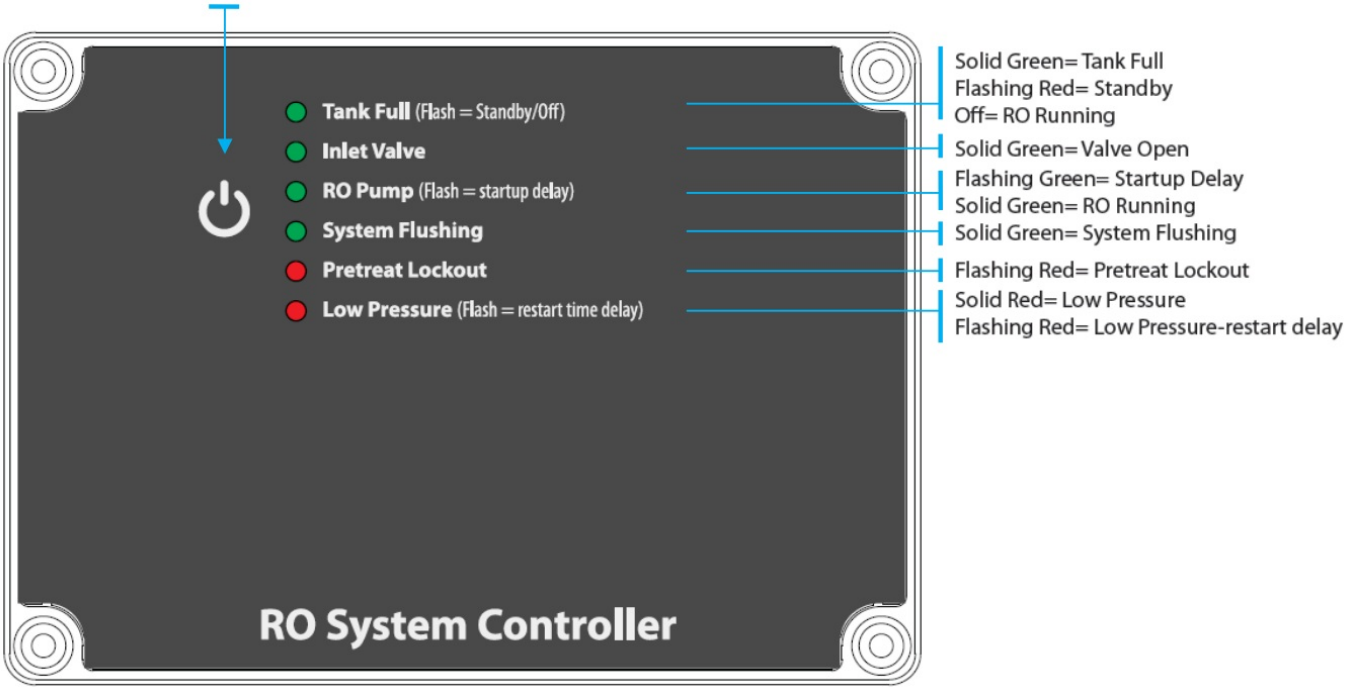
Inputs	
Tank level switch	(1) Normally-Closed. RO runs on switch closure.
Inlet pressure switch *	Normally-Open. Switch opens on low pressure.
Pre-treat lockout switch *	Normally-Open. Pretreat lockout active with switch closure. **NOTE:** All switch inputs are dry contacts. Voltage applied to the switch 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 a pplied 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. ***The solenoid relay ratings above reflect the capacity of the relays only. The current capacity of each circuit is 2A.***
Motor	1.0 HP @ 120V, 2.0 HP @ 240V.
Circuit Protection	
Controller Power Fuse	F1 5x20mm 1/4(0.25)Amp Little Fuse 0218.250MXP ***Branch circuit protection, motor and valve protection must be provided externally.***
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)

- Flush solenoid and pre-treat lockout are optional equipment.

Step 4.2. 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.



Step 4.3. RO Controller Programming

The controller has 3 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)

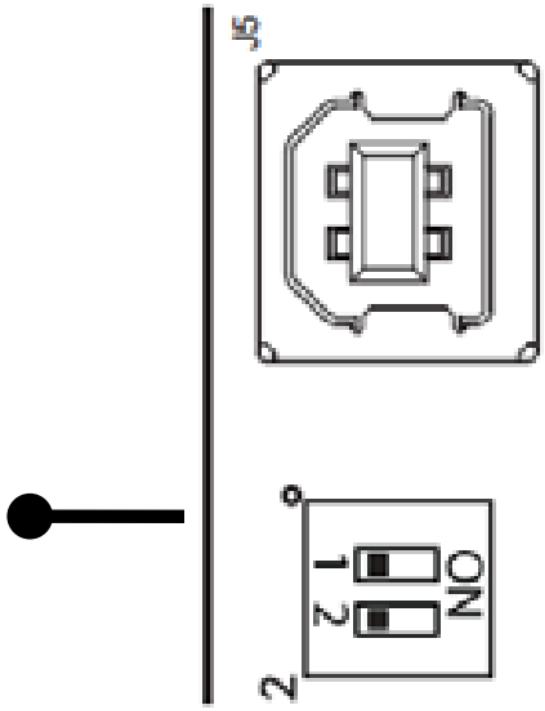
Parameter	**Value**	**Program 1**	**Program 2**
Tank Level Switch delay (actuation and de- actuation)	Seconds	2	2
Pressure Switch delay (actuation and de-actuation)	Seconds	2	2
Pretreat Switch delay (actuation and de-actuation)	Seconds	2	2
Pump start delay	Seconds	10	10
Inlet Solenoid stop delay	Seconds	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	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

Step 4.4. DIP Switch Settings



RO Program Settings		
Switch 1	Switch 2	Program
ON	OFF	1
OFF	OFF	2

Step 4.5. Starting Up and Flushing the System

1. 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 3.) 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 depressing the red button located on top of the housing.
2. Open the recycle valve to the fully open position. For RSLHP models open the Concentrate Reject valve fully open.
3. Turn on system breaker/Disconnect switch. Press the ON button.

RSL units: Let the system operate for about 5 minutes with recycle valve fully open
RSLHP units once the pump is running and all air is purged from the system, close the reject valve until you have a flow rate of 5 gpm. Let the system operate for about 5 minutes with recycle 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 flush.

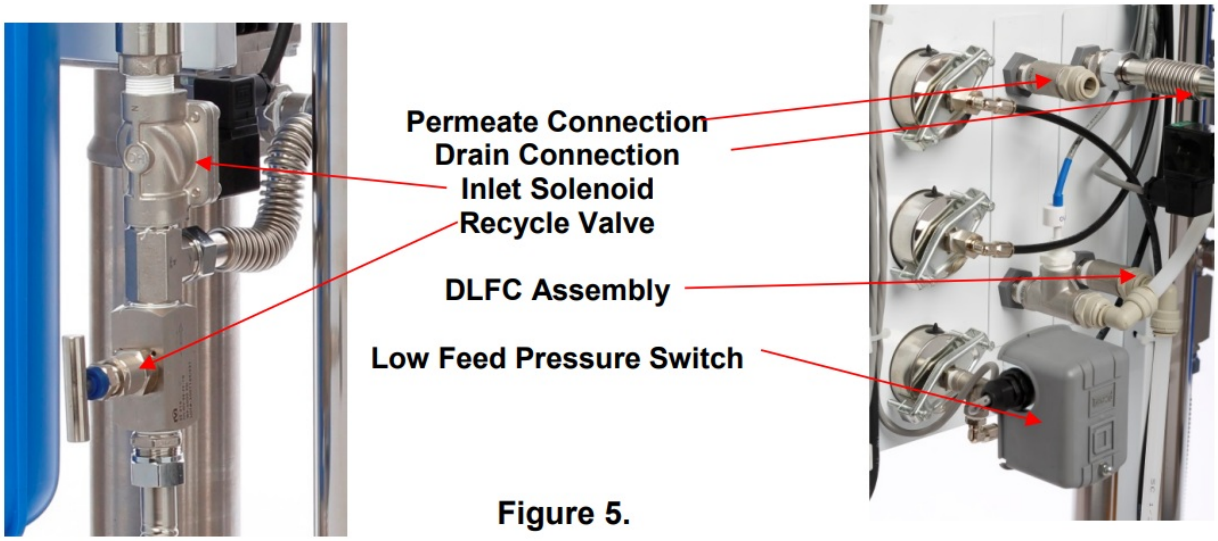


Figure 5.

Step 4.6 Operating Pressures

RSL Units
The RSL systems are designed to normally operate at 130 psi (140 psi for RSL 7200/9600).
At this pressure, the proper waste/production ratio is established. Begin to close the recirculation valve slowly until the operating pressure gauge registers 130 psi (9.1 bar) on 2400 and 4800 models, 140 psi for 7200 and 9600 models. 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 valves in the proper position by removing the handles to discourage tampering.
Your system is now set up to operate at its design settings.
RSLHP Units
The RSLHP systems are designed to normally operate at 220 psi. At this pressure, the proper waste/production ratio is established. Begin by closing the reject valve slowly until the Reject flow is about 3 gpm. Now close the recycle valve slowly until the pressure is at 210 psi. The nominal reject/production flow for these models is 2/3. Adjust both valves until the pressure is stabilized at 230 psi with a 2:3 ratio for flow. DO NOT ALLOW THE SYSTEM TO OPERATE IN EXCESS OF 250 PSI AS MEMBRANE AND SYSTEM DAMAGE MAY RESULT.
You may wish to lock the valves in the proper position by removing the handles to discourage tampering.
Your system is now set up to operate at its design settings

! YOUR MEMBRANES 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.

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 3:4 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 pagesof this manual (Section 9) will help you get started.

Auto Flushing your VectaMaxx™ RSL (Optional)

For TDS above 1000ppm, it is strongly recommended that periodic fast flushing be done to remove sediments and mineral build-ups from the membrane surface.
An Auto flush system purges high concentrates of dissolved solids out of the system on a time basis. This helps to keep scale and fouling to a minimum.
An Auto-flush system is a factory installed option, but can be installed by a qualified field technician. (Waterite P/N RSLAFSH)

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 Dissolved Solids 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 CD600)

The membrane element life will range from 1 to 5 years, depending on the quality of the raw water. See 3.4 Figure 3 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 plastic sleeve. **It is a good idea to always keep an extra membrane(s) on hand to avoid system downtime when cleaning 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™ RSL 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 if 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 2000 TDS for RSL standard units/or in excess of 4000 ppm TDS for RSLHP units, use of feed water that does not meet recommended conditions and with system alterations made, without a written approval from Waterite.

Trouble Shooting Guide

Problem	Possible Cause	Solution
Low or Declining	Water supply valve closed.	Open valve.
Permeate Production	Crimped poly product line Raw water TDS too high Membranes fouled. Membrane installed upside down. Low operating pr essure. Brine seal rolled out of groove. Feed water content has changed. Membrane permeate o rings not sealing or damaged Pre-treat ment cartridges plugged.	Repair or replace tube Con sult dealer – may need pre -treatment. Clean or replace membran e. Fast flush system Install element correctly See “Lo w System Pressure”. Re-in stall membrane using lubri cant. Check brine seal for damage. Review pre-treat ment. Reseat membrane o r replace orings Replace c artridges.
Leaking Joints	Fittings not seated. Filter housing leaking.	Disconnect fitting and rese at tube. Tighten with housi ng wrench. Inspect o-rings for cuts or crimps.
Low System Pressure	Clogged pre-filter or fouled pre-treatment. Low feed water pressure. Inlet solenoid closed.Booster pump malfunctioning.	Replace pre-filter cartridge s. Check feed water source f or restrictions. Check solen oid circuit- replace if neces sary. Call dealer.

	Malfunctioning pressure gauge.	Replace gauge.
High System Pressure	Plugged or restricted recycle valves. Crimped produ ct line tube. Malfunctioning pressure gauge. Membr anes fouled	Clean or replace Repair or replace Replace gauge. Cl ean or replace Membranes
Permeate TDS Rising	Scaled, perforated or fouled membrane(s).Pre-treat ment system failure. O-rings on product adapters	Clean or replace membran es. Fast flush membrane. Che ck feed water quality. Chec k and replace
	cut or damaged.	damaged o-rings.

Common Replacement Parts

Part Description	Part Number	Models
Excelpure 20” 5 Micron PP Spun Cartridge	PP20B05	ALL
Excelpure 20” 1 Micron PP Spun Cartridge	PP20B01	ALL
¾” Inlet Solenoid	ROSD220	ALL
Low Pressure Cut-off Switch N.O.	FRG22	ALL
2 ½” Pressure Gauge, 0-100 psi	LDU10025	ALL
2 ½” Pressure Gauge, 0-200 psi	LDU20025	RSL
2 ½” Pressure Gauge, 0-300 psi	LDU30025	RSLHP
Pre-filter Housing Wrench	HAN13W	ALL
Recirculation Valve	IVISBFF10	ALL
Concentrate Reject Valve	IVISBFF8	RSLHP
RSL Drain Line Flow Control – DLFC (see Sec 3.3 Table 1 for sizing)		RSL
Product Adapter O-ring	N70210	ALL
Membrane Housing End Cap O-ring	N70342	ALL
Pre-Filter Housing O-ring	RKE0013HLB	ALL
Black Max 4040 Membrane, TFC, XLP	BME4040SXL	RSL
Black Max 4040 Membrane, TFC, S	BME4040S	RSLHP

Feed Water Flow Requirements

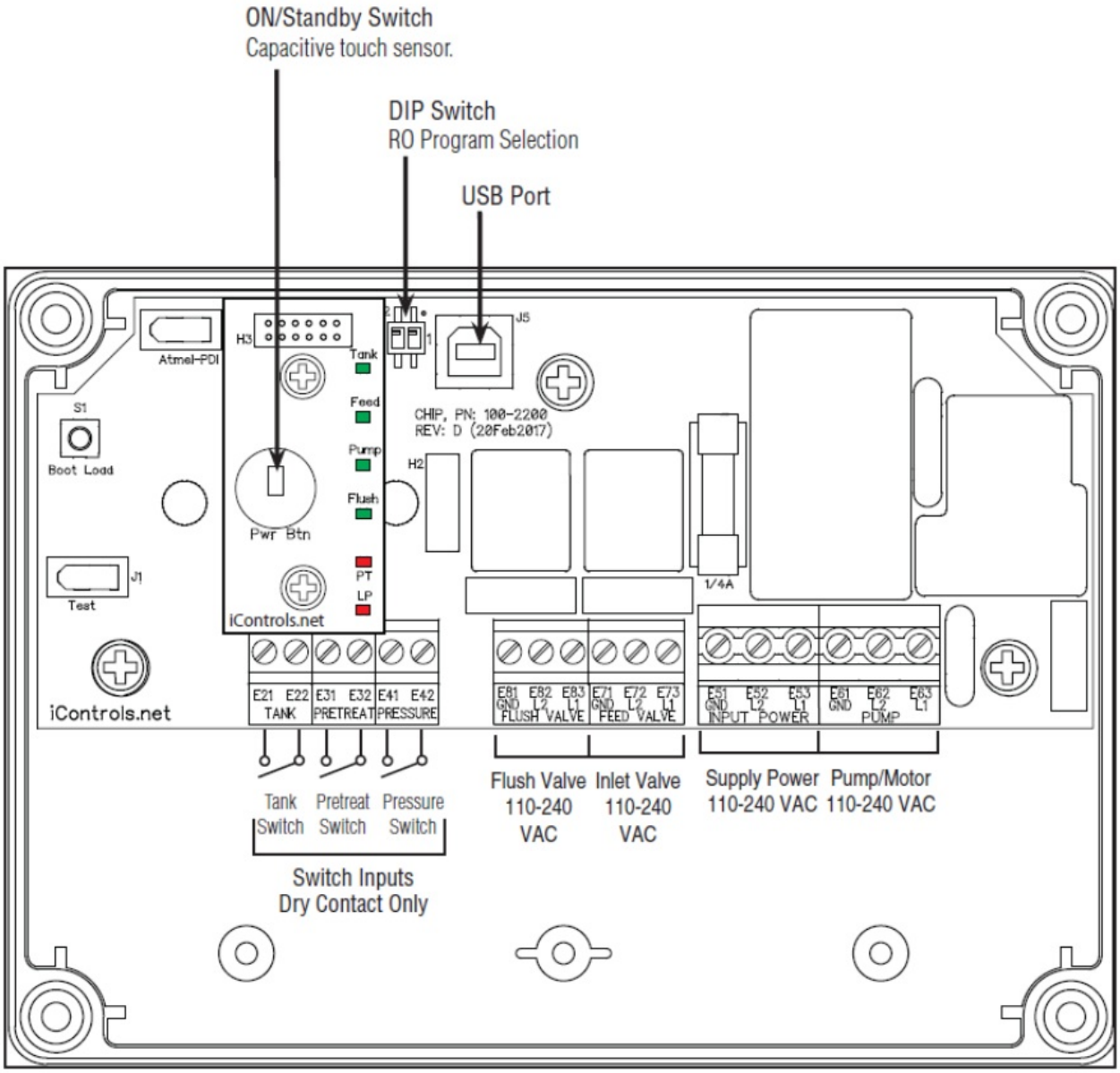
RSL2400: **RSL4800:**	4.0 USGPM minimum 8.0 USGPM minimum	*includes 20% safety factor*
RSL7200: **RSL9600:**	12.0 USGPM minimum 16.0 USGPM minimum	*on 1000 TDS feed water.*
RSLHP2400 RSL HP4800	3.1 USGPM minimum 6.2 USGPM minimum	*includes 20% safety factor*
RSLHP7200 RSL HP9600	9.3 USGPM minimum 12.4 USGPM minimum	*on 3000 TDS feed water.*

Installations that have purchased the flush option require a flow of a minimum 10 gpm at 30 psl

VectaMaxx RSL Performance Log

Date	**Line**	**System**	**Permeate**	**Feed Water**	**Pre-Filter**	**Fast**	**Permeate**	**Waste**
	Pressure	**Pressure**	**TDS**	**TDS**	**Change**	**Flush**	**Flow Meter**	**Flow Meter**

VectaMaxx RSL Electrical Wiring Diagram


ON/Standby Switch
Capacitive touch sensor.
DIP Switch
RO Program Selection
USB Port
Atmel-PDI
H3
Tank
Feed
Pump
Flush
PT
LP
S1
Boot Load
Pwr Btn
J1
Test
iControls.net
J5
CHIP, PN: 100-2200
REV: D (20Feb2017)
H2
1/4A
E21 E22 TANK
E31 E32 PRETREAT
E41 E42 PRESSURE
E81 E82 E83 GND L2 L1 FLUSH VALVE
E71 E72 E73 GND L2 L1 FEED VALVE
E51 E52 E53 GND L2 L1 INPUT POWER
E61 E62 E63 GND L2 L1 PUMP
Tank Switch
Pretreat Switch
Pressure Switch
Switch Inputs
Dry Contact Only
Flush Valve 110-240 VAC
Inlet Valve 110-240 VAC
Supply Power 110-240 VAC
Pump/Motor 110-240 VAC

Pump Motor	**RSL2400**	**RSL4800**	**RSL7200**	**RSL9600**
	1HP 230VAC	1HP 230VAC	1.5HP 230VAC	1.5HP 230VAC
	1PH 6.4A	1PH 6.4A	1ph 8.6A	1ph 8.6A
Pump Motor	**RSLHP2400**	**RSLHP4800**	**RSLHP7200**	**RSLHP9600**
	2 HP 230VAC	2 HP 230VAC	2 HP 230VAC	2 HP 230VAC
	1ph 10.4A	1ph 10.4A	1ph 10.4A	1ph 10.4A

Motor Service factor all units: Amps x 1.30
ALL RSL AND RSLHP UNITS ARE WIRED 230/208VAC 1 PH 60HZ, UNLESS OTHERWISE SPECIFIED

Customer Support

MEMBER CANADIAN Water Quality™ ASSOCIATION

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https://manual-hub.com/

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Documents / Resources

	Waterite VERSION III Advanced Reverse Osmosis System [pdf] Instruction Manual VERSION III Advanced Reverse Osmosis System, VERSION III, Advanced Reverse Osmosis System, Reverse Osmosis System, Osmosis System, System

References

- User Manual