



# Farallon 1800/2800c

With Spectra Connect  
Installation and Operating Manual



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*Thank you* for your purchase of a new Spectra Farallon system. When properly installed and maintained it will provide years of trouble free service. Please pay attention to the installation instructions and the system layout. Like any piece of mechanical equipment the system will require inspection and service from time to time. Do not place the components in inaccessible areas that will prevent proper maintenance. If you are having a dealer install the system for you, review the location of the components to make sure that the installation will meet your approval upon completion.

## **Farallon Installation Quick Start**

### **Important Details for Installer**

1. The system must have a dedicated sea water inlet to guarantee a solid flow of water to the system. The inlet should be as low in the boat as possible and with a forward facing scoop type thru-hull fitting installed.
2. The Spectra-Pearson Pump module must be installed in a well ventilated compartment where **temperatures will not exceed 120F (48C)**. Many engine compartments exceed this temperature when underway. Warranty will be void if the installation does not meet this requirement.
3. Follow the wire gauge charts in the instructions! Using larger wire than specified is acceptable.
4. If you are separating the high pressure pump and membrane assembly please review the high pressure hose assembly instructions. Improper assembly will cause failure! The Control Box can also be remotely mounted, see instructions later in this manual.
5. **Run, test, then “sea trial” the complete system** before assuming the system is operational. If the boat is in fresh or dirty water, see “Dry testing the system.” **After running make sure that the flush cycle operates properly.** The water going overboard at the end of the flush should not taste salty (<1000ppm)
6. The system must have power continuously to achieve the full benefits of the fresh water flush system. The domestic fresh water pressure must be on and the fresh water tank level maintained. Calculate 15 gallons (76L) per flush..
7. The system must be de-powered after the system is put in storage “pickled” where a storage chemical or antifreeze is run through the system.
8. Spectra distributors and dealers are responsible for educating the vessel owners on the operation and maintenance of the system.
9. Please fill out the warranty card. The warranty is void if it is not registered.
10. Do not install the watermaker over electrical equipment that may be damaged by leaks.

## Getting Started

Unpack the system and inspect it to make sure that it has not been damaged in shipment.

Refer to the shipping list for your system to make sure you have received all of the components listed. Do not discard any packaging until you have found and identified all of the parts. The small installation parts are listed on the cellophane bags' pick list.

***We will not be held responsible for shortages that are not reported within thirty days of the ship date. Shipping damage must be reported within 30 days of receiving goods.***

Next, study the system layout diagram, component photos and descriptions before beginning your installation. This will assist you in understanding the function of each component.

Layout the system. Before starting the installation identify the location where each module and component will be placed. Ensure that there is proper clearance around the components for removal of filters and system service. Also check to make sure you have adequate tubing and hose before starting so additional parts may be ordered. Check to see that the MPC cable is long enough to reach from the display location to the feed pump module.

Farallon shipping list:

- Spectra-Pearson Pump Module with remote mountable Control Box
- Boost Pump
- Pre-filter Module
- Fresh Water Flush Module
- Inlet and Brine Discharge Service Modules
- Install Kit
- Service Kit
- 25' 5/8" Braided Nylon Brine Discharge Hose
- 10' 3/4" Spiral Wound Reinforced Suction Hose
- 25' 3/4" Braided Nylon Intake Hose
- 25' 1/2" Parker Product Tubing
- 10' 3/8" Low Pressure Tubing

# Spectra Connect Quick Start Guide

When you first power up the system, you will get a warning message, asking if the system has been stored with chemicals. **If the system has been pickled, winterized, this is the first startup, or the condition of the system is unknown, go to COMMISSIONING or serious damage may occur.**



## Start

Pressing the 'Start' button once advances to the Run Mode selection screen.



## Run Mode

Select your desired Run Mode to start making water and filling your tanks. See details on Run Mode options on p. 37



## Fresh Water Flush

Pressing the 'Fresh Water Flush' button flushes the watermaker with fresh water from the vessel's domestic water tanks. After completing the flush, Spectra Connect will automatically enter the Auto Store mode.



## Stop

Pressing the 'Stop' button from the Home Screen will end the Auto Store mode countdown timer and leave your watermaker in Standby mode.

## Spectra Connect Modes and Definitions

**Auto Store:** After the watermaker fresh water flushes, it will start a countdown timer that can be seen on the Home screen. The timer indicates the next programmed fresh water flush if the watermaker is not started again, or the 'Stop' button is not pressed.

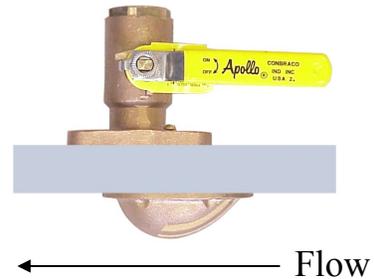
**Fill Tank:** The watermaker will automatically run until the Tank Full switch in the water storage tanks closes. Once the Tank Full switch closes, the watermaker automatically fresh water flushes, then reverts to the *Auto Store* mode.

**Auto Run:** The watermaker can be set to run for a number of hours, or for a quantity of water to be produced. When the desired quantity of water is produced or the run timer expires, the watermaker will Fresh Water Flush and enter the *Auto Store* mode.

## Installation Basics

- **Read the directions!**
- Avoid tight hose bends and long runs.
- Use the proper wire size.
- Boost Pump must be installed below waterline.
- Install Spectra-Pearson Pump as low and as close to the boost pump as possible.
- Use a dedicated thru-hull with scoop type strainer.

*Thruhull Not Included.*



### Thru-hulls

It is mandatory that a minimum 1" diameter, dedicated, forward facing, scoop-type intake thru-hull and seacock be installed. Install the intake for the system as close to the middle and as far below the water line as possible. Thru-hulls in the bow area are susceptible to air intake in rough conditions. Sharing a thru-hull with another system is not acceptable and will void the warranty. Sharing a thru-hull can introduce unforeseen problems such as intermittent flow restriction, air bubbles, and contaminates. For racing boats and high speed power boats above 15 knots, a retractable snorkel-type thru-hull fitting is preferred to be able to pick up water away from the hull.

Do not install the intake close to or downstream of a head discharge. Install as far below the waterline and as close to center line as possible to avoid contamination and air induction.

The brine discharge through-hull should be mounted above the waterline, in or just above the boot stripe to minimize water lift.

Double clamp all hose connections below the waterline.

### Pipe Fitting Instruction

Plastic to plastic fittings should have 3 to 4 wraps of Teflon tape and will thread almost all the way in. If the fitting bottoms out add more Teflon tape. When applying Teflon tape leave the first thread uncovered so the fitting will start correctly.

**Avoid getting dirt or debris into the piping or hoses during assembly.** A small bit of debris can stop the system!

Avoid restrictions or long runs on the entire inlet side of the plumbing from the thru hull to the main feed pump module.

Prevent tight bends and excessive elbows. Any restrictions will hamper system performance. Secure the piping away from moving objects such as engine belts and hatches. Prevent chafe on the tubing as required. Test and inspect all piping and hose clamps after several hours of operation.

### Wiring

- Pay attention to wire size or system performance will be impaired.
- Perform wiring to UL, ABYC, CE or applicable standards.

## Component Placement

Please take the time to think through where all the components will be mounted prior to starting the installation.

### Spectra Connect Remote Panel

If a Remote Control panel is required it will use a standard Ethernet cable (Cat 5 or 6).

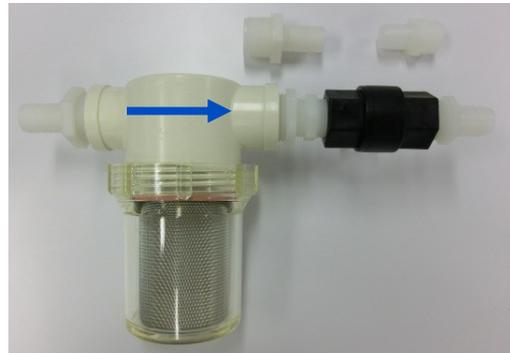
If there is Wi-Fi available on the boat the Spectra Connect will allow for control access to any internet enabled device.



### Sea Strainer

Mount the strainer in an accessible area close to the intake through-hull that can handle water spillage during service. Extra care during assembly must be taken to avoid air leaks from the strainer. Use the supplied "Quick Block" and wire tie for mounting.

**Note there is a check valve installed on the outlet of the sea strainer and there are hose barb fittings included so it can be installed anywhere in the suction hose before the Boost Pump.**



### Service Inlet Module

The service inlet module is mounted between the sea strainer and the boost pump and can be mounted in any orientation. Be sure that once installed you will have access to the yellow valve handle on top and the garden hose fitting on the side. **The Inlet and Brine service modules should be installed so that when the service hoses are attached they can both go into the same bucket (for cleaning or long term storage).**



### Boost Pump

The boost pump module should be mounted horizontally. The boost pump, and the entire intake hose leading to it, **MUST** be installed below the water line to ensure that it will prime.



## Pre-filters

The Pre-filters are located between the boost pump and the High Pressure Module. They house the 20 and 5 micron filters. They should be mounted vertically so that water doesn't pour out of the filter bowls during filter changes. Allow 2" below the filter housings for removal. Do not install over electrical equipment as water will spill during filter changes.



## Brine Discharge Service Module

The brine discharge service module is mounted between the brine discharge outlet on the Spectra-Pearson Pump Module plumbing manifold and the brine discharge thru-hull fitting. It can be mounted in any orientation. Be sure that once installed you will have access to the yellow valve handle on top and the garden hose fitting on the side. **The Inlet and Brine service modules should be installed so that when the service hoses are attached they can both go into the same bucket (for cleaning or long term storage).**



## Spectra-Pearson Pump and Control Module

Mount the Spectra-Pearson Pump and Control Module on a horizontal surface no more than 3' (1.0M) above the waterline. It is preferable to mount it as low as possible. Locate in an area that allows the lid to be easily lifted and is accessible for service and oil changes. Keep future maintenance in mind when choosing a location. The membranes can be damaged at ambient temperatures over 120F (48C). The Control Box can be remotely mounted if space is limited. Call the factory if an extended control cable is necessary.



## Charcoal Filter Housing

The Charcoal Filter Housing may be located in any convenient location near the Spectra-Pearson Pump Module. It should be mounted with the filter housing vertical and accessible for changing filters. Allow 2" below the filter housing for removal. The unit contains a charcoal filter for the flush water and a shut-off valve. Do not install over electrical equipment as water will spill during filter changes.



## Spectra-Pearson Pump Module



The membrane maximum temperature specification is 113°F (45°C), as specified by the membrane manufacturer. This module must be installed in an area that maintains a temperature below 120F (50C). Make sure that the area around and under the pump does not have any water sensitive equipment. Water will be spilled during any repairs or if a leak occurs.

Be sure you will have clearance to open the lid of the enclosure, and leave room to remove all side and top panels for easy servicing..

The Spectra-Pearson Pump Module comes complete with a mounting system. **Be sure to**

### Membrane Pressure Vessel Mounting

The high pressure pump and membrane assembly has been pre-assembled at the factory. If it is necessary to disassemble this unit and mount the pressure vessels remotely use the guidelines on *pg 45* of the manual. Use only approved hoses for assembly.

## Raw Water Plumbing

From the inlet thru hull through to the boost pump module use supplied clear 3/4" (19mm) spiral suction rated hose.

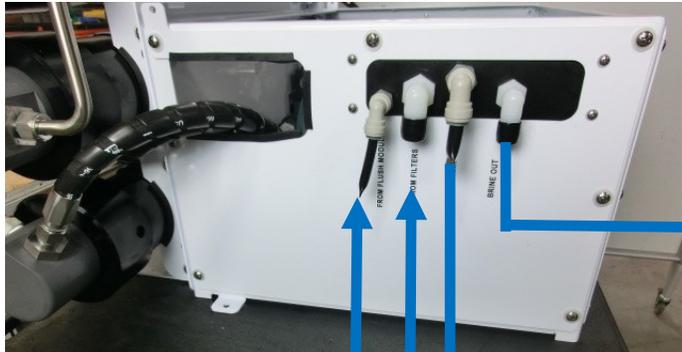
The outlet of the Boost Pump is under pressure ( $\approx 20$ psi) use the supplied 3/4" (19mm) braided clear vinyl hose from the outlet of the Boost Pump to the pre-filter assembly.

From the brine discharge on the plumbing manifold to the brine discharge thru-hull use supplied 5/8" (19mm) clear braided vinyl hose.



**Route all hoses and tubes to prevent kinks and restrictions. Secure piping away from moving objects such as engine belts and hatches. Prevent chafe on tubing as required. Test and inspect all piping and hose clamps after several hours of operation.**

# Plumbing



Brine Discharge—Use 5/8" braided hose from the manifold through the Brine Discharge Service Valve and to the thru-hull.



Use the 3/8" nylon tubing between the Flush module and the High Pressure Pump Module



Fresh Water out to tanks. Use supplied 1/2" black Parker tubing.

Fresh water to top of storage tank

From the Boost Pump through the 20 micron filter inlet out to the plumbing manifold use the 3/4 inch braided hose.



Air Purge Button



Air Purge Buttons



Flush water from ship's pressure water system 25 psi (2bar) minimum

Inlet Service Module



From the inlet thru-hull up to the boost pump module use the supplied clear 3/4 (19mm) spiral suction rated hose.



**Note!** When plumbing the Farallon High Pressure Module route the feed water so that the top and side covers may be opened without removing the hoses or tubing.

Leave room on the left side for attaching tubing and accessing the pump, motor and diversion valve.



**Manifold on left end of unit.**



Feed Water Inlet—From boost pump

Product Water Outlet—To Ship’s Tanks

Brine Discharge—To  
above the waterline Thru-Hull

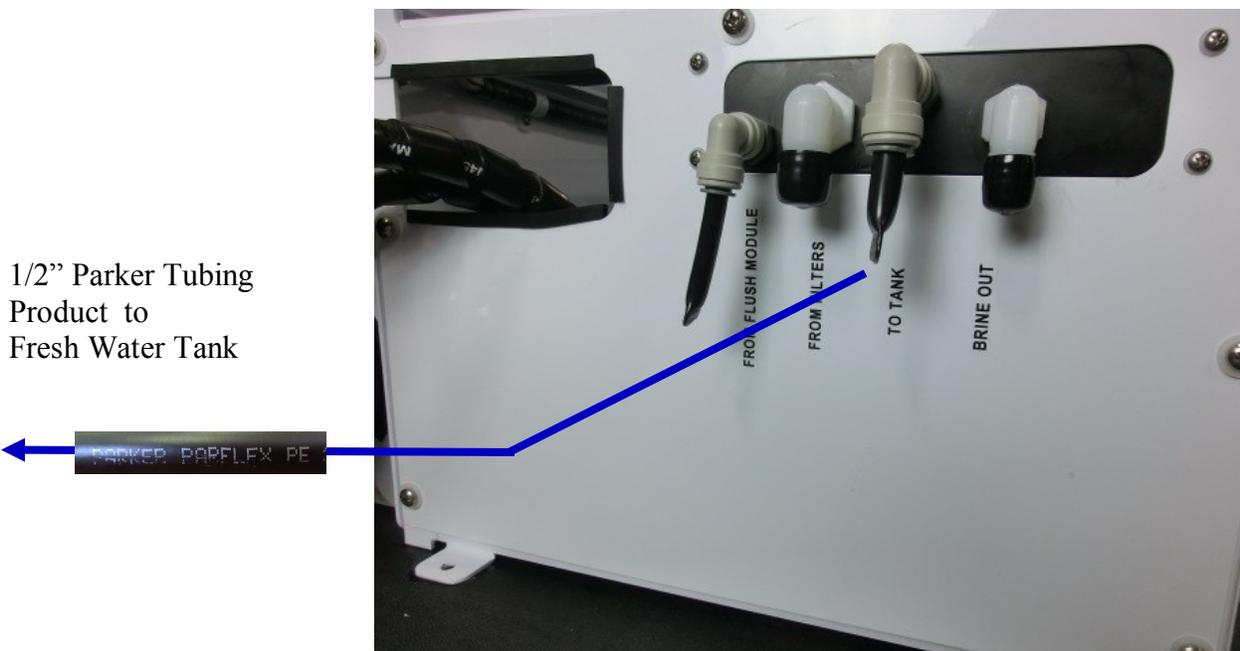
## Product Water tubing

Product water tubing is 1/2" (9.5mm) Parker tubing. Product water goes from the membrane into the pump module manifold where it passes through the flow meter, the salinity probe and the diversion valve. If the salinity is good the diversion valve energizes and the product goes to the tank from the manifold product outlet. If the diversion valve is not energized the product goes back into the feed water.

Route the product water tube from the product water outlet fitting on the High Pressure Module manifold into the top of the tank. Install a tee in the water tank fill or tap a pipe thread into an inspection port in the top of the tank. Do not feed the water into a manifold or bottom of the tank. Make sure there is no restriction in this plumbing.

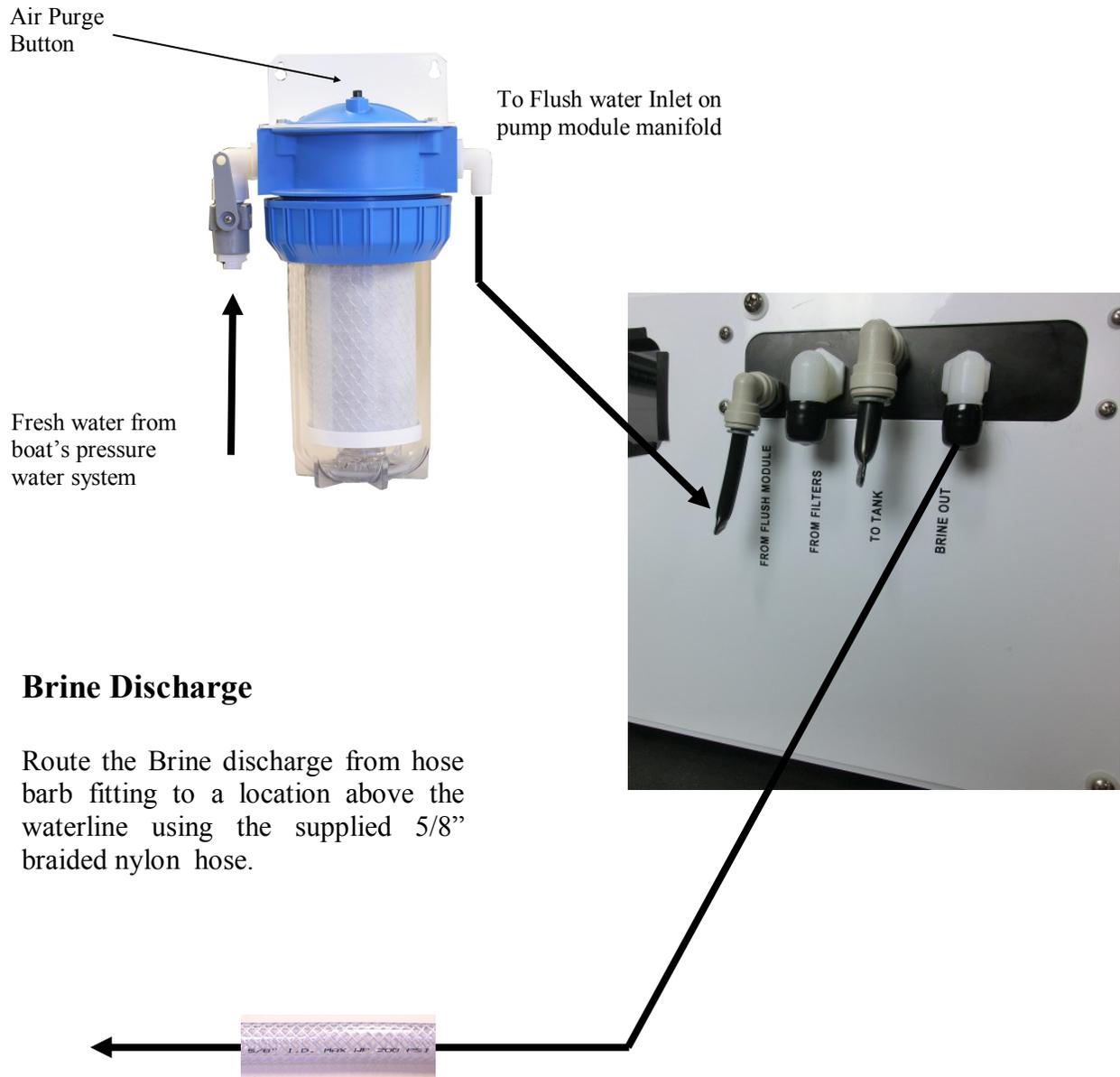
A product sampling tap can be installed along the tank fill hose between the manifold and the tank connection. If a sampling tap or filling manifold is to be installed on the product water line, then an "open-before-close" type 3 way valve should be used to ensure that the product water line is never accidentally pressurized.

If the length of product water tubing supplied with the watermaker is insufficient, use a larger size hose. Product water **flow restriction will cause reduced output and increased power consumption and can potentially damage the membrane.**



## Fresh Water Flush Filter

Run a feed line from the domestic cold water pressure system to the 1/2 hose barb on the fresh water flush assembly. This needs to be pressurized even when the boat is unattended for the fresh water flush system to function properly. **The domestic fresh water pump must be able to deliver 2 gallons per minute (7.5lpm) at 25 PSI (1.5Bar).**



## Brine Discharge

Route the Brine discharge from hose barb fitting to a location above the waterline using the supplied 5/8" braided nylon hose.

# John Guest Super Speedfit Fittings

## How Super Speedfit Works

To make a connection, the tube is simply pushed in by hand; the unique patented John Guest collet locking system then holds the tube firmly in place without deforming it or restricting flow.

### Materials of construction

**Super Speedfit** fittings are made up of three components:

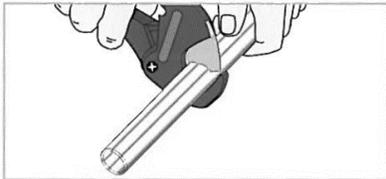
**Bodies** are produced in an acetal copolymer or polypropylene.

**'O' rings** are Nitrile rubber or EPDM.

**Collets** are produced in acetal copolymer or polypropylene with stainless steel teeth.

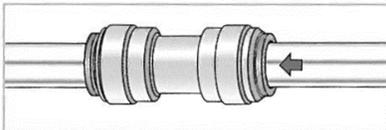
## How to make a connection

Cut the tube square



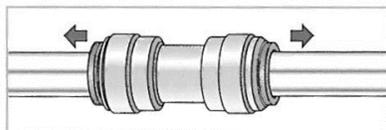
Cut the tube square and remove burrs and sharp edges. Ensure the outside diameter is free of score marks. For soft or thin walled tube we recommend the use of a tube insert

Push up to tube stop



Push the tube into the fitting, to the tube stop.

Pull to check secure



Pull on the tube to check it is secure. Test the system before use.

## Grips before it seals

The Collet (gripper) has stainless steel teeth which hold the tube firmly in position while the 'O' ring provides a permanent leakproof seal.

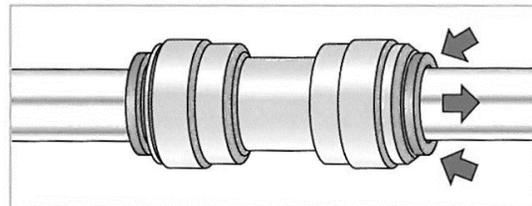
'O' ring provides a leakproof seal

Collet

Stainless steel teeth grips the pipe

## To disconnect

Push in collet and remove tube



To disconnect, ensure the system is depressurized, push the collet square against the fitting. With the collet held in this position the tube can be removed.

## Wiring

*PROVIDE CIRCUIT PROTECTION AT THE SOURCE!! Inadequate wiring will cause a loss of system performance and could be a fire and/or shock hazard.*

### Wire Sizing

#### Farallon 1800

- 110V: Use a 15Amp breaker and 12 AWG wire for 10.5 Amperes.
- 220V use a 10 Amp breaker and 12 AWG wire for 5.5 Amperes.
- Amperage ratings assume a Pf of 60%. Actual measurements may vary.

#### Farallon 2800

- 220V use a 15 Amp breaker and 12 AWG wire for 7 Amperes.
- Amperage ratings assume a Pf of 60%. Actual measurements may vary.

**Note: If the specified circuit breaker sizes are unavailable use the next higher rating but do not exceed the specification by more than 10%. All wiring to be done to applicable ABYC, Marine UL or CE standards.**

## WIRING

Make sure that the Control Box is mounted in cool dry place, well above bilge level and not subject to water spray.

If being used connect the remote display cable to the open display jack on the side of the electrical box. Route the remote display control cable through the boat to the MPC remote display location. Be careful not to damage the connector or get it wet. Plug this into the back of the remote display.

Remote display socket

Boost Pump Plug



Route the boost pump power cable to the Control Box from the boost pump. Do not get the cable wet, and be careful not to damage the plug or conductors during installation. The boost pump power cable plug is located under the sockets for the Salinity probe and the Remote display. Route the power cable and use cable ties to keep it in place.

# Tank Switch or Level Sensor Installation

## Factory Supplied Tank Switches

There are two types of tank float switches available depending on your installation requirements. Often making an assembly as pictured below (right) is a good solution as there is only a single penetration and it can be above the high water level.

Turning the watermaker off when the high level switch is recommended, so you can just “Fill Tank” and the watermaker will shut off when it’s full. We do not recommend that the system is turned on by the low level float switch as it can create a situation that could sink your boat, not likely but possible.



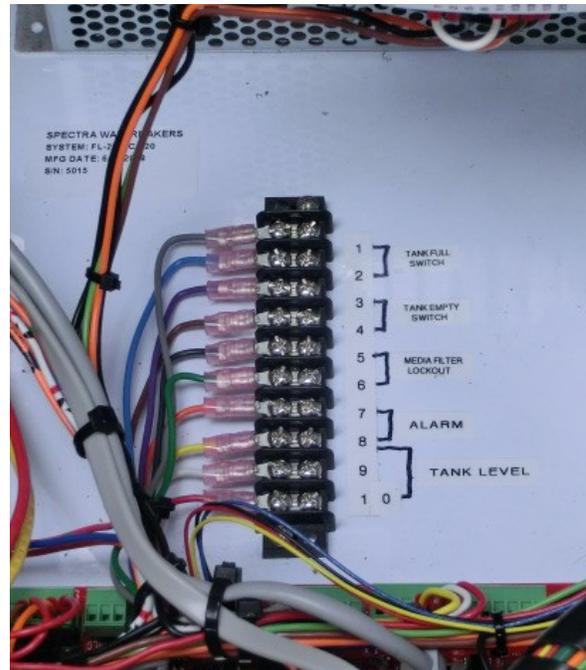
Top mounted float switch EL-SWT-LV



Side mounted float switch EL-SWT-SMLV

Refer to the wiring diagrams for the Terminal Block numbers for the tank level switches.

Note: If tank switches are not used you **must disable the tank full switch** in the system settings.



## Tank Level Sensor

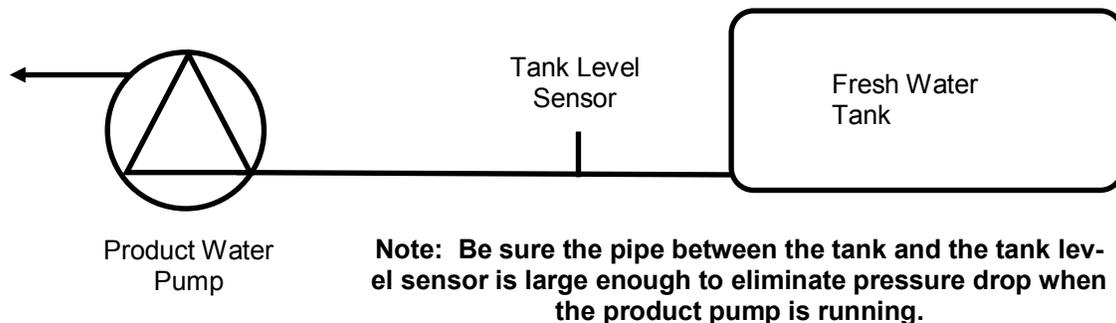
Installing a tank level sensor (**EL-SSR-5PSI**), which is a pressure sensor in the discharge line from your storage tank will allow the Spectra Connect to track the tank level. Once the sensor is installed connect to the Terminal Block above referring to the wiring diagram for terminal location.

## Optional Tank Level Sensor Installation

The optional Tank Level sensor allows even greater control of your ship's fresh water systems. This unique level monitoring system requires no holes to be drilled into your tank while measuring tank volume with greater accuracy than a standard resistive float.

Turn off the ship's domestic water system, close the fresh water supply valve at the water tank, then bleed off the pressure by opening a tap in the galley or head sink.

Install a tee in the **water supply hose at the bottom of the tank, or at the inlet to the domestic water pump**. Connect open leg of the tee to the Tank Level Sensor. Note: The tank level sensor requires a 1/4" npt connection. We recommend installing a minimum 1/2" tee, and using a reducing bushing to connect the sensor.



Route the 3 conductor cable back to the Spectra Connect control board at the feed pump module. Extend the wires as necessary. *If you must extend the wires beyond 50' contact the factory to ensure proper operation.*

Connect the Tank Level Sensor cables to the appropriate terminals in the Control Junction Box (pg. 10) and refer to the wiring diagram on pg.49 to identify the correct terminals. **Polarity must be maintained!**

If a 2nd Tank Level Sensor is going to be installed, it should be installed at the base of the second tank. **If monitoring 2 connected water tanks, they must be isolated from each other with a valve to read properly.**

The wiring connections for the second Tank Level Sensor are located inside the Spectra Connect control box. **See System Settings section of this manual for instructions on enabling the second Tank Level Sensor.**

**See the Tank Level Calibration (pg. 17) in the Commissioning section of this manual.**

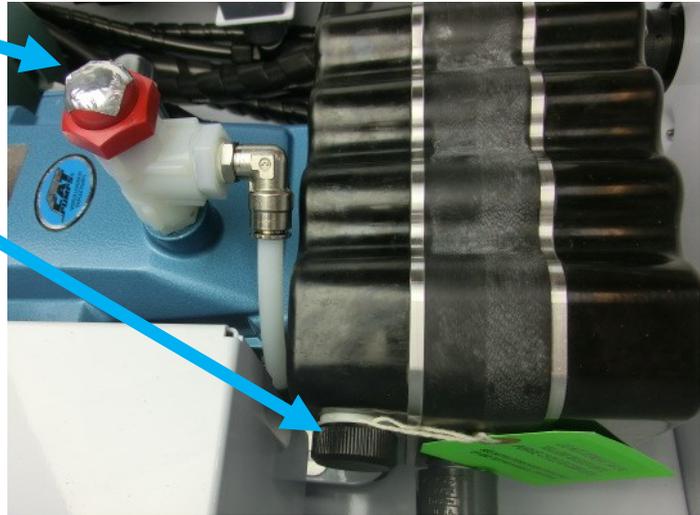
# New System Start-Up and Testing

Use this procedure when the system contains preservative or cleaning chemicals.

**Warning! Damage will occur if the system is not purged of the storage chemicals before pressurizing the system.**

## 1. First Check that:

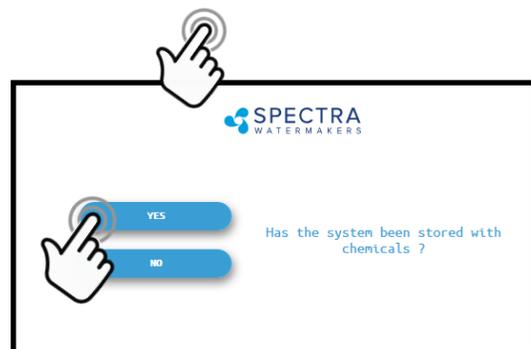
- Fresh water system is pressurized and there is water in the tank.
- **The tape is removed from the oil vent cap on the top of the crankcase, confirm there is oil in the crankcase.**
- **Pressure Relief Valve is OPEN one full turn**



2. Confirm both the inlet and discharge service valves are in the RUN position



3. Thru-hull valve is open. The brine discharge will contain a small amount of propylene glycol (non-toxic potable anti-freeze) during the purge cycle.
4. Confirm toggle switch on the control box is in the RUN AUTO position.
5. Turn on the power to the system and the Spectra Connect screen will display, "Has the system been stored with chemicals?" Press 'Yes', to start the Purge sequence. Note: The watermaker will shut down if the pressure relief valve is left closed during the Purge mode.



## New System Start-Up and Testing continued...

- The system will start purging and the display will show the progress and time remaining for the purge cycle.



- Using the buttons on top of the filter housings, bleed out the air in the filter housings until water is coming out.

Air Purge Button

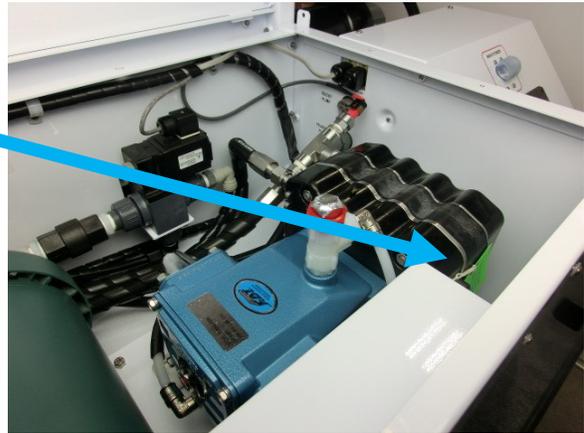
- Check the system for leaks.
- Check the brine discharge for water flow. The system should fully prime within 60-90 seconds and all air should be out of the feed water hoses. The pump will should sound smooth.



**Note: If you must stop the purge sequence for any reason, the control will default back to the beginning of the purge cycle to protect your system.**

## New System Start-Up and Testing continued...

10. After the purge sequence the display will alarm with the message “Close pressure relief valve.” Close the valve and proceed by pressing Ok to resume the Purge Cycle running pressurized and purging the product water to drain.



11. The system will now run under pressure and desalinate water. This mode diverts the product water overboard in case there is any residual chemicals in the membrane. Carefully inspect for leaks over the entire system! Shut down the system and repair any leaks you find.



12. After the Product Purge cycle completes, the system will prompt to Restart, then advance to the Main Menu. If this is a NEW INSTALLATION, continue to the Calibration Instructions to finalize the installation. If you are putting your watermaker back into service after storage or cleaning your system is now ready for use.

**If the system is stored with Propylene Glycol, additional purging time may be required if there is chemical odor to the product water, or if salinity remains high after the purge sequence. All systems are shipped from the factory stored with Propylene Glycol.**

# Sensor Calibration

Many of the settings on your system have been pre-calibrated during standard factory testing, however, there are a few settings that will vary based on the installation conditions. **If the system has just been installed you must calibrate the Pre-filter Condition graph before proceeding.**

## Pre-filter Gauge Calibration

This procedure does **not** need to be done with each filter change under normal operation, it should **ONLY BE DONE IF THE FILTER CONDITION GAUGE WON'T RESET TO 100% WITH NEW FILTERS.**

1. During the calibration sequence the system will automatically start, begin to make water for several minutes and then shut itself down. *Make sure that new filters are in place before proceeding.*
2. Follow the steps in Figures 1—4 below to initiate the Calibration Sequence.



Fig. 1

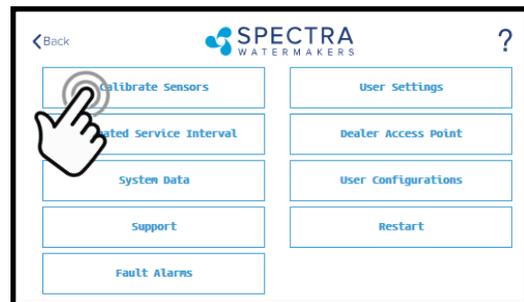


Fig. 2

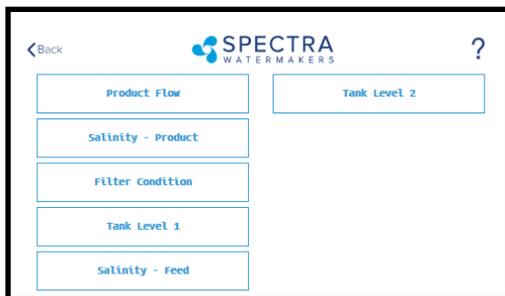


Fig. 3



Fig. 4

3. When the Calibration Sequence is complete, press the <Back> button in the upper left corner to return to the Main Menu. *When prompted by the display, Click **Save** to make sure that the Calibration is stored in the system memory.*
4. The **Filter Condition gauge** has now been calibrated to match your installation.



# Tank Level Sensor Calibration

## (with optional transducer installed)

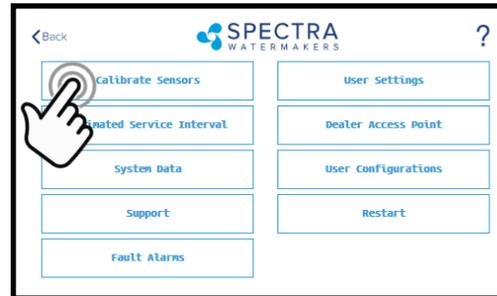
Installing the optional tank level sensor (EL-SSR-5PSI) will allow the control to display tank levels in up to two tanks. Follow the steps below to enter the calibration sequence for the optional Tank Level Sensor(s).

**The tank needs to be full to proceed with the calibration process and you need to measure the approximate height of the tank.**

1. With a full tank, press the Menu Button



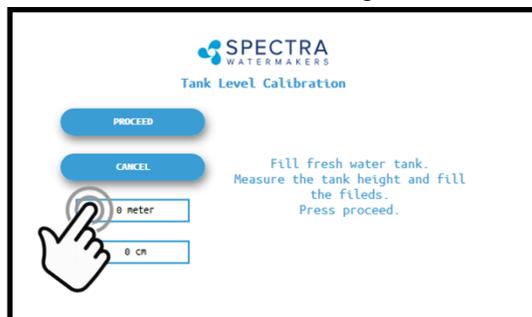
2. Press the Calibrate Sensors Button



3. Press the Tank Level 1 button



4. Press to enter the tank height

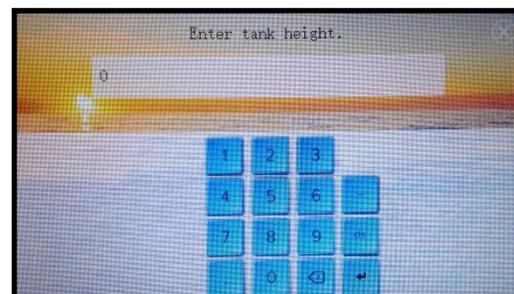


Press the Feet (Meter) field to enter the tank height in feet (meters).

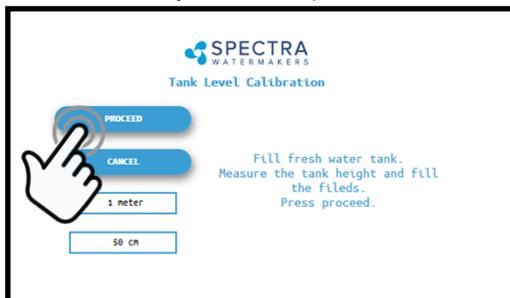
Press the Inch (cm) field to enter the height in inches.

Ex: If the Tank height is 150cm:  
 Enter '1' in the field labeled 'Meter'  
 Enter '50' in the field labeled 'cm'

5. Enter the height



8. If the entry is correct press Proceed.



8. Press OK to save the settings



# Salinity Calibration

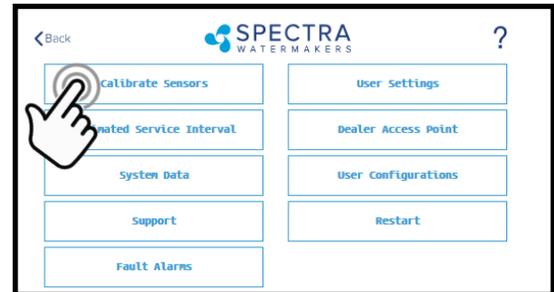
The Salinity probe has been calibrated at the factory during testing and is not normally required during commissioning. If the product quality is not reading accurately, follow calibration steps.

A handheld salinity meter (or other reliable device) is required to perform this calibration as you need to confirm the salinity of the product water.

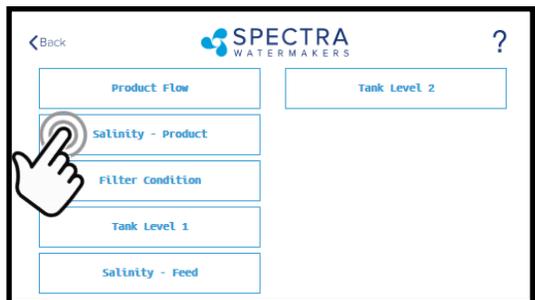
1. Press the Menu Button



2. Press the Calibrate Sensors Button



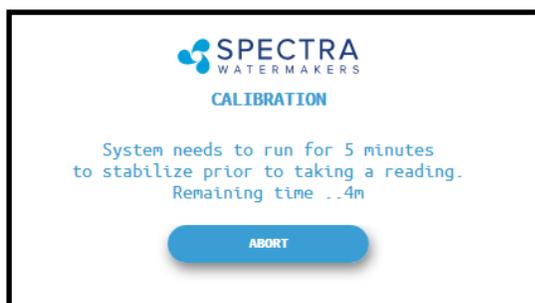
3. Press the Salinity—Product Button



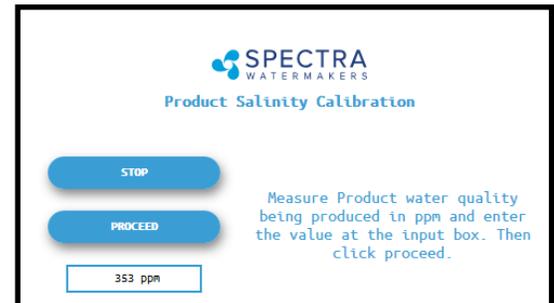
4. Press Continue to acknowledge the warning



5. Allow the salinity to stabilize for 5 minutes.



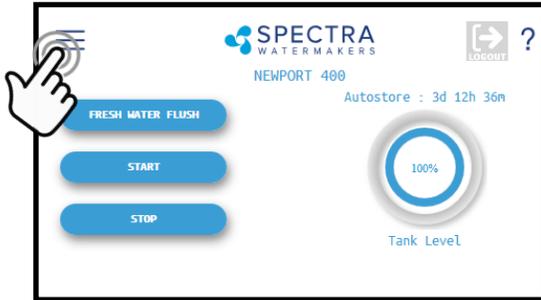
6. Press the PPM field and enter the PPM you measured. Press Proceed to save your entry.



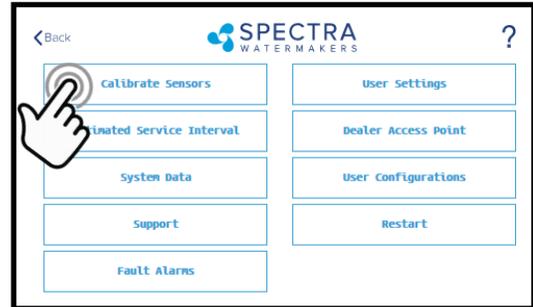
# Product Flow Calibration

The Product Flow sensor has been calibrated at the factory during testing and isn't normally required during commissioning. If the product flow is not reading accurately, confirm the product flow rate by following the Product Flow calibration steps.

1. Press the Menu Button



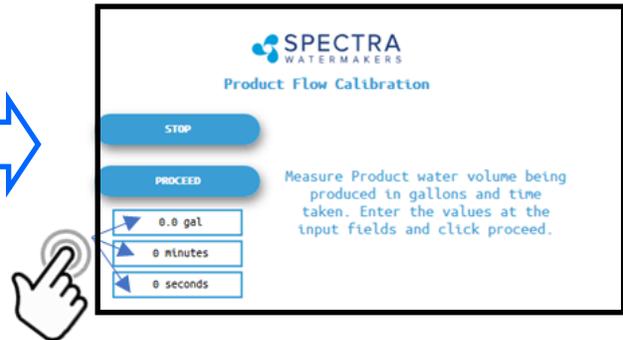
2. Press the Calibrate Sensors Button



3. Press the Product Flow Button



4. Measure the product flow per the process described below, enter the numbers below and press Proceed.



4. Allow the system to run for a few minutes to stabilize and then time in minutes and seconds, how long it takes to fill a container of a known volume.
5. Touch the 'Gal' ('Liter') field to enter the volume of the container used.
6. Touch the 'Minutes' field to enter the minutes it took to fill the container. *Only enter the minutes, ex: 3 min 15 sec should be entered as 3.*
7. Touch the seconds field to enter the seconds it took to fill the container. *Only enter the seconds, ex: 3 min 15 sec should be entered as 15.*
8. Press 'Proceed'. *You must save all changes when prompted after exiting the settings menu*

# Networking

Your Spectra Connect is equipped with state of the art networking options to allow the maximum user control in a wide variety of installations. The instructions below will help you get the most out of your Spectra Connect.

*Note: Your Spectra Connect is only available when your device is connected to the same local network as the Spectra Connect control board. If you have difficulty connecting to your watermaker control application, double check that your device network is the same as your Spectra Connect*

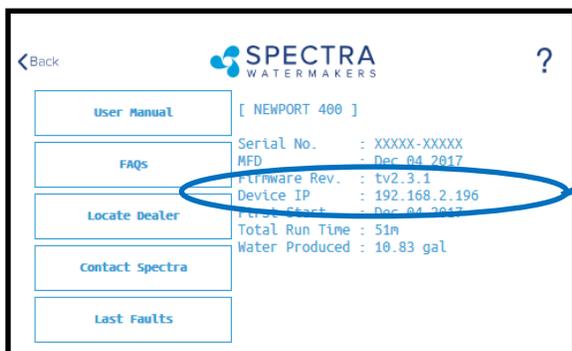
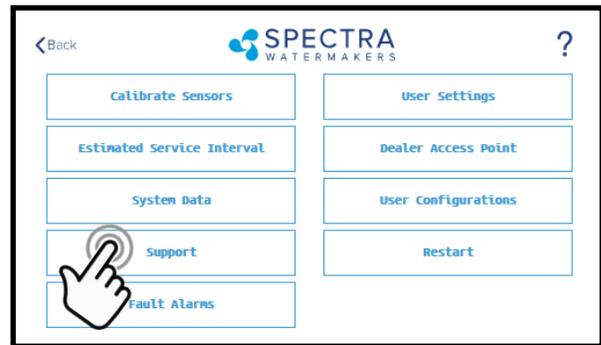
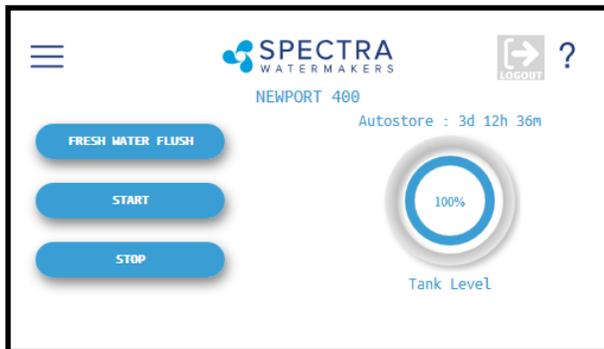
## Connecting to the existing Network

1. Turn power to the system off. **Ethernet Plug**
2. Connect a standard Cat5e or Cat6 ethernet cable from the plug inside the watermaker to your router or networking switch.



Note: If you are connecting directly into a wireless router, **DO NOT CONNECT TO THE WLAN (Wireless Local Area Network)** ethernet port. You must connect to one of the LAN ports typically labeled 1, 2, 3, 4, etc.

3. Turn power to the system back on.
4. Follow the screen prompts below:



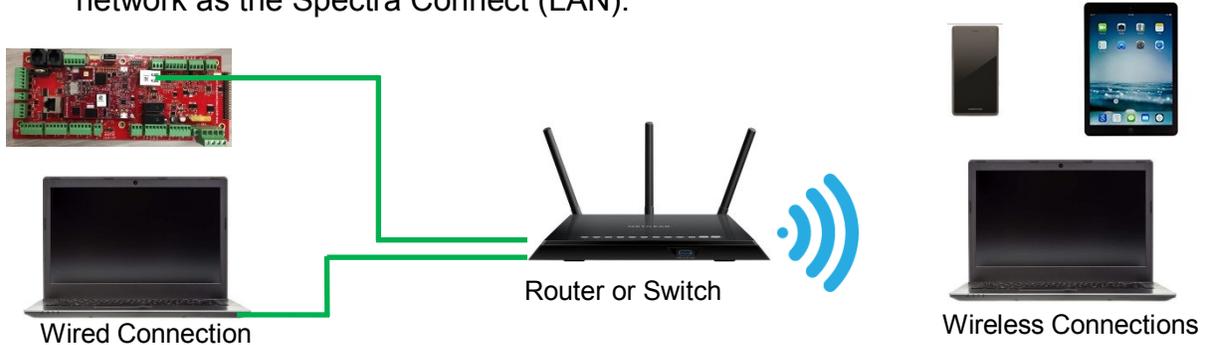
5. Note the 'Device IP' address shown in and record the 10 digit numerical address on the front of this manual for future reference.

## Connecting to the existing Network—Cont'd

6. Connect your computer, tablet or smart phone to the local network your Spectra Connect is plugged into;

**Wired Connection:** simply plug your computer's ethernet port directly into the router or switch where you connected the watermaker.

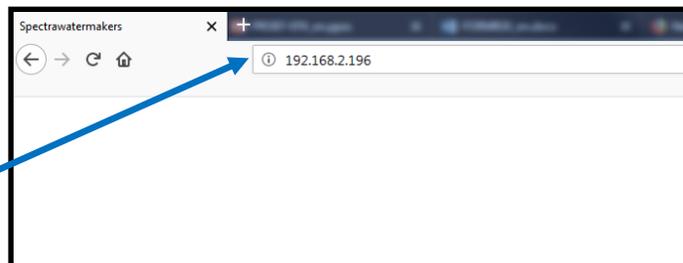
**Wireless Connection:** make sure your device is connected to the same local wireless network as the Spectra Connect (LAN).



7. On the computer, tablet or smartphone, open a web browser such as Firefox, Chrome, or Safari. In the web address bar at the top, type the 'Device IP' address previously recorded. Press 'Enter'.

**Note: Internet Explorer may not be compatible with your Spectra Connect web app. If formatting issues occur, use another browser such as Firefox, Safari, or Chrome.**

Ex: Address Bar—Firefox



8. Your computer should now show the same image as shown on your local Spectra Connect



9. Your web browser is now synced with your Spectra Connect. Any buttons you press on your web browser will be controlling your watermaker.

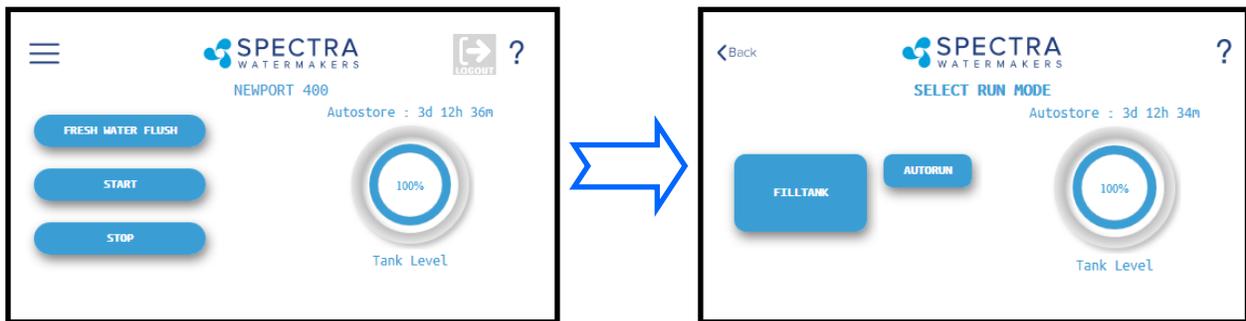
**Caution! If operating your watermaker from a computer, phone, or tablet, you must keep the tab open while the system is in operation and the volume turned up on your device in order to hear any audible alarm faults.**

# Normal Operation

If the system has been pickled or stored with chemicals, use the New System Startup procedure.

Your watermaker will fresh water flush **after every use**. Remember that you need to run the system approximately half an hour to make enough fresh water for one flush.

1. Check to see that the inlet and brine discharge seacocks are open and the domestic pressurized water system is turned on.
2. Press the 'Start' button, then select the desired operating mode.



## Standard Operating Modes



3. Runs your watermaker until the Tank Full switch closes, fresh water flushes the system, then goes into 'Auto Store' mode and the Flush Interval timer starts. *This is the default mode of operation.*

-OR-



4. Gives you the option to run for a preset amount of time, or a preset volume of water to be produced. **If no tank switches are installed, and they have been disabled in the system settings**, this is the only Operating Mode available.

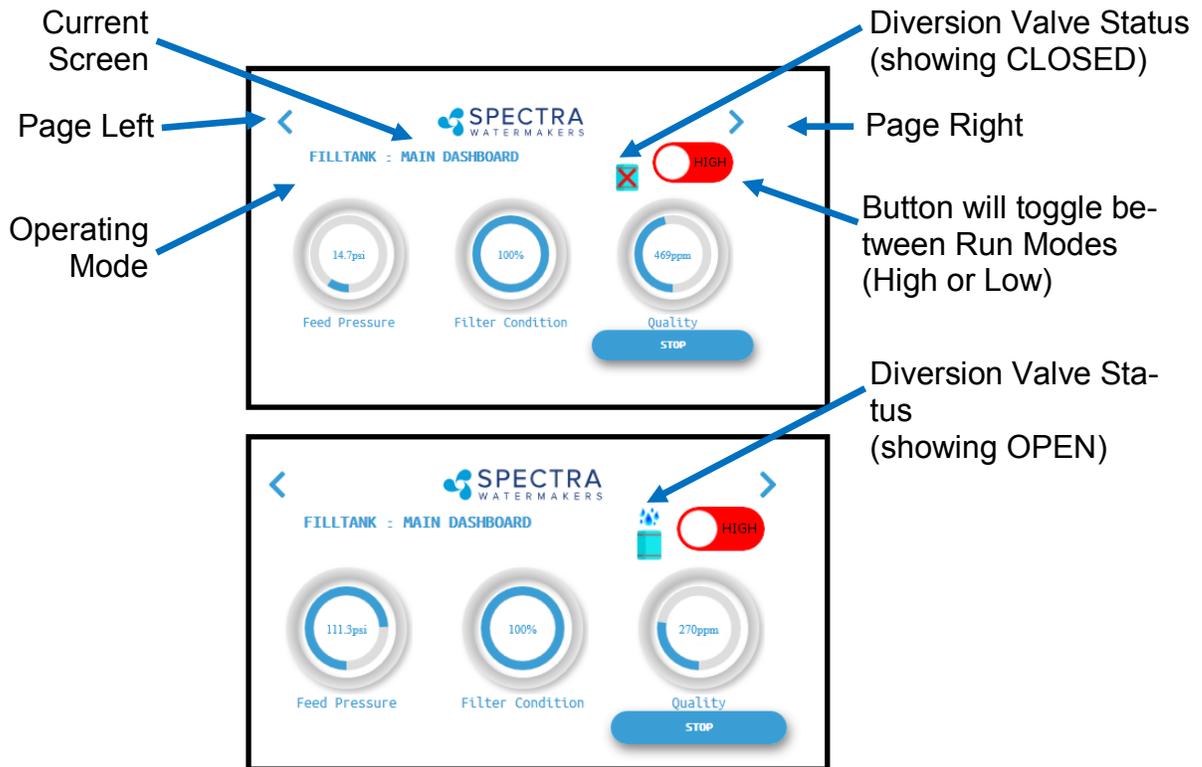


## Normal Operation—Cont'd.....

5. The system will now begin the start sequence and will count down to the pump starting. Pressing 'Stop' will stop the sequence and bring you back to the Main Menu.



6. Once the Boost Pressure reaches the minimum threshold, the system starts operating and you will be taken directly to the Main Dashboard which shows the current status.



7. When the Product Water Quality is better than the programmed threshold, the Diversion Valve opens, allowing water to enter the tanks and the screen image changes.

8. Pressing the < (Page Left) or > (Page Right) arrows while the system is running will scroll through the different screens with operating information for your watermaker.

## Normal Operation—Cont'd.....

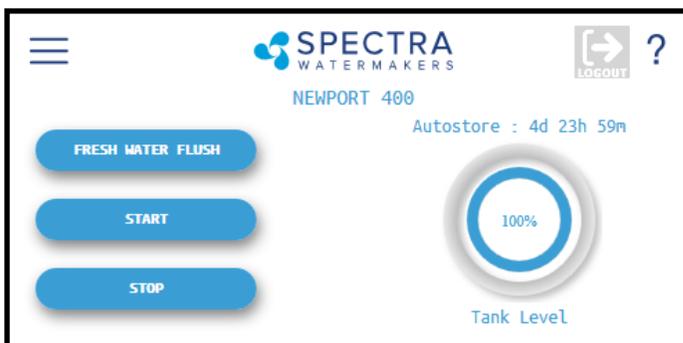
9. When the Run Cycle completes, the system will start the Fresh Water Flush cycle. If you stop the system (interrupting the run cycle) the system will also start a flush cycle.

**The system must be FRESH WATER FLUSHED AFTER EACH USE, or serious damage can occur.**



10. After Fresh Water Flushing the system will enter standby mode waiting for the next run cycle.

**Note: See pg. 34 for ways to utilize the Auto Store mode.**



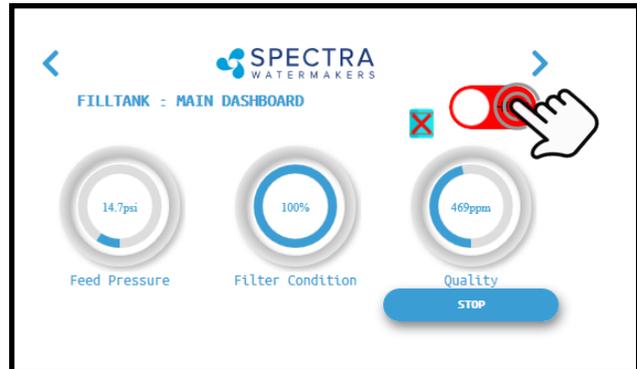
# Normal Operation—Cont'd.....

## Other Operating Modes

### Run Low Mode

You can toggle back and forth between Run High Mode and Run Low Mode by tapping the 'High' toggle button.

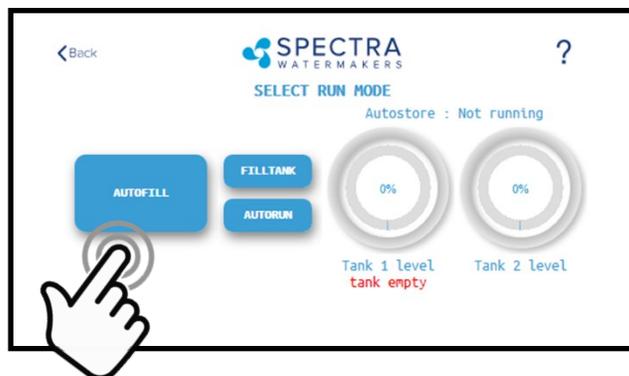
Run Low Mode may be selected to reduce power consumption, lower the membrane pressure, or prolong filter life.



*Note: The system will automatically drop to Low Mode when it senses high membrane pressure, or low boost (feed) pressure.*

### Auto Fill Mode

If using the Tank Low and Tank Full switches, **and both are enabled in the system settings**, then your Start Menu will allow the system to be operated in Auto Fill mode.



In Auto Fill Mode the Spectra Connect will automatically fill your water tank, stop itself, fresh water flush, return to Auto Store mode with the flush interval timer running, and then turn itself on again to fill the tank as soon as the water level drops below the Tank Low Switch with no additional user commands.

Additionally, if power is interrupted at any stage of operation, the Spectra Connect will return to Auto Fill mode, ensuring that your tanks will always have water.

# Auto Store

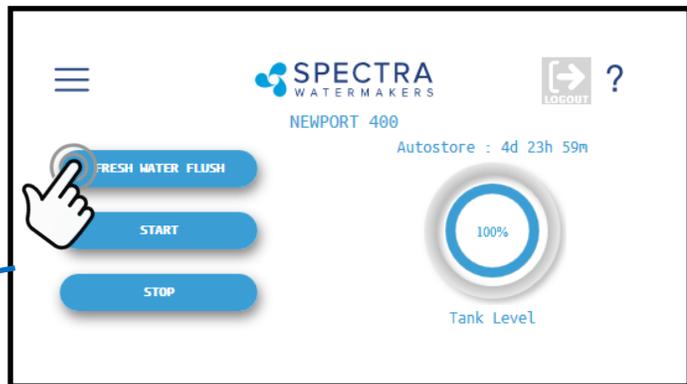
**Warning!** Proper understanding of the Spectra flush system and the fresh water system is mandatory for extended use of Auto Store.

The Auto Store function flushes the watermaker at programmed intervals. As long as the watermaker is flushed with fresh water every 5 days you need not store the system with chemicals.

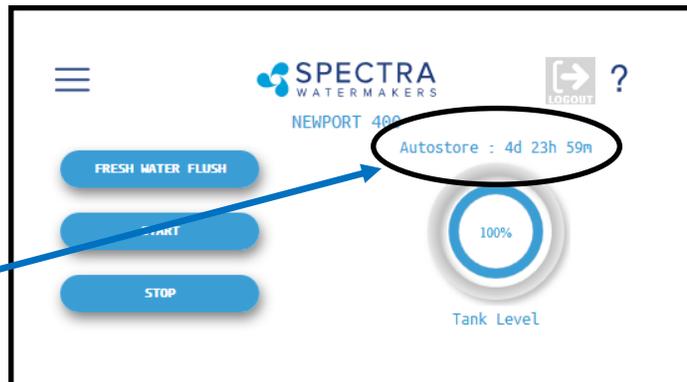
**Note; If the system runs out of water the pump will be damaged.**

- Make sure the pressure relief valve on the Pearson pump is closed.
- **The system must be continually powered on during the Auto Store mode.** Turning off the power will disable the automatic fresh water flush and damage may occur.

Pushing the fresh water flush button flushes the system with fresh water and activates the auto store cycle:



Shows Autostore: time to next flush cycle.



## Dry Testing With Artificial Ocean

If it is not possible to test run the system with the boat in the water testing may be accomplished with an artificial ocean. Purchase enough salt to make 5 gallons (20 liters) of salt water. Salt water is 32,000mg/L or 3% salt by weight.

Make sure that the domestic water system is powered up and that there is water in the tank. Confirm that the Charcoal filter is installed in the Fresh water flush module and that the domestic water line has been installed and all valves are open.

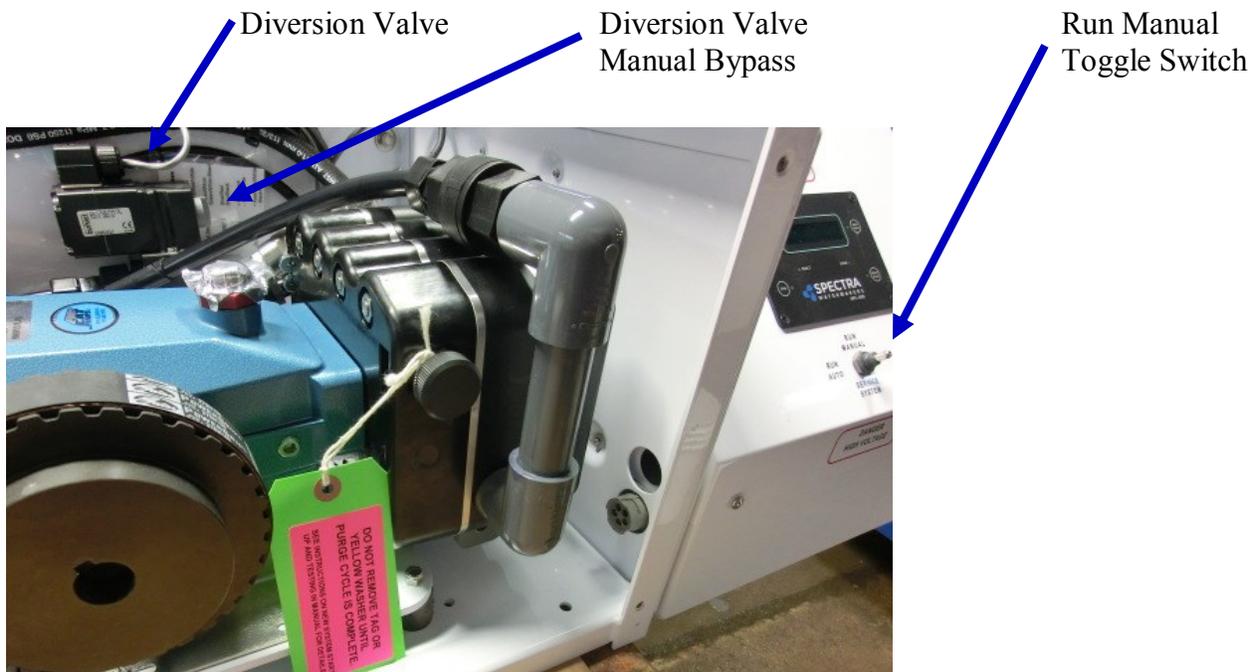
1. **Open Pressure Relief Valve.**
2. Power up the control system.
3. Close the sea cock
4. Press both “**Auto Run**” and “**Stop**” to bypass the purge sequence. If the motor starts, stop immediately and press the Auto run and stop buttons again until you get the message **PURGE MODE BYPASSED.**
5. Press the “**Auto Store**” button and allow the fresh water flush system to cycle through its timed operation. Press the “**auto store**” system 5 or more times to purge all of the storage chemicals out of the system (20 minutes total purging). If the Spectra-Pearson Pump is cavitating during the flush cycle, then there isn't enough flow to the pump. See the instructions for “Flush Cycle Adjustment”.
6. Hook up your service hoses to the Brine Discharge Service valve and the Service Intake Module. Route them into a 5 gallon (20 Liter) bucket.
7. Turn the yellow valve on the Service Intake Module from “**Run**” to “**Service.**”
8. Press auto flush one more time to fill the bucket, press “**Stop**” once the bucket is nearly full. Add 32grams of salt for every liter of water in the bucket to approximate the salinity of an ocean. If you have a hydrometer, mix salt into the bucket until you have specific gravity of 1.024.
9. Close the pressure relief valve and start the system using the “**Auto Run**” Button. If you have no way to measure the salinity, slowly add salt while running the machine until the membrane pressure reaches 650psi (45bar).
9. Run and test the system for as long as possible. During the run test carefully inspect for leaks. Check all of the system parameters to make sure the system is operating correctly. Do not allow the water in the bucket to get above 120F (50C).
10. Store the system per the “Storage” instructions.

## Manual Operation

**In the event of a component failure** resulting in a shut down due to a false alarm, the failed component can be overridden using the Programming Function on the display. High Pressure, Service Prefilter, System Stalled (airlock), and Salinity Probe Failed can be defeated. If one safety shutdown is disabled, the other safety shutdowns will still be activated. The pressure sensors and salinity probe can also be calibrated from the display. Complete instructions are found in Part 2 of this manual under “Programming from the Display”. **Be absolutely certain that the alarm is false before defeating the automatic controls.**

**In the event of complete MPC control failure**, the system may be operated manually by using the manual run switch on the Electrical Box and manually opening the diversion valve.

- For manual start up, switch on the Spectra-Pearson Pump and Boost Pump by setting the feed pump switch to “RUN MAN”. Shut the unit down if the Spectra-Pearson Pump knocks loudly or sounds rough or if air is continuously present in the intake line. ***The automatic safety controls are disabled in manual mode.***
- The diversion valve, an electrically operated three way valve which is normally energized by the MPC controls to send water to the tank, will not open automatically in manual mode. Instead, it must be opened using the mechanical override button on the valve. The button is located on the side of the valve opposite the electrical connection and above the plumbing fittings. Firmly *press the button in* as far as it will go and *rotate it 90 degrees Clockwise*. This locks the diversion valve open.
- Always discard the product water for the first few minutes of operation. The initial product water from the system may not be potable. Taste the product water before sending to a tank. To get a water sample loosen the 1/2 inch product tube fitting at the diversion valve in the High Pressure Module or remove the tubing from the membrane outlet and collect a sample, or collect a sample of a sampling tap—if installed. Check it with a handheld salinity meter or taste it.



## Long Term Storage Procedures

Watermakers are best run frequently (every other day is ideal), biological growth in the membrane is the leading cause of membrane fouling. A warm environment will cause faster growth than a cold environment. The fresh water flush system will greatly reduce biological growth but may not stop it completely in certain conditions.

### **System Storage for up to 6 months, “Pickling”**

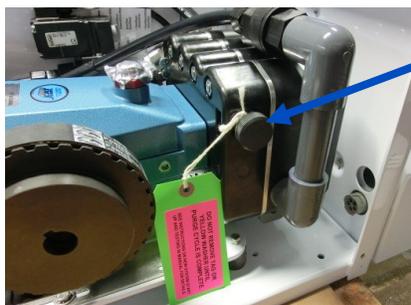
**If the system is to be left unused for more than 2 weeks**, perform the following storage procedure. The procedure introduces a chemical compound, SC-1, into the system that prevents biological growth.

**Spectra SC-1 is a special storage compound used by the US Navy. It is formulated to be compatible with the modern engineering plastics and composites in the Spectra pumps. Do not use any substitute except propylene Glycol, SC-1 Storage Compound has to be mixed at a ratio of 1 Spectra container to 3 gallons (12L) of fresh water to have the proper solution. An average of 6 gallons (22L) of water is in the system. This water has to be figured in to the mixture using two packets of SC-1.**

**Caution! Avoid contact with skin, eyes, or lungs with the storage chemical.**

## Storage Procedure

- Step 1: Do two Fresh Water Flushes.
- Step 2: Install the 5/8" braided nylon service hose from the service kit on the three-way valve installed on the brine discharge outlet, and lead the hose to a 5 gallon bucket. Turn the valve handle to the 'Service' position.
- Step 3: Push the Fresh Water Flush button: to fill the bucket with 2 gallons of fresh unchlorinated water. When the bucket has reached the desired level Push the "Stop" button.
- Step 4: Connect the hose, using the garden hose barb fitting from your service kit, to the service port of the Service Intake Module. Lead the hose into the same bucket. Turn the service valve on the boost pump module 180° to the 'Service' position, so the intake is now coming from the bucket.
- Step 5: Mix the storage chemical compound into the water in the bucket. Note that if the water is cold it may take an hour for the chemical to dissolve.
- Step 6: Make sure the pressure relief valve on the Spectra-Pearson Pump is Open one full turn (unpressurized).



Pressure Relief Valve

- Step 7: Set the switch on the pump module to "Service System" to turn on the feed pump. Circulate the storage chemical in the system for approximately 20 minutes. Set the switch to "Run Auto" when finished.

### Clean Up:

- Remove the brine discharge service hose from the three-way valve, and turn the valve back to the 'Run' position. You may at this point, if you choose to, pump the bucket dry by using the feed pump switch. Stop when the bucket is empty.
- Turn the service valve 180° back to its original 'Run' position, remove the service hose, and replace the dust cap.
- Turn off the AC power to the system.
- **LEAVE THE PRESSURE RELIEF VALVE OPEN**

## Storage & Winterizing

**Warning! Use only potable water antifreeze (Propylene Glycol). That does not contain any Ethyl Alcohol.**

**Do not use automotive antifreeze (Ethylene Glycol).**

Propylene Glycol is an effective biocide and antifreeze only at concentrations above 25%. Commercially available products range from 25 to 60 percent. They are usually labeled with a temperature rating. "Minus 50" antifreeze is already diluted to 25%. "Minus 100" is a 60% solution. Purchase the strongest antifreeze available. Use enough to ensure that the system contains at least a 25% solution even after dilution with the residual water inside the watermaker.

**Note that there is 3.5 gallons of water in the system so if you want to make a 50% solution you will need 3.5 gallons of Antifreeze.**

Follow the procedure on the previous page with the following changes;

- Skip step 2, you will be putting straight Propylene Glycol in the bucket
- Substitute Propylene Glycol for the SC-1 storage chemical in Step-5

Everything else in the process is the same.

# MAINTENANCE

## General

Periodically inspect the entire system for leakage and chafe on the tubing and hoses. Repair any leaks you find as soon as practical. Some crystal formation around the Spectra-Pearson Pump blocks is normal. Wipe down any salt encrusted areas with a damp cloth.

## The Seawater Strainer

- The sea water strainer's stainless steel element should be inspected, removed, and cleaned as needed. A clogged strainer will cause the control to alarm "**Service Prefilters**". Be careful to ensure that the thru-hull is closed before disassembly and the seal and element are in place before reassembly. Put the screen up to a light for inspection. When the system is put into storage, remove, rinse, and reassemble dry to impede corrosion. Check frequently during operation.

## The Prefilters

- Service the prefilters as soon as possible after the prefilter condition graph begins to rise. If the filter condition graph gets all the way to "Replace" the machine will slow down. When display reaches "Replace" a second time the alarm sounds and the system will shut down to prevent damage.
- To service the filters shut off the thru-hull, open the housings, discard the old filters, Clean out the housing bowls, reassemble the housings with new 20 and 5 micron filter elements. The 5 micron filter goes downstream from the 20 micron. Leave dry until next startup.
- Use only Spectra approved filters or you may void your warranty. Occasionally, lightly lube the O-rings with silicone grease.
- Note that the ring holding the filter bowls in place only needs to be hand tight. Making the ring tighter will not improve the seal. If it leaks the o-ring is dirty or damaged.

## The Charcoal Fresh Water Flush Filter

- Replace the charcoal filter element at least every 6 months.

# MAINTENANCE

## GEARCASE LUBE OIL

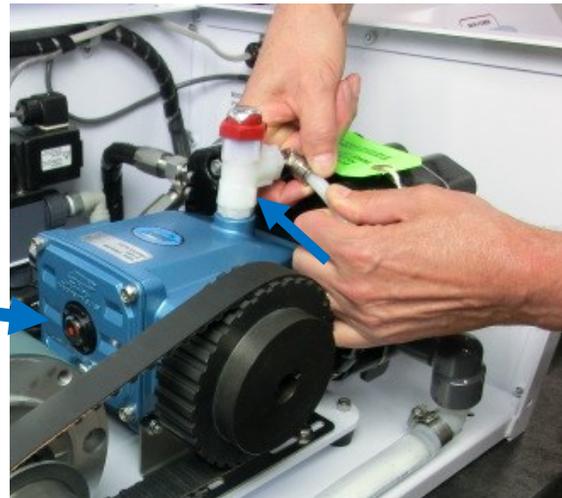
*Use only 5W-30 synthetic oil in Spectra-Pearson Pump crankcase. Do not overfill the crankcase with oil. Check oil condition and level frequently. The Oil should be replaced every 5000 hours or annually, whichever comes first.*

The Spectra– Pearson Pump comes mounted on a counterclockwise rotating CAT™ crankcase. **Inspect the oil level and condition often.**

The oil in the crankcase should be changed every 5,000 hours or when the oil appears milky. There is an inspection window that is visible from the plumbing manifold side of the Spectra-Pearson Pump, or the oil can be checked by the vent plug on the top of the crankcase.

Push the drain tube into the fitting and pull the ring on the fitting into the fitting which will release the tube. Keep pressure on the ring and pull the tube out.

Oil Lever sight glass



Drain oil into a suitable container.

Reattach the tube (pull to make sure it is secure) and refill the pump with oil, checking the level with the sight glass.



## The Membranes

- The membranes need to be cleaned only when operating pressures have risen more than 10% or the product quality degrades. The leading cause of fouling in marine use is from biological growth that occurs when the system is left unused without flushing or pickling. Fouling from mineral scaling can happen during operation under certain sea water conditions, and from rust. Monitor the product salinity and membrane pressure for higher than normal readings for the conditions. Other conditions can cause high pressure such as cold water or high ocean salinity. Low product flow is usually due to blocked or partially blocked pre-filters, Spectra-Pearson Pump problems, or low boost pressure. Look for all other causes before cleaning the membrane. Membrane life can be shortened by excessive cleaning.
- There are two types of cleaners: acid and alkaline. The acid cleaner (SC-3) will remove mineral scaling. The alkaline cleaner (SC-2) is used to remove biological by-products, oil, and dirt particles that get past the prefilters. If membrane performance is reduced and they have not been pickled recently, cleaning with both chemicals is recommended. The acid cleaner should be used first. If the membrane fails to respond to both cleanings, this is an indication of another problem with the system, or that it is time to replace the membranes. Contact Spectra Water-makers before removing a membrane.

### Membrane Cleaning

For normal cleaning, the SC-3 Acid Cleaning Compound is used first, then the SC-2 Alkaline Cleaning Compound. If known bio-fouling is present, the SC-2 may be used first. Use hot water if possible, up to 120°F (45C) is recommended as it greatly enhances the ability of the cleaners to do their jobs.

If the history of the system is unknown or has been left “unpickled” for an extended length of time and biological growth is present, it is recommended that the system is cleaned with SC-2, using an alternate source of unchlorinated fresh water before the system is run under pressure. A simple test can be performed to see if biological growth has occurred. Before running the system, remove the prefilters and examine their condition. If the housings are full of smelly discolored water, the system was not properly stored. Install clean prefilters if they were bad. Next check the membrane. Attach the brine discharge service hose and lead to a bucket. Open the pressure relief valve one turn, and manually run the system for 30 seconds. Examine the brine water: if it’s discolored and smells bad, perform an SC-2 cleaning with an alternate source of unchlorinated water before running the system pressurized. If the brine is fairly clean, the system can be purged, run normally, and checked for performance. Clean the membranes only if performance is reduced.

Heating the water is preferable. One way to do this is to find a camp stove and use a large stainless steel pot to heat the solution in. The cleaning solution throughout the system will heat as it circulates in and out of the pot. An alternative is to heat the one or two gallons of water to 120° on the before mixing in the cleaner and circulating it into the system. Periodically stop and re-heat the solution.

**Perform the cleaning procedures while the ship is in acceptable sea water for purging and testing.**

## Membrane Cleaning

Membranes should only be cleaned when it is indicated by understanding the history of the watermaker, see the previous page for details.

**.Note: Procedures are the same for the SC-2 and SC-3 cleaners**

*A Spectra Cleaning Compound (SC-2 or SC-3) must be mixed with fresh water at a ratio of 1 container of compound (8oz.) to 3 gallons (12L) of unchlorinated water to have the proper solution. An average of four gallons (8L) of water is already present inside a Farallon system . This water has to be figured into the mixture. A Farallon system will use 2 containers of compound. SC-2 and SC-3 are never mixed together. Do not use them for storage pickling solution.*

**Warning! The pressure relief valve on the Spectra-Pearson Pump must be open for this procedure or membrane damage may result. Maximum pressure 50 psi.**

### Cleaning Procedure:

- Step 1: Close the seacock. Flush the system twice. Use the “Auto Flush” button on the MPC-5000 display, once the first flush has been completed, press “Stop” to cancel the 5 day interval timer, then press “Auto Flush” again.
- Step 2: Connect the brine discharge service hose to the **Service Port** on the *Brine Discharge Service Module*, turn the yellow handled service valve to the **Service** position , and lead the hose to a bucket.
- Step 3: Press “Auto Flush” again to fill the bucket with 2 gallons (8L) of fresh unchlorinated water. Press “Stop” when the bucket has reached the desired level.
- Step 4: Connect the intake service hose, using the garden hose barb fitting from your service kit, to the **service port** of the *Intake Service Module*. Lead the hose into the same bucket as the brine discharge service hose. Turn the service valve on the *Intake Service Module* 180°, so the intake is now coming from the bucket.
- Step 5: Mix the cleaning chemical compound into the water in the bucket. *Note that not all of the chemical will dissolve completely into solution. This is acceptable and will not harm the system.*
- **Step 6: OPEN THE PRESSURE RELIEF VALVE ON THE SPECTRA-PEARSON PUMP.**
- Step 7: Use the “Run Manual” switch on the MPC control box to turn on the feed pump. Circulate the storage chemical in the system for approximately 25 minutes. Allow to soak for several hours or overnight if the solution is cold. Run the pump occasionally to agitate the solution. Set the toggle switch to ‘Run Auto’ when finished.
- Step 8: Replace the brine overboard hose. Remove the Inlet Service hose and turn the Service valve to the Run position.
- Step 9: To avoid damaging the membranes, Follow the “New System Startup” Instructions to Purge the chemicals out of the System.

## Suggested Spares

### Short term cruising, weekends etc.

We suggest a hand held salinity meter and basic cruise kit. Kit consists of 3 ea, 20micron, and 5 micron filters and two SC-1 storage chemicals.

### Cruising 2 to 6 months at a time.

Two basic cruise kits, One each replacement charcoal filter, Oil Change Kit, Salinity Probe.

### Longer than 6 months.

Additional filters, membrane cleaning chemicals. One replacement strainer screen, O-ring for strainer screen, O-rings for filter housings, Salinity Probe, Oil Change Kit

### **Spectra Watermakers parts list:**

### **Part Number**

SC-1 STORAGE CHEMICAL	KIT-CHEM-SC1
SC-2 CLEANER	KIT-CHEM-SC2
SC-3 CLEANER	KIT-CHEM-SC3
BASIC CRUISE KIT	KIT-BCK-D
5 MIC FILTER	FT-FTC-5BB
20 MIC FILTER	FT-FTC-20BB
CHARCOAL FILTER	FT-FTC-CCBB10
6" STRAINER SCREEN	FT-STN-6S
6" STRAINER O-RING	SO-STN-6SS
FILTER HOUSING O-RING	SO-FHS-3PS20BB
4 X 40" MEMBRANE	FT-MB-SW4X40
SALINITY PROBE	EL-MPC-SP4
OIL CHANGE KIT	KIT-SPP5-OP
HAND HELD METER	KIT-HHM

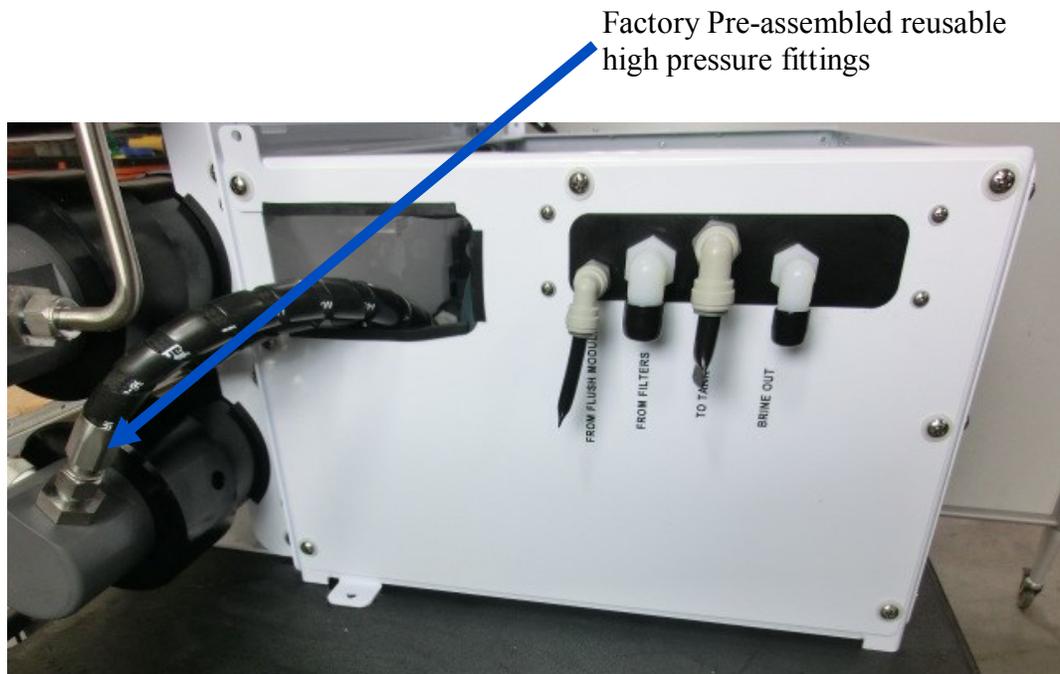
## Membrane Pressure Vessel Relocation

Use **ONLY** size –8 hydraulic hose, p/n PL-HS-1/2HP, for high pressure connections. Pay attention to the direction and flow path of the factory installed hoses before disassembly. Make sure that you reinstall the new hoses in the same manner.

The high pressure fittings are typically pre-installed at the factory. The fittings on the Spectra-Pearson Pump seal with an O-ring and require no Teflon tape or pipe thread sealant. The fittings on the pressure vessels are UNF Straight Thread and pre-installed at the factory. These fittings should not be disassembled, contact the factory if further installation options are necessary.

***Follow the high pressure hose connection instructions on the next page.*** Carefully measure the total assembled length from fitting to fitting. It is usually best to assemble one end of the hose fitting, connect it, lay out the hose length required, then mark and cut the hose to length, taking into account the assembled length of the fitting. A 90 degree bend in a tube is better than a 90 degree fitting. Do not exceed a 5” (13cm) minimum radius bend.

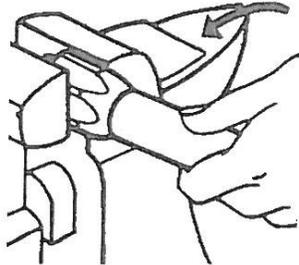
When connecting the hoses to their components, be sure to hold the fitting body with a wrench during the final tightening. Of special note are the fittings on the membrane housing seal, these fittings are national pipe thread and must be properly supported to ensure leak-free service.



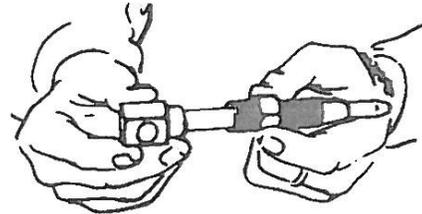
# Reusable Fitting Assembly Instructions

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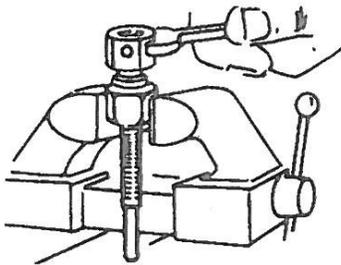
## 22 Series and 23 Series (Group XIII) Mandrel Assembly Instructions



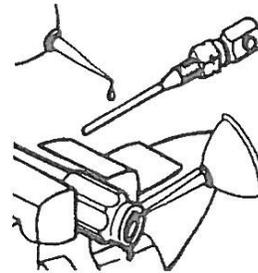
1. Identify Over All Length (OAL) of hose assembly and the Cut Off Allowance (COA) length of fitting(s) on hose ends by use of the fitting data table. Properly measure, mark and cut hose to desired length using fine tooth hacksaw or a cut-off machine. Place socket in vice and screw in hose counter-clockwise until hose bottoms. Back hose out 1/2 turn.



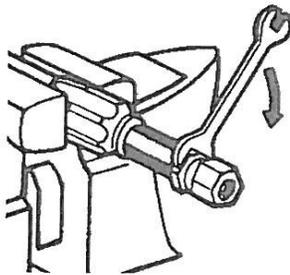
2. When assembling male pipe ends, slide nipple onto mandrel.



3. When assembling swivel ends, screw threaded mandrel all the way into interior threads of swivel and wrench tight.



4. Oil nipple threads and inside of hose with silicone oil or diluted soapy water. **DO NOT OIL HOSE COVER**



5. Push nipple into socket.  
Male ends: Thread nipple in until it bottoms against socket.  
Swivel Ends: Apply wrench to hex of assembly mandrel.  
Thread nipple clockwise into socket until clearance between nut and socket is approximately 1/32"(.794mm) to allow nut to swivel. Remove mandrel.

**Note:** DISASSEMBLE IN REVERSE ORDER

**Caution:** Do Not Attempt to Assemble These Fittings to the Hose Without Using a Mandrel.

## High Pressure Compression Fittings

The Spectra-Pearson Pump is equipped with compression fittings for reliability and easier service. These fittings are used to connect the raw water outlet on the plumbing manifold to the raw water inlet on the Spectra-Pearson Pump. Should these fittings need to be replaced or repaired, follow the instructions below to ensure leak-free service.

Use **ONLY** Dayco Imperial Nylo-Seal 88-NSR-1/2 or stainless steel tubing for high pressure connections.

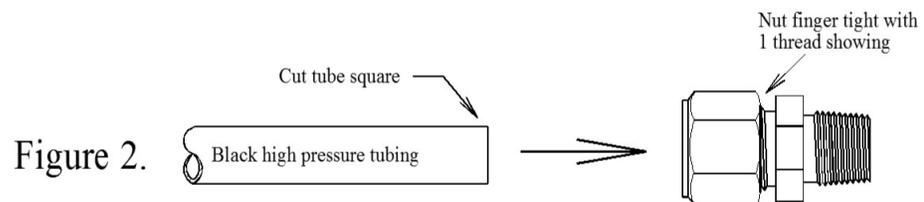
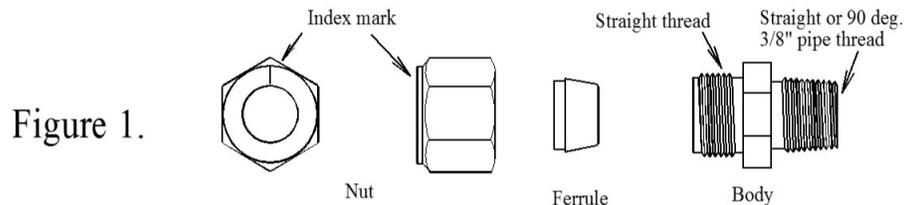
Carefully fit and measure the tubing before cutting with a sharp razor knife or hose cutter and remove any burrs. Minimum tubing bend radius is 6". Route tubing away from excessive heat sources and secure from vibration and chafe. Have at least one shallow bend in a tube assembly after it is installed.

**Refer to figure 1.** If a fitting has been disassembled, reassemble as illustrated. The notch on the ferrule must engage the inside of the nut properly for the nut to seat down fully. Once the tube is inserted the ferrule and nut will naturally align.

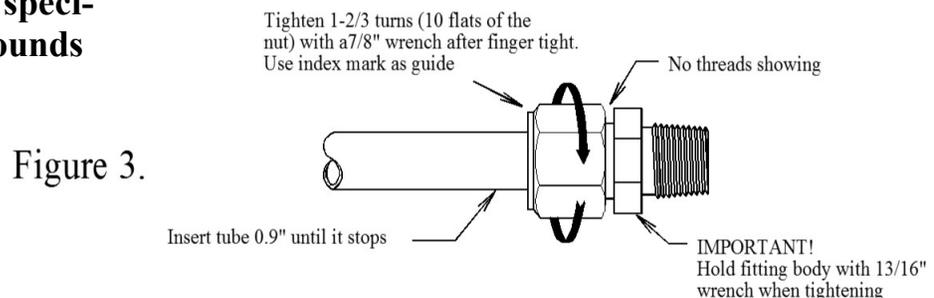
**Refer to figure 2.** Insert tube fully into the fitting, it should go in 0.9". Tighten the nut finger tight while moving the tube around to prevent binding. One thread should be showing under the nut. Secure the tube so it won't back out when tightening.

**Refer to figure 3.** Use 13/16" wrench to hold a straight body fitting or a 3/4" wrench for a 90° body, and a 7/8" wrench for the nut. Hold the body, recheck the tube insertion, then tighten the nut 1-1/4 turns. Use the index mark on the nut as a guide. The threads should be completely covered by the nut.

Make Sure these fittings are tight on initial assembly or they will fail!



**The correct Torque specification is 85 foot pounds**



# Troubleshooting Spectra Connect Alarms

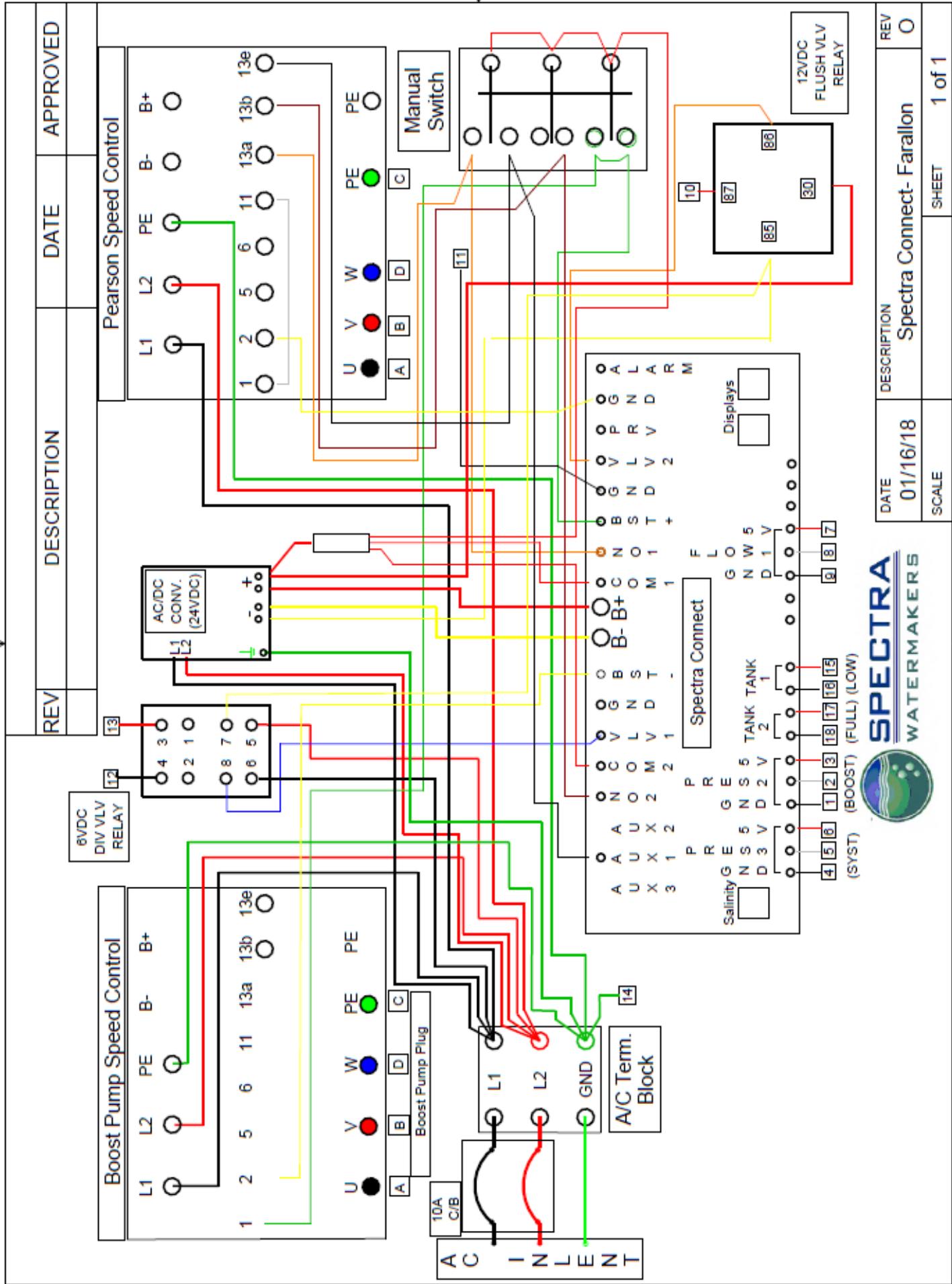
SYMPTOMS	PROBABLE CAUSE	REMEDY
Pump runs constantly, will not turn off	<ul style="list-style-type: none"> <li>• Toggle switch on control box to RUN MAN or SERVICE</li> </ul>	<ul style="list-style-type: none"> <li>• Turn switch on control box to RUN AUTO</li> <li>• Replace Speed Control</li> </ul>
Pump runs with loud noise	<ul style="list-style-type: none"> <li>• Low or high Boost pressure</li> <li>• Intake blocked</li> <li>• Air in system</li> </ul>	<ul style="list-style-type: none"> <li>• Adjust Boost pressure</li> <li>• Check sea strainer for leaks</li> <li>• Check fresh water flush module for leaks</li> <li>• Re-prime system (restart)</li> <li>• Confirm voltage at Boost Pump, check wiring connections.</li> </ul>
No lights or display, system does not operate	<ul style="list-style-type: none"> <li>• Display has gone to sleep</li> <li>• Remote display not connected</li> <li>• No power to control box</li> </ul>	<ul style="list-style-type: none"> <li>• Touch the screen to wake it up</li> <li>• Check display cable connections at back of display and at control box</li> <li>• Check and reset main DC supply breaker</li> <li>• Check for voltage control box, check 20A fuse on control board.</li> <li>• Try manual switch on control box: If pump runs, then control or display may be defective</li> </ul>
Display activates, but pump will not run	<ul style="list-style-type: none"> <li>• Loose or broken pump wire connection</li> <li>• Tanks are full (if equipped with tank switch)</li> <li>• Speed control overheated</li> </ul>	<ul style="list-style-type: none"> <li>• Check wiring at terminal block inside control box</li> <li>• Check tanks– system cannot be started if tanks are full.</li> <li>• Improve cooling</li> </ul>
System runs, no product water delivered to water tanks, Product volume gauge good, Diversion valve shows activated on display	<ul style="list-style-type: none"> <li>• Diversion valve inoperative or wiring fault.</li> <li>• Disconnected or broken product tubing</li> <li>• Diversion valve plunger stuck</li> </ul>	<ul style="list-style-type: none"> <li>• Check wiring at diversion valve and inside control box</li> <li>• Check product tubing</li> <li>• Exercise diversion valve by pressing the manual button top, retest.</li> <li>• Replace diversion valve.</li> </ul>
System runs, no product water delivered to water tanks, Product volume gauge good, Diversion valve shows deactivated on display	<ul style="list-style-type: none"> <li>• Poor product water quality diversion valve open</li> <li>• Salinity probe out of calibration or defective, bad cable</li> <li>• Chlorine damage to membranes</li> <li>• Pressure relief valve partially open</li> </ul>	<ul style="list-style-type: none"> <li>• Check for low feed pressure</li> <li>• Check for leaks at high pressure hoses</li> <li>• Test product water with hand-held tester– if over 500 PPM for 1 hour, see ‘Poor Product Quality’ on p.50</li> <li>• Close pressure relief valve</li> </ul>

# Troubleshooting Spectra Connect Alarms

SYMPTOMS	PROBABLE CAUSE	REMEDY
<p>“System Stalled” alarm is caused by the roto-flow not reading properly, if no product flow the system alarms “System Stalled”</p>	<ul style="list-style-type: none"> <li>• Pressure relief valve open</li> <li>• Intake thru-hull closed</li> <li>• Airlocked system</li> <li>• No signal from Rotoflow meter</li> </ul>	<ul style="list-style-type: none"> <li>• Close pressure relief valve</li> <li>• Check thru-hull</li> <li>• Purge air</li> <li>• Check wiring, confirm roto-flow is spinning, clean or replace Rotoflow meter</li> </ul>
<p>“High Pressure”</p>	<ul style="list-style-type: none"> <li>• Blocked brine discharge or product line</li> <li>• Fouled membrane</li> </ul>	<ul style="list-style-type: none"> <li>• Check brine discharge</li> <li>• Clean membrane</li> </ul>
<p>“Re-starting”</p>	<ul style="list-style-type: none"> <li>• No signal from Rotoflow meter at startup.</li> <li>• System airlocked</li> </ul>	<ul style="list-style-type: none"> <li>• See remedy above for “system stalled”</li> </ul>
<p>“Service Prefilter”</p>	<ul style="list-style-type: none"> <li>• Clogged filters</li> <li>• Loose or defective pressure sensor wires</li> </ul>	<ul style="list-style-type: none"> <li>• Install new filters</li> <li>• Check sensor wiring</li> <li>• If the error persists, follow Prefilter Calibration instructions.</li> </ul>
<p>“Salinity High”</p>	<ul style="list-style-type: none"> <li>• High product water salinity</li> <li>• Chlorine damage to membranes</li> <li>• Defective salinity probe or cable, cable disconnected</li> </ul>	<ul style="list-style-type: none"> <li>• Check for low feed pressure</li> <li>• Check for leaks at high pressure hoses</li> <li>• Remove and clean probe contacts. Check calibration</li> <li>• Check cable connections</li> <li>• Clean membrane</li> </ul>
<p>“Can’t Connect to Water-maker from Web Browser”</p>	<ul style="list-style-type: none"> <li>• Device (phone/tablet/computer) not connected to same network</li> <li>• Router/Switch turned off</li> <li>• Watermaker turned off</li> <li>• Connecting to wrong web address</li> </ul>	<ul style="list-style-type: none"> <li>• Check the wireless network on your mobile device or computer</li> <li>• If using a wired connection, confirm you are connected to the same network.</li> <li>• Make sure Router/switch has power.</li> <li>• Restart Router/Switch</li> <li>• Make sure watermaker is powered on</li> <li>• Confirm Device IP address matches address typed into browser</li> </ul>

# Troubleshooting Spectra Connect

SYMPTOMS	PROBABLE CAUSE	REMEDY
Device IP in Support Menu reads 'NIL'	<ul style="list-style-type: none"> <li>• Control board not connected to router or switch</li> <li>• Control board not receiving IP address from router or switch</li> </ul>	<ul style="list-style-type: none"> <li>• Connect the control board to a router or switch according to the Networking instructions</li> <li>• Cycle power on the water-maker with the network cable connected</li> </ul>
Tank Level not accurate	<ul style="list-style-type: none"> <li>• Tank Level not calibrated</li> <li>• Domestic water pump running</li> <li>• Water tanks sloshing while underway, no baffles in tanks</li> <li>• Tank sensor failed</li> </ul>	<ul style="list-style-type: none"> <li>• Calibrate tank level according to calibration instructions</li> <li>• Stop domestic water pump and check tank level</li> <li>• Re-check tank level accuracy while vessel in in port and sea state is calm</li> <li>• Replace sensor</li> </ul>
Tank Level shows ' ! '	<ul style="list-style-type: none"> <li>• Tank Level sensor disabled in Settings</li> </ul>	<ul style="list-style-type: none"> <li>• Verify tank level sensor is installed, and enable the tank level sensor</li> </ul>
Power suddenly drops out and watermaker restarts	<ul style="list-style-type: none"> <li>• Electrical short, or failed boost pump</li> <li>• Electrical short, or failed solenoid valve</li> <li>• Electrical short, or failed pressure sensor</li> <li>• Electrical short, or failed speed control</li> <li>• Electrical short, or failed salinity probe</li> </ul>	<ul style="list-style-type: none"> <li>• Disconnect boost pump wires from control board and cycle power. Check boost pump for electrical short.</li> <li>• Replace Boost Pump</li> <li>• Disconnect solenoid valves from control board and check valve for a short.</li> <li>• Replace valve</li> <li>• Disconnect speed control and cycle power. Check speed control for electrical short.</li> <li>• Replace Speed Control</li> <li>• Disconnect salinity probe wires from control board and cycle power.</li> <li>• Replace Salinity Probe</li> </ul>



REV	DESCRIPTION	DATE	DESCRIPTION	REV
		01/16/18	Spectra Connect-Farallon	0
SCALE			SHEET	1 of 1

Connector Position	Wire Color	Location	REV	DESCRIPTION	DATE	APPROVED
--------------------	------------	----------	-----	-------------	------	----------

1	WHT/BLK	GND		Pressure Sensor Cable (53")		BLK
2	WHT	PRES2				WHT (BOOST PRESSURE)
3	WHT/RED	5V				RED
4	ORG/BLK	GN		Pressure Sensor Cable (28")		BLK
5	ORG	PRES3				WHT (SYSTEM PRESSURE)
6	ORG/RED	5V				RED
7	WHT/RED/BLK	5V				
8	BLU/WHT	FLOW1		Rotoflow 48"		
9	ORG/GRN	GND				
10	RED/GRN	VLV2		FWF Solenoid 48"		
11	BLK/RED	GND				
12	BLK	DIV VLV L1		A/C Diversion Valve		
13	RED	DIV VLV L2				
14	GRN (WHT)	GND				

AC TECH VFD SETTINGS	
PEARSON PUMP	BOOST PUMP
P44= 25 (PASSWORD)	P44= 25 (PASSWORD)
P03= 02	P04= 03
P04= 03	P05= 02
P10= 04	P19= 5.0
P11= 04	P20= 5.0
P12= 04	P24= 60.0
P19= 5.0	P27= 60.0
P20= 5.0	P31= 53.5
P24= 60.0	
P27= 60.0	
P35(1800)= 60.0 (RUN HIGH)	
P35(2800)= 60.00	
P36= 42.0 (RUN LOW)	
P33= 15.0 (PURGE, FLUSH)	
P31= 20.0 (SERVICE)	
P42= 5.0	

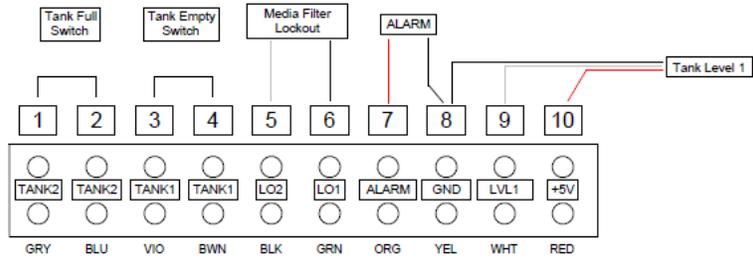
Note:  
On startup, apply 24V to terminal 11 and use keypad to set speed to 0.0.

BLK	LO1	Media Lockout
GRN	LO2	
RED	+5V	
WHT	LVL1	Tank Level 1
YEL	GND	Alarm
ORG	ALARM	
GRY	TANK 2	Tank Full
BLU	TANK 2	
VIO	TANK 2	Tank Empty
BWN	TANK 2	



DATE	DESCRIPTION	REV
01/16/18	Cable Assignments & VFD Settings	0
SCALE	SHEET	1 of 1

REV	DESCRIPTION	DATE	APPROVED
0			DKW



DATE	DESCRIPTION	REV
02/06/18	Auxiliary Terminal Block	0
SCALE		SHEET 1 of 1

# System Dimensions



Pre Filters  
Depth 8.5" / 21.6 cm



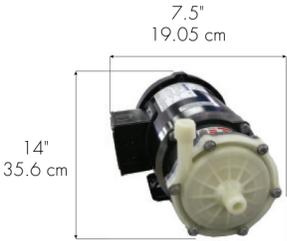
Service Valve Module  
Depth 7.75" / 10 cm



Charcoal Filter  
Depth 8.5" / 21.6 cm



Spectra Connect Remote Display  
Depth 1" / 3 cm



Boost Pump



High Pressure Pearson Pump and Membrane  
Depth 25.5" / 64.7 cm

### Optional Components



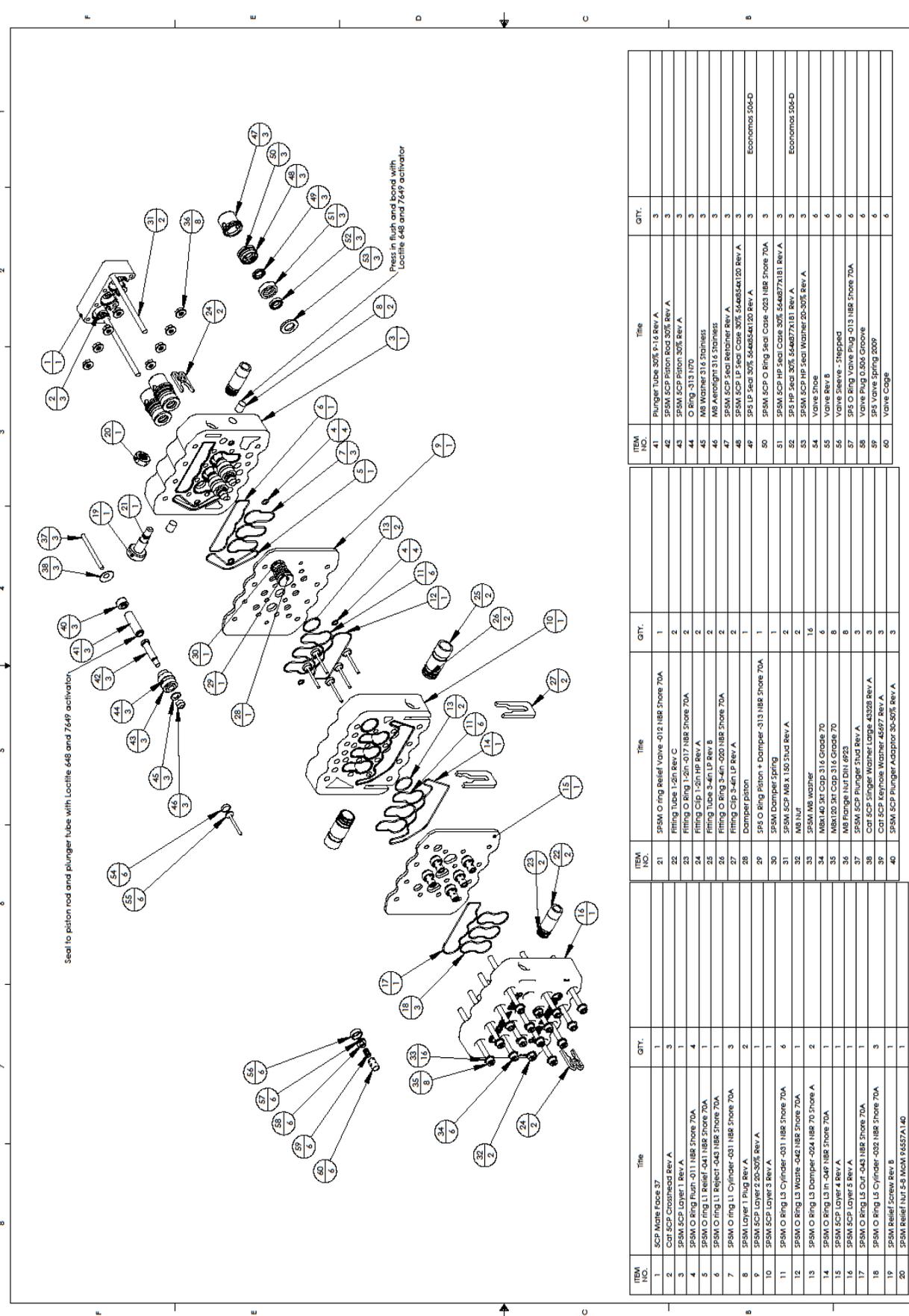
Spectra Connect Remote Display  
Depth 1" / 2.5 cm



Wifi Module



Tank Level Sensor



SP5M 5CP Assembly 30% Rev B Exploded	
Contact	Colin Pearson
Phone	+44 / 0 20 8340 8333
Mobile	+44 / 0 7860 003137
email	colin.pearson.spectral@gmail.com
Dwg No.	
Size	A1 of 1

ITEM NO.	Title	QTY.	ITEM NO.	Title	QTY.	ITEM NO.	Title	QTY.
1	SCP Male Face 37	1	21	SP5M O Ring Relief Valve -012 NBR Shore 70A	1	41	Plunger Tube 30% P-16 Rev A	3
2	Call SCP Crosshead Rev A	3	22	Fitting Tube 1.20 Rev C	2	42	SP5M SCP Piston Rod 30% Rev A	3
3	SP5M SCP Layer 1 Rev A	4	23	Fitting O Ring 1.20-017 NBR Shore 70A	2	43	SP5M SCP Piston 30% Rev A	3
4	SP5M O Ring L1-011 NBR Shore 70A	4	24	Fitting O Ring 1.20-HP Rev A	2	44	O Ring -313 IN70	3
5	SP5M O Ring L1 Relief -041 NBR Shore 70A	1	25	Fitting Tube 3.46-1P Rev B	2	45	M8 Washer 316 Stainless	3
6	SP5M O Ring L1 Relief -043 NBR Shore 70A	1	26	Fitting O Ring 3.46-020 NBR Shore 70A	2	46	M8 AeroTight 316 Stainless	3
7	SP5M O Ring L1 Cylinder -031 NBR Shore 70A	3	27	Fitting O Ring 3.46-1P Rev A	2	47	SP5M SCP Seal Retainer Rev A	3
8	SP5M Layer 1 Plug Rev A	2	28	Damper Piston	1	48	SP5 LP Seal 30% 544854x120 Rev A	3
9	SP5M Layer 2 20-30% Rev A	1	29	SP5 O Ring Piston + Damper -313 NBR Shore 70A	1	49	SP5 LP Seal 30% 544854x120 Rev A	3
10	SP5M SCP Layer 3 Rev A	1	30	SP5M Damper Spring	1	50	SP5M SCP O Ring Seal Case -025 NBR Shore 70A	3
11	SP5M O Ring L3 Cylinder -031 NBR Shore 70A	6	31	SP5M SCP MB x 150 Stud Rev A	2	51	SP5M SCP O Ring Seal Case 30% 544877x181 Rev A	3
12	SP5M O Ring L3 Waste -042 NBR Shore 70A	1	32	M8 Nut	2	52	SP5 HP Seal 30% 544877x181 Rev A	3
13	SP5M O Ring L3 Damper -024 NBR 70 Shore A	2	33	SP5M MB Washer	16	53	SP5M SCP HP Seal Washer 20-30% Rev A	3
14	SP5M O Ring L3 in CAP NBR Shore 70A	2	34	MB140 316 Cap 316 Grade 70	6	54	Valve Shoe	6
15	SP5M SCP Layer 4 Rev A	1	35	MB120 316 Cap 316 Grade 70	6	55	Valve Rev B	6
16	SP5M SCP Layer 5 Rev A	1	36	M8 Flange Nut DIN 6923	8	56	Valve Sleeve - Shipped	6
17	SP5M O Ring L5 Out -043 NBR Shore 70A	1	37	SP5M SCP Plunger Stud Rev A	3	57	SP5 O Ring Valve Plug -013 NBR Shore 70A	6
18	SP5M O Ring L5 Cylinder -032 NBR Shore 70A	3	38	Call SCP Singler Washer 43268 Rev A	3	58	Valve Plug 0.50x Groove	6
19	SP5M Relief Screw Rev B	1	39	Call SCP Keynote Washer 45897 Rev A	3	59	SP5 Valve Spring 2009	6
20	SP5M Relief Nut 5-5 MCM Y6557A140	1	40	SP5M SCP Plunger Adaptor 80-50% Rev A	3	60	Valve Cage	6

Remove all burrs and sharp edges, max radius 0.10"	
Material	
Surface Finish	
Dimensions	B 110316 Layers 1, 3 & 6 use moldings from modified tool. Uses SP5 plunger tube with adaptor.
Tolerances	A 1st issue: SP5M Layer 1 Rev F, SP5M Machined Layer 3 Rev A, SP5M Layer 5 Rev E. Layers 1 & 5 use moldings from unmodified tool.
SCALE: 1:10	Do not scale Isometric Projection
Rev	Date
Rev	Purpose & Changes

# Spectra Connect Settings

Your new Spectra Connect is designed to make your watermaker easier than ever to operate, maintain and enjoy. This section will guide you through some of the more advanced settings options available.

**Always use caution when changing any factory default settings, as serious damage can occur.**



The Spectra Connect automatically monitors the operation of the system to ensure a long and trouble-free service life. If an operating parameter changes, the Connect can switch operating modes, shut itself down, or automatically store itself in order to protect your watermaker.

It includes advanced calibration sequences to make proper setup and maintenance of your watermaker easier than ever.

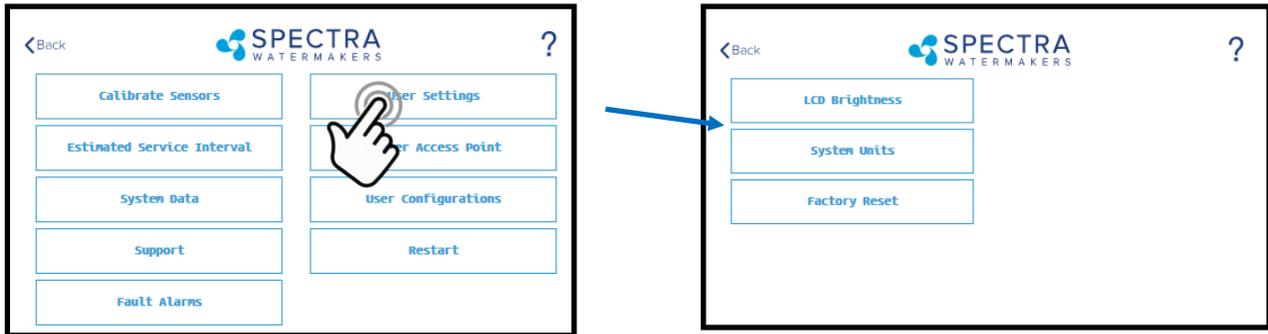
The onboard clock feature allows for temporary power interruptions without detrimental effects on the system. In some cases your watermaker will continue to function in its last known operating state.

The Spectra Connect has built in data logging, allowing for easy access to historical operating data—which can indicate a wearing component or spares to be carried along before a failure occurs.

Built in warnings for preventative maintenance automatically alert a user of pending maintenance items, helping to keep your watermaker's up-time to 100%! Advance warnings are pre-programmed for Prefilter Life, Pump rebuilds, membranes, Z-Ion reactor rod life, and carbon filter life. These warnings are resettable, allowing you to perform the maintenance before a catastrophic failure, then reset the interval—so you're always on top of the maintenance cycle!

# Spectra Connect Settings, Cont'd

## User Settings

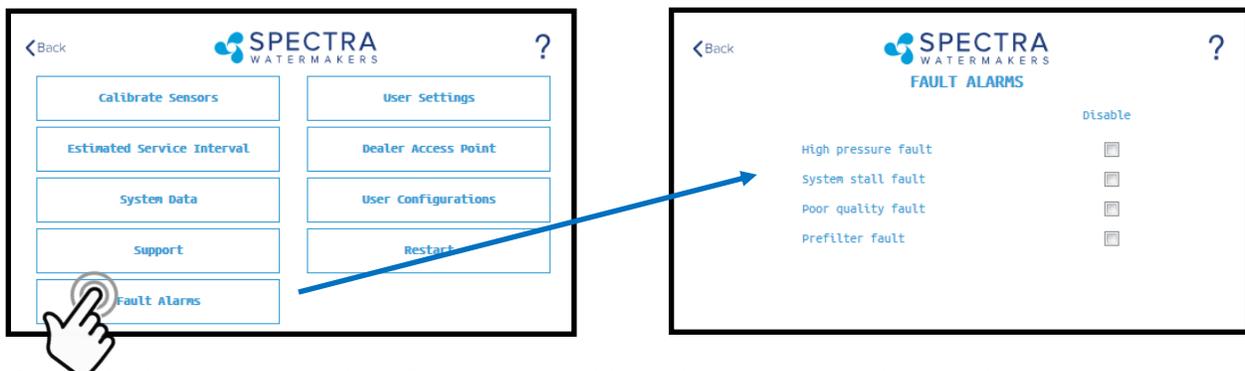


**LCD Brightness:** Set brightness of the hardwired display(s) from 10—100%

**System Units:** Change from US Standard units to Metric

**Factory Reset:** Resets any changed parameters a user has made back to the factory defaults for that configuration.

## Fault Alarms



**CAUTION!!** Never disable a Fault Alarm without being certain that the issue is with a bad sensor. Disabling a fault and running the system can cause serious damage or injury.

**High Pressure Fault:** Disables the 'High Pressure' shutdown fault in the event of a feed pressure sensor failure.

**System Stall Fault:** Disables the 'System Stalled' shutdown fault in the event of a failed rotoflow sensor. System stalled alarms occur when the control board does not sense any product water being produced, and shuts down to protect the pump from running dry.

**Poor Quality Fault:** Disables the 'High Salinity' shut down fault in the event that the salinity probe has failed or cannot be calibrated within range. **NOTE: The diversion valve will always be active when this fault is disabled. ALWAYS VERIFY PRODUCT QUALITY BEFORE DRINKING. Serious health risks may occur.**

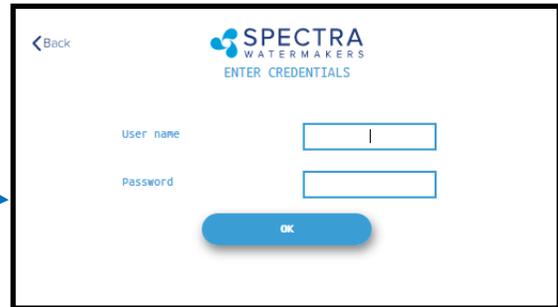
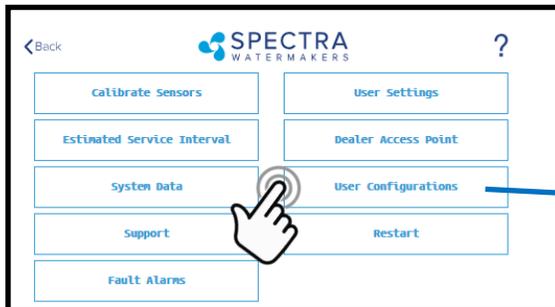
**Prefilter Fault:** Disables the 'Service Prefilter' shut down fault in the event that the boost pressure sensor has failed or cannot be calibrate within range. **CAUTION: Permanent damage to the feed pump can occur if this fault is disabled, use caution when operating this system with this fault disabled.**

# Dealer Access Point—Settings

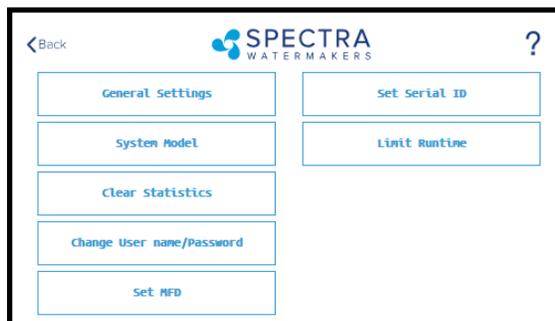
## Dealer Access Settings

It is highly recommended that users consult with a factory trained technician before altering any settings behind the 'Dealer Access Point'. **Changing this settings without understanding the full effect of each change can void the warranty of your system, and cause irreparable damage.**

**If any settings are inadvertently changed, they can be reverted back to the defaults by using the 'Factory Reset' feature.**



Default Login: admin  
Default Password: admin



**System Model:** Configures the Spectra Connect for a different system model from a preset list of options.

**Clear Statistics:** Resets all of the Estimated Maintenance Intervals back to 100%. This feature should only be used on a brand new system.

**Change Username/password:** Changes the default username and password. If you forget your changed username and password, a Factory Reset will revert back to the default username and password.

**Set MFD:** Changes the Manufactured Date on the system. This should only be adjusted if a control board is being replaced on an older system.

**Set Serial ID:** Changes the Serial Number recorded in the Spectra Connect. This should only be adjusted if a control board is being replaced on an older system.

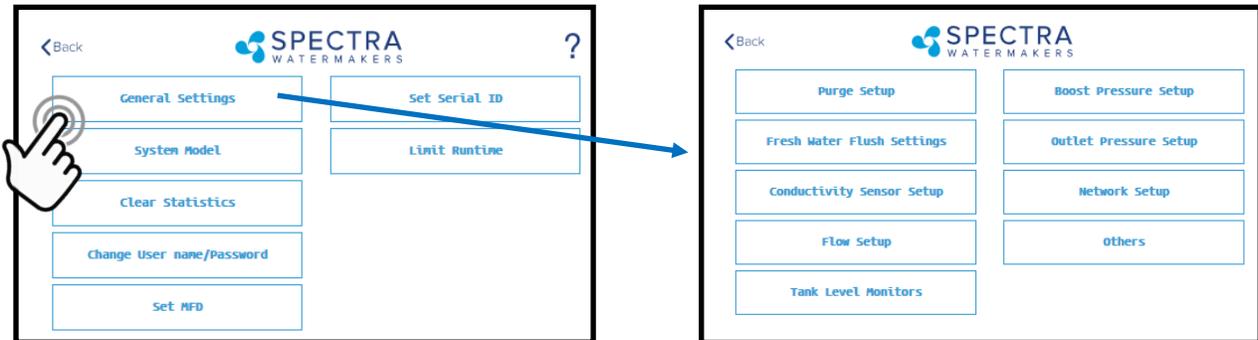
**Limit Runtime:** Limits the maximum run time for the system before shutting down and fresh water flushing. Disabling this setting allows the watermaker to be operated 24/7.

# Dealer Access Point—Settings cont...

## Dealer Access Settings

It is highly recommended that users consult with a factory trained technician before altering any settings behind the 'Dealer Access Point'. **Changing this settings without understanding the full effect of each change can void the warranty of your system, and cause irreparable damage.**

**If any settings are inadvertently changed, they can be reverted back to the defaults by using the 'Factory Reset' feature.**



**Purge Setup:** Adjusts the time and maximum feed pressure allowed for the Purge Mode. **CAUTION: Permanent damage to the membrane can occur if this setting is adjusted. Consult the factory before making any adjustments.**

**Fresh Water Flush Settings:** Allows adjustment of the fresh water flush duration and the interval between flushes. If the Z-Ion is installed, the Flush Interval should be changed to 30 days.

**Conductivity Setup:** Allows for enabling or disabling conductivity sensors on the feed water and product water. Set the threshold for the diversion valve to divert water to the tanks.

**Flow Setup:** Allows the user to adjust the flow sensor settings, or disable a flow sensor circuit altogether. **DO NOT USE THIS SETTING TO CALIBRATE THE PRODUCT FLOW.** Follow instructions on calibrating the flow sensor in this manual.

**Tank Level Monitors:** Enable and disable the Tank Level Sensors, which read the % remaining in the tank, and the tank switches, which allow the system to turn on/off automatically.

**Boost Pressure Setup:** Enable alternate Boost Pressure sensors, change the Low Vacuum Limit, or Boost Pressure Setpoint. **CAUTION: Permanent damage to the pump can occur if this setting is adjusted. Consult the factory before making any adjustments.**

**Low Vacuum Limit:** The minimum boost pressure required at the inlet to the pump. This setting prevents the pump from getting damaged by running under high vacuum. Adjusting it to a lower number increases the risk that the pump will suffer damage during normal operation.

**Boost Pressure Setpoint:** During startup the controller turns on the boost pump and waits for the Boost Pressure to reach the Boost Pressure Setpoint. If the boost pressure fails to reach this setpoint, then the main pump won't turn on. Reducing the Boost Pressure Setpoint may cause the system to start, then immediately shut down due to low boost pressure.

**Outlet Pressure Setup:** Set High Pressure Limit, enable alternate high pressure sensors, select pressure sensor scaling. **CAUTION: Permanent damage to the pump can occur if this setting is adjusted. Consult the factory before making any adjustments.**

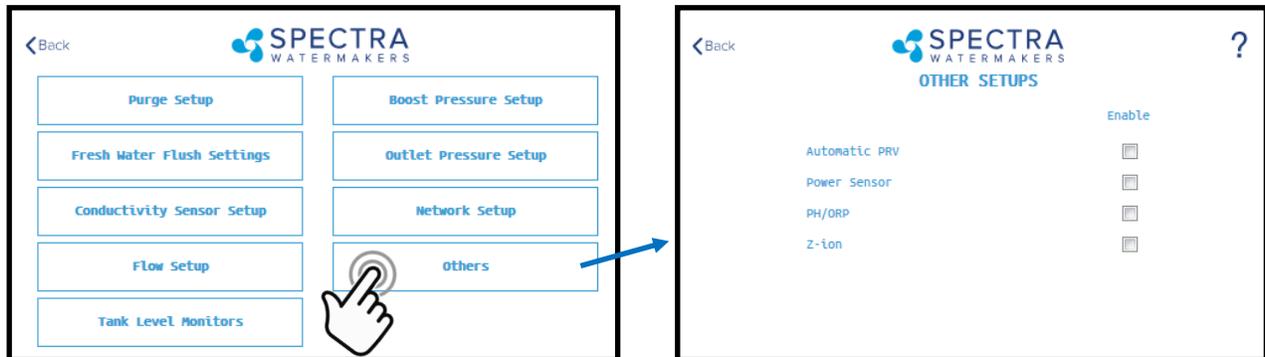
**Network Setup:** Enabling the Spectra Connect Wireless access turns on a Power Over Ethernet feature on the wired connection. **ENABLING THIS FEATURE CAN CAUSE SERIOUS DAMAGE TO YOUR SHIP'S NETWORK. DO NOT ENABLE THIS FEATURE WITHOUT CONSULTING A QUALIFIED TECHNICIAN OR THE FACTORY.**

# Dealer Access Point—Settings cont...

## Dealer Access Settings

It is highly recommended that users consult with a factory trained technician before altering any settings behind the 'Dealer Access Point'. **Changing this settings without understanding the full effect of each change can void the warranty of your system, and cause irreparable damage.**

**If any settings are inadvertently changed, they can be reverted back to the defaults by using the 'Factory Reset' feature.**



### Other Setups—Default is all disabled

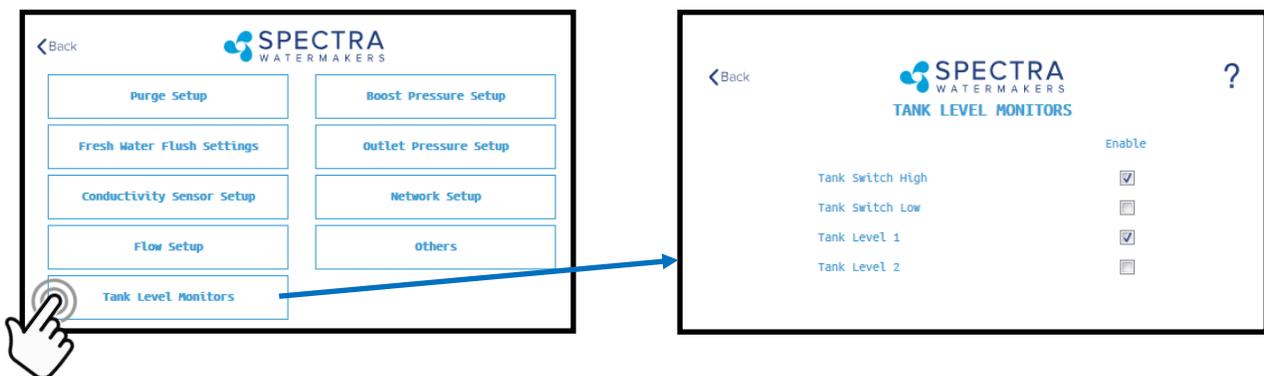
**Automatic PRV:** Enables an optional Automatic Pressure Relief Valve, after it is installed. This setting should remain off unless you are certain that you have this feature installed on your system.

**Power Sensor:** Enables or disables an optional power sensor, after it is installed.

**PH/ORP:** Enables an optional pH or ORP meter, after it is installed.

**Z-Ion:** Enables or Disables the optional Z-Ion system, after it is installed. If the Z-Ion is enabled, you should also adjust the Flush Interval to 30 days.

## Tank Level Monitors



**Tank Setup** - Enable/disable tank sensors.

**Enable Tank Switch High** - Enable/disable tank high switch high. If this is disabled Auto Fill and Fill Tank run modes will not be available.

**Enable Tank Switch Low** - Enable/disable tank high switch low. If this is disabled Auto Fill mode will not be available. Both High and Low tank switches must be enabled for Auto Fill mode.

**Enable Tank Level 1** - Enable/disable tank level sensor 1. If this is disabled there will be no tank level reading and tank level gauge will read "I".

**Enable Tank Level 2** - Enable/disable tank level sensor 2..

# Handling Spectra Connect Alarms or Faults

Faults are (potentially hazardous) conditions that might occur during running of your watermaker. The control board has the ability to monitor these faults in real time and take necessary actions to prevent damaging your equipment.

## HIGH PRESSURE FAULT

High pressure fault is triggered if

Outlet pressure (Feed/Membrane pressure) > Pressure Limit

If a high pressure fault is triggered, the system goes to low production mode if it is running in high production mode, or stops the operation if it is already running in low production mode. Then the system will begin the Auto Store mode.

### Resolutions

Check for kinked or blocked hoses.

Confirm "#3 Sensor PSI High limit" and "#3 Sensor PSI Offset" options on Outlet Settings.

Clean membrane.

## SYSTEM STALL FAULT

System stall fault is triggered if

There is no product flow for 1 minute continuously.

If system stall fault is triggered, machine will stop the current run cycle and will prompt to restart. If restarted it will retry the previous running mode. If the stall condition persists even after restart, the system will begin the Auto Store mode.

### Resolutions

Confirm product water at membrane endcap.

Check intake line for restrictions, blockages or air leaks.

Close Pressure Relief Valve on Pump.

Confirm controller settings correct.

## SERVICE PREFILTER FAULT

The Service Prefilter fault is triggered if

Inlet Pressure(boost pressure) < Low Vacuum Limit

If the Service Prefilter fault triggers, the system goes to low production mode if it is running in high production mode or stops the operation if it is already running in low production mode. Then the system will begin the Auto Store mode.

### Resolutions

Change prefilters and the sea strainer screen.

Confirm adequate boost pressure in inlet pressure settings.

Check for obstructions in intake line.

Check sensor for proper operation

## POOR QUALITY FAULT

The High Salinity fault triggers if

The Salinity of the product water is above the threshold (measured salinity > Salinity 1 threshold) for more than 8 minutes.

If the High Salinity fault is triggered, the machine will stop the current run cycle and will prompt to restart. If restarted it will retry the previous running mode. If the High Salinity fault condition persists even after restart, the system will begin the Auto Store mode.

### Resolutions

Check pump operation - Clark Pump (pressure relief valve closed), Feed Pump (moving water).

Confirm product water quality.

Membrane damage - clean or replace.

Salinity probe out of calibration.

Clean or replace salinity probe.

## Operation and Repair Bulletins

The following documents are sections of our complete service bulletin set available on our website [Spectrawatermakers.com](http://Spectrawatermakers.com). Technical Support, - Service Bulletins.

### MB-2 MEMBRANE CARE

Membrane life is affected by a large number of factors and is somewhat unpredictable, however five or six years of use is typical. The biggest killers of membranes are lack of use, chlorine damage, and improper storage.

Don't let membranes sit around with sea water or stale fresh water in them. Biological growth will occur in the membrane. Here at the factory we frequently get back membranes for inspection that reek of hydrogen sulfide (rotten eggs). This odor is produced by anaerobic bacteria that live in an unused membrane, feeding on whatever animal or vegetable matter is trapped in it from the plankton that gets through the system. Membranes badly fouled in this way can seldom be saved. These bacteria are always present but are inhibited by the oxygen in sea water while the unit is in frequent use. If you won't be frequently using your membrane you can prevent biological growth by Fresh Water Flushes or by Pickling your membrane. Keeping the prefilters clean is also important in preventing bio-fouling. If your prefilters are allowed to become a breeding ground for bacteria (get smelly), the contamination will spread throughout the system. When we cut open a failed membrane we also find mildew, another form of bio fouling, probably due to long term storage with no biocide or stale biocide.

After many hours of water making mineral deposits will form and must be dissolved away with an acid cleaner. Alkaline cleaners are used for bio-fouling.

Chlorine destroys a membrane in minutes. It attacks the material that the membrane is made from. Always use product water or water filtered through a charcoal filter for flushing and chemical treatments.

Oil clogs the membrane. We have brought back oil fouled membranes with dish soap (See MB-5 Cleaning with Detergent.)

For storage we recommend using SC-1 or propylene glycol potable water system anti-freeze if available. Propylene glycol can safely be left in the system for one year and will keep things from freezing in cold conditions. It is hard to find in warm climates, and takes up a lot of room on a small boat, so our SC-1 is best for tropical cruising.

Even if given good care a membrane will eventually start to slowly fade away. The feed pressure may rise and/or the ppm go up.

## Poor Product Water Quality

With any product water quality issue, you must ensure accurate calibration if you are using a salinity meter. For general quality evaluation, your taste is always good enough.

Membranes are not an exact science and two identical systems can have different product quality. World health standards deem water of up to 1000 PPM of total dissolved solids acceptable for drinking. We consider any thing below 750 PPM acceptable, and anything below 500 PPM excellent. Factors that could affect water quality are addressed below.

**LOW SYSTEM FLOW OR PRESSURE** will equate to lower product quality (higher PPM).

**DAMAGE TO THE MEMBRANE** by chlorine contamination. Flushing the system with chlorinated water will irreparably damage the membrane. Charcoal filters are used to absorb any chlorine which might be present in flush water. They must be of proper specification to be suitable. There is no test for chlorine damage except the process of elimination of other causes.

**DIRTY OR SCALED** membranes. A dirty (foreign material), scaled (mineral deposits), or contaminated (bacterial growth) membrane can result in poor water quality and abnormal operating pressures. If operating pressures are above normal, then cleaning is indicated. If the system pressures are within normal operating range, cleaning may have little result. Low water quality after storage with propylene glycol can usually be remedied by flushing with the pressure relief valve for several hours or if that is not effective a SC-2 cleaning.

**MECHANICAL LEAKAGE** within the membrane pressure vessel. This is an unlikely but possible cause of poor water quality. A pinched or damaged O-ring within the pressure vessel, a scratch on the product tube on the membrane, a scratch within one of the end caps, or a seal fouled by contamination could allow sea water into the product water.

## **MB-5 MEMBRANE CLEANING WITH DETERGENT**

If the membrane has been fouled with oil it may be possible to save it by cleaning with dish soap such as Joy. Do not use anything that contains bleach. You will need a lot of chlorine free fresh water. If using shore water run it through a charcoal filter at a rate of not more than 1.5 gallons (6 liters) per minute.

Use the “Membrane Cleaning Procedure”

Fill a bucket with fresh water and mix in a couple squirts of the detergent. Run the system unpressurized (with pressure relief valve open) with the watermaker drawing water from the bucket and discharging overboard. When about half the water is gone from the bucket stop the unit and let the membrane soak for a few minutes. Restart and pump the remaining solution overboard. Repeat until the discharge appears clean.

After most of the oil is cleaned out you can put the brine discharge into the bucket and run the system with the soapy water circulating as you would for the other cleaning chemicals. Run the Fresh Water Flush cycle to clean membrane, then flush for twenty minutes using sea water. Pressurize and test.

## **BAD SMELLING PRODUCT WATER**

The reverse osmosis membrane is permeable by many gases including hydrogen sulfide, the gas that causes rotten egg smell. If there are bad odors in the feed water they will go through the membrane and the product water will be affected. Usually the source of the odor is from the decay of plankton trapped in the sea strainer and pre-filters. These tiny oxygen loving creatures soon suffocate and die inside the pre-filter housings when the unit is shut down and begin to decay. Once this decay starts the only solution is to rinse the Pre-filter and let it dry completely (to kill the bacteria) or just replace it with a new filter. If the system is making smelly water, it will likely be the pre-filters that are the source of the problem. In cold climates this process of decay and take weeks, but in very warm waters this can happen overnight. These bacteria can spread throughout the watermaker, and begin to grow on the membrane, causing poor water quality and high feed pressures.

Flushing the system with fresh water after every use greatly slows this process, allowing the automated spectra units to operate with less frequent pre-filter changes, but units operated for only an hour or so a day will probably need to have the filters changed due to odor before they are dirty enough to restrict water flow. After shutting down the unit remove the used pre-filters and install a clean set. Leave the housings full of air until the next use.

If the rotten egg smell does not go away after operating the watermaker for 6 or 8 hours it may be time to clean the membrane with SC-2. Typically the smell will go away with use, but if it persists cleaning may be indicated.

The Z-ION was created to eliminate this problem by disinfecting the system during each fresh water flush, disinfecting the filters and the membrane.

More on this subject is available on our website at [www.spectrawatermakers.com](http://www.spectrawatermakers.com).

Oct 2013