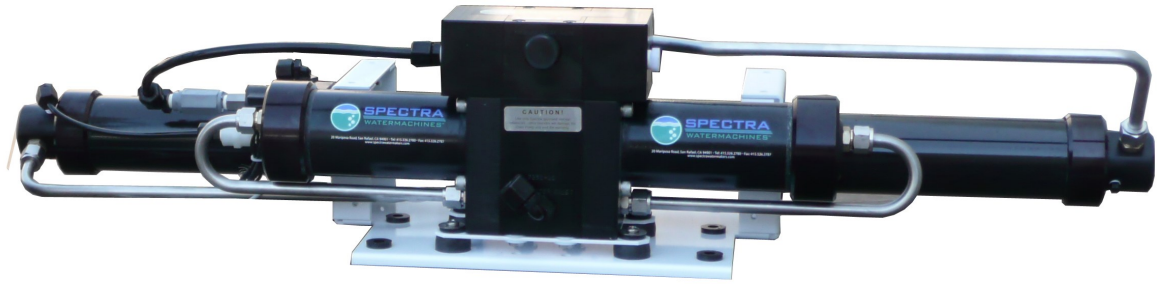
SPECTRA
WATERMAKERS

CATALINA 300 Mk ll-Z
INSTALLATION & OWNERS MANUAL



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MPC Controller Quick Guide

To bypass the Purge Mode, **only if you are sure there are no chemicals in the system**, Press Auto Run and Stop, momentarily at the same time.

Program Mode allows checks and adjustments of all system settings. Please consult your manual before making any adjustments. See page 76.

Auto Run

To **Start** and run for **one hour,** press once. Press again for each additional hour of run time.

For **Auto Fill** mode, press and hold for 5 seconds and system will run until your **Tank Switch** closes.

Auto Run functions always terminate with a **fresh water flush**.

In Program mode, press to **REDUCE** value

Auto Store

Press and hold for 3 sec for **one time fresh water flush**

Press once to **fresh water flush** and activate the **flush timer interval**. The light blinks when in this timed flush mode.

In Program mode, press to **INCREASE** value

Stop (or Start)

Press once to start or stop system.

If you stop the system by pressing stop, the system **will not fresh water flush itself**.

Alarm Display

Push to silence alarm

When system is running, press to scroll though **system readings**

In **program mode**, push to scroll through the system parameters

Catalina 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. Both the Catalina MkII feed pump module and the Clark Pump/Membrane 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 Clark Pump/membrane assembly, please review the high pressure tube assembly instructions. Improper assembly will cause failure.
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 with an Artificial Ocean on page 44. After testing, make sure that the flush cycle operates properly. The water going overboard at the end of the flush should only taste slightly salty and measure <1000 PPM salinity.
6. The MPC control must have DC 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 7 gallons (12L) per flush.
7. The MPC 5000 control must be de-powered (DC power off) after the system is put in storage.
8. Spectra dealers are responsible for educating the vessel owners on the operation and maintenance of the system. We request that you walk through the installation with the customer.
9. Please have the owner fill out the warranty card or fill one out on Spectra's website, www.spectrawatermakers.com.

Table of Contents

Table of Contents continued...

Installation

Getting Started

Unpack the system and inspect it for damage during shipping. Freight damage must be reported to the carrier within 24 hours.

Refer to the shipping list for your system to ensure you 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 kit list.

Warning! We will not be held responsible for shortages that are not reported within thirty days of the ship date.

Study the system layout diagram, component photos, and descriptions before beginning installation.

Lay out the system. Before starting the installation identify where each module and component will be placed. Ensure that there is enough clearance around the components for removal of filters and system service. Make sure you have adequate tubing and hose before starting. Additional parts may be ordered.

Catalina 300 MkII-Z Shipping List:

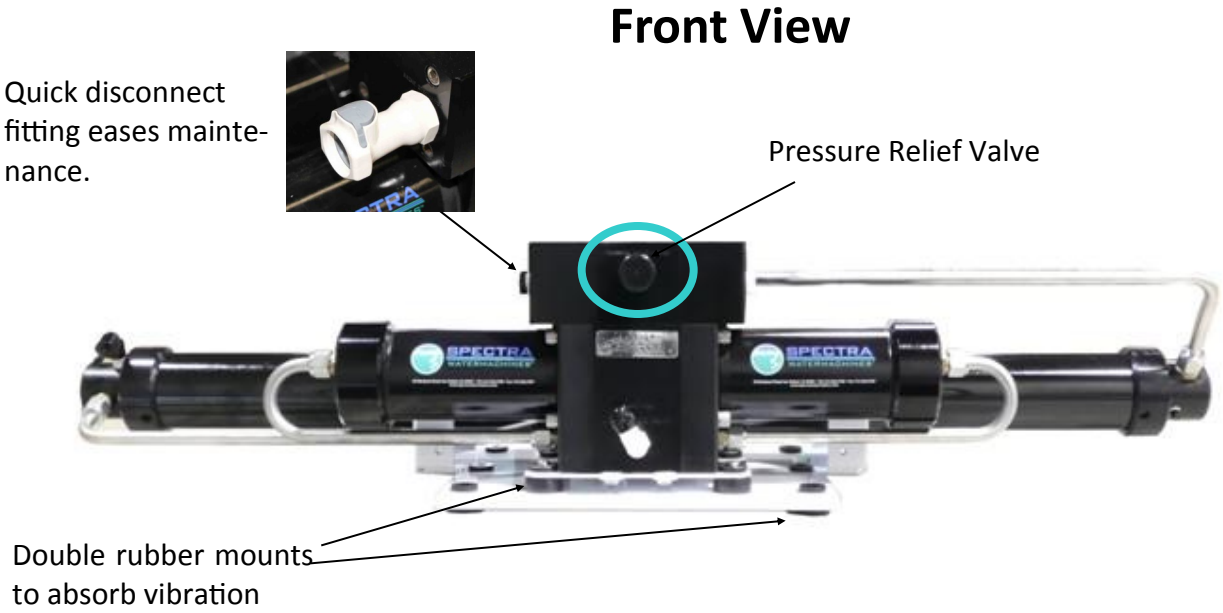
- Catalina Feed Pump Module
- 10% Clark Pump and Reverse Osmosis Membrane Module
- Boost Pump Module
- Fresh Water Flush Module
- Catalina Instillation Kit Mk II
- Service Kit
- 5/8 Hose (25’)
- 3/4 Hose (10’)
- 1/2 Tube (10’)
- 3/4 Suction Hose (25’)
- 3/8 LP Tube (2 X 25’)

  Optional: Z-Ion or Z-Brane system

Introduction to Catalina 300 MkII-Z Components

Thank you for your purchase of a Spectra Catalina 300 MkII system. Properly installed, it will provide years of trouble free service. Please read through the installation instructions and the system layout prior to installing. Like any piece of mechanical equipment, the system will require inspection and service from time to time. Plan for service access and place the components in accessible areas. If you are having a dealer install the system, review the location of the components to make sure that the installation will meet your approval upon completion. The MPC 5000 automatic control system adds programmability, automated operation, and system monitoring. Prudent operation is required with any marine equipment. ***Always maintain enough reserve water to get to your next port safely.***

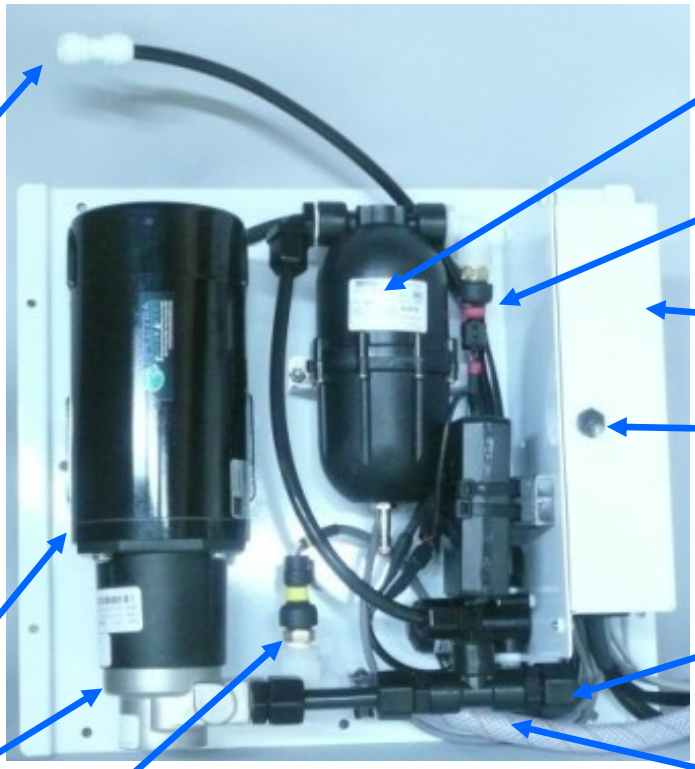
Front View



The Clark Pump Membrane Module is pre-mounted and plumbed together as a single unit to save time and add reliability. This module must be installed in an area that maintains a temperature below 120F (50C) and may be placed as high in the boat as you desire. Make sure that the area around and under the pump does not have any water sensitive equipment. Allow access to the pressure relief valve. You may mount the Clark Pump in any position, even upside down, but the salinity probe on the diversion valve manifold must always be down. Note: If your machine is equipped with the optional Z-Brane, see the instructions on page 36 for installing the Z-Brane anodes. The anodes should be installed before installing the Clark Pump membrane module.

Introduction to Components continued...

Feed Pump Module: *Remove front cover for access.* Mount the feed pump module on a horizontal or vertical surface, which can be up to 3feet (1.0M) above the waterline. It is preferable to mount as low as possible. Locate in an area that allows easy access to the filter housing and the left side of the enclosure. Place where water spills during filter changes will not be a problem, and keep future maintenance in mind. The feed pump has overheat protection and will not operate properly at ambient temperatures over 120F (48C).



Note: When plumbing the Catalina feed pump module, route the feed water hose so that the front cover may be opened without removing the hose or tubing. All tubing connections are made using Parker Fast and Tite connections, shown on page 21. These fittings should be finger tight only, not tightened with a wrench. After assembling all plumbing fittings, thoroughly check for leaks.

Introduction to Components continued...

Sea Strainer: Mount close to the intake through-hull in a location that can handle water spillage during service. Use the supplied Quick Block and wire tie for mounting.

Flush Cycle Expansion Tank: This expansion tank maintains water flow during the flush cycle as the feed pump cycles on and off. The feed pump cycles so the flow through the charcoal filter is limited to 1.5 GPH.

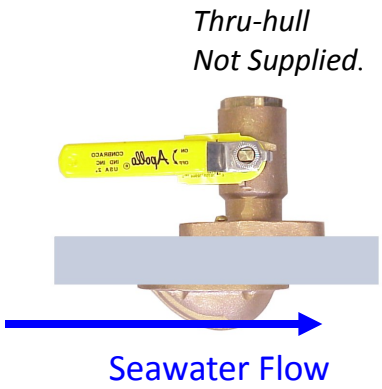
Fresh Water Flush Module: The fresh water flush module may be located in any convenient location near the feed pump module. It should be mounted with the filter housing vertical and accessible for changing filters, with 2" below the housing for filter changes. Do not install over electrical equipment. The unit contains a charcoal filter for the flush water, a shut off valve, and flush water pressure regulator. **If you ordered your system with the optional Z-Ion, it will replace the filter bowl on the Feed pump module, and have an additional control box. THE PHOTO ABOVE, AND All SUBSEQUENT PHOTOS OF THE FEED PUMP MODULE WILL LOOK SLIGHTLY DIFFERENT. SEE PAGE 32 FOR Z-ION INSTALLATION AND INSTRUCTIONS.**

Boost Pump module: The boost pump module should be mounted vertically with room to attach the service hose to the outlet on the right side (not visible in photo). The boost pump **MUST** be installed below the waterline to ensure that it will prime. If allowed to run dry it will fail and the feed pump will be damaged.

Remote Control Panel: Can be mounted anywhere that is dry and convenient. Cut a 4-9/16" (116 mm) wide by 2-7/8" (68mm) high opening for the panel. Take care when routing the cable so the plugs on each end are not damaged. **Use only Spectra approved remote cable.** The cable is not a standard LAN cable or phone cord.

Installation Basics

- **Read the directions!**
- Avoid tight hose bends and excessive runs.
- Use heavy gauge wire.
- Install feed pump module as low as possible.
- Boost pump module must be installed below the waterline.
- Use a dedicated thru-hull with scoop type strainer.
- Do not mount components over electrical devices.
- **Avoid getting dirt or debris into the piping or hoses during assembly.** A small bit of debris can stop the system!



Thru-hull Location: The system must be connected to a dedicated 3/4" to 1" forward-facing scoop-type intake thru-hull and seacock.

Install the thru-hull intake as far below the waterline and as close to centerline as possible to avoid contamination and air entering the system. Do not install the intake close to, or down-stream of, a head discharge, behind the keel, stabilizer fins, or other underwater fixtures.

Thru-hulls in the bow area are susceptible to air intake in rough conditions. Sharing a thru-hull can introduce unforeseen problems such as intermittent flow restrictions, air bubbles, contaminants, and will void the warranty. For racing boats and high speed boats traveling above 15 knots, a retractable snorkel-type thru-hull fitting is preferred because it picks up water away from the hull.

The brine discharge thru-hull should be mounted above the waterline, along or just above the boot stripe, to minimize water lift and back pressure.

Double clamp all hose connections below the waterline.

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

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.

Pipe Fitting Instructions: To seal plastic-to-plastic fittings, wrap 6 to 8 layers of Teflon tape over their threads. Hold the fitting in your left hand and tightly wrap the threads clockwise. For smoother assembly, do not tape the first (starting) threads.

Wiring

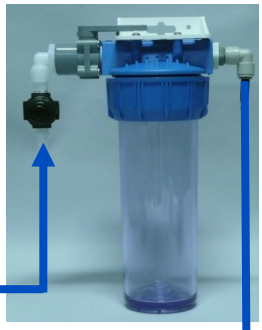
- Pay attention to wire size or system performance will be impaired
- Perform wiring to UL, ABYC, CE or applicable standards

Plumbing Schematic

From the Clark pump brine discharge connector use the supplied 5/8 (15.9mm) clear braided vinyl hose to the brine overboard fitting.

Use the 1/2 inch nylon high pressure tubing between the feed pump module outlet and the Clark Pump inlet

The Z-ION will replace the Fresh Water Flush module



Connects with John Guest Super Speedfit fitting (see page 22)

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

3/8" black tubing between the flush module and the feed pump module

Use the supplied 3/4" (19mm) suction hose (clear with black spiral) from the inlet thru-hull to the boost pump module.

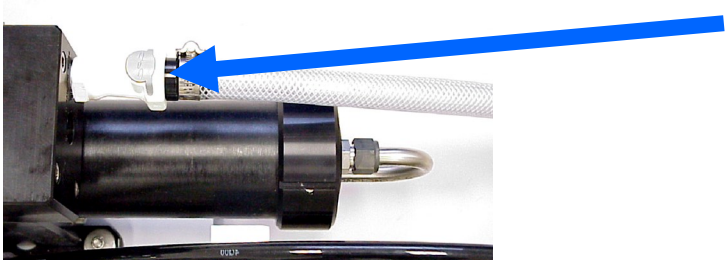
3/8" Black nylon tubing for Fresh Water Flush plumbing

Plumbing Detail

From the inlet thru-hull to the boost pump module use supplied 3/4” (19mm) spiral suction-rated hose (clear with black spiral). From the boost pump module to the feed pump module use the 3/4” braided vinyl hose.

From the feed pump to the Clark Pump feed water inlet use the supplied Parker 1/2” tube and fittings. Use two grab rings on the 1/2” parker tubing. Refer to the parker assembly instructions on page 21.

Brine Discharge: Route the brine discharge from the quick disconnect fittings to a thru-hull above the waterline using the supplied 5/8” braided vinyl hose:



Quick Disconnect Fitting

Fresh Water Flush: Route a feed line from the domestic cold pressure water system to the 1/2-inch hose barb on the fresh water flush module. This needs to be pressurized when the boat is unattended for the fresh water flush system to function properly. *The domestic fresh water pump must be able to deliver 1.5 gallons per minute (6 LPM) at 25 PSI (1.7 bar).*

The Z-ION will replace the Fresh Water Flush module

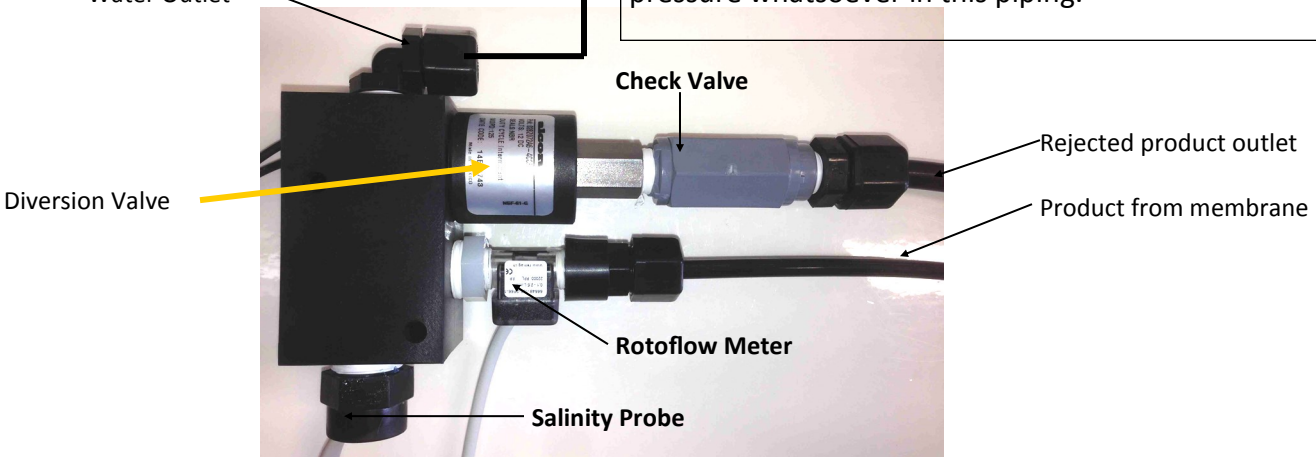
Fresh water from boat’s pressure water system

Attaches to black nylon 3/8” tube fitting on solenoid valve

Product Water Plumbing

The 1/4”(6mm) product water tubing is pre-plumbed from the membrane into the electric diversion valve. The diversion valve will reject product water into the overboard brine stream until MPC-5000 control determines the product water is below 750 PPM salinity. Once below 750 PPM, the MPC 5000 control opens the diversion valve and product water is diverted into the fresh water tank. **The salinity probe must be mounted in a vertical position with the cable coming out the bottom.** If the Clark Pump/Membrane Module is mounted vertically or upside down the diversion valve/probe assembly MUST be remounted in the proper orientation. For plumbing to the fresh water tank, ***see the Parker tube fitting assembly diagram on the next page***.

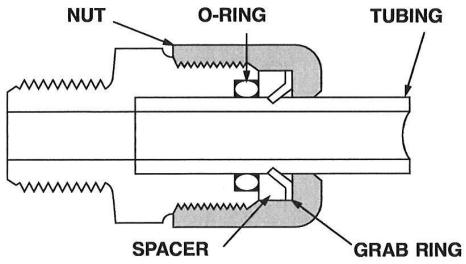
Product to tank: Route the product water into the top of a vented tank, or a tee in the water tank fill hose. **DO NOT** feed into a vent line, manifold, or into the bottom of the tank. Bladder tanks will create too much back pressure. There must be no restriction or back pressure whatsoever in this piping.



Product Diversion Valve Manifold

Fast & Tite® Thermoplastic Fittings

Fast & Tite® fittings are the most complete line of plastic fittings for thermoplastic tubing in the industry.



Fast & Tite® thermoplastic tube fittings from Parker will prove to be the answer to your tubing connector needs. Patented Fast & Tite® fittings install in seconds without tools and provide a tight, sure, leak proof seal without clamps or adjustments. A unique 302 stainless steel grab ring for tube retention, coupled with a Nitrile O-Ring for positive seal, assures good tube connection with only hand tight assembly. A plastic grab ring is also available upon special request. Vibration or tube movement will not break the seal and cause leakage. Preassembled in either highly inert polypropylene, or strong, durable nylon, Fast & Tite® fittings are the answer to full flow thermoplastic tubing system requirements.

When necessary, Fast & Tite® fittings can be disassembled by hand for fast system drainage. Fittings are completely reusable.

Parts are easily replaced. O-Rings are standard size and universally available. (For applications requiring other than Nitrile O-Rings, consult your Fast & Tite® distributor.)

Use Fast & Tite® fittings with Parker Parflex tubing or other plastic, glass or metal tubing for low pressure or vacuum lines up to the pressure limits shown below.

Fast & Tite® fittings meet FDA and NSF-51 requirements for food contact.

Working Pressures for Fast & Tite® Fittings

Air-Oil-Water Pressure in PSI			
Tube O. D., in.	Up to 75°F	76° to 125°F	126° to 175°F
1/4	300	300	300
5/16	300	300	300
3/8	250	250	150
1/2	200	200	150
5/8	150	100	50

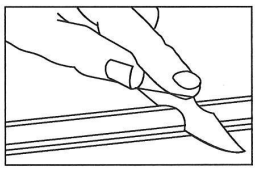
Ratings are based on use with copper tubing, and in all cases represent the maximum recommended working pressure of the fitting only. Working pressures (vs. temperatures) of other types of tubing may limit the tube and fitting assembly to pressures lower than shown above. Consult factory for recommendations on applications other than shown above.

Temperature Range:

Black/White Polypropylene: 0°F (-18°C) to +212°F (+100°C)
White Nylon: -40°F (-40°C) to +200°F (+93°C)

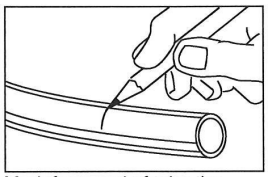
Fast Assembly

Step 1.



Cut the tube squarely and remove any burrs.

Step 2.



Mark from end of tube the length of insertion. (See table below)

Tube O.D. (in.)	Insertion Length with Tube Support (in.)	Insertion Length without Tube Support (in.)
1/4	5/8	9/16
5/16	5/8	9/16
3/8	13/16	3/4
1/2	7/8	13/16
5/8	1	15/16

Step 3.

Loosen nut on fitting until three threads are visible. Fittings for glass tubes must be disassembled and the grab ring removed.

Step 4.

Moisten end of the tube with water. Push the tube **Straight** into fitting until it bottoms on the fitting's shoulder. Tighten nut by hand. Additional tightening should not be necessary, but 1/4 additional turn may be added if desired. **Do not overtighten** nut as the threads will strip and the fitting will not function properly. A proper assembly will not show the insertion mark extending beyond the nut. If the insertion mark is visible, then steps 1 thru 4 must be repeated.

Step 5.

When using clear vinyl tubing or urethane tubing, it is necessary to use a **TS** tube support. Disassemble the fitting and place the nut, grab ring, spacer and tube support, in that order on the tube. Locate the grab ring at the insertion mark as shown. Seat the O-ring in the body, then proceed with Step 4.

Note: Provide adequate fail-safe mechanisms such as leakage detection sensors, automatic shut-off controlls or other industry and code appropriate fail-safe devices in the design of your water-handling appliance to protect against personal injury and property damage.

Plastic fittings containing an o-ring that are used in water applications should be replaced at least every five years or more frequently depending on the environment and severity of the application.

John Guest Super Speedfit Fittings

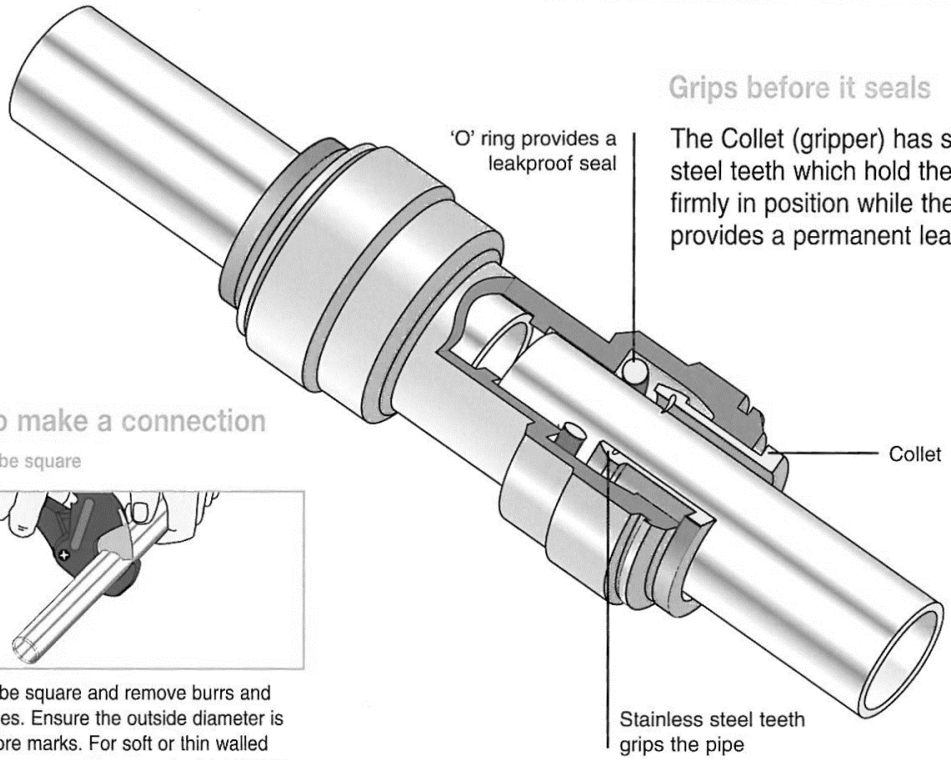
How Super Speedfit Works

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.

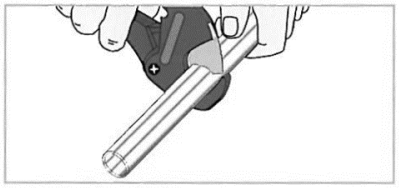


Grips before it seals

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

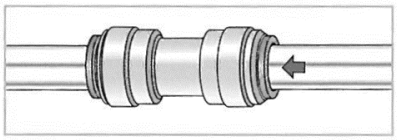
How to make a connection

Cut the tube square



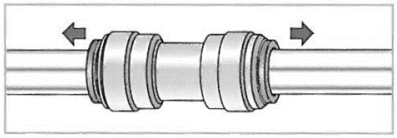
Cut the tube square and remove burrs and sharp edges. Ensure the outside diameter is free of score marks. For soft or thin walled tube we recommend the use of a tube insert

Push up to tube stop



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

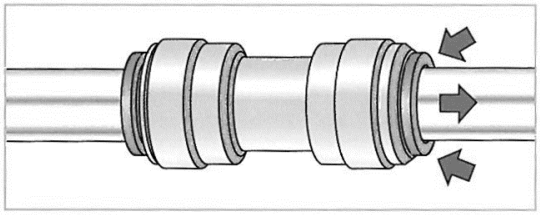
Pull to check secure



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

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.

Spectra High Pressure Tube Fitting Assembly Instructions

Carefully fit and measure the tubing before cutting with a sharp razor knife or hose cutter. Remove any burrs from tube ends. Route tubing away from excessive heat sources and secure from vibration and chafe. Have at least one shallow bend in the tube assembly after it is installed. The minimum tubing bend radius is 6 inches (15cm).

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" (23mm)—once tube goes past the grab ring it is locked in position. 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 a 13/16" wrench to hold a straight body fitting or a 3/4" wrench for a 90º body. Use a 7/8" wrench for the nut. Hold the body, recheck the tube insertion, then tighten the nut 1-2/3 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.**

Figure 1.

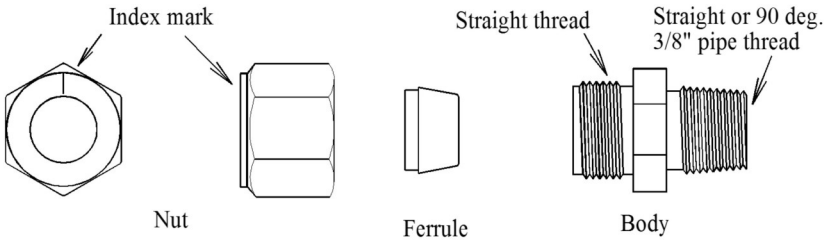


Figure 2.

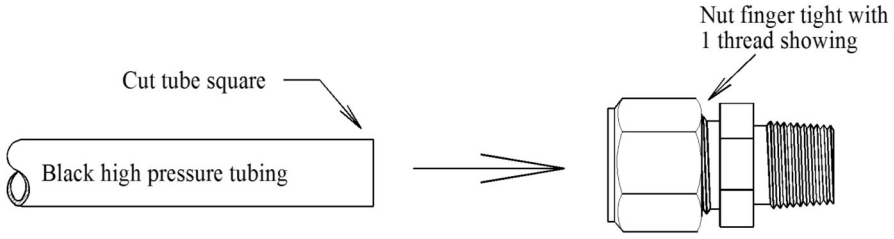
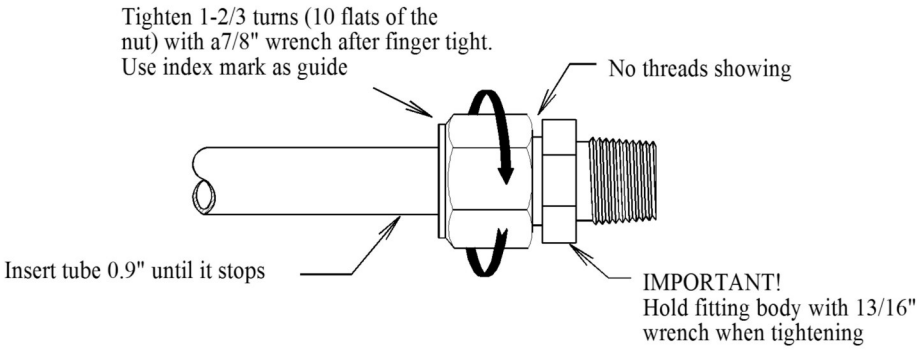


Figure 3.

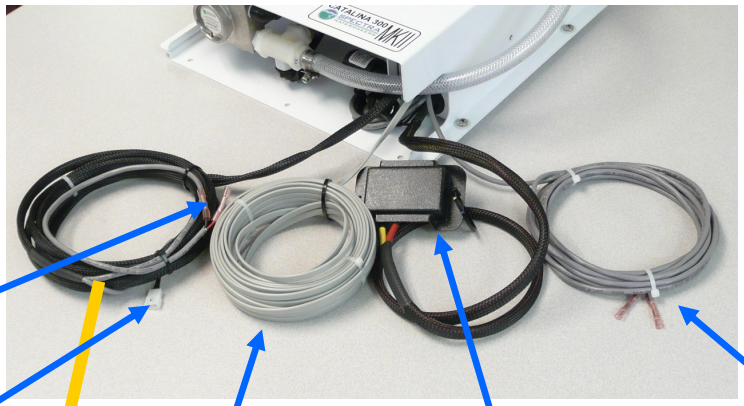


Wiring

Catalina 300 MkII systems have a power inlet harness with a terminal block and cover, a 2-conductor boost pump cable, a 2-conductor diversion valve cable, a Rotoflow sensor cable, and a 50-foot (15M) cable for the MPC-5000 display.

The Rotoflow plug and the diversion valve cable are bundled into the same wire loom.

The boost pump cable is coiled independently.



Cables are shown coming out of the bottom of the Feed Pump Module.

Diversion Valve Cable

Rotoflow Sensor Plug

50’ (15M) cable with connectors for the MPC-5000 control display

Power Inlet harness with terminal block

Boost Pump Cable

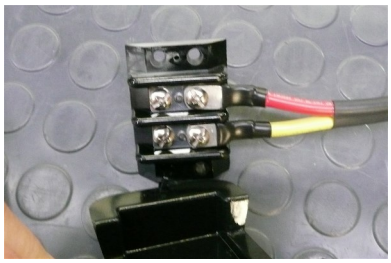
MPC-5000 Board
Looking at the box from the inside

To Rotoflow Meter

To Diversion Valve

Wiring continued…

Mount the main power terminal block in a junction box or on a bulkhead adjacent to the feed pump module. Make sure it is a dry location, well above bilge level, and not subject to spray.



Connect the red and black boost pump wires to the corresponding red and black conductors on the boost pump cable (red to red, black to black). Use the supplied butt connectors, and heat the connectors to shrink and waterproof them.

Route the diversion valve and Rotoflow cable loom to the diversion valve manifold mounted on the high pressure module between the Clark Pump and the membrane housing. Connect the white Molex three conductor plug into the corresponding male plug on the rotoflow sensor. Connect the 2-conductor diversion valve wires to the diversion valve. Polarity is not important when wiring the diversion valve solenoid.

Check the wire size chart to select the proper conductor size to the main power harness. DC power feeds should be uninterruptible to ensure proper operation of the Auto Store feature. Avoid using house breaker panels that could be easily tripped.

Wire Size Guide for the Catalina MkII 12V:
Protect with 20 Amp Fuse or Circuit Breaker
10 Gauge (6mm²) up to 10 feet (3 M)
8 Gauge (10mm²) up to 15 feet (4.5M)
#6 Gauge (16mm²) up to 25 feet (7.6M)
#4 Gauge (25mm²) up to 45 feet (14M)

Wire Size Guide for the Catalina MkII 24V:
Protect with 10 Amp Fuse or Circuit Breaker
#12 Gauge(4mm²) up to 10 feet (3M)
#10 Gauge (6mm²) up to 25 feet (7.6M)
#8 Gauge (10mm²) up to 35 feet (10.6M)
#6 Gauge (16mm²) up to 45 feet (14M)

Distances at left represent the total ROUND TRIP wire length (DC positive length plus DC negative length), NOT the length of the pair of wires together. Size cables accordingly.

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

MPC Display Panel Installation

The Catalina 300 MkII ships with a Vacuum Florescent Display (VFD). The display brightness can be adjusted using the programming function on page 76.

Two panels can be installed on a single machine, and commands to the system can be entered at either.

The display must be mounted in a protected location, out of direct sunlight, and away from spray or dripping water.

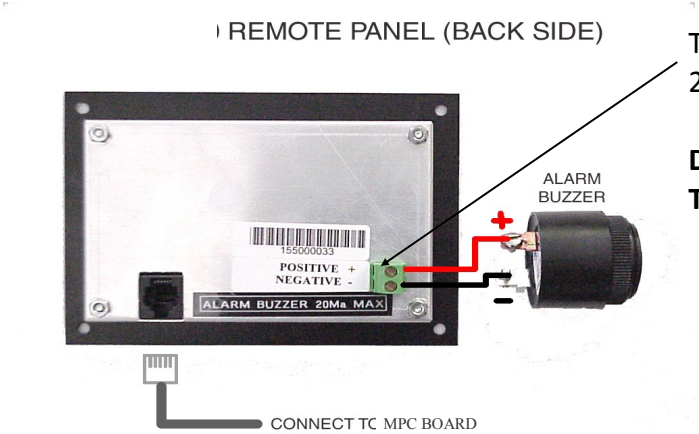
The display panel connects with the supplied 50-foot cable to the MPC board jack marked **DISPLAY.** Route the 50' cable for MPC display through the boat to the display location. Be careful not to damage the connector or get it wet. Plug this into the back of the remote display. **Do not substitute a different type of cable!** Contact the factory if you need longer or additional cables.

Display Jacks

Each display panel is supplied with an external alarm buzzer to provide audible alerts in the event of a fault or at the end of certain timed cycles.

Use only the buzzer units supplied by Spectra Watermakers, as the display buzzer terminal is limited to 20 mA max and an excessive load may damage the MPC or display panel.

Connect the buzzer RED wire to the terminal marked +POSITIVE, connect the buzzer BLACK wire to the terminal marked –NEGATIVE on the back of the remote display panel.



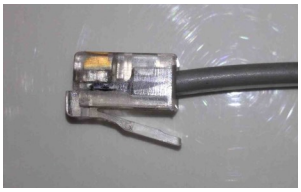
This buzzer output terminal is 20mA MAX current limit!

DO NOT CONNECT POWER TO THESE TERMINALS

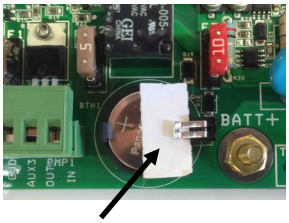
Salinity Probe Installation

All systems are shipped with an MPC 5000 with Battery Backup and matching salinity probe.

- The salinity probe cable is hard-wired directly to the probe in the potting compound, and cannot be removed.
- Open the housing that contains the MPC 5000 control board so that the circuit board is exposed (see photo below).
- Route the RJ-12 Connector with the other control cables through the watertight grommet at the base of the housing. Take care not to bend or break the locking tab on the backside of the RJ-12 connector.
- Insert the RJ-12 connector into the open terminal marked PROBE on the MPC Board.
- Secure the cable to the existing wiring bundle, leaving enough loose cable for a service loop.
- There is a small tab isolating the on-board battery from the MPC controller. Remove the isolating tab prior to closing up the MPC housing.
- Replace the housing cover. Be careful not to put excessive pressure on the existing wires inside the housing.



RJ-12 Connector



Battery Isolating Tab

Battery with tab removed

Insert Salinity Probe Cable here into PROBE jack

MPC 5000 Tank Switch Installation and Operation

The MPC5000 has two sets of terminals for tank switches. Using these switches it is possible to automatically start the watermaker when the tank is empty, and stop the watermaker when the tank is full. These terminals are on the green 10 pin connector and are labeled **Float Switch 1** and **Float Switch 2,** with float Switch 1 being the tank full switch and float switch 2 the tank empty switch.

Automatic operation using these switches could potentially flood a boat or run ship's batteries completely dead, so it is imperative that you have a thorough understanding of the automatic operation, and your ship's plumbing and electrical systems. Contact Spectra for more information.

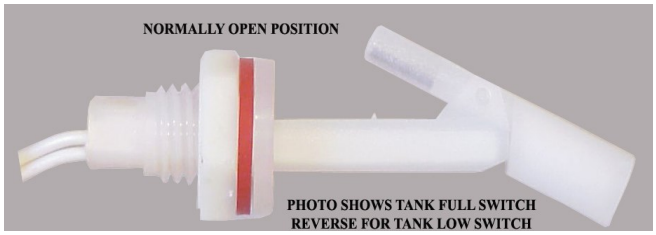
Spectra uses two types of float switch, the side-mounted float switch (EL-SWT-SMLV) may be used as either a tank full or tank empty switch. The top-mounted Tank Full Switch (EL-SWT-LV) may only be used for tank full.

Option 1: Tank Empty and Tank Full Switches (see diagrams on following page)
If the unit is wired for both Auto Start and Auto Stop, it can be put into AutoFill Mode by pushing and holding the **Auto Run** button on the MPC-5000 display. In this mode the watermaker will start whenever the water level drops below the tank empty switch. When the tank is full and both of the switches have remained closed for two minutes, the watermaker will shut down and flush itself. The watermaker will start back up when the water level drops below the tank empty switch, and the switch has remained open for 2 minutes.

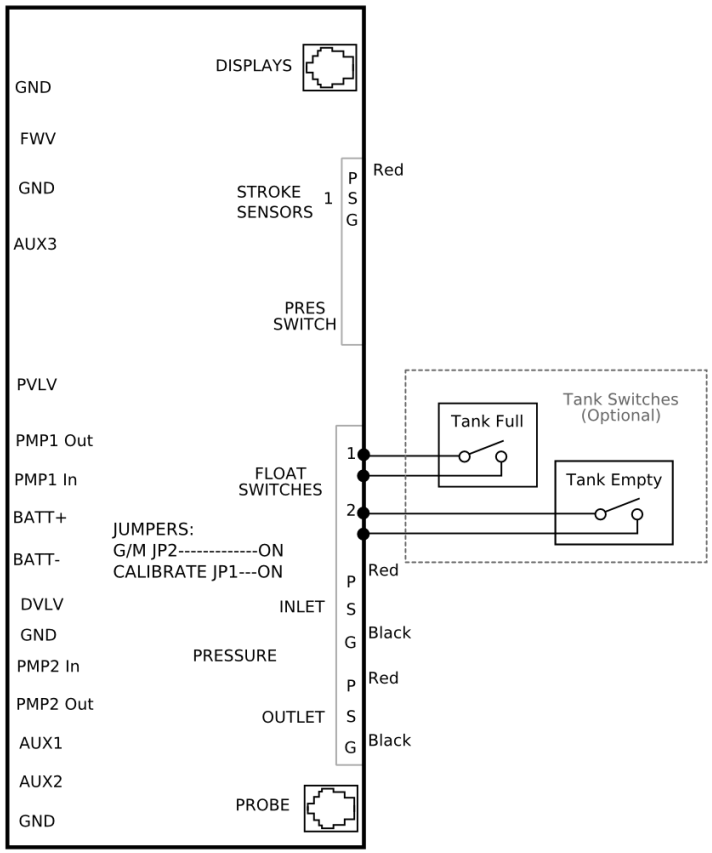
If the tank remains full for extended periods, the watermaker will automatically fresh water flush itself, as programmed under the Flush Interval (see pages 46 and 76). AutoFill Mode can be ended by pushing the **Stop** button or the **AutoStore** button. If the watermaker is in AutoRun Mode it can be put into Autofill Mode without stopping it by holding down the **AutoRun** button.

Option 2: Tank Full Switch Installed, Tank Empty Terminals Jumped
For automatic shutoff without the automatic startup, only the tank full switch is used and a jumper is placed between the tank empty terminals (Float Switch 2). To use this mode the watermaker must be started with the **Stop/Start** button or the **Auto Run** button. The watermaker will then fill the tank automatically and enter the Autoflush Mode, fresh water flushing itself according to the programmed Flush Interval. ***If you are only using only the tank full switch, DO NOT press and hold the Auto Run button, as this will enter the AutoFill Mode and the watermaker will not function properly***.

Note: Tank switches can be configured for multiple tanks. Contact factory for advice.

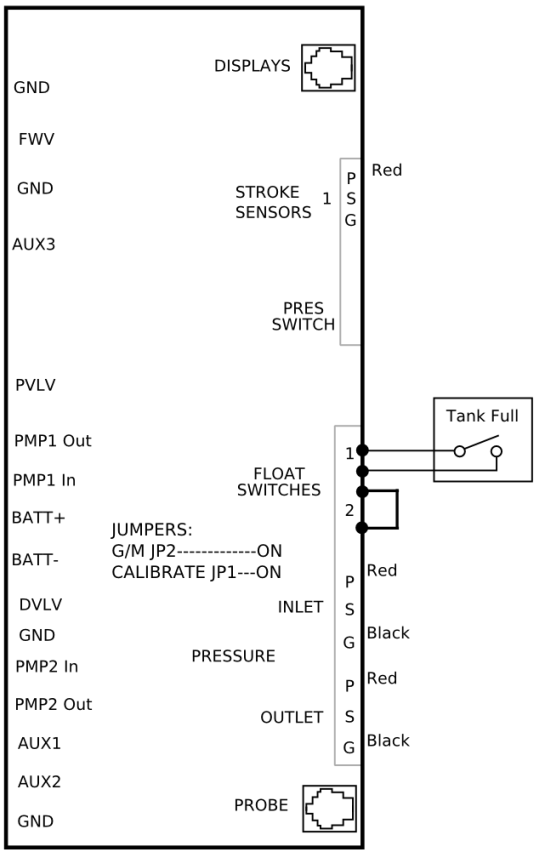


Option 1:
Tank Empty and Tank Full Switches Installed



MPC 5000

Option 2:
Tank Full Switch Installed, Tank Empty Terminals Connected



MPC 5000

Tank Switch Wiring

Optional Z-Ion and Z-Brane Membrane Protection Systems

The Z-Ion and Z-Brane, both developed by Spectra, are systems to protect the reverse osmosis membrane from fouling for extended periods without fresh water flushing or storage chemicals (pickling).

The Z-Ion achieves this end by introducing a stream of metallic ions into the fresh water flush module, thus flooding the entire system with ions that prevent biological growth for up to thirty days. If you are going to let your system sit idle for longer than thirty days, treatment with SC-1 storage chemical or propylene glycol is still required.

The Z-Brane applies zeta potential high voltage capacitive current to the membrane pressure vessel, creating an unfriendly environment for bio-film and bacteria, and assists in the prevention of scale formation on the membrane surfaces. After thoroughly fresh water flushing the system, the Z-Brane will protect an idle system indefinitely as long as the Z-Brane is energized. The Z-Brane draws less than 1 Amp, but storage with chemicals may be preferable for longer periods if battery power is an issue.

Neither the Z-Ion nor the Z-Brane will prevent freezing, so in freezing climates pickling with propylene glycol is still required. Even with the Z-Ion or Z-Brane there may still be cases where you need to pickle your system with SC-1 storage chemical or propylene glycol, so we recommend you carry one of these products at all times.

If your system was ordered with either of these systems, they will require only some basic wiring and commissioning, laid out in the following pages.

If you didn't order you system with the Z-Ion or Z-Brane, either can be retrofitted to any Spectra system.

Z-Ion

If you did not order your system with the optional Z-Ion you may disregard this section of the manual.

This revolutionary adaptation of an ancient technology effectively and safely protects the membrane and filters on your Spectra Watermaker from biological growth. The result is that your system will be kept ready to operate without any additional flushing, external power sources, pickling chemicals, or complex procedures.

Each fresh water flush with the Z-Ion will protect your watermaker for up to 30 days. The metal probes on a Z-Ion should last for about three years of constant use before needing replacement.

Specifications
10-48 VDC inlet voltage
10-38V output @1.5A Current controlled
Polarity reverses every 10-15 seconds (adjustable)
Timed auto shutoff (adjustable)
Current output is field adjustable.

Operation
The unit should be energized at all times, but will only consume power when water is running through it. Upon initial power-up the LED will flash red/green and then will turn solid green. When fresh water flows, the operation cycle begins and the LED will flash green/amber. The cycle will continue until either the water flow stops or the adjustable timer times out.

If the voltage is out of range, below 10V or above 56V, the LED will flash red every two seconds and the unit will shut down.

Z-Ion Installation

The Z-Ion will replace the fresh water flush module. The control box comes with four-foot cables for flexibility in mounting on the bulkhead adjacent to the feed pump module. In the photo below, the control box is mounted on top of the filter housing, but it may be mounted anywhere within four feet.

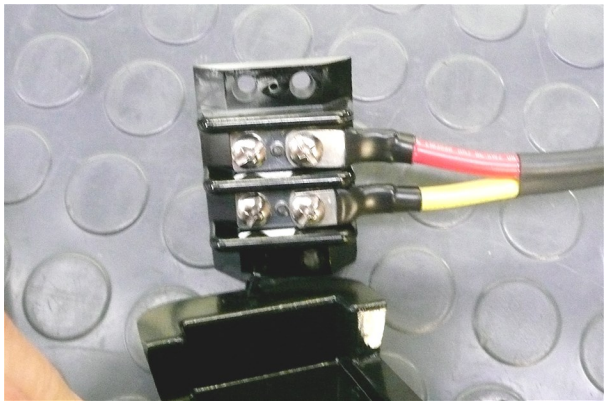
Plug the Z-ION connector from the generator into the control box.

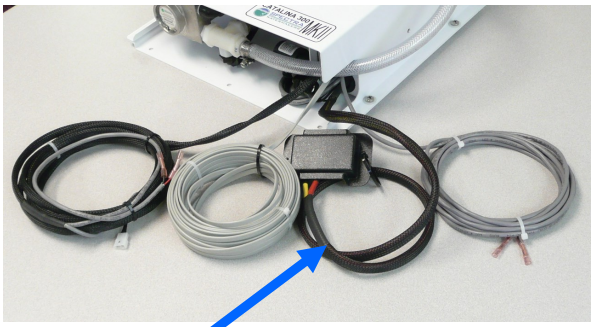
Z-Ion Installation continued...

Turn off the main DC breaker or remove the main power fuse to the watermaker.

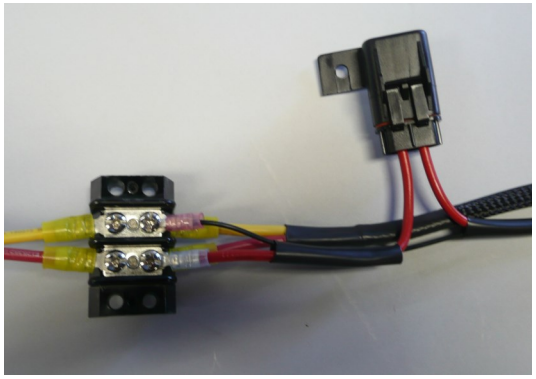
Locate the DC bus bar for the watermaker (or any other DC power source), as shown below. Connect the DC power leads from the Z-Ion control box to the incoming DC bus bar.

- Pay attention to polarity!
- Connect Red (fuse) to DC +
- Yellow to DC -
- Replace the protective cover





Watermaker power cable



Z-Ion Fuse holder: Install in a dry location with easy access.

Testing the Z-Ion

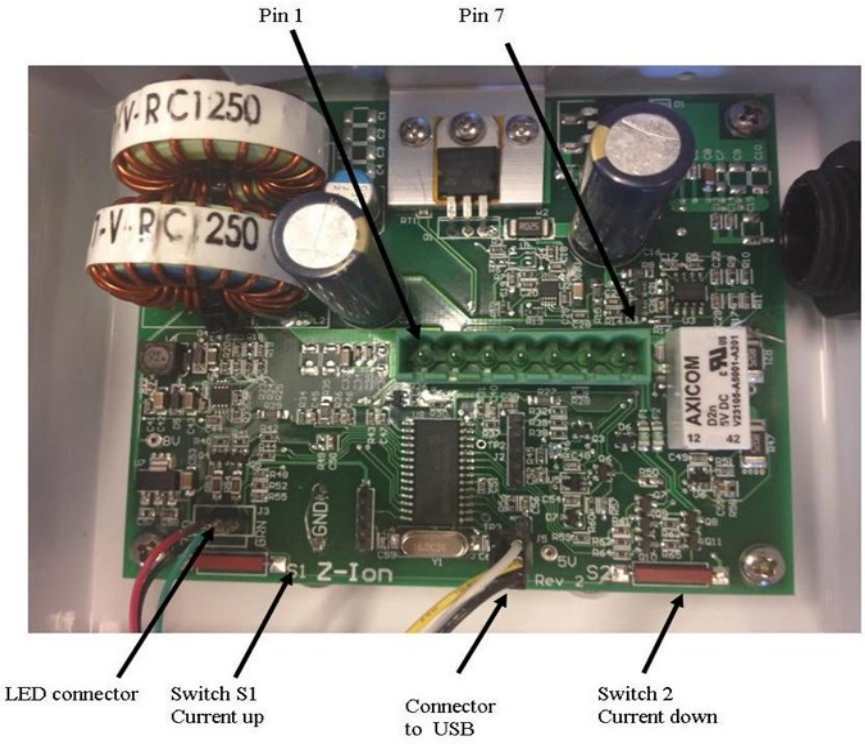
Normally no adjustment is necessary as the unit has been set up at the factory for your watermaker, however it is advisable to make sure the Z-Ion is working properly. Likewise, the following test is the only way to know if the probes on the Z-Ion need replacement.

There is no way to test for silver ions, but we can test for copper ions. The Z-Ion puts both into the flush water, and where there is one there is the other. You will need Spectra test kit (EL-ZION-TESTKIT) or a similar copper test kit for pools and spas.

Once the installation is complete and the unit is powered up, carry out a fresh water flush per the instructions. The LED on the Z-ION controller should start flashing as the unit cycles. Close to the end of the flush cycle, take a sample of the brine discharge. If the brine discharge thru-hull isn't accessible you will need to take a sample from the brine outlet on the Clark Pump, or use the brine discharge service hose (see pages 56 to 58). Once you have obtained a sample, first check it with a salinity monitor to make sure the salinity is below 1000 PPM. Next, use the copper test kit to make sure there is about 1 PPM of copper in the flush water.

If the salinity of the flush water is above 1000 PPM or does not have adequate copper content, please contact our technical support for instructions on how to adjust the system.

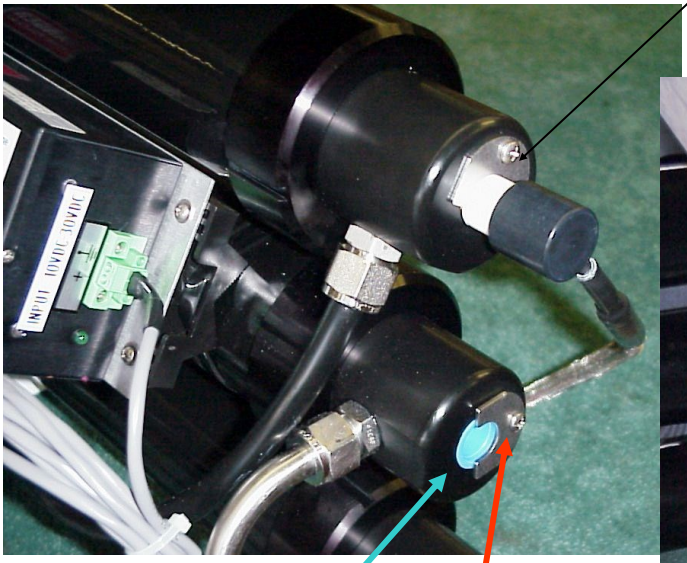
Z-ION Board Layout



Z-Brane Installation

Spectra ships the high pressure module with the white Z-Brane anode removed from its socket to prevent shipping damage. Before the high pressure module (Clark Pump and membrane) is mounted the anode should be installed.

The membrane housing has been capped with shipping plugs to keep the membranes clean and moist during shipping and storage. Remove the C-clips that secure the shipping plugs, then remove the shipping plugs. Insert an anode into the membrane until the groove is flush with the membrane end plug. The C-clip will then slip into the groove, and the C-clip screw will secure the clip.



C-Clip and retaining screw with probe installed

Shipping Plug (remove to insert probe)

C CLip

C-Clip groove in Anode

NOTE: your watermaker will only have one membrane. In these pictures there are three membranes.

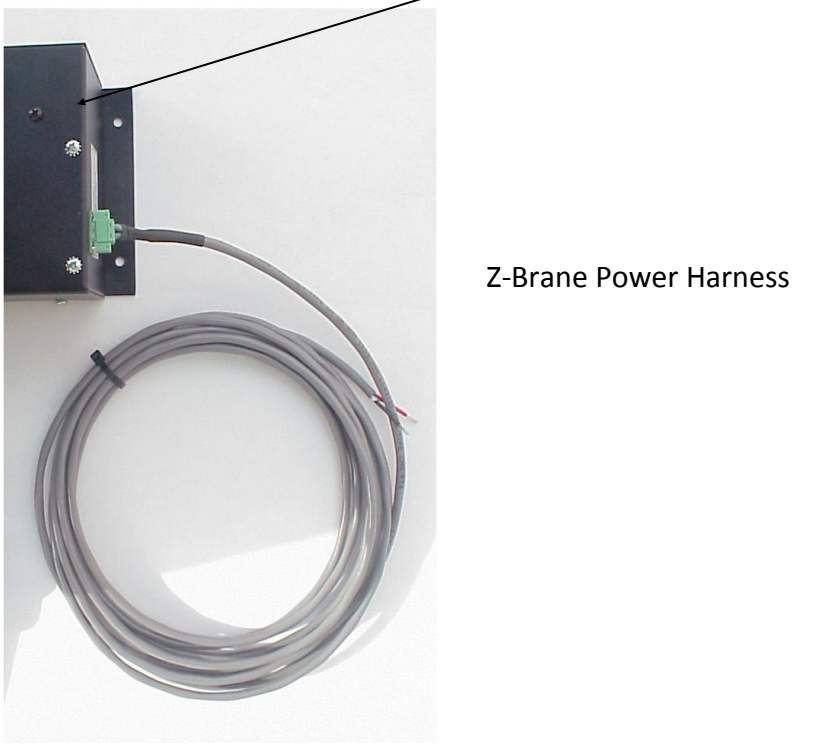
Z-Brane Wiring

The Z-Brane system is integrated with the watermaker and only requires continuous 12V or 24V DC power to operate.

WARNING! SHOCK HAZARD!: There is no reason to open the transformer enclosure. Do not service this unit unless it is disconnected from the power source! There may be high voltage present even after the transformer is de-powered!

We recommend that the Z-Brane be connected to its own electrical circuit. The power must be on when the watermaker is in operation and when the Z-Brane is used for membrane storage. If the power is obtained from the MPC circuit board then the MPC must be powered up at all times during storage, and this may not be ideal.

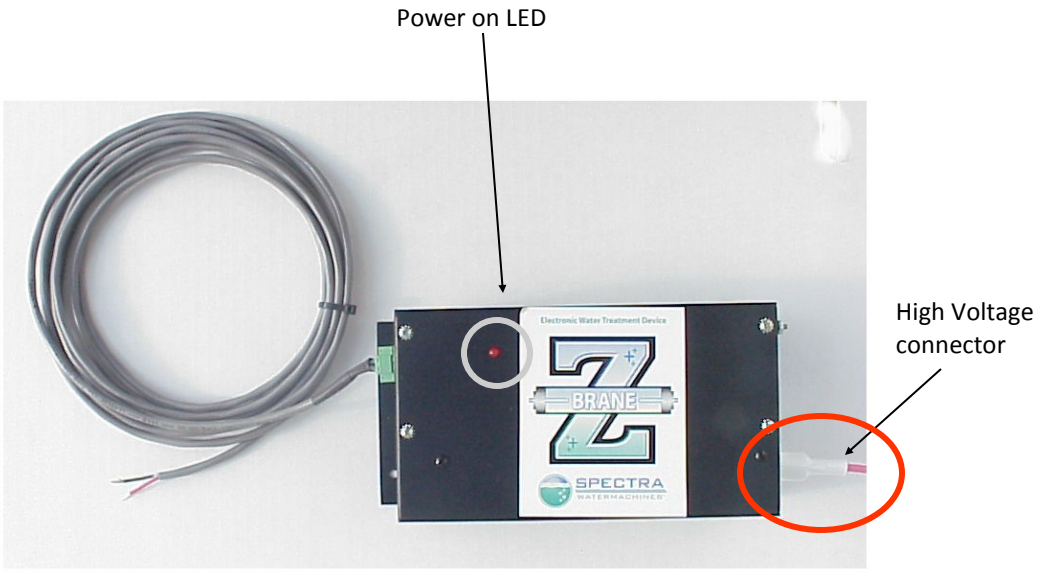
Fuse the power at the source with a 1 amp fuse or circuit breaker.
Red is Positive (+) , Black is Ground (-)



Z-Brane Operation

During normal operation the red LED should be on. Power needs to be supplied to the Z-Brane unit whenever you wish to prevent bio-fouling and scaling. We recommend flushing your watermaker with fresh water after each use, which will protect your membrane and also prevent corrosion in the feed water system. Thoroughly fresh water flush the watermaker several times before leaving the vessel unattended for extended periods.

The Z-Brane may be de-powered if the system is pickled with chemicals or winterized with propylene glycol.



DO NOT DISCONNECT OR SPLICE ANY OF THE HIGH VOLTAGE WIRING!

Contact the factory if modifications are required.

Operation

New System Start-Up and Testing

Use this procedure when starting a new watermaker for the first time and **whenever the system has been pickled or cleaned.**

Avoid running the Catalina system if the vessel is in contaminated water. The system should be fully tested before leaving port. If the location or weather prevents proper testing, refer to **Dry Testing with an Artificial Ocean** on page 44.

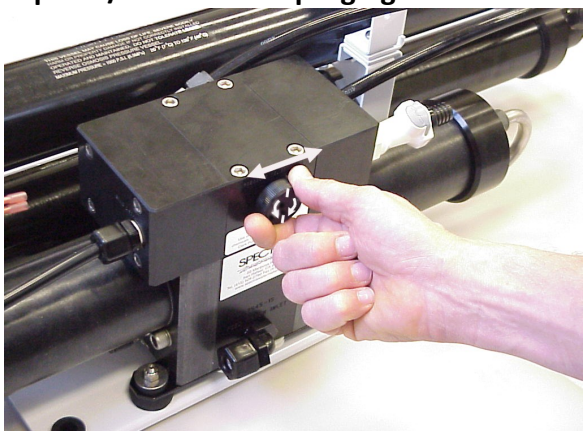
Warning! Damage may occur if the purge sequence is bypassed and the membrane is pressurized with storage chemical in it.

First check:

- Thru-hull inlet and the brine discharge valves are open.
- All of your hose connections are tight.
- The washer with the green tag under the pressure relief valve has been removed.
- The pressure relief valve is open 1/2 turn.
- The toggle switch on the MPC control box is set to the Auto position.
- There are at least several gallons of water in your fresh water tank for priming and the ship's pressure water system is on.

Remove Tag and Washer!

Open 1/2 Turn when purging chemicals!



Power up the system by turning on the circuit breaker. After a few seconds a message on the display will read "**Open Pressure Relief Valve Now**":

Push the **Auto Run** Button. The feed pump will start and the message "**Purging Storage Solution**" will appear:

New System Start-Up and Testing continued...

The system will go into a starting mode and the feed pump will start shortly thereafter. The fresh water flush solenoid will open, allowing water from your pressurized fresh water system to help prime the pump. The system should prime within 30 seconds. Check the strainer and the brine discharge for water flow. There should be few bubbles anywhere in the intake hoses and the feed pump should sound smooth after priming. After confirming that the system is primed, inspect for leaks.

Note: The reject light will be on whenever the product water is being rejected or not being made. When the product water is below 750 PPM the green (Good) light will show that water is going to the tank.

Note: You can bypass the purge sequence and initiate a normal start at any time by Pressing "Auto Run" and "Stop" simultaneously. This will bypass the purge sequence and enable a normal start. If you must stop the purge sequence for any reason, the control will default back to the beginning of the purging mode to protect your system. Be sure to purge the system of chemicals for at least twenty minutes. DO NOT BYPASS THE PURGE MODE UNLESS YOU ARE ABSOLUTELY SURE THAT THE CHEMICALS ARE PURGED FROM THE SYSTEM, OR YOU WILL PERMANENTLY DAMAGE THE MEMBRANE.

1. After the purge sequence, the control will alarm with the message "**Close Pressure Relief Valve.**" Close the valve and proceed by pressing **Auto Run.**
2. The system is now running under pressure and making water. The display will read "PURGING PRODUCT WATER," and count down another ten minutes while it purges any residual chemicals from the membrane and product lines. After ten minutes, if product water is below 750 PPM it will send the product water to the tank. Carefully inspect for leaks over the entire system. Shut down the system and repair any leaks you find.
3. The system is now operational, and you may run your system as you desire. When beginning to make water it is best to use the **Auto Run** button which defaults to the automatic fresh water flush after the unit is finished making water. If you shut down the system by pressing the **Stop** button the system will not fresh water flush. If you do stop the system using the **Stop** button, use the **Auto Store** button to effect a fresh water flush. You should fresh water flush your watermaker after every use.
4. Check that the system is operating within its normal parameters. Compare with the parameters on the next page.

Nominal Operating Parameters

To access this information about your watermaker while it is running press the **Alarm Display** button (bottom right). This will allow you to scroll through the product flow, salinity, feed water pressure, and pre-filter condition screens.

Product Flow
11-13 GPH (42—50LPH)

NOTE: To switch from Imperial (gallons) and Metric Units (Liters) see page 76, Programming from the Display.

Salinity
Salinity reads in PPM, parts per million, and controls the diversion valve. If the salinity is higher than 750ppm, the red REJECT LED is illuminated and the product water is sent overboard. If the salinity is less than 750 PPM, the green GOOD LED is illuminated, and the product water is sent to the tank.

Feedwater Pressure
Pressure range 80-90 PSI (5.5-6.2 BAR)

Pressure will be higher in cold water and lower in warm water. Extreme salinity or temperature conditions may result in operating pressures outside of the nominal range.

Pre-filter Condition
PREFILTER warns that filters are getting dirty, and they should be changed as soon as convenient. If the graph reaches full scale the machine will alarm **Service Prefilters** and shut off.

The MPC 5000 board is fully programmable from the remote display. Instructions on how to access and adjust the operating parameters are on page 76 of this manual.

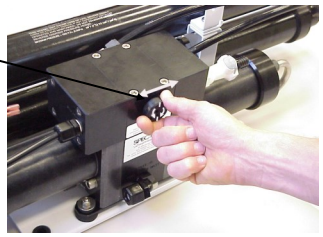
Dry Testing with an Artificial Ocean

If it is not possible to test run the system with the boat in the water, you may test the system with an artificial ocean. You will need 1.3 lbs. of non-iodized salt (rock salt, sea salt, or aquarium salt) to make a 5 gallons (605 grams of salt per 20 liters) of water that is about 33,000 PPM salinity (average seawater salinity). A rule of thumb is 1/2 cup (.12 liters) of salt per gallon (4 liters) of water. Make sure the domestic water system is powered up and the boat's tank has at least 35 gallons (130 Liters) of water to purge the storage chemicals from the system. Confirm that the charcoal filter is installed in the feed pump module, and the domestic water line is connected.

1. **Open the pressure relief valve on the Clark Pump. Remove the green tag and spacer.**
2. Turn the yellow service valve on the boost pump module to OFF. This is the center position. See Figure 1.
3. Power up the control. Bypass the purge mode by pushing **Stop** and **AutoRun** simultaneously. "PURGE MODE BYPASSED" should appear.
4. Push the **Auto Store** button and allow the system to run a full flush cycle. Do this **six** times to purge the storage chemicals.
5. Connect the inlet and brine discharge service hoses per Figures 2 and 3, and route them into the 5 gallon (20 liter) bucket. Disconnect the product tube from the diversion valve, and using another small piece of tube, route it into the bucket.
6. Push the **Auto Store** button one or two more times to fill the bucket with fresh water from the brine discharge service hose (hose attached to Clark Pump). Press **Stop** when the bucket is full.
7. Rotate the yellow service valve to the SERVICE position.
8. Mix the salt to the proper proportion or use an aquarium hydrometer to adjust the salinity level. If a hydrometer is available, mix to a specific gravity of 1.025.
9. Push the **Auto Run** button, allow the system to prime and then close the pressure relief valve. The system should build pressure and after several minutes start making water, with the brine and product water recombining in the bucket to be cycled again. This will gradually heat the water. Do not let the water temperature exceed 120 deg. F (49 deg. C).
10. Run the system under pressure, checking for proper operation and leaks. After testing the system, replace the brine discharge hose and product tube, and turn the service valve to RUN. You can now flush the system by pressing the **Auto Store** button.

Remove tag and washer

OPEN PRESSURE RELIEF VALVE



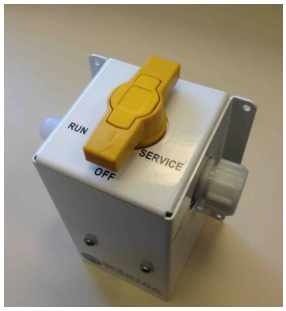


Fig. 1

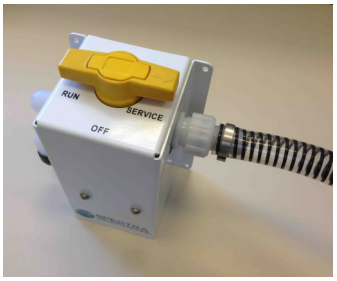


Fig. 2

Fig. 3

Normal Operation and Fresh Water Flush

If the system has been pickled or stored, use the New System Startup procedure on page 41.

You should fresh water flush your watermaker after every use. Remember that you need to run the system almost a half hour to make enough fresh water for one flush. You may notice that the system output is higher when charging your batteries, as the watermaker is voltage sensitive.

1. Check to see that the inlet and brine discharge seacocks are open.
2. Push **Auto Run** one or more times. The machine will run for one hour for each time the button is pushed, then shut off and automatically do a fresh water flush.
3. Run the system until you have filled your tank or have made enough to meet your requirements for several days.
4. After the system fresh water flushes and shuts down it will enter the **Auto Store** mode, which will flush the system at programmed intervals. See the next page.
5. You may stop the system at any time with the **Stop** button. If the **Stop** button is pressed during operation, the system will not flush itself or go into Auto Store mode.

Auto Store mode: The timer counts down the hours until the next Fresh Water Flush.

Auto Store

Warning! Proper understanding of the Spectra flush system and the vessel's fresh water system is mandatory for extended use of Auto Store. The flush cycles must not be allowed to drain all the fresh water from the tank or damage to the vessel's systems and the watermaker may occur.

As described in Normal Operation and Fresh Water Flush, on page 45, the Auto Store function flushes the watermaker at programmed intervals. As long as the watermaker is flushed with fresh water every 5 days (30 days with the Z-Ion) you need not store the system with chemicals.

- Make sure there is enough water in the fresh water tanks to supply the watermaker for more than the expected time of operation in the Auto Store mode. If there isn't enough fresh water in your tank, seawater will be drawn in to make up the difference, and the system will not be completely flushed with fresh water. The Catalina 300 MkII requires about 7 gallons (26 liters) for each flush. The boat's pressure water supply must be on and stay on while the system is in Auto Store mode. If these conditions cannot be met, then pickling with SC-1 storage chemical or propylene glycol is preferable.
- Make sure the pressure relief valve on the Clark Pump is closed.
- The system must be continually powered during the Auto Store mode. Turning off the power will disable the automatic fresh water flush and damage may occur.
- **Pressing the Auto Store button once** will flush the system and then activate the flush interval cycle: The display will read "FRESH WATER FLUSH" with a countdown timer. The feed pump will turn on for 3 seconds and off for 6 seconds, cycling on and off in this fashion for the duration of the flush to limit the flow rate to 1.5 GPM. After 5 minutes (adjustable) the pump will stop, the display will read "FLUSH TIMER INTERVAL," and the countdown timer will reflect the number of hours until the next flush.
- **Pressing and holding the Auto Store button for 5 seconds will engage a one-time flush.** The display will read "FRESH WATER FLUSH" while flushing, then the default display will appear when finished. The system will not re-flush at programmed intervals.
- **Pressing the Stop button** will cancel the Auto Store Mode.

Flush Adjustments

The Catalina flush duration is set to a factory default of 5 minutes, which is usually the right amount of time to ensure that sea water is thoroughly flushed out of the watermaker using the least amount of fresh water. However, due to different lengths of hose runs, different rates of flow, and different pressures in shipboard fresh water systems, the flush duration can be optimized for your boat.

Detailed instructions about how to access the programming function and set the flush duration can be found on page 76, Programming From the Display. Set the Flush Duration so that the fresh water flush comes to an end just as the salinity of the brine discharge drops below 1000 PPM, or no longer tastes brackish. Since the flush duration can only be adjusted in round minutes, you may want to lessen the duration to 4 minutes, to save water, or increase to 6 minutes to ensure a thorough flush.

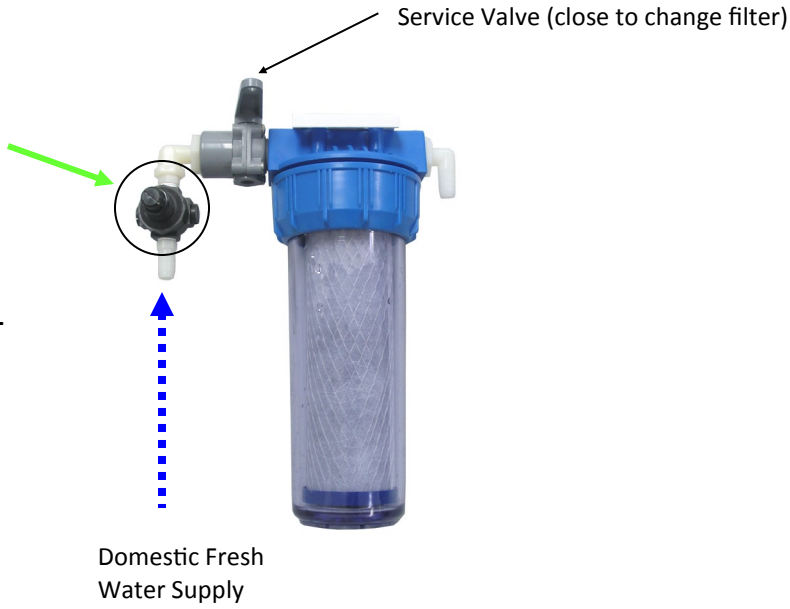
Flush Adjustments continued...

Also, the charcoal filter is rated for 1.5 GPM (6 LPM): If the system pushes more than 1.5 GPM through the charcoal filter (4.5 gallons in 3 minutes), the flow regulator can be adjusted:

Adjusting the pressure regulator:

Place the output hose from the charcoal filter into a bucket and open the service valve. Turn the center screw on the pressure regulator to adjust the flow.

In 1 minute you should get 1.5 gallons of water (5.7 Liters).



Note: If your system was ordered with the optional Z-Ion, the Z-Ion will replace the fresh water flush module, but the adjustments will be the same.

Alarm Override and Manual Operation

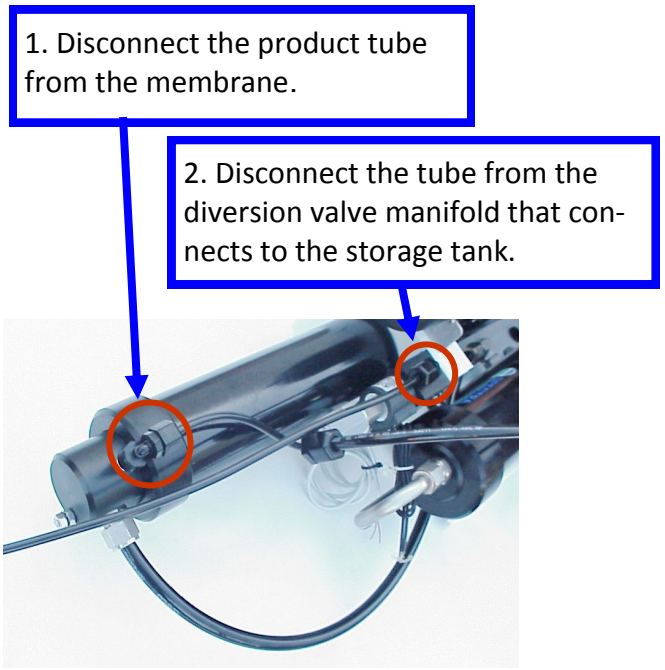
In the event of a sensor failure resulting in a shut down due to a false alarm, the failed sensor can be overridden using the programming function on the display (page 76). High Pressure, Service Prefilter, System Stalled (airlock), and Salinity Probe Failed can all be overridden and the system will still run automatically with all other functions intact. **Be absolutely certain that the alarm is false before overriding the automatic controls.**

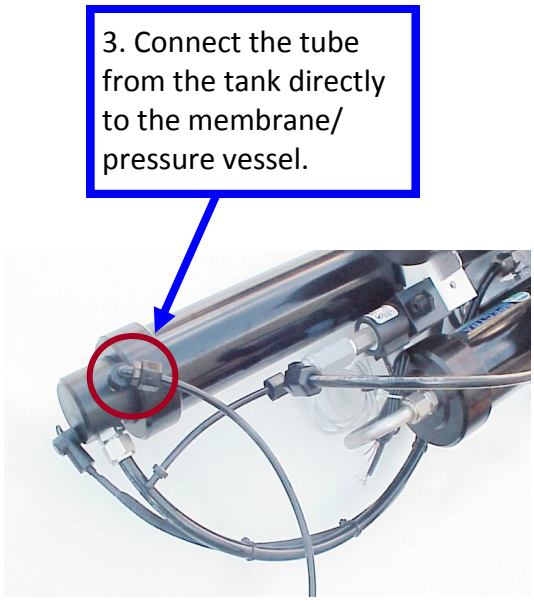
In the event of a complete MPC control failure, the system may be operated manually using the Manual/Auto switch on the MPC Control Box. Automatic controls and water monitoring are disabled in manual mode, so the diversion valve will send all of your product water overboard through the brine discharge. The diversion valve must be bypassed, and product water must be routed directly to the tank from the membrane product water outlet.

Bypass the diversion valve as follows (see photos below):

- Disconnect the 1/4 inch tube from the end of the membrane pressure vessel. This tube connects the membrane product outlet to the diversion valve manifold.
- Disconnect the product-to-tank tube from the diversion valve manifold and connect it directly to the membrane product outlet.
- Taste or sample the product water before sending it to a tank. Always discard the product water for the first few minutes of operation, as the initial product water from the system may not be potable.
- Test the water with a handheld salinity meter or taste it regularly to ensure water quality.

- To shut down manually, set the switch on MPC control Box to AUTO.
- To manually flush, collect 7 gallons of product water in a container. Connect the inlet service hose to the service connection on the boost pump module, and put the other end of the hose in the bucket of water. Turn the service valve to the SERVICE position. Start the feed pump with the manual switch on MPC Control Box. Run the feed pump until the bucket is empty, then turn the yellow service valve back to RUN. Disconnect the inlet service hose.





Maintenance, Storage, and Troubleshooting

Suggested Spares for the Catalina 300 MkII

Short term cruising, weekends etc.

A basic cruise kit A. This kit consists of six 5 micron filters and two packs of SC-1 storage chemical.

Cruising 2 to 6 months at a time.

Two basic cruise kits, one replacement charcoal filter, and one replacement feed pump head.

Longer than 6 months

Additional filters, offshore cruising kit consisting of Clark Pump seals, O-rings, tools and membrane cleaning chemicals. One replacement strainer screen, replacement O-ring for strainer screen, and replacement O-rings for the filter housings.

Common Parts:

Item	**Part Number**
SC-1 STORAGE CHEMICAL	KIT-CHEM-SC1
SC-2 CLEANER	KIT-CHEM-SC2
SC-3 CLEANER	KIT-CHEM-SC3
BASIC CRUISE KIT A	KIT-BCK-A
OFFSHORE REBUILD KIT	KIT-OFFSH
5 MICRON FILTER	FT-FTC-5
CHARCOAL FILTER	FT-FTC-CC
5” STRAINER SCREEN	FT-STN-5S
OIL/WATER FILTER	FT-FTC-OW
FEED PUMP HEAD	KIT-PMP-110MRF
5” STRAINER O-RING	SO-STN-5SS
FILTER HOUSING O-RING	SO-FHS-10H
SALINITY PROBE	EL-MPC-SP4
CHARCOAL FILTER HOUSING O-RING	SO-FHS-3PCS10

Maintenance

General

Periodically inspect the entire system for leakage and chafing. Repair any leaks as soon as you find them. Some crystal formation around the Clark Pump blocks is normal. Wipe down any salt encrusted areas with a damp cloth.

Watermakers are at their best when run regularly. Biological fouling in the membrane is more likely when a watermaker sits idle. A warm environment will cause more growth than a cold environment. A fresh water flush every five days (30 days with the Z-Ion) will greatly reduce biological growth, but may not stop it completely. Both the Z-Brane or Z-Ion systems protect the membrane from bio-fouling without the use of storage chemicals.

The Seawater Strainer

The seawater strainer's stainless steel element should be inspected, removed, and cleaned as needed. Ensure that the thru-hull is closed before disassembly and the gasket is in place before reassembly. When the system is put into storage, remove the strainer, rinse with fresh water, and reassemble dry to impede corrosion. Check frequently during operation.

The Pre-filter

Service the pre-filter on a regular basis. The MPC will alarm when the filter reaches a 10 PSI (.7 BAR) differential. If you use the system until it stops at a 10 PSI differential (.75 BAR) then the filter will have to be discarded. Extremely dirty filters will harm system performance and may cause system shut down. Leaving dirty filters in the machine during long idle periods will cause biological contamination.

To service the prefilter, turn yellow service valve on boost pump module to OFF, open the housings, and remove the old filter. Clean out the housing bowl, reassemble the housing with a new 5 micron element. Leave dry until the next startup. Use only Spectra-approved filters or you may void your warranty. The filters may be cleaned up to three times with a soft brush and water in a bucket, hung overboard overnight, or dragged behind your vessel underway. Drying the filters in the sun helps kill microbes and remove bad smells. Occasionally, lightly lube the filter housing O-ring with silicone grease.

Oil/Water Separator (Optional)

To install oil water separator capability, add a second filter housing UPSTREAM of the 5 micron housing. Service as you would per the instructions above.

The Charcoal Fresh Water Flush Filter

Replace the charcoal filter element at least every 6 months. This filter protects the membrane by removing chlorine from the flush water. Use only a Spectra-approved replacement. See page 66.

Maintenance continued...

The Feed Pump and Clark Pump

The feed pump and the Clark Pump require no routine maintenance except inspection for leaks. Tighten any hose clamps or fittings that show signs of leakage. The high pressure fittings threaded into the Clark Pump have O-ring seals with a straight thread. These should never leak and should never be over-tightened. If one of the tube nuts starts to leak, it can be un-threaded, sealed with a bit of silicone grease or oil, and tightened with two wrenches very tightly. See instructions on page 29 and 30.

The Membrane

Always perform a flow test (page 62) before cleaning your membrane. Cleaning shortens the lifespan of membranes, so only clean a membrane if you have ruled out other possibilities for low production or poor water quality. The leading cause of fouling is biological growth that forms when the system is left unused without flushing or pickling. Fouling from mineral scaling can happen under certain seawater conditions, or from rust. Monitor the product salinity and feed pressure for higher than normal readings, take environmental conditions into considera-tion:

- Cold feed water or a clogged pre-filter can cause high pressure.
- Low product flow is usually due to low voltage, a worn feed pump, or worn Clark Pump.

Test to see if biological growth has occurred: Before running the system, remove the prefil-ters and examine their condition. If the filter housings are full of smelly, discolored water, the system was not properly stored. Install clean pre-filters.

Next check the membrane. Detach the brine discharge hose, attach the brine service hose, and lead it to a bucket. Open the pressure relief valve 1/2 turn, and manually run the system for 30 seconds (metal toggle switch on feed pump module). Examine the brine water: If it is discol-ored and smells bad, perform an SC-2 cleaning with unchlorinated water before running the system pressurized. If the brine is fairly clean, follow the New System Startup procedure on page 41 and run normally. Check for performance. Clean the membranes **only if** performance is reduced.

See the **Cleaning Procedure** on page 58 for complete instructions.

Introduction to Spectra Chemicals

We use four types of chemicals: SC-1, SC-2, SC-3, and propylene glycol antifreeze. SC-1 and propylene glycol are for system storage, while SC-2 and SC-3 are for membrane cleaning. **Do not use metasodium-bisulfate, citric acid, or any other storage chemical not supplied by Spectra.** These chemicals, used to store other watermaker brands, are very acidic and will damage the Clark Pump and void the warranty.

Note: Never use any chemicals with the system pressurized! Always open the pressure relief valve 1/2 turn. Always follow the instructions for purging the chemicals as shown in the New System Startup section (page 41) of your owner's manual.

Storage

SC-1 prevents biological growth when your system is idle. It should not be used as a cleaning chemical, nor will it protect your system from freezing. A jar of SC-1 is mixed with 1 to 2 gallons of product or dechlorinated fresh water in a bucket and circulated through the system for 10 minutes. This treatment will protect the system for six months, after which the SC-1 treatment must be repeated. To use SC-1, follow the instructions for **Catalina MkII Storage Procedure** on page 56.

Spectra systems should be stored with propylene glycol if freezing is likely to occur. Propylene glycol can be used instead of Spectra SC-1 storage chemical for storage in any climate, and treatment is effective for one year. Propylene glycol is a food-grade antifreeze used to winterize RV's, boats, and cabins. Do not use ethylene glycol automotive antifreeze, which is toxic and will damage the system.

The propylene glycol formulations sold in marine and RV stores are usually diluted with water. The water remaining in the watermaker before the storage procedure will further dilute the antifreeze, reducing the microbial protection and increasing the temperature at which the mixture will freeze.

Antifreeze labeled "Minus Fifty" is a 25% solution and will begin to form an icy slush at about +15Degrees F (-10C) and will only provide burst protection to about Zero F (-18C). After a further 50% percent dilution by water remaining in the watermaker, "Minus Fifty" antifreeze will only protect from bursting down to about +25F (-4C). Therefore if low temperature freezing protection is required a 60% or stronger antifreeze should be used. 60% solutions are labeled "Minus 100" and will provide burst protection to -15F (-27C) even after a fifty percent dilution with residual water. "Minus 200" formulations are pure propylene glycol.

Introduction to Spectra Chemicals continued...

Complete microbial protection requires a 25% solution of propylene glycol, so care must be taken that the solution remaining in the watermaker during long term storage is at least 25%, even if freeze protection is not required. For these reasons Spectra recommends that all pickling be carried out with a 60% or greater concentration.

See **Winterizing with Propylene Glycol** on page 57.

Cleaners

Cleaning can be detrimental to the membrane and shorten its life. Avoid unnecessary cleaning, and avoid cleaning as a diagnostic tool.

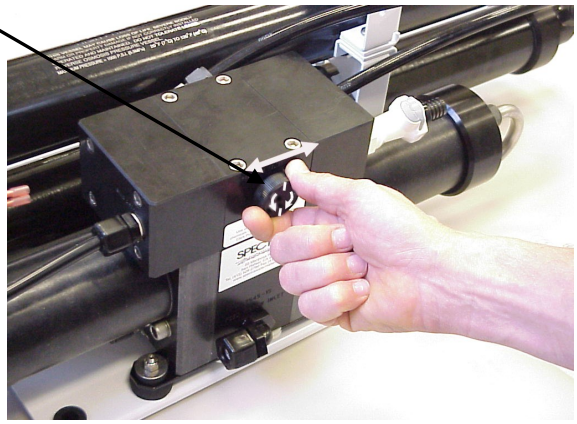
SC-2 is an alkaline cleaner used to remove light oil, grime and biological growth. It is most effective if heated to 120 deg. F (49 deg. C), which is difficult on a boat. In most cases the water quality will increase in PPM (salinity) after an SC-2 cleaning. After a few hours it should recover to near the level it produced before the cleaning.

SC-3 is an acid cleaner used to remove mineral and scale deposits. In most cases this is used first and if there is no improvement, go on to the SC-2. SC-3 will in most cases lower the product PPM and overall pressures. Scaling is a slow process that may take several months or years. SC-3 is less harmful to the membrane and will almost always improve the performance of an older membrane.

For cleaning with either SC-2 or SC-3, see the **Cleaning Procedure** on page 58.

Catalina 300 MkII Storage Procedure

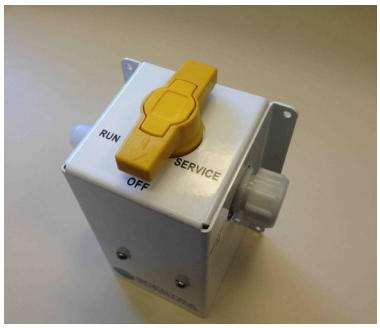
1. Turn the yellow service valve on the boost pump module to OFF (see photos below).
2. Push **Auto Store** to fresh water flush the system. Repeat, to flush the system twice.
3. Remove the cap on the service port on the boost pump module and install the inlet service hose from the service kit. Remove the quick disconnect fitting from the brine discharge outlet of the Clark Pump, and replace it with the quick disconnect brine discharge service hose. Lead both hoses to a 5 gallon bucket.
4. Push the **Auto Store** button and run the feed pump until you have one gallon of fresh water in the bucket from the brine discharge service hose. Stop the system.
5. Mix 1 container of SC-1 storage compound with the water in the bucket.
6. **Make sure the pressure relief valve on the Clark Pump is OPEN (un-pressurized) by turning 1/2 turn counterclockwise**
7. Place the yellow service valve in the Service position (pictured below).
8. Turn on the feed pump using the manual control switch on the MPC 5000 Control Box. The solution will be drawn from the bucket with the service hose, and returned to the bucket from the brine discharge service hose. Circulate the storage chemical in the system for approximately 10 minutes. Turn off the feed pump.



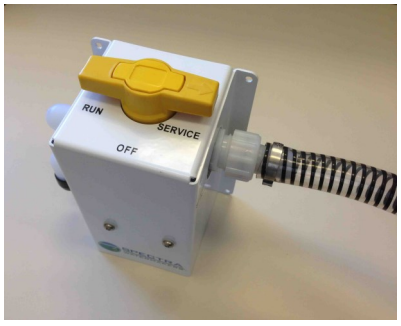
Clean Up

Remove the brine discharge service hose from the Clark Pump, and replace the brine discharge hose that leads to the thru-hull. You may now pump the bucket dry by using the manual control switch on the MPC Control Box.

Turn the service valve 180° back to the RUN position, and remove the inlet service hose. Close the seacock, drain and clean the strainer and any filters in the system. Reassemble dry. Leave the pressure relief valve open, since the next time you run the system you will need to purge the storage chemicals with the system unpressurized.



Service valve OFF



Service hose connected and service valve to SERVICE

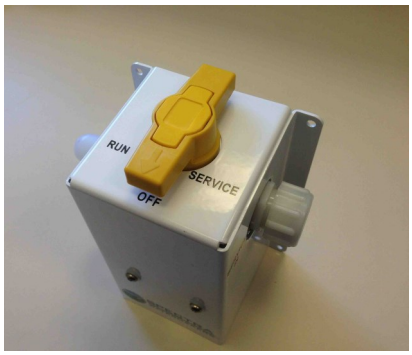
Connecting brine discharge service hose

Winterizing with Propylene Glycol

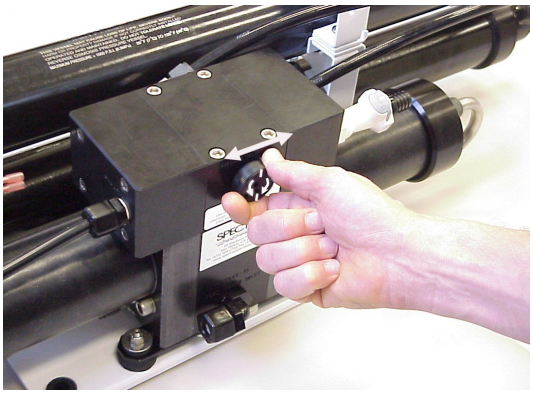
See description of propylene glycol formulations on page 54-55.

1. Turn the yellow service valve on the boost pump module to OFF (see photos below).
2. Push **Auto Store** to fresh water flush the system. Repeat, to flush the system twice.
3. Connect the inlet service hose to the boost pump module and lead the hose to the bottom of a bucket. Connect the brine service hose, and run it into a second container.
4. Turn the yellow service valve on the boost pump module to the SERVICE position.
5. Pour 1 gallon (4 liters) of propylene glycol of appropriate concentration (see pages 54-55) into the bucket with the intake service hose.
6. **Make sure the pressure relief valve on the Clark Pump is OPEN 1/2 turn (un-pressurized).**
7. Run the feed pump using the manual switch on the MPC control box until about a gallon of water has flowed from the brine discharge service hose, or antifreeze appears. Propylene glycol will look slightly different, and feel more slippery, than water. Stop the pump. Add more propylene glycol to the intake bucket if necessary.
8. Lead the brine discharge service hose into the intake bucket of propylene glycol. The service hose will now draw propylene glycol from the bucket, and the brine discharge service hose will return it. Run the feed pump and circulate the propylene glycol for 10 minutes.
9. Stop the feed pump. Close the seawater intake and turn the yellow service valve to OFF. Drain the seawater strainer, the hose leading to the boost pump module, and the hose between the boost pump module and the feed pump module. Disconnect the product tubing from the membrane housing and blow residual water out of the tubing. Empty the charcoal filter housing and flush water lines.

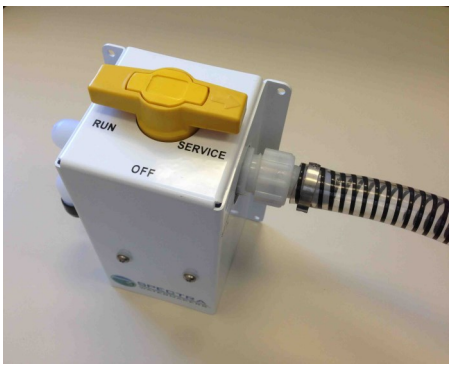
Your watermaker is now protected from biological growth and freezing for one year.



Service Valve OFF



Open the Pressure Relief Valve



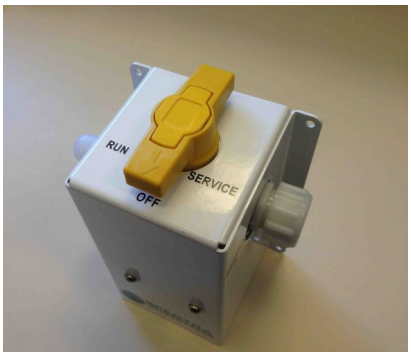
Service hose connected and service valve to SERVICE

Connecting brine discharge service-hose

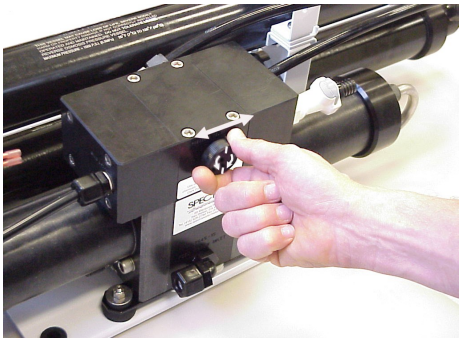
Membrane Cleaning Procedures

Spectra cleaning compound (SC-2 or SC-3) must be mixed with fresh water at a ratio of 1 container of compound to 3 gallons (12L) of unchlorinated water. An average of two gallons (8L) of water is already present inside a Catalina 300 MkII system, so this water must be figured into the mixture. A Catalina 300 MkII system requires one container of compound per cleaning.

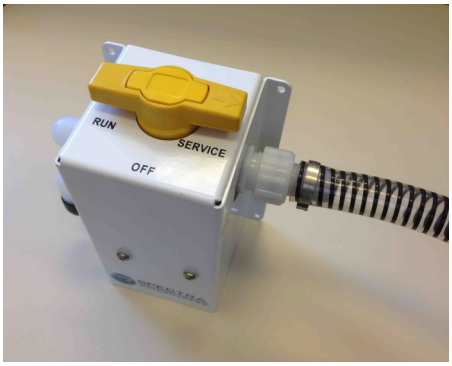
1. Turn the yellow service valve on the boost pump module to OFF (see photos below).
2. Push **Auto Store** to fresh water flush the system. Repeat, to flush the system twice.
3. Remove the cap on the service port on the boost pump module and install the inlet service hose from the service kit. Remove the quick disconnect fitting from the brine discharge outlet of the Clark Pump, and replace it with the quick disconnect brine discharge service hose. Lead both hoses into a 5 gallon (20 liter) bucket.
4. Push the **Auto Store** button and run the feed pump until one gallon of fresh water runs into the bucket from the brine discharge service hose. Stop the system.
5. Turn the yellow service valve to the SERVICE position.
6. **Make sure that the pressure relief valve on the Clark Pump is open (un-pressurized).**
7. Mix the cleaning chemical in the bucket. If possible, heat the solution to 120 deg. F (49 deg. C).
8. Start the system using the manual switch on the MPC control box. The intake service hose will draw solution from the bucket and the brine discharge service hose will return it. Circulate the solution through the system in this manner for 45 minutes.
9. Stop the pump. Replace the brine discharge overboard hose and run the pump until the bucket is empty. Stop the pump and turn the yellow service valve back to the RUN position. Restart the pump and run for 20 minutes to flush the chemicals out of the system **(DO NOT CLOSE the pressure relief valve!)**
10. Move the switch on the MPC Control Box to AUTO. The system may now be restarted, flushed, or stored.



Service valve in OFF position



Open the pressure relief valve!



Service hose connected and service valve to SERVICE

Attaching brine discharge service hose

Troubleshooting Catalina MkII Systems

SYMPTOMS	PROBABLE CAUSE	REMEDY
Feed pump runs constantly, will not turn off	• Manual switch in ON position on control box	• Turn off manual switch on control box
Feed pump runs with loud noise	• Intake blocked • Air in system	• Check thru-hull valve • Check sea strainer for leaks • Check fresh water flush module for leaks • Re-prime system (restart)
No lights or display, system does not operate	• Remote display not connected • No power to control box	• Check display cable connections at back of display and at control box • Check and reset main DC supply breaker • Check for voltage (12 or 24 VDC) at control box power input studs • Try manual switch on MPC control box: If pump runs, then control or display is defective
Display activates, but pump will not run	• Loose or broken pump wire connection • Tanks are full (if equipped with tank switch)	• Check wiring at terminal block inside MPC • Check tanks– system cannot be started if tanks are full.
System runs, no product water delivered to water tanks, GPH bar graph shows OK, “Good” LED activated	• Diversion valve inoperative or wiring fault. • Disconnected or broken product tubing • Diversion valve plunger stuck	• Check wiring at diversion valve and inside control box • Check product tubing • Disassemble and clean diversion valve plunger or replace valve
System runs, no product water delivered to water tanks, GPH bar graph shows OK, “reject” LED activated	• High salinity of product water, causing system to reject water • Salinity probe out of calibration or defective, bad cable • Chlorine damage to membranes • Pressure relief valve open	• Check for low feed pressure • Check for leaks at high pressure hoses • Test product water with hand-held tester– if over 500 PPM for 1 hour, contact factory • Close pressure relief valve

Catalina 300 MkII Fault Alarms

SYMPTOMS	PROBABLE CAUSE	REMEDY
"System Stalled" ("system stalled" may alarm when using the control panel to run system for servicing with the pressure relief valve open– use manual override switch instead)	• Pressure relief valve open • Intake thru-hull closed • Airlocked system • No signal from Rotoflow meter	• Close pressure relief valve • Check thru-hull • Purge air • Clean or replace Rotoflow meter
"High Pressure"	• Blocked brine discharge • Fouled membrane	• Check brine discharge • Clean membrane
"Voltage Too High" "Voltage Too Low"	• Battery voltage too high or low • Loose wires or poor connections	• Charge batteries • Check charging voltage • Check power connections
"Re-starting"	• No signal from Rotoflow meter at startup. • System airlocked	• See remedy above for "system stalled"
"Check Fuse" (followed by fuse number)	• Blown fuse at circuit board	• Check first for cause, then replace fuse (mini automotive type ATM). See page 88.
"Service Prefilter"	• Clogged filters • Loose or defective pressure sensor wires	• Install new filters • Check sensor wiring • With clean filters, recalibrate Low Vacuum Limit or Clean Pressure (see pages 76-79).
"Salinity High"	• High product water salinity • Chlorine damage to membranes • Defective salinity probe or cable, cable disconnected	• Check for low feed pressure • Check for leaks at high pressure hoses • Remove and clean probe contacts. Check calibration • Check cable connections • Clean membrane

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 but not ideal, 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). Catalina systems, which have a higher feed to output pressure ratio (See nominal pressures under Flow Test, page 62), as well as a higher feed flow/membrane area ratio, will produce water in the 150-300 PPM range.

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. See page 66. 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 operating normal range, cleaning may have little result. Avoid cleaning as a diagnostic tool.

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.

If system flow (product plus brine) is 2.2 GPM or above, the membrane is clean, the product flows are consistent with the system flow and the water quality is still not acceptable, then replacement of the membrane is indicated.

Catalina 300 MkII Flow Test

The flow test is the most useful diagnostic test for system performance, and should be done before replacing or cleaning your membrane. Changes in production or water quality are normally caused by something **other than** the membrane, unless the system has been left unused for a long time.

Before the flow test, change all filters and clean the sea strainer. Carefully check for water or air leaks, as air in the system will cause low production and erratic salinity. Look for air bubbles in the product flow meter, feed water hoses, and brine overboard hose.

Run the system and watch the feed pressure very closely. If the feed pressure to the Clark Pump is asymmetrical from one stroke to another, this could be part of the problem. A difference of a few PSI is acceptable, but anything over that is an issue. If the pump is asymmetrical, Clark Pump repairs should be done before continuing with these tests.

If no asymmetry is noted, continue with this test.

You will need a graduated bucket and a stopwatch. Measurements must be very accurate, as errors of just a few percent will skew the results. Log the voltage at the feed pump at the same time. Confirm at least 12.5 volts at the pump on 12-volt systems. You may have to run the engine or battery charger during the test.

1. **Product Flow**: First divert the product flow into the bucket and record how long it takes to accumulate a given amount. Product flow is usually expressed in Gallons Per Hour or Liters Per Hour, so it's easiest and most accurate to collect the flow for exactly ten minutes, then multiply the quantity by six to get GPH or LPH. Alternatively, you can collect exactly one gallon or four liters then calculate GPH or LPH as follows:

   3600/time in seconds x quantity of water=GPH or LPH
   There are 3600 seconds in an hour.

   Example: It took 9 minutes, 45 seconds to collect 1 gallon of product water, so
   3600/585 x 1 gallon = **6.15 GPH**
   3600/585 x 4 liters = **24.62 LPH**
   (9 times 60 seconds is 540 plus 45 equals 585 seconds).

2. **Total Flow:** Connect the service hose to the brine discharge fitting and divert the brine discharge, and the product water, both into the bucket. Feed flow (brine discharge and product combined) is usually expressed in Gallons Per Minute or Liters Per Minute. For the simplest and most accurate measurement, divert exactly 5 gallons or 20 liters, record the time, and calculate GPM or LPM as follows:

   60/time in seconds x quantity of water = GPM or LPM

   Example: It took 3 minutes (180 seconds) to collect 5 gallons of feed flow, so
   60/180 x 5 = 1.67 GPM

In order to make good quality product water, you need the proper amount of feed water flow, as in the table below. Compare the product flow to the total feed flow. Product flow should be 9.5% of total flow for a Catalina 300 MkII. If product percentage is low, you may have an internal leak in the Clark Pump.

	AMPS				Feed		Static *	Feed Flow				Product Flow			
System	12V	MAX	24V	MAX	Press.		Press.	Flow		MIN	MIN	Flow	Flow	MIN	MIN
					psi	Bar	psi	gpm	lpm	gpm	lpm	gph	lph	gph	lph
Catalina	≈ 15	16	≈ 7	8	80-90	5.6-6.3	25-30	2.3	8.7	2.2	8.3	12.5	47.3	12.3	46.5

***pressure relief valve open ½ turn**

For every $^{1}/_{10}{}^{th}$ of a GPM feed water flow loss, we will lose about $^{1}/_{2}$ gallon per hour of product flow and the salinity will go up 100 PPM.

Low feed flow combined with low system pressures is most frequently caused by a worn pump head.

Technical Bulletins

The following pages include Spectra's most commonly-used technical bulletins, covering tests, adjustments, troubleshooting, and common points of confusion. Many more technical bulletins are available on the Spectra website, www.spectrawatermakers.com.

ACCUMULATOR PRESSURE

Your Catalina 300 MkII is supplied with two pressure accumulator tanks (PL-ACC-TK). One is installed in the feed water line between the feed pump and the Clark Pump, the second is installed between the sea strainer and the boost pump.

The purpose of the feed line accumulator is to reduce the spikes in the feed pressure caused by the cycling of the Clark Pump. If the accumulator is not properly charged it can lead to pressure spikes and system shut down. The accumulator has a Schrader air valve, like a car tire, which allows the internal air bladder of the accumulator to be pre-charged. The accumulator should be pumped up to about 60 psi (4.1 bar) for best results. Add air using a tire pump or air compressor. You can experiment with the exact pressure that will give the best pulsation dampening on your installation.

The second accumulator tank, installed between the sea strainer and the boost pump, absorbs pressure spikes from the cycling of the feed pump during fresh water flushes. It should be adjusted to 6 (six) PSI.

Schrader valve

PREFILTERS

During normal operation, the feed water is filtered in two stages. First it passes through a fine mesh metal sea strainer, which protects the boost pump from foreign materials and sea creatures. After passing through the boost pump, the feed water passes the filter housings containing the 5 micron element, removing very fine particles that could damage the feed pump or Clark Pump and shorten membrane life. An additional carbon filter prevents the entrance of chlorine during fresh water flushing (see next page).

Pre-filter maintenance schedules will vary widely depending on how and where the system is used. If large amounts of feed water are run through the system in biologically fertile near-shore waters the pre-filter will plug up, water production and quality will drop, and the system pressure will change dramatically. In blue water conditions the pre-filter may only need to be changed every week or two.

When operated for only an hour or two a day in inland or near-shore waters, the trapped plankton will begin to decay in the filters long before the elements plug up. The decaying plankton and bacteria will cause a rotten egg smell in the product water. This decay will set in overnight in tropical waters, or after a week or two in higher latitudes. If handled gently and changed regularly before they get too smelly, filters can be cleaned several times. (See Maintenance, page 52.)

Our filter element part numbers are FT-FTC-XX, where the last digits indicate the micron rating. FT-FTC-5 is for a 5 micron element, FT-FTC-20 is a 20 micron element. The optional oil/water separator is FT-FTC-OW.

5 Micron 20 Micron Optional Oil/Water Separator

CHARCOAL FILTERS

The charcoal filter element (FT-FTC-CC) removes chlorine from the fresh water flush water supply, as the RO membrane can only handle small amounts of chlorine without permanent damage.

The charcoal filter used for the fresh water flush system will not plug up unless you have very dirty domestic water in your boat's supply tank.

The charcoal filter we supply removes 99.7% of the chlorine. Beware when buying other charcoal filters. If they don't specify the percentage of chlorine removed, don't use them. Cheap ones may remove only 60% or 70%. Also, there are aftermarket filters which are very close to, but not exactly the right dimensions, and they will not seal in the housing. If you skimp on the charcoal filter you risk damaging a $600.00 membrane on the first flush. The other factor is the flow rate that the filter can handle. Because the chlorine is adsorbed by the charcoal, it must remain in contact with the charcoal for a sufficient period of time for the all of the chlorine molecules to be captured. The filters we use can handle 1.5 gallons (6 liters) per minute flow, and are good for 3000 gallons (12,000 liters) at 1.5 GPM, or six months, whichever comes first. Regardless of the amount of water treated, the charcoal loses its effectiveness after six months.

Charcoal filter, Spectra part number FT-FTC-CC

Performing a Fresh Water Flush with a Failed Salinity Probe

In the event of a “Salinity Probe Failed” alarm on the remote display the alarm function can be defeated to allow the system to remain in the Auto Store mode until repairs can be facilitated. Access the program mode, as outlined on page 76, Programming from the Display. Scroll through the menus until you reach the Disable Salinity heading. Press the Auto Store button once, this will change the setting from NO to YES. Wait 40 seconds for the display to timeout and return to the default screen. Press Auto Store once. The system will begin Auto Store Mode, flushing itself and then initiating the flush interval timer as outlined on page 46.

Performing a Fresh Water Flush with a Failed Inlet Pressure Transducer

In the event of a “Service Prefilter” alarm on the remote display **that cannot be cleared by replacing the pre-filters**, the alarm function can be defeated to allow the system to remain in the Auto Store mode until repairs can be facilitated. Access the Program Mode, as outlined on page 76, Programming from the Display. Scroll through the menus until you reach the Disable Salinity heading. Press the Auto Store button once, this will change the setting from NO to YES. Wait 40 seconds for the display to timeout and return to the default screen. Press Auto Store once. The system will begin Auto Store Mode, flushing itself and then initiating the flush interval timer as outlined on page 46.

MPC 5000 Programming and Controls

Introduction to the MPC 5000

Your new MPC 5000 with Battery Back-up is packed with features to make operating your Spectra Watermaker easy, intuitive, and automatic.

All operating data for your watermaker is at your fingertips, including Feed Pressure, Filter Condition, Water Quality, Operating Mode, and Elapsed Time Counter.

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

Your MPC control board can be calibrated and programmed from the remote display, quickly and easily, with only a few key strokes.

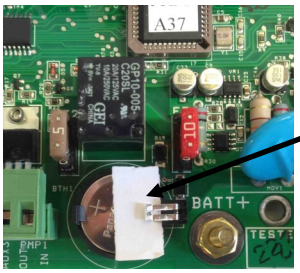
The Battery Back-up feature allows for temporary power interruptions without detrimental effects on the system. In some cases your watermaker will continue to function in its last known operating state.

Spectra MPC 5000 Operation Guide

This document outlines the MPC 5000 with Battery Backup operation. It details what is seen on the display, what outputs are active during run-time, and the functions of the different modes.

Catalina 300 MkII systems use a single feed pump that runs at one speed, with an added boost pump to ensure adequate water supply to the feed pump. These systems have two pressure sensors: The first is mounted before the feed pump to measure boost pump pressure and filter condition. The second is mounted after the feed pump to measure feed water pressure to the Clark Pump.

Prior to starting your system for the first time, remove the battery isolation tab located to the immediate left of the BATT + post on the MPC board.



Battery Isolation Tab

JP2 Jumper on (all Mk II systems)

Catalina systems use software Version A-37

JP1 Jumper on (all systems)

USB Type B Computer Connection

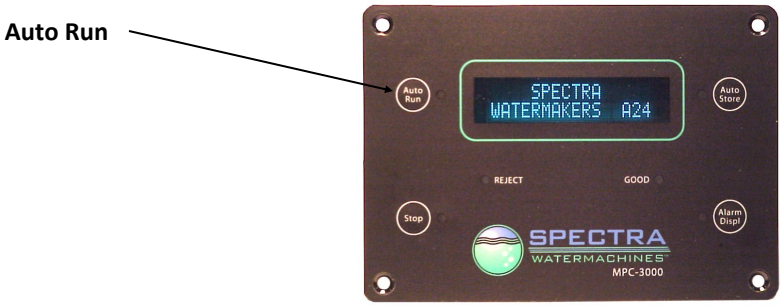
Battery

MPC 5000 Circuit Board

MPC 5000 Display Controls

Auto Run: Pressing the Auto Run button in the top left corner of the display activates the MPC's automated run sequence:

- The fresh water flush solenoid valve opens for 20 seconds to prime the feed pump. The display will begin to count down from 10, then feed pump will run.
- The system will now operate in Auto Mode for 1 hour, with the duration extended by one hour each time Auto Run is pressed.
- At the end of the run cycle, the system will perform a fresh water flush. At the end of the fresh water flush cycle, the MPC will start the Flush Interval Timer (factory default flush timer interval is set to 5 days; 30 days if your system includes the optional Z-Ion).
- At the end of the flush timer interval countdown the watermaker will perform another fresh water flush and restart the flush interval timer.
- The flush interval and flush cycle will repeat themselves until the user enters another command.



Auto Store: Pressing the Auto Store button, in the top right corner of the display, will activate the automated storage sequence. This will automatically store the system, performing a fresh water flush once every 1 - 30 days, according to the flush timer interval settings programmed into the MPC:

- The fresh water flush solenoid will open and the feed pump will run.
- At the end of the fresh water flush cycle, the MPC will start the flush interval timer (factory default flush timer interval is set to 5 days; 30 days if your system includes the optional Z-Ion).
- At the end of the flush timer interval countdown, the watermaker will perform another fresh water flush, and restart the flush interval timer.
- This process will repeat itself until the user enters another command.

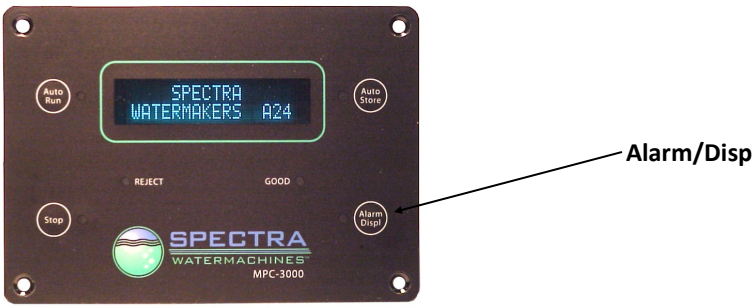
MPC 5000 Display Controls continued...

Stop: Pressing the Stop button in the lower left corner of the MPC display will stop any current action. In standby mode pressing Stop will activate the manual run sequence:

- The fresh water flush solenoid valve opens for 20 seconds to prime the feed pump. The display counts down from 10, then feed pump will run.
- The system will run indefinitely until the user ends the run cycle by pressing either the Stop or Auto Store buttons.
- **If the Stop button is pressed to end the manual run sequence a fresh water flush will not be initiated and raw water will sit throughout the system until another command is given. After pressing Stop it is advisable to use the Auto Store button, which will initiate a fresh water flush and restart the flush interval timer.**

Alarm/Displ: The Alarm/Displ button has several functions, depending on the current state of the system:

- **Alarm Active:** Pressing Alarm/Displ will silence the alarm. Pressing it again will reset the alarm if the underlying condition has been corrected.
- **Default Screen:** Pressing Alarm/Displ from the default screen will display the number of hours the system has run.
- **During Run Cycle:** Pressing Alarm/Displ during a run sequence will scroll through the watermaker's operating parameters: Run Mode, Production Volume, Feed Water Pressure, Filter Condition, Boost Pressure, Production Quality, and Hours.



MPC 5000 Display Controls continued...

Auto Fill Mode: Pressing and holding Auto Run for 5 seconds will start the MPC in the Auto Fill Mode:

- In this mode the system will automatically start, flush, store and restart itself based on the tank level. This mode requires that the optional float switches are installed in your tank, as detailed on pages 27-28.
- **It is not advisable to operate your watermaker unattended. Severe damage to the vessel, watermaker, or other equipment may result.**

Auto Run for 5 seconds:
Auto Fill Mode

Single Flush: Pressing and holding the Auto Store button for 5 seconds will activate the single flush mode:

- The system will perform a single fresh water flush, then return to the default screen, displaying “Spectra Watermakers X-XX”.
- **The system will remain in standby mode indefinitely until another key is pressed.**

Auto Store for 5 seconds:
Single Flush Mode

Programming from the Display

To enter **Program Mode** the system must be in **Standby Mode.** If the system has been depowered recently you may need to *bypass the Purge Sequence* by pressing Auto Run and Stop at the same time.

To enter Standby Mode, press the Stop button from any other mode. The display will read SPECTRA WATERMAKERS A-XX. To have the watermaker running during the programming process, start the machine using the run manual toggle switch on the control box. The watermaker will run but the controls will be in standby mode.

To Enter Program Mode push and hold the Stop and Alarm/Displ buttons at the exact same time, holding them down for 4 seconds, after which the display should read "System Units." If the display doesn't read System Units, try again.

After entering Program Mode the buttons on the display will have different secondary functions as follows:

Alarm/Displ: Scrolls through the various programming windows.

Stop: Selects the digit in the Rotoflow meter calibration constant window to be changed. Has no function in other windows.

Auto Run: Changes the selected parameter down one unit per push.

Auto Store: Changes the selected parameter up one unit with per push.

To Exit Program Mode: Press and release the Stop and Alarm/Displ buttons simultaneously. The control will automatically revert from Program Mode to Standby Mode if no buttons are pressed for 40 seconds.

The programming windows and their functions:

SYSTEM UNITS: Select Imperial (gallons, PSI) or Metric (liters, bar) by pressing Auto Run or Auto Store.

FLOW SENSOR TYPE: Select **Rotoflow** with the Auto Run or Auto Store buttons.

PRESSURE RANGE: For the Catalina's 0-125 PSI pressure gauge, select **Low**.

DISABLE AIR LOCK: THIS IS A SAFETY SHUTDOWN. **SELECT NO**. Do not select YES unless the system is shutting down on a "System Stalled" alarm due to a **failed Rotoflow meter.**

DISABLE PREFILTER: THIS IS A SAFETY SHUTDOWN. **SELECT NO**. Select YES only if you are getting a **FALSE "Service Prefilters" alarm**.

DISABLE PRESSURE: THIS IS A SAFETY SHUTDOWN. **SELECT NO**. Select YES only if you are getting a **FALSE "High Pressure" alarm.**

DISABLE SALINITY: Factor default is **NO**. This function allows you to run the watermaker in the event of a salinity probe, probe cable, or salinity sensing circuit failure. If you get a "Salinity Probe Failed" alarm or the salinity reading cannot be properly calibrated using the Salinity Cal function, select YES to continue making water. **WARNING: When "YES" is selected the diversion valve will be energized whenever the watermaker is running and all product water will be sent to the vessel's water tank regardless of its quality.** Before disabling the Salinity Probe, test the product water carefully and regularly.

Note: As long as any of the above functions are disabled, the red LED next to the Alarm/Displ button will flash.

PPM THRESHOLD: Set this parameter to the desired salinity level to reject the product water. The diversion valve will send water to the water tank when the product parts per million is lower than this set point and reject the product overboard when the salinity is higher than the set point. Factory default setting is **748 PPM**.

PRESSURE LIMIT: If the pressure at the feed pump discharge exceeds this set point the unit will shut down and alarm "High Pressure." The left hand number on the display is the real time feed pressure, as read by the sensor (marked red) on the feed pump output. The number on the right is the high pressure limit. Factory default for the Catalina models is **125 PSI**.

LOW VACUUM LIMIT: Set point for the maximum allowable pressure drop through the prefilter. If the inlet pressure reading drops below this point the unit will alarm "Service Prefilter" and shut down. This set point is in absolute pressure, and determines the "Replace" end of the Prefilter Condition bar graph. In most cases this parameter should be set to 10.

FLOW CONSTANT: The flow constant calibrates the product flow reading. The number on the left is the real time flow reading and the number on the right is the flow constant. The flow constant is set by selecting the desired digit to be changed by pushing the Stop button until the digit to be changed is flashing. Push Auto Run to decrease the value or Auto Store to increase the value. Then select the next digit to be changed with the Stop button. The flow constant is most easily adjusted with the watermaker running with the switch on the control box set to Run Manual. Measure the product flow using a graduated container and a stop watch. Adjust the flow constant until the flow reading matches the measured flow. The flow reading is heavily dampened and will take some time to stabilize after changes are made to the constant. The factory default setting for Catalina models is **25000**.

SALINITY CAL: This window is used to calibrate the salinity sensor. The number on the left is the real time salinity reading and the number on the right is the calibration setting. Increase the setting to raise the reading. The factory default setting for Catalina models is **60**. See **Salinity Probe Calibration** on page 79 for details.

INLET OFFSET: This parameter calibrates the boost pressure sensor found on the intake manifold of the feed pump (marked yellow). The number on the left is the real time pressure reading and the number on the right is the offset. The reading can be increased or decreased by putting a positive or negative number in the offset setting.

OUTLET OFFSET: Outlet Offset calibrates the sensor on the outlet of the feed pump which is used to determine feed pressure (marked red). The number on the left is the real time pressure reading and the number on the right is the Offset in PSI or bar.

BRIGHTNESS: The brightness may be adjusted from 0 to 4. Factory default is 0.

FLUSH DURATION: This parameter sets the length of the fresh water flush in minutes. Factory default is 5.

PUMP ON TIME: Sets the length of time, in seconds, that the feed pump will cycle on during a fresh water flush. Combined with Pump Off Time, the feed pump will cycle on and off during the flush cycle, permitting the correct flow of flush water to pass through the charcoal filter. Factory default is 3.

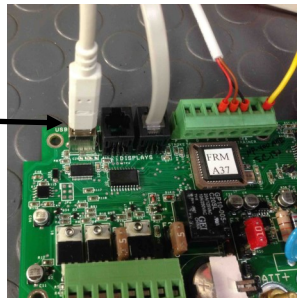
PUMP OFF TIME: Sets the time in seconds that the flush valve is open, but the feed pump is not running. Combined with Pump On Time, this allows the right flow of fresh water through the charcoal filter. Factory default is 6.

FLUSH INTERVAL: This is the time in days between automatic flushes when the system is in Auto Store mode. The Flush Interval is programmed in days, but the Flush Interval Timer will count down in hours. Factory default is 5 days; 30 days with the optional Z-Ion.

CLEAN PRESSURE: This should be set to the pressure seen at the inlet sensor when the system is running with a brand new pre-filter. After installing a new filter, run the machine using the Auto Run button. The number on the right is adjusted to be the same whole number as the number on the left, which is the inlet sensor reading. This parameter sets the “Clean” end if the prefilter condition bar graph.

MPC 5000 Software may be loaded from www.spectrawatermakers.com or CD ROM, and installed on most Windows-based computers. The computer must then connect to the MPC board with a USB cable with a type B connector on one end, as shown. Due to wide variations in computers and operation systems, Spectra cannot provide installation support, and we only recommend this software for experience technicians. **All parameters and programming can be easily accessed from the MPC display, without this software.**

Type B connector plugged into MPC circuit board



Salinity Probe Calibration

Salinity is a measurement of dissolved solids in liquid. These solids will conduct electricity to varying degrees. A probe with two electrical contacts determines the resistance to the flow of electricity in the liquid. The higher the resistance, the fewer the PPM (parts per million) of dissolved solids. Spectra considers water below 750 PPM to be potable, and water below 500 PPM to be excellent.

The salinity probe is located in the diversion valve manifold, connected to the product water line from the membrane. The salinity probe monitors the salinity level of the product water before deciding to either reject the water and send it overboard, or accept it and divert it into the tank.

The salinity level in PPM can be seen on the remote display.

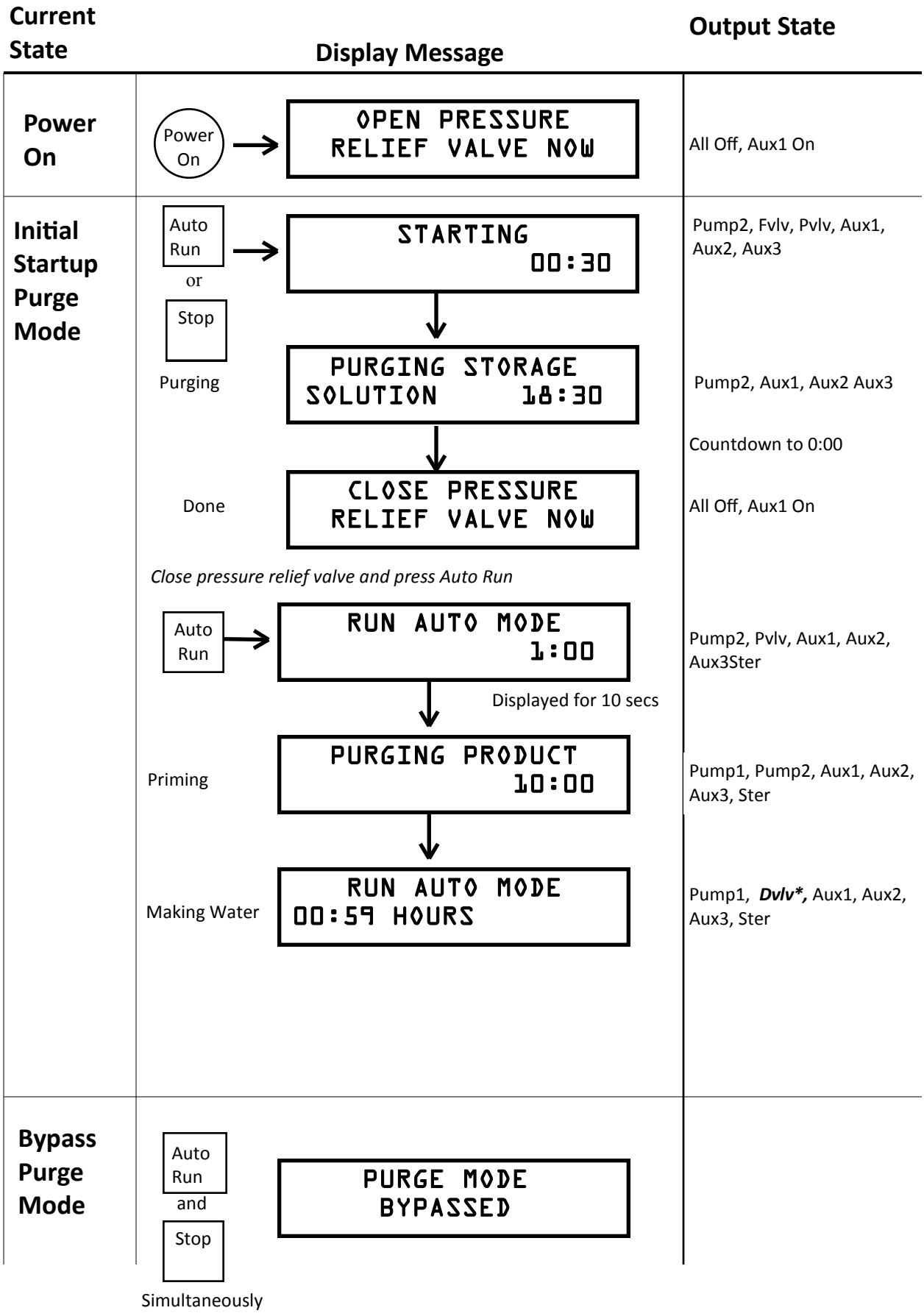
Using a hand-held tester, note the salinity in PPM of your product water after the unit has been running. Be sure to calibrate the hand-held salinity meter as per the manufacturer's instructions.

Access the Program Mode from the remote display (simultaneously press and hold the Stop and Alarm/Displ buttons for 4 seconds). Press Alarm/Displ to scroll through the menus until you reach the Salinity Cal heading.

The number on the left is the real time salinity reading and the number on the right is the calibration setting. Increase or decrease the setting until the number on the left corresponds to the number acquired from the handheld tester.

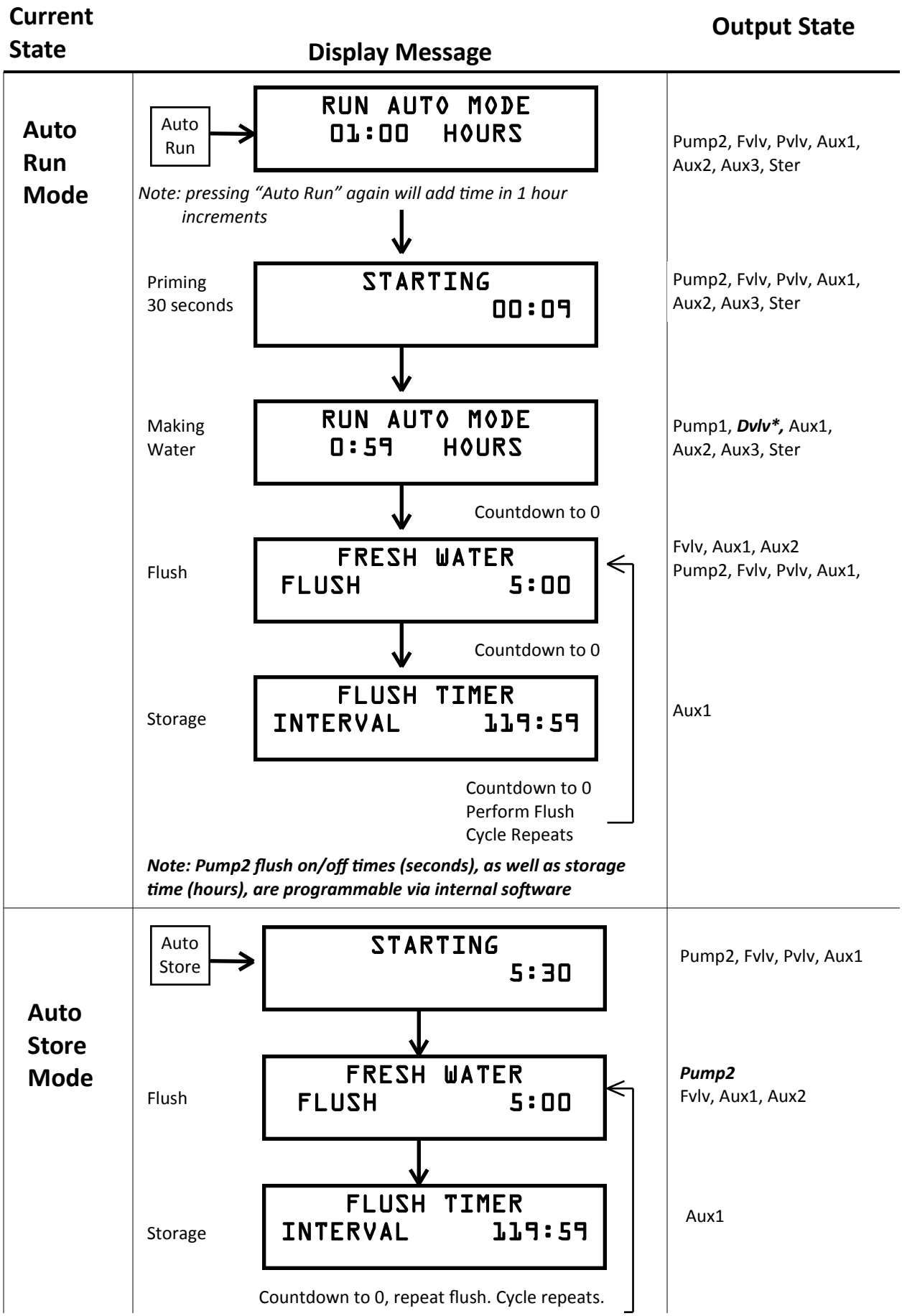
Note: Occasionally you may need to calibrate the handheld salinity tester. In order to properly calibrate, a water sample of known salinity must be acquired. These are available from Spectra, part number EL-SLT-CGS8.

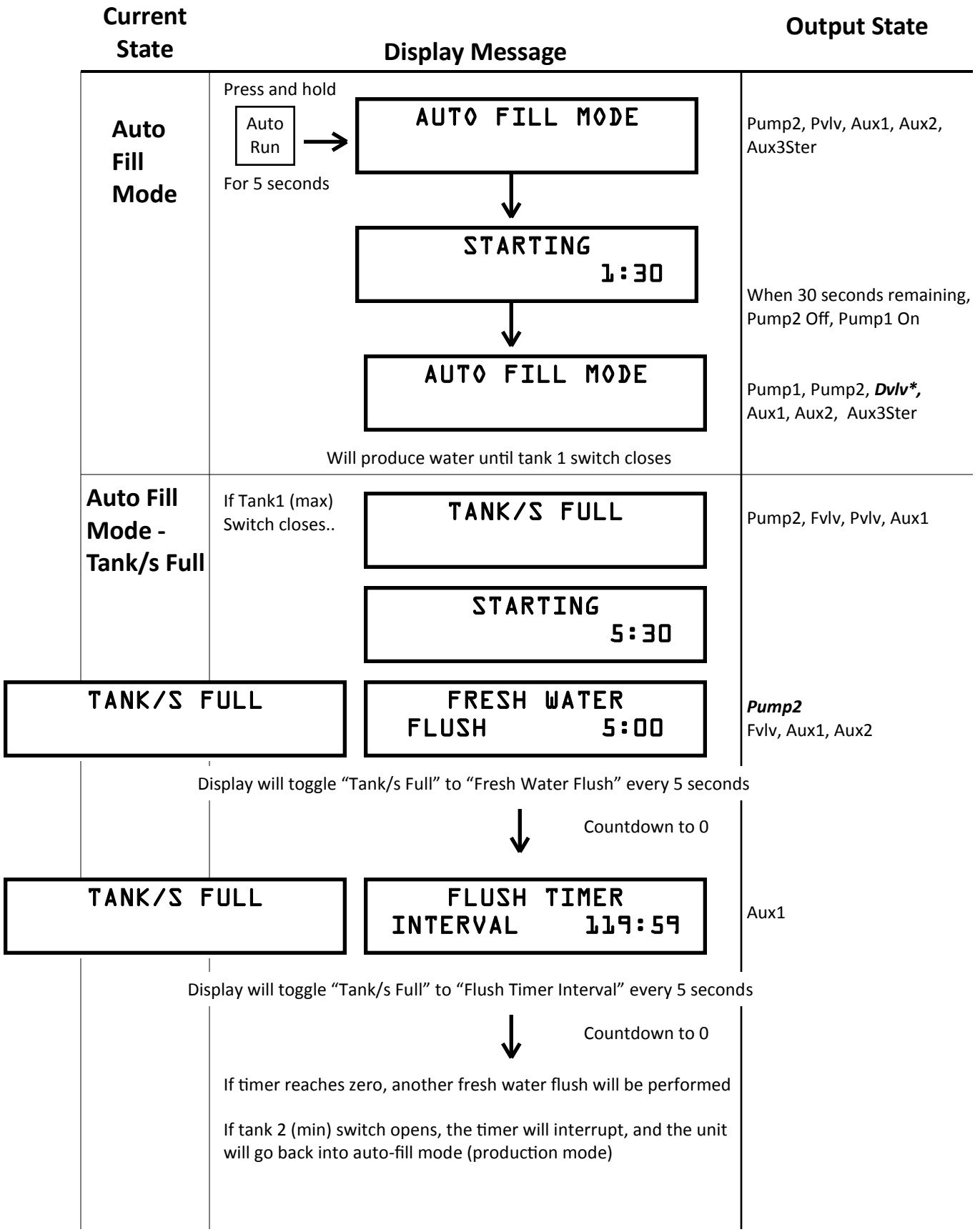
Display Messages and Output States



Cur-rent State	Display Message	Output
Manual Run Mode	Stop → RUN HIGH MODE	Pump2, Fvlv, Pvlv, Aux1, Aux2, Aux3, Ster
	Displayed for 20 secs ↓	
Priming	STARTING 00:09	Pump2, Fvlv, Pvlv, Aux1, Aux2, Aux3, Ster
	↓	
Making Water	GPH PRODUCT 17.2	Pump1, ***Dvlv*,*** Aux1, Aux2, Aux3, Ster

NOTE:
If salinity is out of tolerance, the diversion valve will close, and the "reject" LED will be lit. Salinity must drop below tolerance diversion valve will open.


Current State
Display Message
Output State
Auto Run Mode
Auto Run
RUN AUTO MODE
01:00 HOURS
Pump2, Fvlv, Pvlv, Aux1, Aux2, Aux3, Ster
Note: pressing "Auto Run" again will add time in 1 hour increments
Priming 30 seconds
STARTING
00:09
Pump2, Fvlv, Pvlv, Aux1, Aux2, Aux3, Ster
Making Water
RUN AUTO MODE
0:59 HOURS
Pump1, Dvlv*, Aux1, Aux2, Aux3, Ster
Countdown to 0
Flush
FRESH WATER
FLUSH 5:00
Fvlv, Aux1, Aux2
Pump2, Fvlv, Pvlv, Aux1,
Countdown to 0
Storage
FLUSH TIMER
INTERVAL 119:59
Aux1
Countdown to 0
Perform Flush
Cycle Repeats
Note: Pump2 flush on/off times (seconds), as well as storage time (hours), are programmable via internal software
Auto Store Mode
Auto Store
STARTING
5:30
Pump2, Fvlv, Pvlv, Aux1
Flush
FRESH WATER
FLUSH 5:00
Pump2
Fvlv, Aux1, Aux2
Storage
FLUSH TIMER
INTERVAL 119:59
Aux1
Countdown to 0, repeat flush. Cycle repeats.


Current State
Display Message
Output State
Auto Fill Mode
Press and hold
Auto Run
For 5 seconds
AUTO FILL MODE
Pump2, Pvlv, Aux1, Aux2, Aux3Ster
STARTING
1:30
When 30 seconds remaining, Pump2 Off, Pump1 On
AUTO FILL MODE
Pump1, Pump2, Dvlv*, Aux1, Aux2, Aux3Ster
Will produce water until tank 1 switch closes
Auto Fill Mode - Tank/s Full
If Tank1 (max) Switch closes..
TANK/S FULL
Pump2, Fvlv, Pvlv, Aux1
STARTING
5:30
TANK/S FULL
FRESH WATER FLUSH 5:00
Pump2
Fvlv, Aux1, Aux2
Display will toggle "Tank/s Full" to "Fresh Water Flush" every 5 seconds
Countdown to 0
TANK/S FULL
FLUSH TIMER INTERVAL 119:59
Aux1
Display will toggle "Tank/s Full" to "Flush Timer Interval" every 5 seconds
Countdown to 0
If timer reaches zero, another fresh water flush will be performed
If tank 2 (min) switch opens, the timer will interrupt, and the unit will go back into auto-fill mode (production mode)

System Alarms and Faults

HIGH PRESSURE

If Feed/Membrane Pressure > Pressure Limit

Shutdown,
Audible Alarm
Alarm LED lit

RESOLUTION:

- Check for kinked or blocked hoses
- Confirm 'Outlet Offset' in Program Mode
- Clean Membrane
- Clark Pump problems - see tech bulletin CP5

SYSTEM STALLED

If no product for 30 seconds:

Countdown to 0, **retry previous mode**

If still no product

Countdown to 0, **retry previous mode**

If still no product

Shutdown,
Audible Alarm
Alarm LED lit

RESOLUTION:

- Confirm product water at membrane endcap
- Check intake line for restrictions, blockages or air leaks
- Close Pressure Relief Valve on Pump
- Check Rotoflow Meter wiring
- Confirm MPC settings correct

SERVICE PREFILTERS

If difference in inlet and outlet pressures exceeds the differential limit

Shutdown,
Audible Alarm
Alarm LED lit

RESOLUTION:

- Change prefilters
- Check for obstructions in intake line
- Check sensor for proper operation
- Check sensor cables

System Alarms and Faults

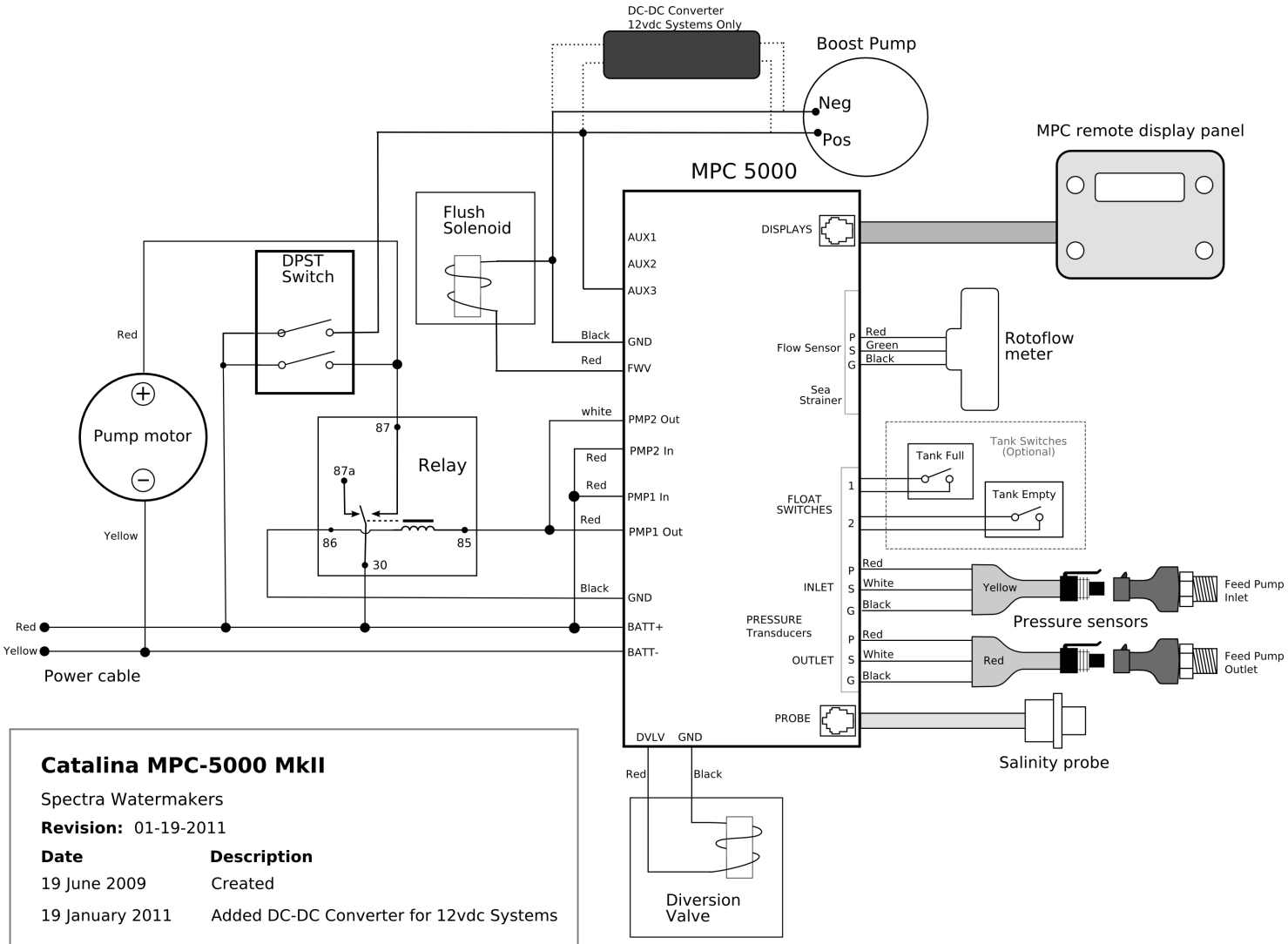
LOW VOLTAGE If DC Input voltage too low: 	Begin FWF Mode To Shutdown RESOLUTION: • Check wiring to MPC board • Check battery state
SALINITY PROBE FAILED If salinity probe bad or disconnected: 	Shutdown RESOLUTION: • Check probe connections • Replace probe
CHECK FUSE If blown fuse  (Where 'x' represents number of blown fuse (1-7)	Shutdown RESOLUTION: • Check equipment connected to corresponding output • Replace fuse (see page 88)
TANK/S FULL If Tank1 AND Tank2 switch closed for 2 minutes:  Depending on operating mode, system may at this point begin a fresh water flush, begin storage mode, or shut down. Refer to "Operating Modes".	
POWER INTERRUPT If power is interrupted to the MPC board for up to 10 days 	

System Alarms and Faults continued...

HIGH SALINITY		Begin FWF Mode Audible Alarm Alarm LED lit
If salinity above tolerance:	Reject lamp lit, 20 minute internal counter begins	RESOLUTION: • Check pump operation • Check Clark Pump • Check Feed Pump • Confirm product water quality • Clean or replace membrane • Recalibrate salinity probe • Clean or replace probe
If salinity above tolerance for 20 minutes::	SALINITY HIGH FLUSH 5:00	
Shutdown	SALINITY HIGH	

If the power supply to the MPC Control Board is disrupted for any reason, the MPC Control Board will retain its last known state. Once power is restored to the board, internal logic in the MPC will determine the best action.

***Note: One some MPC 5000 systems with battery back-up there will be a ten second delay while the system reboots after restoring power. During this delay the remote display may show an Alphanumeric code. This is normal, and the board will reset itself shortly.*



Catalina MPC-5000 MkII

Spectra Watermakers

Revision: 01-19-2011

Date	Description
19 June 2009	Created
19 January 2011	Added DC-DC Converter for 12vdc Systems

MPC 5000 FUSES

The CHECK FUSE alarm indicates that one of the seven fuses on the MPC-5000 Printed Circuit Board has blown. These fuses are the flat, color-coded, small ATM automotive style. The display will indicate by number which fuse has blown, and the fuse bases are numbered on the board. Before replacing the fuse, find and repair the problem that caused the fuse to blow. The fuses supply power to the terminal strip on the PCB as follows:

Fuse F1 (**5 Amp)**:	PVLV Priming valve solenoid
	FWV Fresh water flush valve solenoid
Fuse F2 (**5 Amp)**:	AUX 3. Optional boost pump
Fuse F3 (**10 Amp)**:	PMP1, Feed pump number 1
Fuse F4 (**5 Amp)**:	DVLV, Diversion valve solenoid
Fuse F5 (**10 Amp)**:	PMP 2, Feed pump number 2
Fuse F6 (**10 Amp)**:	AUX 1, Powered when display illuminated
	AUX 2, Powered during run cycle
Fuse F7 (**5 Amp)**:	STER, Powered when feed pump running. Optional ultraviolet sterilizer.

Before replacing fuses, shut off the main power supplies. Remove the lead wire that goes to the affected component from the terminal strip. Using a digital ohmmeter, check the circuits for dead shorts. You should see about 10 ohms or more on the solenoid valve circuits.

MCP 5000 Electrical Specifications

Operating voltage limits: 11.6 – 13.8 for 12-volt systems, 23.2 – 27.6 for 24-volt systems
Controller power consumption, mAmp – 700 maximum

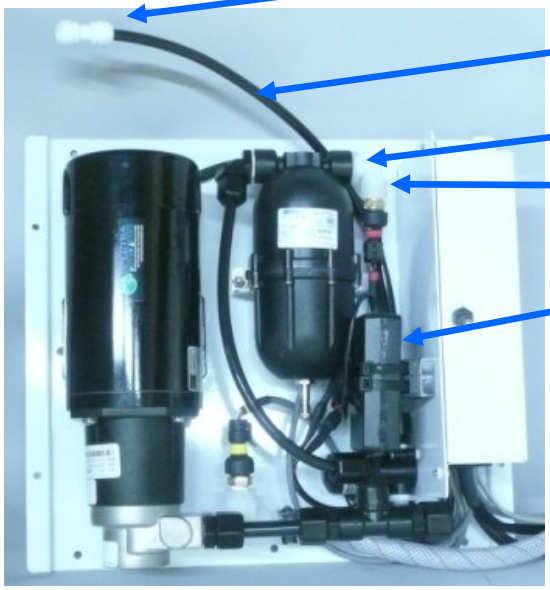
Outputs:

BUZZ – 100 mA DC Piezo buzzer.
PVLV – 2.5 Amp DC priming valve solenoid.
FWV – 2.5 Amp DC fresh water valve solenoid.
AUX3 – 5 Amp DC auxiliary output.
PMP1 – 15 Amp DC auxiliary water feed pump.
DVLV – 10 Amp DC diversion valve solenoid, modulated at 17% duty cycle after 2.5 seconds to reduce power consumption.
PMP2 - 15 Amp DC main water feed pump.
AUX1 - 2.5 Amp DC auxiliary output.
AUX2 – 2.5 Amp DC auxiliary output.
STER – 5 Amp DC sterilizer.

Exploded Views and Part Numbers

Part Numbers

CATLINA MK2-Z FEED PUMP MODULE **SUB-CT-M2-FPMA**



PL-UNN-3/8TJG
3/8" JOHN GUEST COUPLING

PL-NLT-3/8LP
3/8" LOW PRESSURE TUBING

PL-BSH-1/2X1/4N
1/2" TO 1/4" BUSHING

PL-MFF-1/4X31/4
1/4" NPT STREET ELL

EL-PS-1`9V90WCAD
VOLTAGE BOOSTER FOR BOOST PUMP (12 Volt models only)

CATLINA MK2 FEED PUMP MODULE **SUB-CT-M2-FPMA**
SOME PARTS ABOVE REMOVED FOR CLAIRTY

PL-ACC-TK
ACCUMULATOR TANK

EL-SSR-150
150 PSI PRESSURE SENSOR

PL-NLT-3/8LP
3/8" LOW PRESSURE TUBING

PL-MTS-1/4X3/8
1/4" NPT X 3/8" TUBE FITTING

PL-SLN-1/4O12
12V FRESH WATER FLUSH SLOENOID

PL-TEE-3/8PP
3/8" FPT TEE

PL-HS-5/8
5/8" NYLON BRAIDED HOSE

PL-HBS-1/2X5/8
1/2" NPT X 5/8 HOSE NYLON

PL-MTE-1/2X1/2P
1/2" NPT X 1/2" TUBE ELL

EL-MTR-1/6D12
12 VDC MOTOR
EL-MTR-1/6D24
24VDC MOTOR

EL-SSR-ABS
ABSOLUTE PRESSUR SENSOR

PL-NP-3/8N
3/8" CLOSE NIPPLE NYLON

KIT-PMP-100MRF
MAG DRIVE PUMP

PL-TEE-1/2F1/4G
1/2" X 1/4" NYLON GAUGE TEE

PL-MTE-3/8X1/2P
3/8" NPT X 1/2" TUBE FITTING

PL-MTE-1/4X3/8
1/4"NPT X 3/8" TUBE FITTING

Part Numbers

Sea Strainer & Accumulator plumbed for Fresh Water Flush circuit

PL-BHF-3/8TPIEJ
3/8" STEM ELBOW JG

PL-BHF-3/8TSTJG
3/8" BULKHEAD FITTING JG

PL-HBS-3/4X3/4N
3/4"X3/4" HOSE BARB NYL

FT-STN-5
5" SEASTRAINER ASSY

FT-STN-5S
STRAINER SCREEN

PL-CKV-3/4F-F
3/4" CHECK VALVE

PL-HBS-3/4X3/4
3/4" HOSE BARB NYL

PL-NP-3/4N
3/4" NIPPLE NYL

SO-STN-5SS
SEA STRAINER GASKET

PL-ACC-TK
ACCUMULATOR TANK

PL-HBS-1/2X3/4
1/2" X 3/4" HOSE BARB

PL-TEE-1/2FN
1/2" TEE NYL

PL-NP-1/2N
1/2" NIPPLE NYL

PL-HP-1/2N
1/2" PLUG NYL

Boost Pump Module

PL-VLV-3W3/4
3/4" 3-WAY VALVE

PL-HBE-3/4X3/4
3/4" NPT X 3/4" HOSE BARB ELL NYLON

PL-MFF-3/4X3/4
3/4"MPT X 3/4"FPT ELBOW FITT. NYLON

PL-BSH-3/4x1/2N
3/4"NPT x 1/2" NPT hex bushing reducer

EL-FP-BPLDC824
300-1000 BOOSTER PUMP DC 8-24 Volts

PL-VLV-3W3/4
3/4" 3-WAY VALVE

PL-GHF-GC
GARDEN HOSE CAP

PL-GHF-WS
GARDEN HOSE WASHER VINLY

PL-GHF-3/4NP
3/4"NPT X 3/4"GHT NIPPLE

Carbon filter for Fresh Water Flush

PL-BSH-3/4X1/4N
3/4" X 1/4" HEX BUSHING REDUCER NYL

PL-MFF-1/4X1/4
1/4"NPT X 1/4"FPT ELBOW FITTING NYL

PL-NP-1/4N
1/4" NPT CLOSE NIPPLE NYLON

PL-PRG-1/4P
1/4" WATER PRESSURE REGULATOR

PL-HBS-1/4X1/2
1/4" NPT X 1/2" HOSE BARB ST. NYLON

PL-VLV-3/4PVC
3/4"NPT X 3/4"FPT 1-WAY PVC VALVE

PL-HBE-3/4X1/2
3/4 NPT X 1/2"HOSE BARB ELL. NYLON

FT-FTH-10L3PCS
10" LOW PRESS. FILTER HOUSING 3 PCS

FT-FTC-CC
CHARCOAL FILTER (inside housing)

Clark Pump & Membrane Assembly
NOTE: The compact version (two 20” membranes) is shown.

FM-PVB-PBE
PLATE BRACKET END

PL-MTE-3/8X3/8P
3/8"NPT X 3/8"TUBE FITTING ELL. NYL

PL-MTS-1/2X1/2P
1/2"NPT X 1/2"TUBE FITTING ST. NYL

DIVERSTION VALVE ASSEMBLY
(SEE PG. 64)

PL-QDC-BD3/8
NYLON QUCK DISCONNECT BODY

FM-PVB-PB
PLATE BRACKET

KIT-HP-MNTK
SPECTRA MOUNT KIT ASSEMBLY

Pressure Vessel end cap assembly

PL-FTE-1/8X1/4P
1/8"FPT X 1/4"TUBE FIT-TING ELL

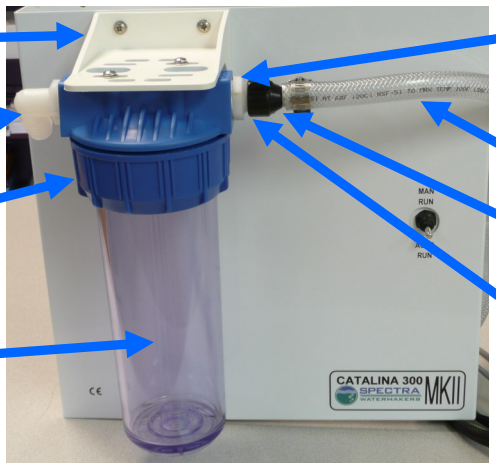
PL-NP-1/8N
1/8"NPT CLOSE NIPPLE NYLON

PL-MTS-3/8X1/2B 3/8" NPT X 1/2" TUBE FITTING ST. BRZ.

SO-HPP-CT
CONNECTOR O-RING

FT-PV-EP1
PRESSURE VESSEL END CAP

Filter Housing (5 micron)



FT-FHB-3PCSHSS
MOLDED FILTER BRACKET

PL-HBE-3/4X3/4
3/4” NPT X 3/4” HOSE BARB ELL NYLON

FT-FTH-10L3PCS
3 PIECE 10” FILTER HOUSING

FT-FTC-5
5 MICRON FILTER ELEMENT (NOT SHOWN)

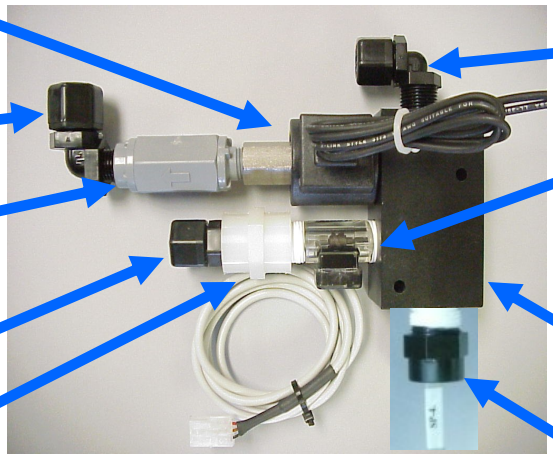
PL-BSH-3/4X1/2N
1/2"NPT X 3/8"NPT CLOSE NIPPLE NYL

PL-HS-5/8VN
5/8” Nylon Braided Hose

PL-HBE-SFPA
SHURFLO PORT ADAPTOR

PL-NP-1/2X3/8N
1/2"NPT X 3/8"NPT CLOSE NIPPLE NYL

Diversion Valve Manifold Assembly



PL-SLN-1/4D12D 1/4" DIVERSION VALVE 12V

PL-MTE-1/4X3/8P 1/4"MPT X 3/8" TUBE ELBOW

PL-MTS-3/8X1/4P 3/8"FPT X 1/4"TUBE FITT ST.

PL-UNN-3/8X1/4N REDUCING COUPLING

PL-MTE-3/8X1/4P 3/8" MPT X 1/4" TUBE ELBOW

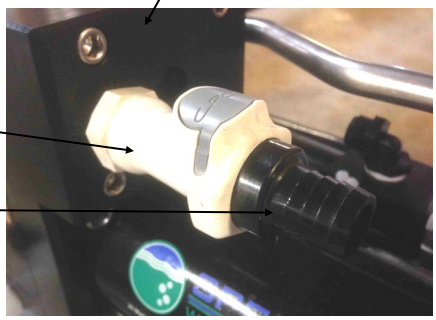
EL-SSR-IFM INLINE FLOW METER SENSOR

SUB-NP-DVM DIVERSION VALVE MANIFOLD

EL-MPC-SP4 SALINITY PROBE

HP-TB-VEB-B Valve End Block B

Brine Discharge Quick Connect



PL-QDC-BD3/8 3/8"NPT Quick Disc. Coupling Body

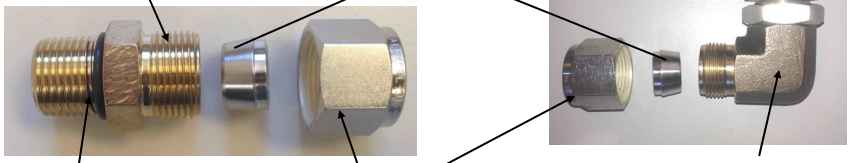
PL-QDC-HB5/8 5/8" Quick Disc. Fitting Hose Barb

High Pressure Fittings

SUB-MTS-3/8X1/2 Nickel-Bronze High Pressure Straight Fitting

SO-FT-STF 3/4"-16 Straight Thread O-RING

PL-HWR-1/2FR 1/2" Stainless Ferrule



Connector O-RING **SO-HPP-CT**

Stainless Fitting Hex Nut **PL-HWR-1/2HN**

PL-MTE-3/4S1/2B 3/4"-16 ST X 1/2"TUBE FITT. ELL BRONZE

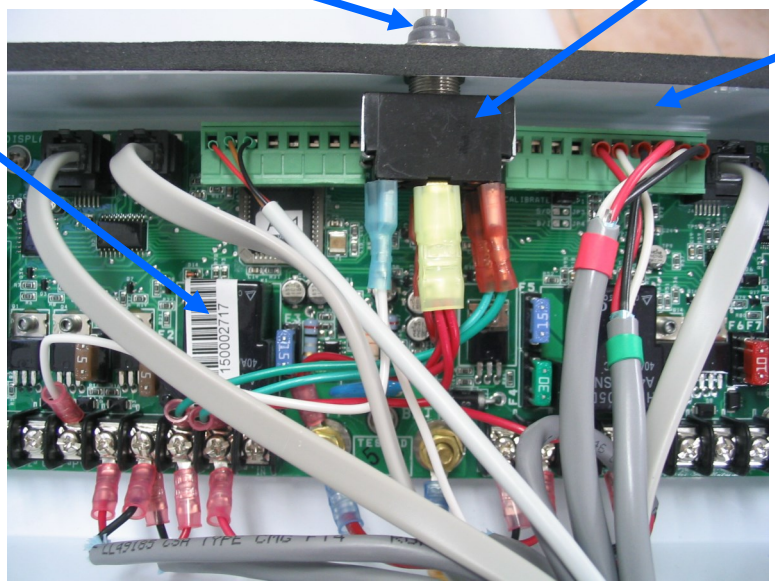
MPC 5000 Control Box

EL-SWT-TG-DPDT
TOGGLE SWITCH DP/DT

EL-SWT-TSBHC
TOGGLE SWITCH BOOT SEAL

FM-MPC-MPCB
MPC BOX

EL-MPC-PCBDPB
MPC-5000 CIRCUIT BOARD

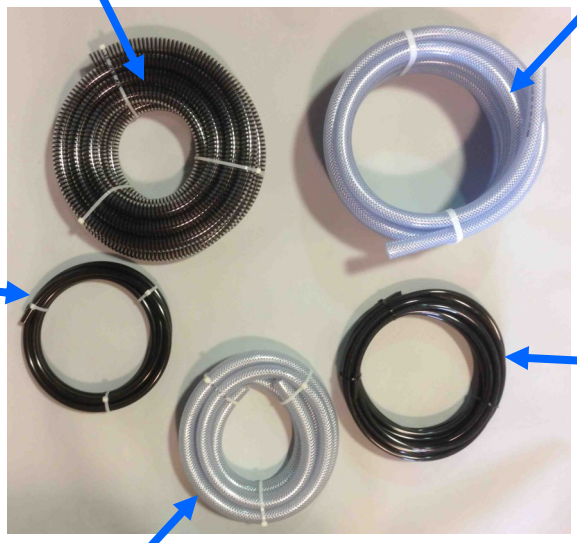


Hoses and Tubes

PL-HS-3/4SH
3/4" REINFORCED SUCTION HOSE

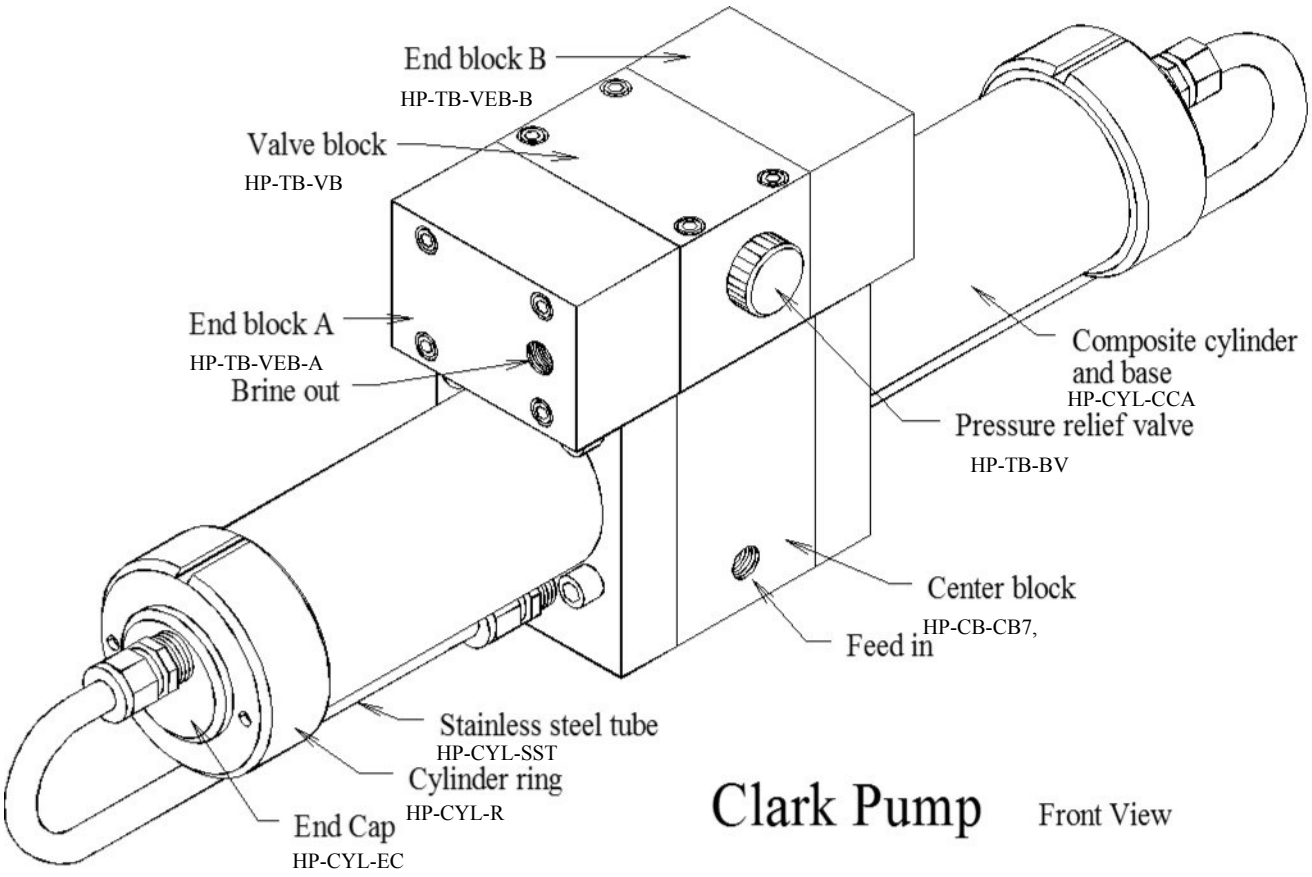
PL-HS-5/8VN
5/8" VINYL HOSE

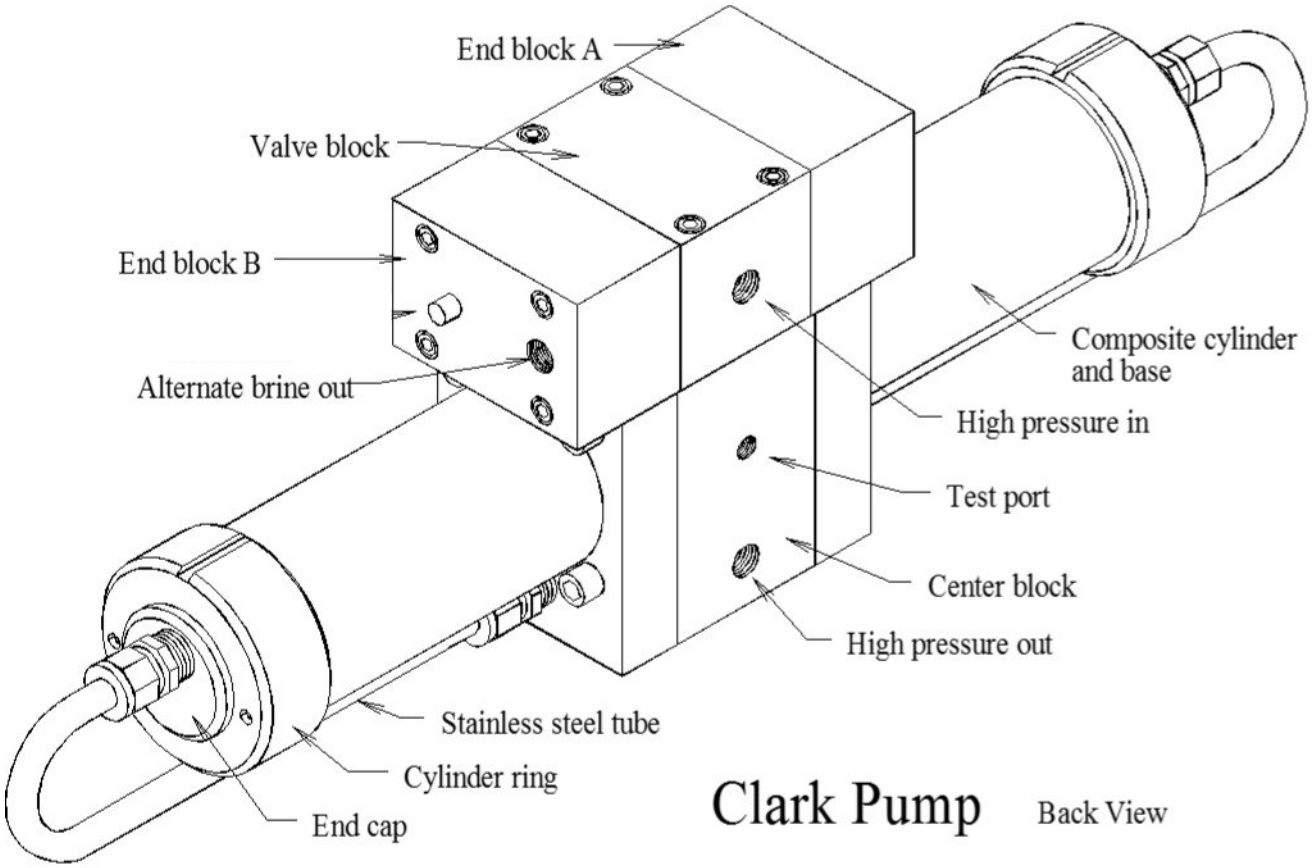
PL-NLT-1/2LP
1/2" LOW PRESSURE TUBING



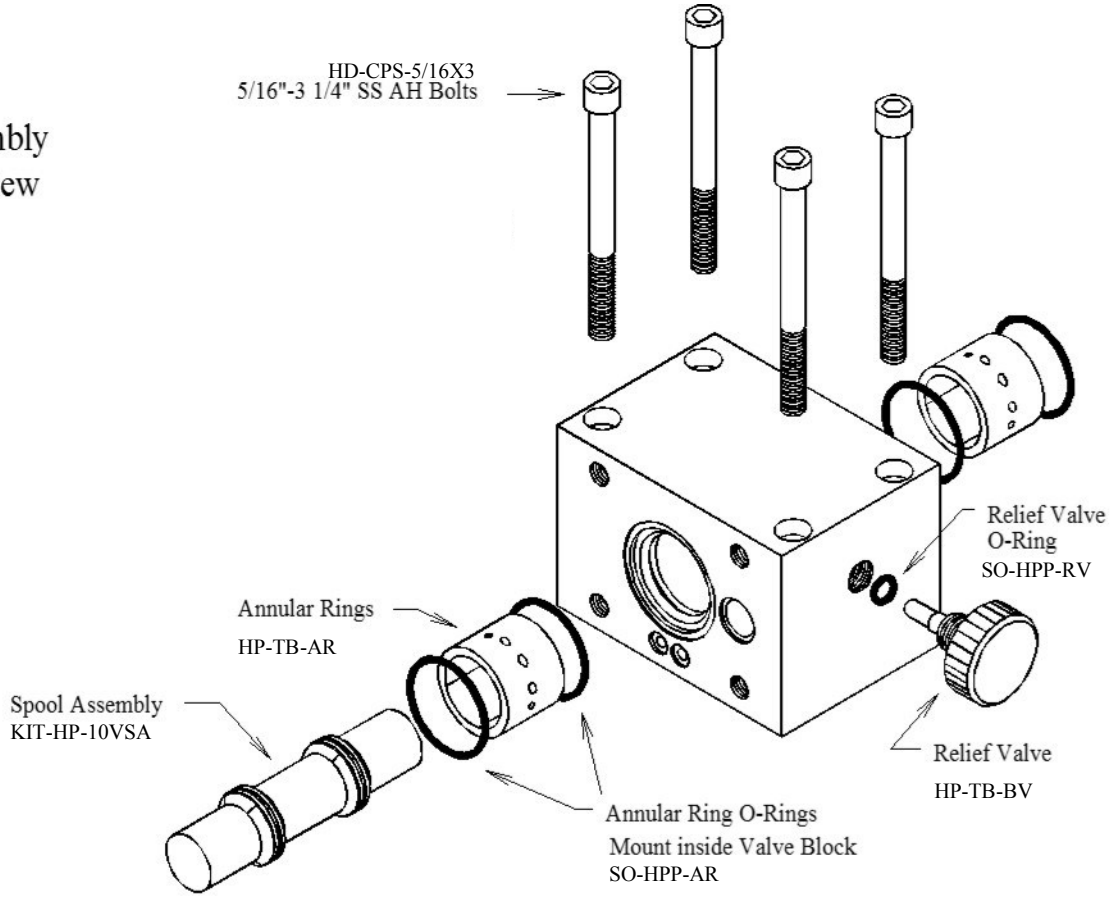
PL-NLT-3/8LP
3/8” Low Pressure Tube (product)

PL-HS-3/4VN
3/4" VINYL HOSE

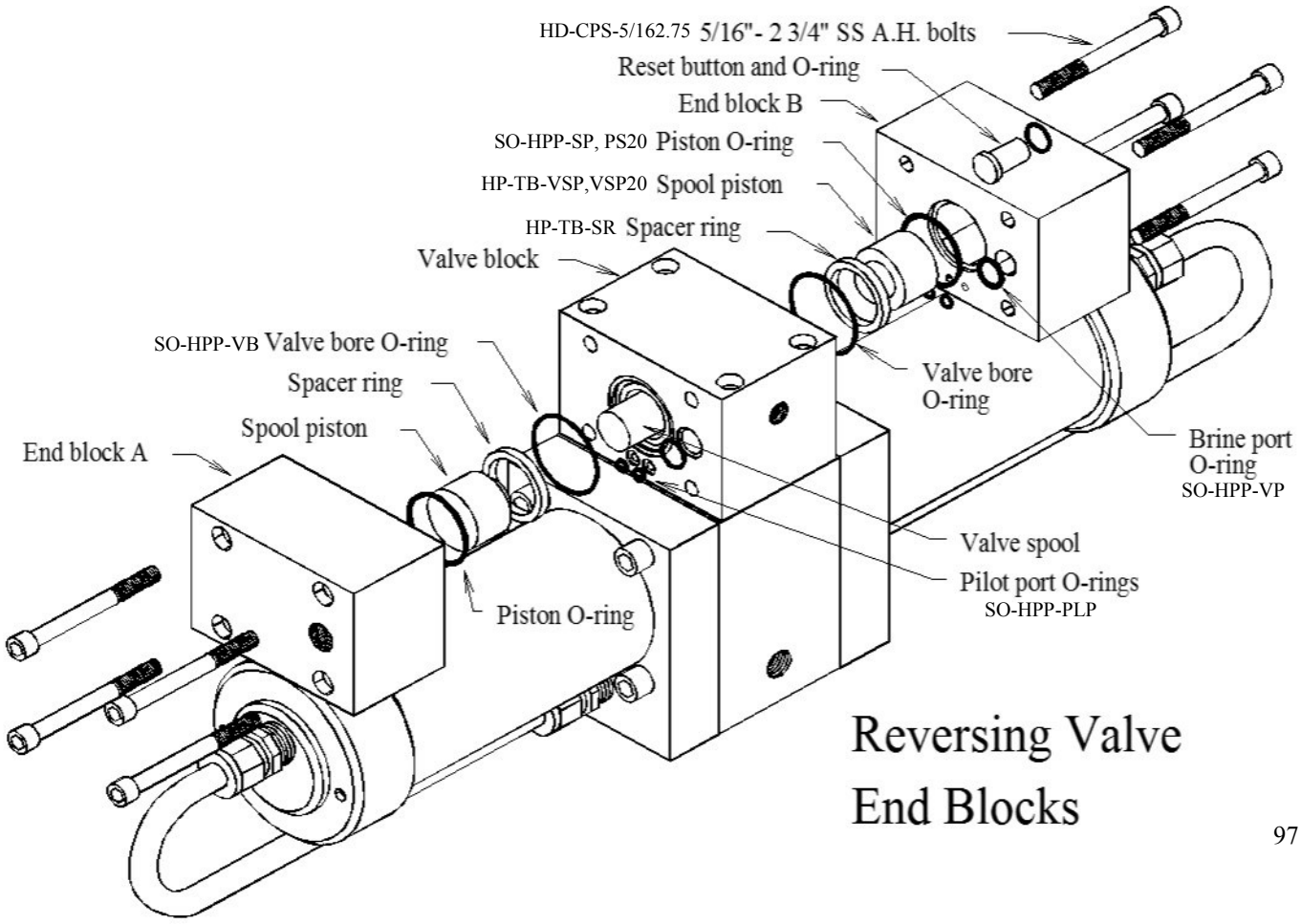

End block B
HP-TB-VEB-B
Valve block
HP-TB-VB
End block A
HP-TB-VEB-A
Brine out
Composite cylinder and base
HP-CYL-CCA
Pressure relief valve
HP-TB-BV
Center block
HP-CB-CB7,
Feed in
Stainless steel tube
HP-CYL-SST
Cylinder ring
HP-CYL-R
End Cap
HP-CYL-EC
Clark Pump
Front View


End block A
Valve block
End block B
Alternate brine out
Composite cylinder and base
High pressure in
Test port
Center block
High pressure out
Stainless steel tube
Cylinder ring
End cap
Clark Pump
Back View

Spool Assembly Exploded View

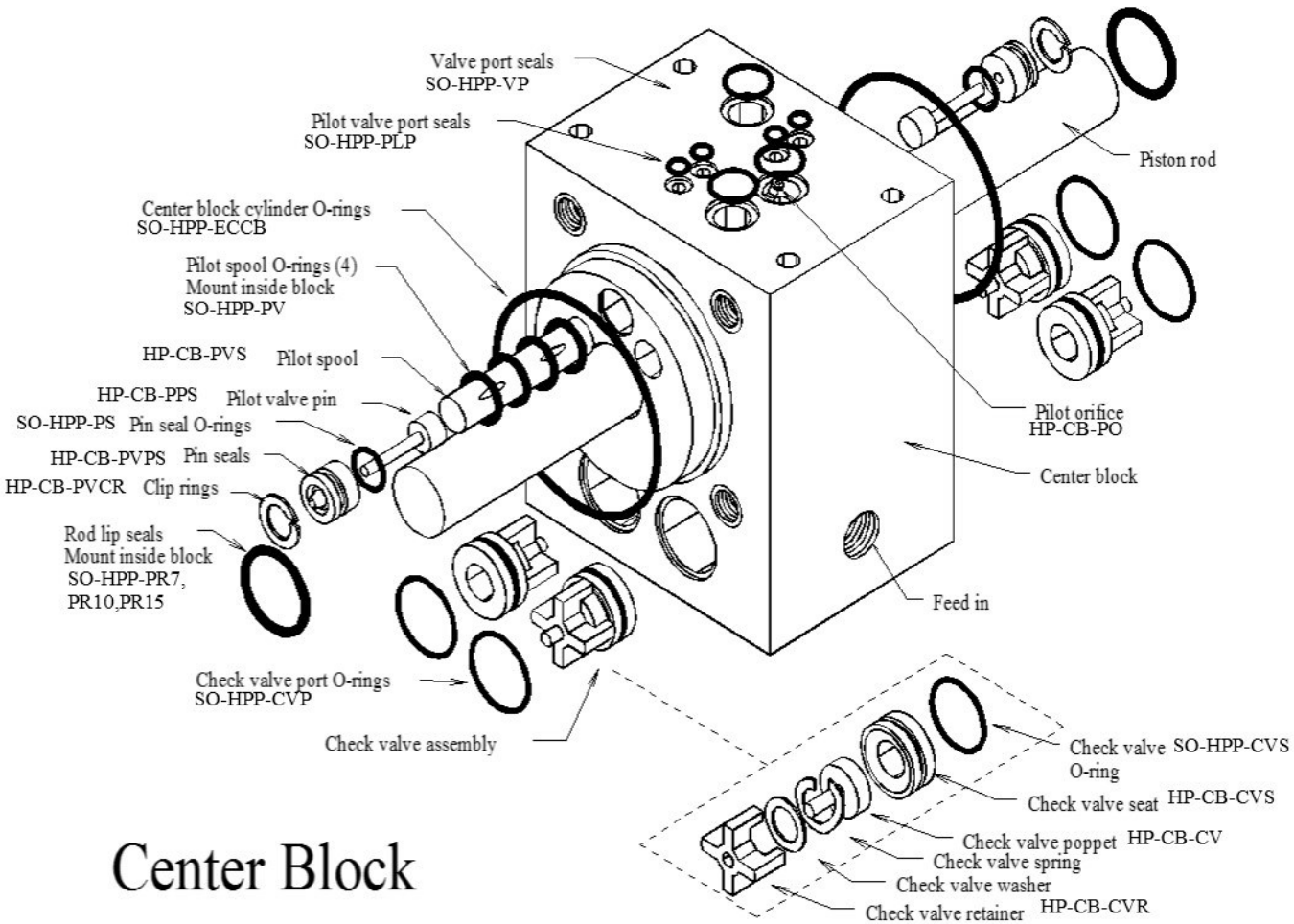


Valve Block



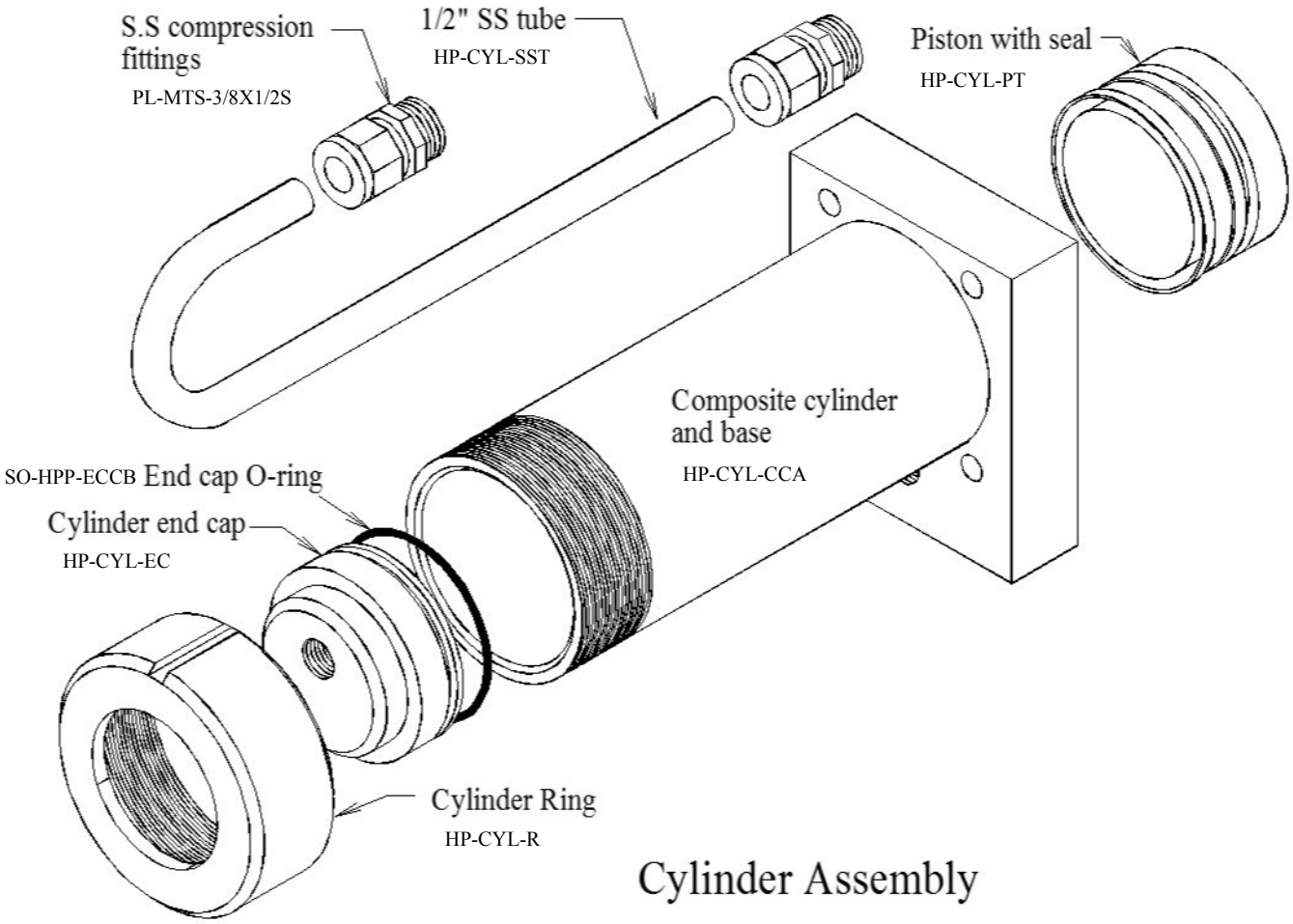
Reversing Valve End Blocks

Parts



Center Block

Parts



Cylinder Assembly