



**SPECTRA**  
**WATERMAKERS**

**CATALINA 300 MPC-5000 MkII  
INSTALLATION & OWNER'S  
MANUAL**

**Part 1.....Installation, Operation, Maintenance**

**Part 2..... Programming and Controls**



Spectra Watermakers, Inc.  
20 Mariposa Road, San Rafael, CA 94901  
Phone 415-526-2780 Fax 415-526-2787  
E-mail: [spectra@spectrawatermakers.com](mailto:spectra@spectrawatermakers.com)  
[www.spectrawatermakers.com](http://www.spectrawatermakers.com)  
06/09 mpc5000 A-34



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

## 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 scoop type forward facing 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 (50C)**. 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 the system.” **After running make sure that the flush cycle operates properly**. The water going overboard at the end of the flush should not taste salty (<1000ppm)
6. **The 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 (26L) per flush.
7. The MPC 5000 control must be de-powered (DC power off) after the system is put in storage (pickled) where a storage chemical or antifreeze is run through the system.
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 fill out the warranty card. The warranty is void if it is not registered.



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## Getting Started

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

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

***We will not be held responsible for shortages and or freight damage that are not reported within thirty days of the ship date.***

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

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

Catalina MkII shipping list:

- Catalina Feed Pump Module
- High Pressure Clark Pump and Reverse Osmosis Membrane Module
- MkII Fresh Water Flush Module
- Catalina Installation Kit MkII
- Boost Pump Module
- Catalina Service Kit
- 1/2" Braided Hose (10')
- 5/8" Hose (25')
- 3/4" Suction Hose (25')
- 1/2" Tubing (10')
- 3/8" Low Pressure Parker Tubing

## Installation Basics

*Thruhull  
Not Supplied.*

- **Read the directions!**
- Avoid tight hose bends and excessive runs.
- Use heavy gauge wire.
- Install feed pump as low as possible.
- Use a dedicated thru-hull with scoop type strainer.



### Thru-hulls

It is mandatory that a dedicated 3/4" forward facing scoop type intake thru-hull and seacock be installed. Install the intake for the system close to the middle and as far below the water line as possible. Thru-hulls in the bow area are susceptible to air intake in rough conditions. **Sharing a thru-hull with another system is not acceptable** and will void the warranty. Sharing a thru-hull can introduce unforeseen problems such as intermittent flow restriction, air bubbles, and contaminates. For racing boats and high speed power boats above 15 knots a retractable snorkel-type thru-hull fitting is preferred to be able to pick up water away from the hull while the boat is in motion.

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

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

Double clamp all hose connections below the waterline.

### Pipe Fitting Instruction

Plastic to plastic fittings should have 3 to 4 wraps of Teflon tape and will thread almost all the way in.

**Avoid getting dirt or debris into the piping or hoses during assembly.** A small bit of debris can stop the system! Avoid getting Teflon tape over the end of fittings that might get into the system. To insure this does not happen, leave the very first thread uncoated.

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

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

### Wiring

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

# Component Placement

*Refer to the Plumbing Diagrams*

## Strainer

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



## 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. Allow 2” below the filter housing for removal. Do not install over electrical equipment. The unit contains a charcoal filter and flush water pressure regulator.



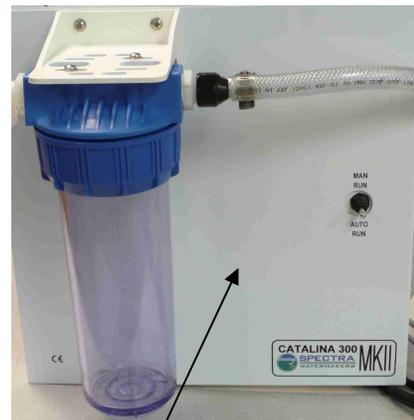
## Boost Pump module

The boost pump module should be mounted vertically with the service hose connection at the top. The boost pump MUST be installed below the water line to ensure that it will prime.



## Feed Pump Module

Mount the feed pump module on a vertical surface that can be up to 3’ (1.0M) above the waterline. It is preferable to mount as low as possible. Locate in an area that allows easy access to the filters. Do not mount above electrical equipment. Keep future maintenance in mind when choosing a location. The feed pump has overheat protection and will not operate properly at ambient temperatures over 120F (48C).



Remove front cover to access mounting holes in the enclosure.

## Clark Pump/Membrane Module

Pressure Relief Valve



The membrane maximum temperature specification is 120F. This module must be installed in an area that maintains a temperature below 120F (50C). A cool location is preferable. It 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. Water will be spilled during any repairs or if a leak occurs.

Be sure you will have access to the pressure relief valve on the Clark pump.

The Clark pump/membrane module comes complete with a mounting system. Be sure to use the supplied washers on the rubber feet. Use it as a template for drilling the mount holes. You may mount the Clark Pump in any position, even upside down. If the Clark Pump and Membrane assembly are mounted vertically or upside down, the diversion valve manifold must be rotated

Note: If your machine is equipped with the optional Zbrane, see the Z-brane Installation and Operation section of this manual for instructions on installing the Zbrane anodes into the membrane end plugs. This should be done before installing the Clark Pump/Membrane Module.

so that the salinity probe is mounted upright. See pg 14 for details.

## Membrane Pressure Vessel Mounting

The Clark pump and membrane assembly has been pre-assembled at the factory. If it is necessary to disassemble this module and mount the pressure vessel remotely use guidelines in back of the manual. Use only approved tubing for assembly.

## Remote Control Panel

The remote control panel can be mounted anywhere that's dry and convenient. Cut a 49/16" (116 mm) wide by 2-7/8" (68mm) high opening for the panel. Locate in an area that is easily visible and easy to manipulate the buttons. **Use only Spectra approved remote cable.**

The cable is not standard LAN cable or phone cord.



## Plumbing

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

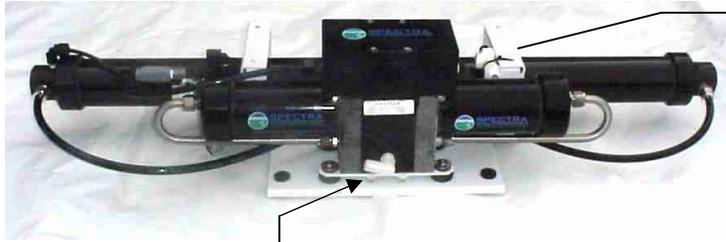
The outlet of the pre-filter to the feed pump module is preplumbed from the factory.

From the feed pump outlet to the Clark Pump use the supplied 3/8" (9.5mm) Parker tubing.

From Clark Pump brine discharge quick connect to the brine discharge thru hull use supplied 5/8" (15.9mm) clear braided vinyl hose.

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

# System Piping schematic



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



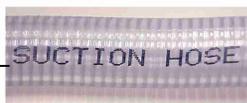
Use the 1/2 inch nylon tubing between the pump module Outlet and the Clark Pump



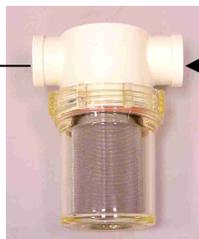
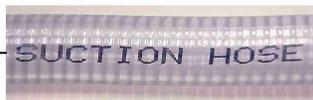
Flush water from ship's pressure water system 25 psi (2bar) minimum



Use the 3/8 inch tube between the Flush module and the Feed Pump Module



From the Boost Pump to the 5 micron filter inlet us the 3/4 inch ID spiral suction hose.



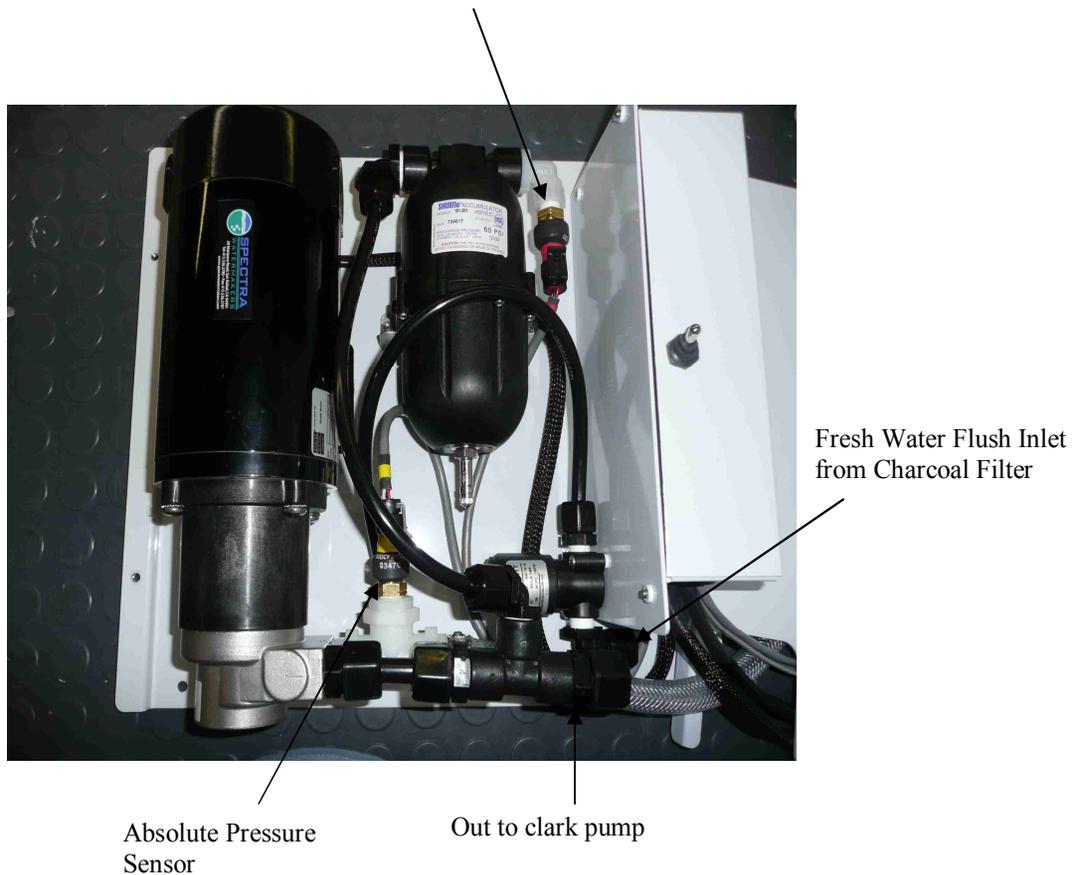
From the inlet thru hull to the boost pump module use the supplied clear 3/4 (19mm) spiral suction rated hose.



**Note!** When plumbing the Catalina Feed Pump Module route the feed water so that the front cover may be opened without removing the hose or tubing.

All tubing connections are made using Parker 'Fast and Tight' connections. For proper assembly instructions see pg. 16. These fittings should be finger tight only, and not tightened with a wrench. After assembly of all plumbing fittings, thoroughly check for leaks.

Feed Water Pressure Sensor

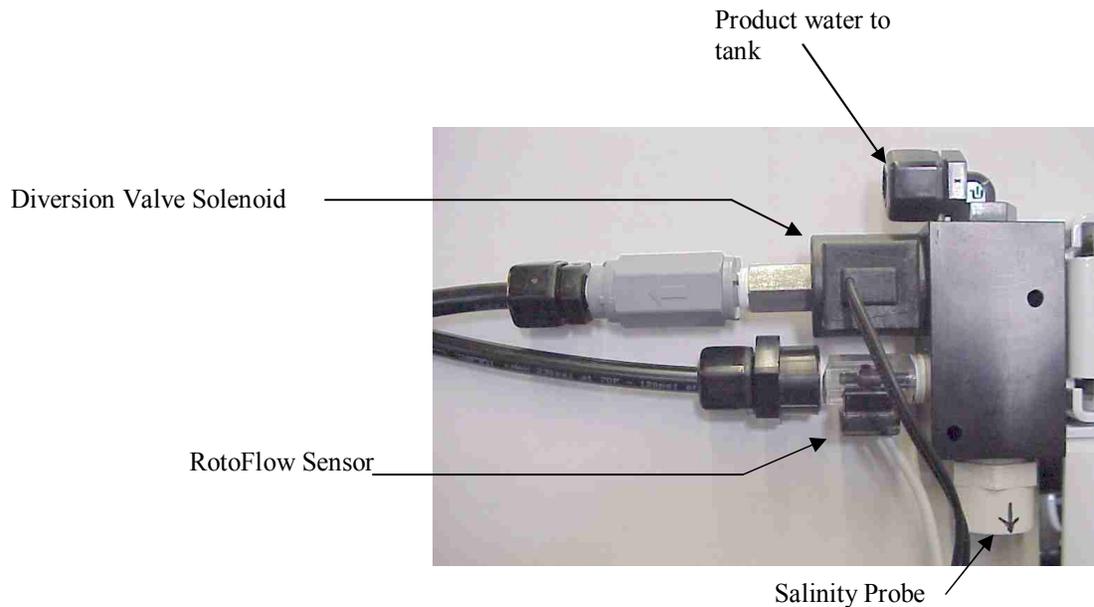


Salinity Probe

## Product Water tubing

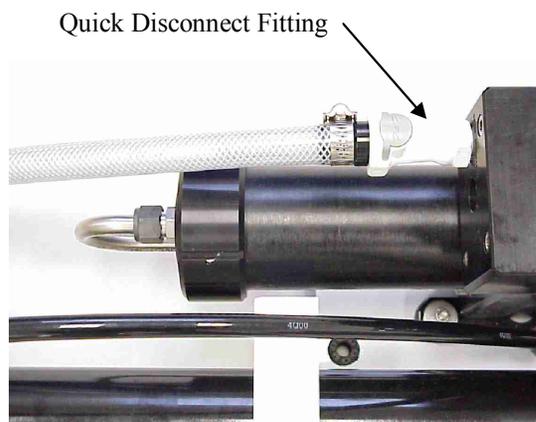
Product water tubing is  $\frac{1}{4}$ " (6.3 mm) Parker tubing. **See the Parker tube fitting assembly diagram on pg 16.** Product water is pre-plumbed from the membrane into the electric diversion valve. The diversion valve will reject product water into the overboard brine stream until good quality is measured by the MPC-5000 control. Product water is then 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 Assembly is mounted vertically or upside down the Diversion Valve/ Probe Assembly MUST be remounted in the proper orientation.

**You will need to route the product water from the valve into the top of the tank. Install a tee in the water fill or tap a pipe thread into an inspection port in the top of the tank. Do not feed the water into a manifold or bottom of the tank. Make sure there is no restriction in this plumbing.**



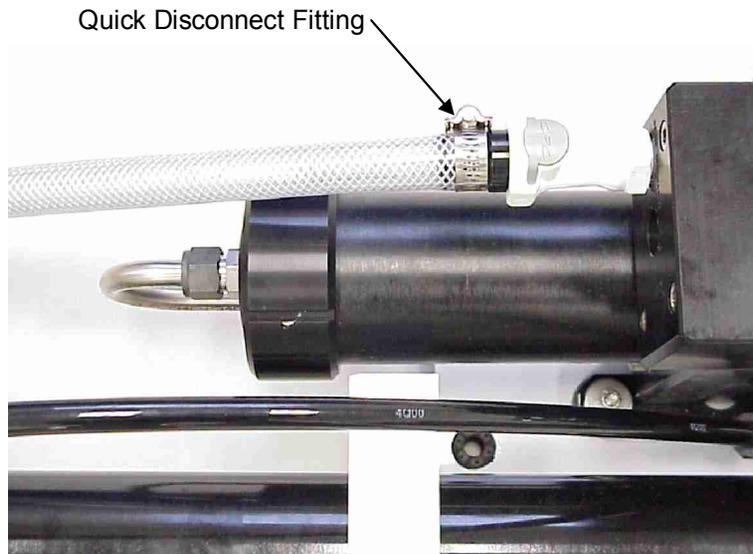
## Brine Discharge

Route the Brine discharge from the quick disconnect fitting to a location above the waterline using the supplied  $\frac{5}{8}$ " (15.9 mm) hose.



## Brine Discharge

Route the Brine discharge from the quick disconnect fitting to a location above the waterline using the supplied 5/8" hose.

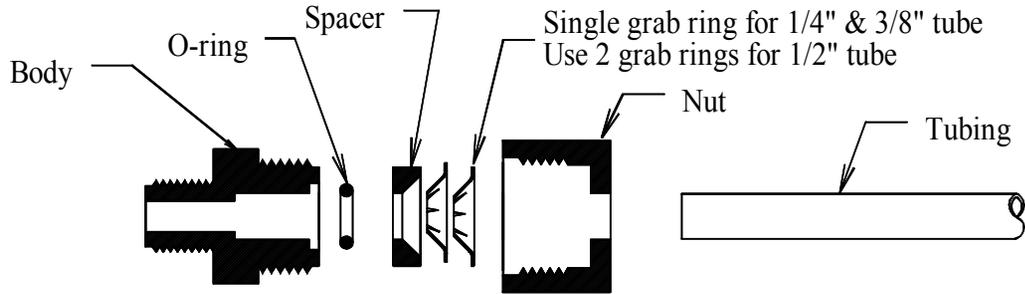


## Fresh Water Flush

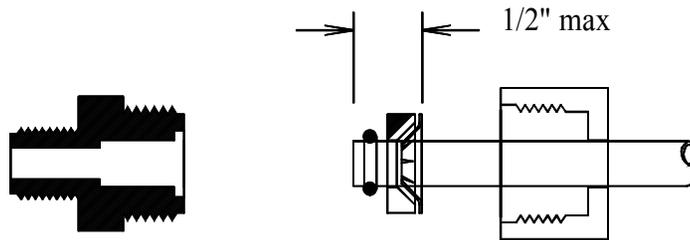
**Run a feed line from the domestic cold pressure water system to the 1/2" hose barb on the fresh water flush assembly.** This needs to be pressurized when the boat is unattended for the fresh water flush system to function properly. *The domestic fresh water pump must be able to deliver 1.5 gallons per minute (6lpm) at 25 PSI.*



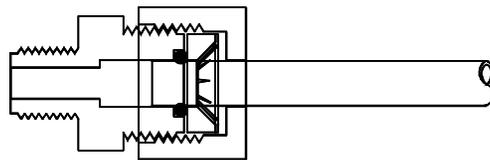
## Parker Tube Fitting Assembly Procedure



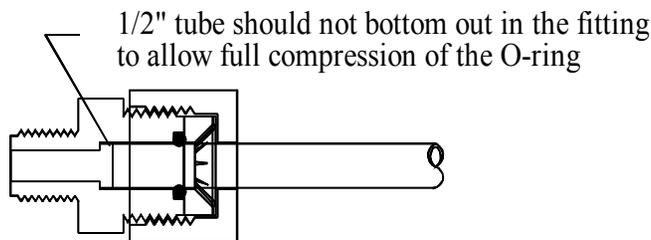
Step 1: Disassemble fitting components



Step 2: Install the Nut first then use the bevelled side of the Spacer to push the Grab Ring onto the tube no more than 1/2". Slip the O-ring over the tube to hold the Spacer in place. If the Grab Ring is pushed too far, trim back the tube so about 1/4" of tube extends past the O-ring.



Step 3: Gently fit the tube into the body and loosely thread on the nut. Be careful not to cross-thread the nut



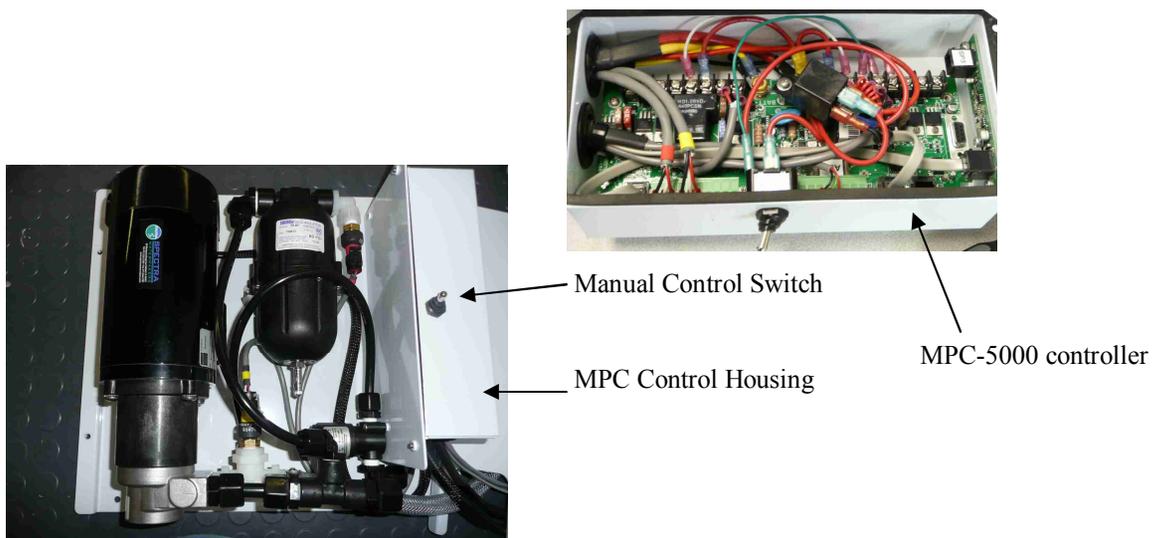
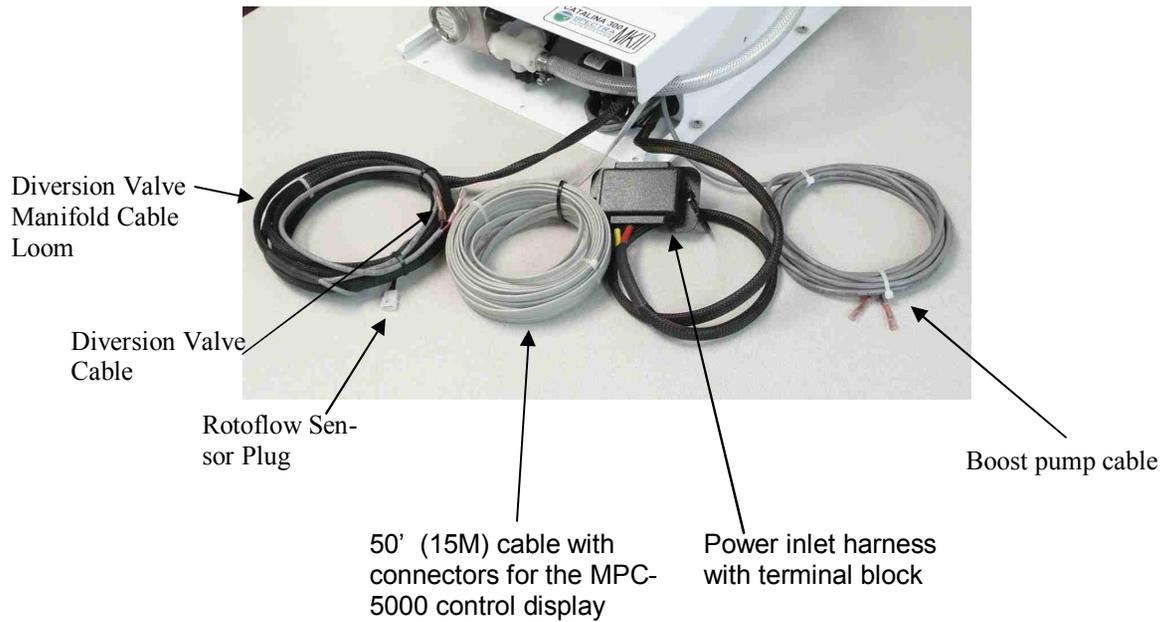
Step 4: Hand tighten the nut. **DO NOT OVER TIGHTEN!** **DO NOT USE A WRENCH!** The tube should not come out if pulled by hand. If it does, tighten the grab ring tabs.

1/4", 3/8", 1/2" Parker Tube Fitting Assembly

## DC Wiring

**Identify cables that are connected to the Catalina Control System.**

Catalina MkII Systems have a Power Inlet harness with a terminal block and cover, a 2 conductor boost pump cable, a two conductor diversion valve cable, a rotoflow sensor cable, and a 50' (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. **Do not install the module in hot or poorly ventilated locations.**



## Wiring (continued)

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

Route the control cable through the boat to the MPC display location. Be careful not to damage the connector or get it wet. Plug this into the back of the remote display.

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) using the supplied butt connectors, and heat the connectors to waterproof them.

Route the Diversion Valve manifold wiring harness to the diversion valve mounted on the High Pressure Module between the Clark Pump and the membrane. 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.

Follow the instructions on the next page (pg 19) for installing the salinity probe.

Check the wire size chart on pg 21 to select the proper conductor size to the main power harness. DC power feeds should be uninterruptible to insure proper operation of the auto store feature. Avoid house breaker panels that could be easily tripped.

### Component Sizing:

- 12V Use a 20Amp breaker and size the wiring for 15 Amperes.
- 24V use a 10 Amp breaker and size the wire for 8 Amperes.
- **Provide circuit protection at the source!** Inadequate wiring will cause a loss of system performance. DC power should be uninterruptible.

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

## Salinity Probe Installation



Insert Salinity  
Probe Cable here

All Spectra Watermakers shipped after April 1, 2008 will have a salinity probe with 10 feet of RJ 12 cable hardwired to the probe. The cable needs to be run backwards from the probe up to the MPC housing. It is not necessary to run the cable inside the loom with the other sensor wires.

Feed the end of the RJ 12 cable through an open cable gland in the bottom of the MPC housing. Use care not to damage the retaining tab on the end of connector.

The cable should be plugged into the small pcb subboard that is mounted on the inside wall of the housing. There are two jacks on the sub-board, the one marked 'control' should have a short RJ 12 jumper cable connected to the main MPC board. The salinity probe cable should be connected to the open jack marked 'probe'.

Secure any excess wire outside the MPC housing using wire ties or other suitable wire strain relief device.

## MPC Remote Control Display Panels

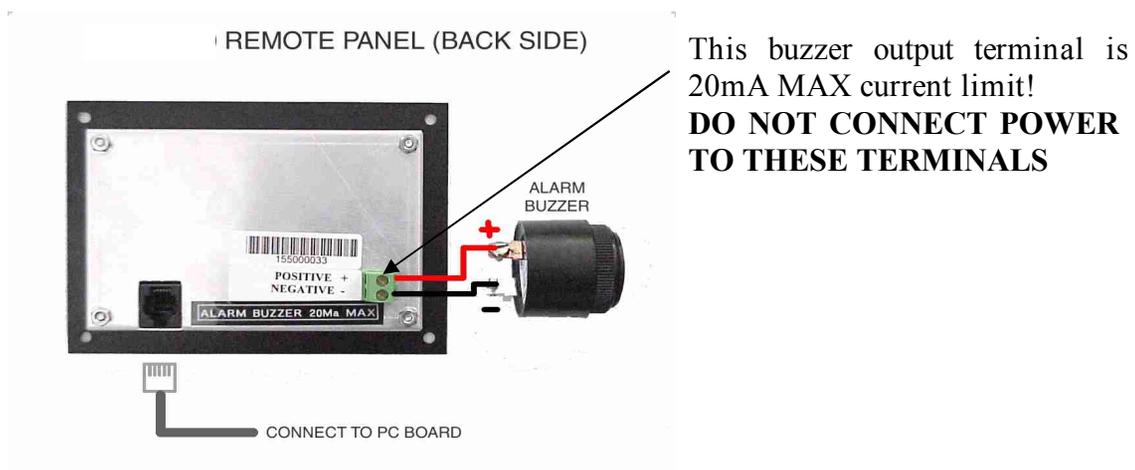
There are currently two types of display options available: Liquid Crystal Diode (LCD) display, which is dark lettering on a backlit background, or Vacuum Florescent Display (VFD), which are bright characters on a dark background. The VFD display brightness can be adjusted using the Programming Function detailed in Part 2 of this manual.

The displays must be mounted in a protected location, out of direct sunlight, and away from spray or dripping water. Commands to the system can be entered at any panel.

The display panels connect with the supplied 50 foot modular type cable to the MPC board sockets marked "DISPLAYS." **Do not substitute a different type of cable!** Contact the factory if you need longer or additional cables.

Each remote control display panel can accommodate 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 LCD buzzer terminal is limited to 20 mA max, any excessive load may damage the MPC or remote 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.

An external buzzer may also be installed at the MPC control board the BUZZ terminals, current limit is 150mA.



## WIRE SIZE CHART

### Catalina MkII 12V DC System Wiring

Wire Length FT.	Meters	AWG.	SQ MM
<b>MkII 12V</b>			
10	3	10	6
15	4.5	8	10
20	6.1	6	15
25	7.6	6	15
30	9.4	4	25
35	10.6	4	25
40	12	4	25
45	14	4	25
50	15	2	35

Wire Length FT.	Meters	AWG.	SQ MM
<b>MkII 24V</b>			
10	3	14	2.5
15	4.5	14	2.5
20	6.1	12	4
25	7.6	12	4
30	9.4	10	6
35	10.6	10	6
40	12	10	6
45	14	8	10
50	15	8	10

Wire length for a pair of wires is measured from source circuit breaker or fuse to control terminal block *one way*.

## Connection of Optional Accessories

*Use of any external devices not approved by the factory may cause permanent damage to the controller and is not covered by the Spectra warranty. Accessory outputs are limited to 2 amps maximum load! Do not connect motors, pumps, etc to accessory outputs.*

**Optional Z-brane System:** Detailed instructions are included in the ZBrane section. Connect to an uninterruptible 12 or 24Volt DC power source.

**Ultraviolet Sterilizer:** Detailed instructions are included with the sterilizer kit. The UV sterilizer lamp module and ballast unit should mount vertically, with the product water inlet at the bottom, outlet at the top. The ballast wires plug into the end of the bulb in the lamp module. The ballast RED wire connects to “STER” terminal on the MPC board, and the ballast BLACK wire connects to the “GND” terminal. If the wires must be extended, use minimum 16AWG wire.



**External Buzzer(s):** In addition to the external buzzer(s) installed at each remote control display panel, a buzzer unit may be installed at the control box. The buzzer RED wire connects to the “BUZZ” terminal on the MPC board, and the buzzer BLACK wire connects to “GND.”

**Float Switches:** The Catalina 300 MkII can have optional tank float switches installed for complete automated operation. See detailed instruction on pg 21 for operation and installation guidelines.



## Tank Switch Installation and Operation:

There are two sets of terminals on the MPC-5000 PCB that can be used in four different configurations to automatically start and stop the watermaker or to automatically stop the watermaker when the tank(s) are full without the auto start feature. These terminals are on the green ten pin connector and are labeled “Float Switch 1” and “Float Switch 2.” Float Switch 1 is the tank full switch and Float Switch 2 is the tank empty switch.

If the unit is wired for both Autostart and Autostop, it can be put into AutoFill Mode by pushing and holding the Auto Run switch on the MPC5000 display. In this mode the watermaker will start whenever the water level drops below the tank empty switch, so that it is open (not conducting electricity). When the tank fills up and both the tank full switch and the tank empty switch have remained closed for two minutes, the watermaker will shut down and flush itself. The water maker will start back up when the water level drops below the tank empty switch and it remains open for 2 minutes. This configuration allows for completely automatic operation. If the watermaker does not need to start up within five days it will automatically do a fresh water flush. AutoFill mode can be ended by pushing the stop button or the Autoflush button. If the watermaker is in Autorun mode it can be put into Autofill mode without stopping it by holding down the Autorun button.

If the owner prefers to install the automatic shutoff feature without the automatic start up option, only the tank full switch is used. A jumper must be placed between the tank empty terminals (Float switch 2) in place of the tank empty switch, because the watermaker will only shut down if both sets of terminals are closed. To use this mode the watermaker must be started up with the Stop/start button or the Autorun button. After the unit starts up, then press and hold the Autorun button until the display reads “Auto Fill Mode”. The watermaker will fill the tank and automatically enter Autoflush mode.

It is possible to use the autofill feature with 2 tanks. A double throw electrical switch must be installed in a convenient location. If only the single tank full switch is installed in each tank connect the wire From the Float Switch 1 terminal “1” to the common on the switch and run separate wires from the switch to each tank switch. The second wires can both be run to the Float Switch 1 terminal 2. If you are using two switches in each tank you will need a double pole double throw switch.



## New System Start-Up and Testing

Use this procedure when starting a new watermaker for the first time and **whenever the system contains Preservative or cleaning compounds.**

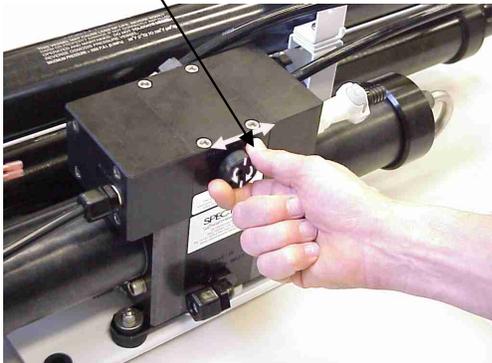
Avoid running the system if the vessel is in contaminated water, such as in a dirty harbor or canal. The system should be fully run tested before leaving port. It is preferable to sacrifice a filter by running the system in turbid water rather than waiting to get offshore to discover a problem or deficiency in the installation. If the location or weather prevents proper testing refer to the section “Dry Testing.”

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

1. First Check That:

- Thru-hull valve is open
- **Run Manual/ Run Auto Switch in “Run Auto” Position**
- Domestic fresh water pressure system **must be on**

2. **Open pressure relief valve 1/2 turn !**



3. Power up the system to enter “Purge Mode”. *Note: The watermaker will not run with the pressure relief valve open unless it is in “Purge Mode”. Instead it will restart twice and alarm “System Stalled”.*

- Alarm will sound
- Display will read “Open Pressure Relief Now” Ensure that it is open.
- Push the Alarm /Display button to silence alarm



4. Press Auto Run Button



The system will go into a start mode and the feed pump will start shortly after. The system should prime within 30 seconds. Check the strainer and the brine discharge for water flow. There should be no bubbles anywhere in the intake hoses and the feed pump should sound smooth after priming. **If the feed pump sounds rough, find the reason before continuing!** Inspect the system for leaks.



**Note:** 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. If you wish, **you can bypass the purge sequence** and initiate a normal start. Pressing both **'Auto Run'** and **'Stop'** simultaneously anytime during the purge sequence will bypass the purge sequence and enable a normal start. **Do not pressurize the system for the first twenty minutes** or more.

**Make sure that you have purged the system adequately or you will impact the membrane.**

5. After the purge sequence. The control will alarm with the message "Close pressure relief valve" - **Close the relief valve** and proceed by pressing **"Auto Run."**
6. The system is now running under pressure and making water. The display will read **"purging product water."** This mode sends the product water overboard for ten minutes in case there are any residual chemicals in the membrane. Carefully inspect for leaks over the entire system! Shut down the system and repair any leaks you find.
7. The system is now in the operational mode. You may start and run your system as you desire. You will not have to go through the purging mode unless you "depower" the system. If you do, you can bypass the purging mode by pushing **"Stop"** and **"Auto run"** buttons at the same time. It is best to use the **Auto-Run** and **Auto-Store** button to start and stop the machine. If you shut down the system from the **Stop** button, then use the auto store button to do a fresh water flush cycle.
8. Check that the system is operating within its normal parameters. Compare with the chart on the next page

## Product Flow

**Catalina 300 MkII** Will produce 11—13 GPH (42—50LPH)

**NOTE:** To toggle between Imperial (gallons) and Metric Units (Liters) access the program mode as described in section 2 of this manual.



## Salinity

Salinity reads in parts per million. System rejects water higher than 750 PPM. Anything below 500 is excellent.



## 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



## Filter Condition

PREFILTER warns that filters are getting dirty. Clean filters as soon as convenient. If the graph reaches full scale the machine will alarm Service Prefilters and shut off the watermaker.



The MPC 5000 Control board is fully programmable from the remote display. Instructions on how access and adjust the operating parameters are included in section 2 of this manual. Do not adjust program settings without consulting with a qualified technician first.

## Dry Testing With Artificial Ocean

If it is not possible to test run the system with the boat in the water, testing may be accomplished with an artificial ocean. Purchase enough aquarium salt to make 5 gallons (20 liters) of salt water.

Make sure that the domestic water system is powered up and that there is water in the tank. Confirm that the charcoal filter is installed in the fresh water flush module, and that the domestic water line had been installed and all valves are open.

1. Open pressure relief valve.
2. Power up the control system.
3. Press both “Auto Run” and “Stop” to bypass the purge sequence. If the motor starts, stop immediately and press the “Auto Run” and “Stop” button again until the message **Purge Mode Bypassed** is displayed.
4. Press the “Auto Store” button and allow the fresh water flush system to cycle through its timed operation. Cycle the auto store system five or more times to purge all of the storage chemicals out of the system (20 minutes total purging).
5. Hook up your service hoses to the service intake on the boost pump module and to the quick disconnect brine discharge fitting on the Clark Pump. Route them into a 5 gallon (20 liter) bucket. Disconnect the product tube from the diversion valve and using another short piece of tube, route the product water feed into the test bucket.
6. Turn the valve on the fresh water flush module from “Run” to “Service.”
7. Press auto flush one or two more times to get enough water into the bucket to properly mix your salt water. Mix the salt until it goes into solution. If you are using a hydrometer mix the water to be 30,000 PPM. Close the pressure relief valve and start the system using the “Auto Run” button.
8. Run and test the system for as long as possible. During the run test, carefully inspect for leaks. Check all of the system parameters to make sure the system is operating correctly. Do not allow the water in the bucket to get above 120°F (50°C).
9. Store the system per the “Storage” instructions.

## Normal Start Up Using the Auto Run Button

**If the system contains preservative or cleaning chemicals follow the directions for New System Startup or Membrane damage will occur!**

- Press Auto Run button once and the system will prime and run for 1 hour. The display reads “AUTO RUN MODE” then “STARTING” with a 30 second priming countdown timer. After the prime, the display reads “AUTO RUN MODE” with a countdown timer. An hour of run time is added, up to 12 hours, with each successive momentary press of the Auto Run button. An hour can be added at any time. The display shows the default readout unless there is an alarm condition. Successive presses of the Alarm/Display button will scroll through the displays starting with “GPH PRODUCT.” Upon auto shut down by the timer or by the optional tank full float switches, the system will automatically fresh water flush and re-flush every 5 days.
- Pressing the Stop button stops the sequence at any time with no flushes.

### Normal Operation

- For optimum performance, Run the system using the 'Auto Run' feature as long as possible at one time. **Never let the system sit with salt water in it.** Fix all plumbing leaks immediately to avoid damaging the system.

### Normal Shut Down

- If the system was started using the Auto Run button, the system will shut off on its own when the selected run time is over and will auto flush every 5 days.
- Pressing the Stop button at any time will shut off the system with no auto flush function.
- The optional tank float switches will shut off the system from any mode. If the system was started by the Auto Run button the system will flush and then reflush every 5 days. If the system was started by the Start/Stop button it will do a 1 time flush. The display will read “TANK/S FULL.” Once one of the tank float switches opens, the alarm and “TANK/S FULL” display will cease on its own. Note that if “TANK/S FULL” is displayed, the system cannot be restarted.

## Automatic Fresh Water Flush Cycle

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

- **Make sure there is enough water in the fresh water supply system** to supply the watermaker for more than the expected time of operation in the "autostore" mode. The Catalina 300 MkII units require about 7 gallons (26 liters) every 5 days.
- **Make sure that the pressure water supply is on and will stay on during the flush mode** (If this is not possible contact your certified dealer.).
- **Make sure that the pressure relief valve is closed.** It should be closed if the system was just used to make water. The auto flush may not operate if the valve is open.
- **The power for the system must remain on during the auto flush mode.** Turning off the power will disable the auto store function and damage may occur.
- **Pressing the Auto Store button momentarily will start a flush and then activate the 5 day flush cycle.** The flush water solenoid will open and the display will read "FRESH WATER FLUSH" with a countdown timer. After 6 seconds the feed pump will start and run for 3 seconds. The feed pump will continue to cycle on and off in this fashion for the duration of the flush. Then 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 3 seconds will engage a 1 time flush.** The system flushes as described above but will not re-flush every 5 days. Display will read "FRESH WATER FLUSH" with a countdown timer, then the default display when finished.
- Pressing the Stop button will cancel the auto store mode and put the watermaker in standby mode.

## CHECKING THE FLUSH CYCLE

The length of time the flush cycle lasts, and the on time and off time for which the feed pump runs, are preset to nominal values at the factory.

After the installation is complete the flush cycle must be checked to ensure that no salt or brackish water remains in the system after the flush cycle is completed. Salt remaining in the feed pump will cause rapid deterioration of the pump's internal components, and the nutrients found in sea water will allow rapid microbial growth in the membrane.

If the ship's water system is unable to provide flush water at the required flow rate, or the feed pump is running too fast during the flush cycle, sea water will be drawn in to make up the difference.

At initial startup the fresh water flush system should be tested by taking a sample of the brine discharge water just as the flush cycle is ending. This water should not taste salty, and should read less than 1000 ppm on a digital tds meter.

The flush cycle can also be tested by closing the sea cock during the flush cycle. If the MPC 5000 display gives a SERVICE PREFILTERS alarm this means that salt water was being drawn in. If this is the case the water supply should be increased by opening up the pressure regulator (see below).

Otherwise, the feed pump on and off times should be adjusted and the flush duration increased if necessary. Instructions for adjusting the flush parameters can be found in Part 2 of this manual.

**Adjust the pressure regulator by turning the center screw.**

Fresh Water Flush Pressure Regulator

Service Filter Shut-off Valve

Place the output hose from the charcoal filter into a bucket and open the service valve.

**In 1 minute you should get no more than 1.5 gallons of water, and no less than 1 gallon.**

Adjust the regulator until flow rates match those stated above

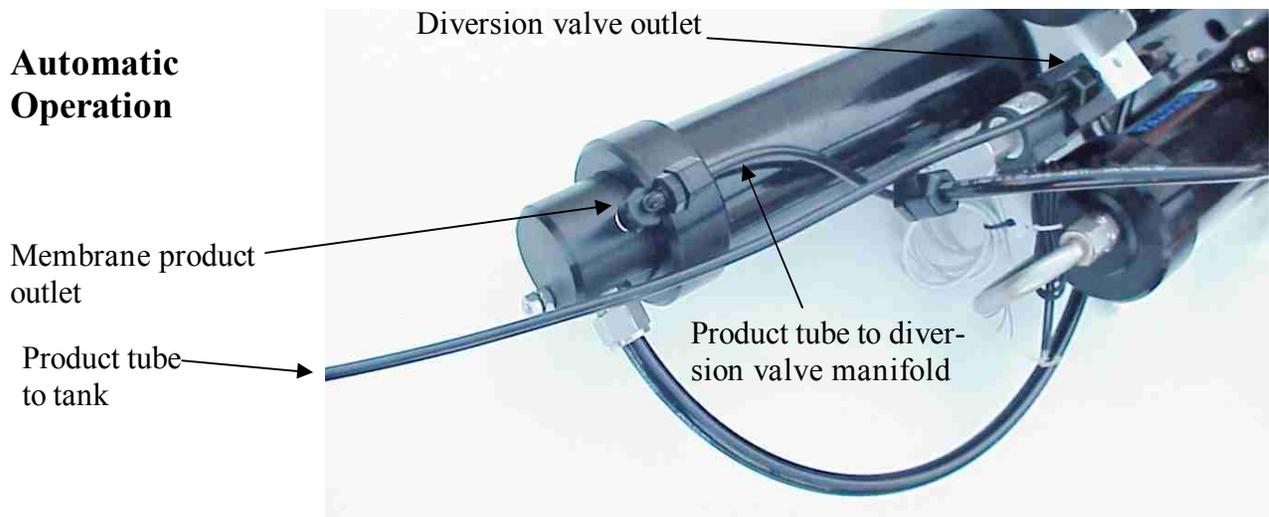


## Manual Operation

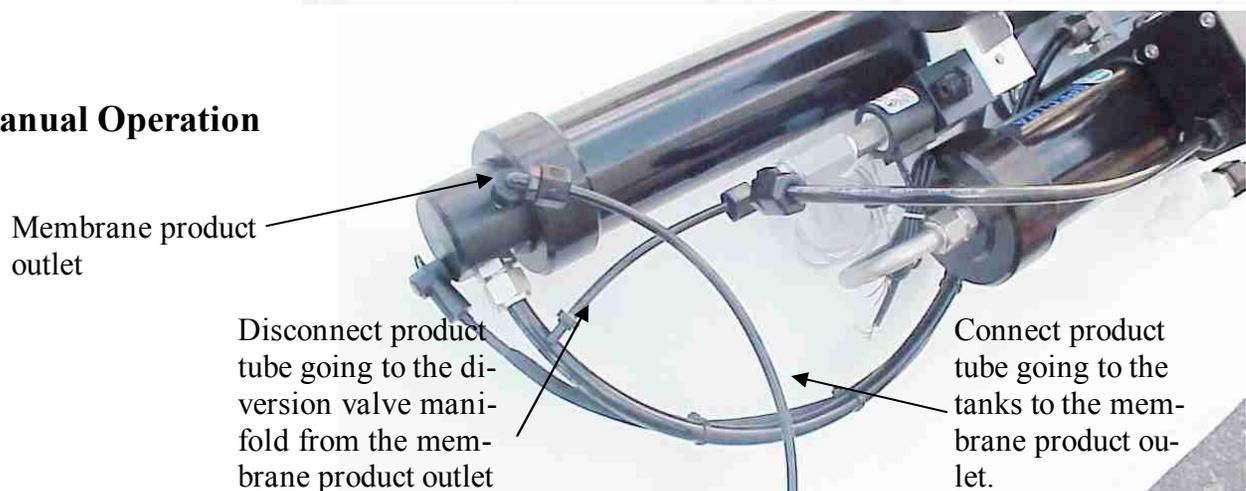
**In the event of a component failure** resulting in a shut down due to a **false alarm**, the failed component can be overridden using the Programming Function on the display. High Pressure, Service Prefilter, System Stalled (airlock), and Salinity Probe Failed can be all be bypassed. The other safety shutdowns will remain activate until bypassed in the programming mode. **Be absolutely certain that the alarm is in error before defeating the automatic controls.**

- **In the event of complete MPC control failure** the system may be operated manually by using the manual run switch on the MPC control box and bypassing the diversion valve.
- For manual start up, switch on the feed pump by setting the feed pump switch to “MANUAL”. Shut the unit down if the Clark pump does not cycle, if air is continuously present in the intake line or if the feed pump is excessively noisy. The automatic safety controls are disabled in manual mode.
- Always discard the product water for the first few minutes of operation. The initial product water from the system may not be potable. Taste the product water before sending to a tank.
- In manual operation, the salinity probe and diversion valve are inoperative. Product water is available directly from the membrane product water outlet fitting. To bypass the diversion valve move the 1/4” tubing that goes to the tank from the diversion valve outlet to the membrane product water outlet as shown below.

### Automatic Operation



### Manual Operation



## Long Term Storage Procedures

Watermakers are best run continuously. When not in use, biological growth in the membrane is the leading cause of membrane fouling. A warm environment will cause more growth than a cold environment. The automatic fresh water flush system will greatly reduce biological growth but may not stop it completely in certain conditions. The 5 day reflush feature allows the system to be shut down without any service procedures for extended periods of time but it doesn't replace performing a storage procedure for long periods of non-use. If an optional "Z-Brane" water treatment system is installed in the system, the 5 day reflush will maintain the system as long as unchlorinated pressurized fresh water is provided.

### System Storage or "Pickling"

If the system is to be left unused for more than 2 weeks, perform the storage procedure on the following page. The procedure introduces a chemical compound into the system that prevents biological growth. This procedure requires dechlorinated water which can be made with the Spectra's charcoal filter. **Charcoal filters last a maximum of 6 months once wet-**

*Spectra SC-1 is a special storage compound used by the US Navy. It is formulated to be compatible with the modern engineering plastics and composites in the Spectra pumps. Do not use any substitute except propylene glycol. SC-1 Storage Compound has to be mixed at a ratio of 1 Spectra container to 3 gallons (12L) of fresh water to have the proper solution. An average of 2 gallons (8L) of water is in a Catalina 300 MkII system. This water has to be figured in to the mixture. A Catalina 300 MkII system uses one SC-1 container.*

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



## Storage Procedure:

- Step 1: Flush the system twice. Push the “Auto Flush” button on the MPC-5000 display, when the first flush has been completed, press “Stop” to cancel the 5 day interval timer, then press “Auto Flush” again.
- Step 2: Remove the quick disconnect fitting from the brine discharge outlet of the Clark pump, and replace with the quick disconnect hose from your service kit, and lead the hose to a 5 gallon bucket.
- Step 3: Push the “Auto Store” button to fill the bucket with 2 gallons of fresh unchlorinated water. When the bucket has reached the desired level Push the “Stop” button
- Step 4: Connect the hose, using the garden hose barb fitting from your service kit, to the service port of the boost pump module. Lead the hose into the bucket. Turn the service valve on the boost pump module 180°, so the intake is now coming from the bucket.
- Step 5: Mix the storage chemical compound into the water in the bucket. *Some storage compound may remain in the bucket undissolved, this is normal.*
- **Step 6: Make sure the pressure relief valve on the Clark pump is Open (unpressurized).**
- Step 7: Set the switch on the pump module to “**RUN MAN**” to **turn on the feed pump**. Circulate the storage chemical in the system for approximately 20 minutes. Set the switch to “**Run Auto**” when finished.



## Clean Up:

- Remove the quick disconnect from the Clark pump brine discharge, and replace the original hose that leads to the thruhull. You may, at this point, pump the bucket dry by momentarily running the feed pump as in Step 7 above. Stop when the bucket is empty.
- Turn the service valve 180° back to its original position, and remove the service hose.
- Turn off the power to the system and the MPC control.
- **LEAVE THE PRESSURE RELIEF VALVE OPEN**

## Storage & Winterizing

**Warning! Use only potable water antifreeze (Propylene Glycol). Do not use automotive antifreeze (Ethylene Glycol).**

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

- Step 1: Flush the system twice. Push the “Auto Flush” button on the MPC-5000 display, when the first flush has been completed, press “Stop” to cancel the 5 day interval timer, then press “Auto Flush” again.
- **Step 2: Open pressure relief valve on the Clark pump.**
- Step 3: Pour at least 3 gallons of the propylene glycol into a bucket. Follow the instructions on the container.
- Step 4: Connect the service inlet hose, using the garden hose barb fitting from your service kit, to the service port of the boost pump module. Lead the hose into the bucket. Turn the service valve on the boost pump module 180°, so the intake is now coming from the bucket.
- Step 5: Set the switch on the pump module to “RUN MAN” to turn on the feed pump. Pump as much of the water remaining inside the watermaker overboard as possible. **Run the feed pump until you see antifreeze begin to appear in the brine overboard hose.** Set the switch to “Run Auto” to stop the feed pump.
- Step 6: Remove the quick disconnect fitting from the brine discharge outlet of the Clark Pump, and replace with the quick disconnect hose from your service kit, and lead the hose to the bucket.
- Step 7: Set the switches to “RUN MAN” to circulate the antifreeze for 20 minutes.

### **Clean Up:**

- Remove the quick disconnect from the Clark Pump brine discharge, and replace the original hose that leads to the thru-hull. You may, at this point, pump the bucket dry by running the feed pump as in step 5 above. Stop when the bucket is empty.
- Turn the service valve 180° back to its original position, and remove the service hose.
- Turn off the power to the system and the MPC control.
- **LEAVE THE PRESSURE RELIEF VALVE ON THE CLARK PUMP OPEN.**

# Maintenance

## General

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

## The Seawater Strainer

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

## The Prefilter

- Service the prefilter as soon as possible after the prefilter condition graph begins to rise. If the filter condition graph gets all the way to "Replace" the alarm sounds and the system will shut down to prevent damage. If cleaning and reusing filter elements, clean when the first block fills in on the filter condition bar graph on the LCD display.
- To service the filter shut off the thru-hull, open the housing using the supplied filter housing wrench, discard the old filters, Clean out the housing bowls, reassemble the housings with a new 5 micron filter element. Leave dry until next startup.
- Use only Spectra approved filters or you may void your warranty. The filters may be cleaned several times with a soft brush and water in a bucket. Occasionally, lightly lube the O-rings with silicone grease.

## The Charcoal Fresh Water Flush Filter

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

## The Membranes

- The membranes need to be cleaned only when operating pressures have risen more than 10% or the product quality degrades. The leading cause of fouling in marine use is from biological growth that occurs when the system is left unused without flushing or pickling. Fouling from mineral scaling can happen during operation under certain sea water conditions, and from rust. Monitor the product salinity and feed pressure bar graphs for higher than normal readings for the conditions. Other conditions can cause high pressure such as cold feed water or clogged filters. Low product flow is usually due to low voltage, damaged feed pump or Clark pump. Look for all other causes before cleaning the membrane. Membrane life can be shortened by excessive cleaning.
- There are two types of cleaners: acid and alkaline. The acid cleaner (SC3) will remove mineral scaling. The alkaline cleaner (SC2) is used to remove biological by-products, oil, and dirt particles that get past the prefilters. If membrane performance is reduced and they have not been pickled recently, cleaning with both chemicals is recommended. The acid cleaner should be used first. If the membrane fails to respond to both cleanings, this is an indication of another problem with the system, or that it is time to replace the membrane. Contact Spectra Watermakers before removing a membrane.

## Membrane Cleaning

For normal cleaning, the SC3 Acid Cleaning Compound is used first, then the SC2 Alkaline Cleaning Compound. If known biofouling is present, the SC2 may be used first. Using hot water if possible, up to 120° (50C) is recommended as it greatly enhances the ability of the cleaners to do their jobs.

If the history of the system is unknown, or has been left “unpickled” for an extended length of time and biological growth is present, it is recommended that the system is cleaned with SC2, using an alternate source of unchlorinated fresh water before the system is run under pressure. A simple test can be performed to see if biological growth has occurred. Before running the system, remove the prefilters and examine their condition. If the housings are full of smelly discolored water, the system was not properly stored. Install clean prefilters if they were bad. Next check the membrane. Attach the brine discharge service hose and lead to a bucket. Open the pressure relief valve one turn, and manually run the system for 30 seconds. Examine the brine water: if it’s discolored and smells bad, perform an SC2 cleaning with an alternate source of unchlorinated water before running the system pressurized. If the brine is fairly clean, the system can be purged, run normally, and checked for performance. Clean the membranes only if performance is reduced.

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

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

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

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

*A 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 to have the proper solution. An average of two gallons (8L) of water is already present inside a 300 system . This water has to be figured into the mixture. A 300 system will use 1 container of compound. SC-2 and SC-3 are never mixed together. Do not use them for storage pickling solution.*

### **Cleaning Procedure:**

- Step 1: Close the seacock. Flush the system twice. Use the “Auto Flush” button on the MPC-5000 display, once the first flush has been completed, press “Stop” to cancel the 5 day interval timer, then press “Auto Flush” again.
- Step 2: Remove the quick disconnect fitting from the brine discharge outlet of the Clark pump, and replace with a quick disconnect from your service kit, fitted to a hose, and lead the hose to a bucket.
- Step 3: Press “Auto Flush” again to fill the bucket with 1 gallon (4L) of fresh unchlorinated water. Press “Stop” when the bucket has reached the desired level.
- Step 4: Connect a hose, using the garden hose barb fitting from your service kit, to the service port of the boost pump module. Lead the hose into the bucket. Turn the service valve on the boost pump module 180°, so the intake is now coming from the bucket.
- Step 5: Mix the cleaning chemical compound into the water in the bucket. *Note: Some cleaning chemical may remain in the bucket undissolved, this is normal*
- **Step 6: Make sure the pressure relief valve on the Clark pump is Open (unpressurized).**
- Step 7: Use the “Run Manual” switch on the MPC control box to turn on the feed pump. Circulate the storage chemical in the system for approximately 25 minutes. Allow to soak for several hours or overnight if the solution cannot be heated to 120 deg F. Run the pump occasionally to agitate the solution. Set the toggle switch to 'Run Auto' when finished.
- Step 8: Turn off the control system (DC) power. Replace the brine discharge hose. Remove the Inlet Service hose and return the Service valve to the Run position.
- **Step 9: To avoid damaging the membranes, Follow the “New System Startup” Instructions to Purge the chemicals out of the System.**

## Salinity Probe Calibration

Salinity is a measurement of dissolved solids in liquid: these solids will conduct electricity to varying degrees. A special probe is used, with two electrical contacts in it, to determine the resistance to the flow of electricity in the liquid. The higher the resistance, the lower the PPM (parts per million) of dissolved solids.

In the Spectra Watermakers systems, the salinity probe is located just before the diversion valve, at the output of the RO membrane. This way the salinity level can be monitored before deciding to either reject the water or accept it and divert it into the holding tank.

The salinity level in partsper-million can be seen on the remote display.

The only accurate way to calibrate the salinity probe is by using a handheld salinity tester that has been calibrated against a known solution. Fill a cup with product water from the watermaker and test using the handheld meter. Compare the reading from the handheld meter to the reading on the remote display on the watermaker.

If the readings do not coincide, then you will need to calibrate the watermaker's probe. Access the program mode and adjust the salinity probe calibration parameter as described in Part 2 of this manual, 'Programming from the Display'.

**If you have difficulty getting the probe to calibrate properly then the probe contacts may be dirty.**

To remove the salinity probe for cleaning, use a wrench to carefully unscrew the probe from the diversion valve manifold. Be very careful not to damage the cable epoxied into the probe body. Clean the probes using some emery cloth or scotch-brite pad and reinstall the probe. Use 5—6 wraps of Teflon tape on the threads of the salinity probe to ensure leak free performance.

## Suggested Spares

### Short term cruising, weekends etc.

We suggest a basic cruise kit. Kit consists of 6 ea. 5 micron filters and two SG1 storage chemicals.

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

Two basic cruise kits, One each replacement charcoal filter. 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, O-ring for strainer screen, O-rings for filter housings.

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

### **Part Number**

SC-1 STORAGE CHEMICAL	KIT-CHEM-SC1
SC-2 CLEANER	KIT-CHEM-SC2
SC-3 CLEANER	KIT-CHEM-SC3
BASIC CRUISE KIT A	KIT-BCK-A
5 MIC FILTER	FT-FTC-5
CHARCOAL FILTER	FT-FTC-CC
5" STRAINER SCREEN	FT-STN-5S
FEED PUMP HEAD	KIT-PMP-110MRF
5" STRAINER O-RING	SO-STN-5SS
FILTER HOUSING O-RING	SO-FHS-3PCS10
OFF SHORE KIT	KIT-OFFSH
40" MEMBRANE	FT-MB-40

## Membrane Pressure Vessel Relocation

Use **ONLY** Dayco Imperial Nylo-Seal 88-NSR-1/2 tubing for high pressure connections. Pay attention to the direction and flow path of the tubing before disassembly. Make sure that you reinstall the tubing in the same manner. Rotate the 90 degree high pressure tube fittings on the Clark pump for ideal tube runs. The high pressure fittings are typically pre installed at the factory. These fitting seal with an O-ring and require no Teflon tape or pipe dope. Loosen the backing nut rotate the fitting and reseal the backing nut.

***Follow the high pressure tube connection instructions on the next page.*** Connect the tubes to one of the components, secure the tube runs, and then trim and connect to the other component. A 90 degree bend in a tube is better than a 90 degree fitting. A tube, when mounted, should have at least ***one gentle bend*** to allow for expansion. **Do not connect a tube straight between hard mounted fittings.**

When connecting the tubes to their components, be sure to hold the fitting body with a wrench during the final tightening. Of special note are the stainless steel tube fittings on the membrane housing seal on an O-ring and should be seated all the way in. Hold the fitting with a wrench while installing the tube.

The fittings on the Clark pump have an O-ring seal and can be reoriented by backing out the O-ring Stop nut. Rotate the fitting to align with the tube and tighten the nut **just past hand tight. Do Not over tighten!**



# Spectra High Pressure Tube Fitting Assembly

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

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

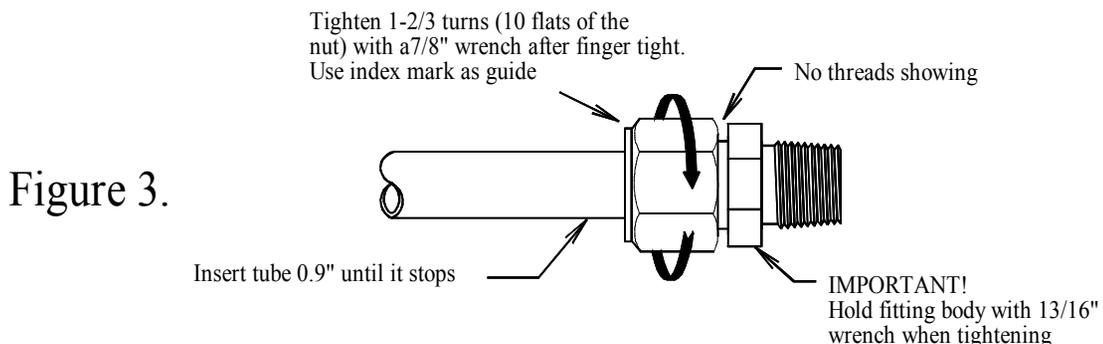
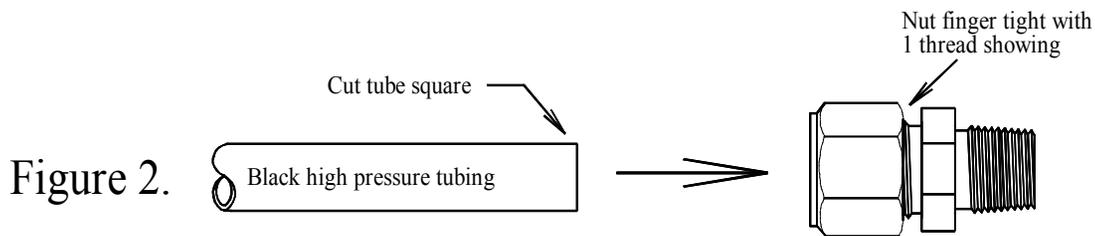
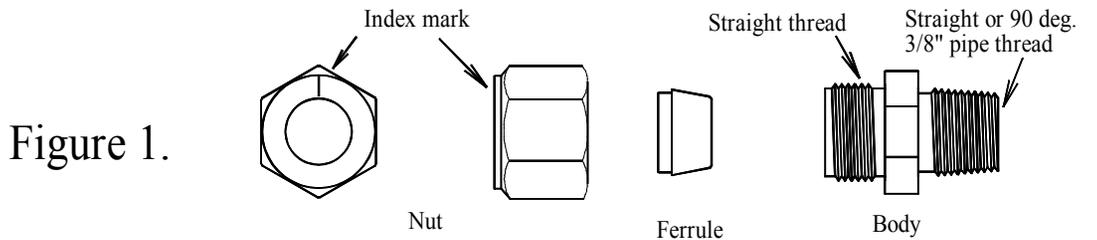
**Refer to figure 1.** If a fitting has been disassembled, reassemble as illustrated. The notch on the ferrule must engage the inside of the nut properly for the nut to seat down fully. Once the tube is inserted the ferrule and nut will naturally align.

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

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

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

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



# Spectra Watermakers Catalina Troubleshooting Procedures

SYMPTOMS	PROBABLE CAUSE	REMEDY
Feed pump runs constantly, will not turn off	Manual override switches in “on” position	Turn off manual switch on control box
Feed pump runs with loud noise	<ul style="list-style-type: none"> <li>- Intake blocked</li> <li>- Air in system</li> </ul>	<ul style="list-style-type: none"> <li>- Check thru-hull valve</li> <li>- Check sea strainer for leaks</li> <li>- Check FWF module for leaks</li> <li>- Re-prime system (restart)</li> </ul>
No lights or display, system does not operate	<ul style="list-style-type: none"> <li>- Remote display not connected</li> <li>- No power to control box</li> </ul>	<ul style="list-style-type: none"> <li>- Check display cable connections at back of display and at control box</li> <li>- Check and reset main DC supply breaker</li> <li>- Check for voltage (12 or 24vDC) at control box power input studs</li> <li>- Try manual bypass switches; if pumps run, then control or display is defective</li> </ul>
Display activates, but pump will not run	<ul style="list-style-type: none"> <li>- loose or broken pump wire connection</li> <li>- tanks are full</li> <li>- faulty motor brushes</li> </ul>	<ul style="list-style-type: none"> <li>- Check wiring at terminal block inside MPC</li> <li>- Check tanks– system cannot be started if tanks are full.</li> <li>- remove brush caps and inspect.</li> </ul>
System runs, no product water delivered to water tanks, GPH display shows OK, “Good” LED activated	<ul style="list-style-type: none"> <li>- diversion valve inoperative</li> <li>- disconnected or broken product tubing</li> <li>- diversion valve faulty</li> </ul>	<ul style="list-style-type: none"> <li>- Check wiring at diversion valve and inside control box</li> <li>- Disassemble and clean valve</li> <li>- Check product tubing</li> <li>- Replace valve (contact factory)</li> </ul>
System runs, no product water delivered to water tanks, GPH shows OK, “reject” LED activated	<ul style="list-style-type: none"> <li>- high salinity of product water, causing system to reject water</li> <li>- salinity probe out of calibration or defective, bad cable</li> <li>- chlorine damage to membranes</li> <li>- pressure relief valve open</li> </ul>	<ul style="list-style-type: none"> <li>- Check for low feed pressure, close pressure relief valve</li> <li>- Check for leaks at high pressure hoses</li> <li>- Test product water with handheld tester– if over 500ppm for 1 hour, contact factory</li> <li>- Close relief valve</li> </ul>

# Spectra Watermakers Catalina Troubleshooting Procedures

SYMPTOMS	PROBABLE CAUSE	REMEDY
<p>“System stalled”</p> <p>(“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)</p>	<ul style="list-style-type: none"> <li>- pressure relief valve open</li> <li>- intake thru-hull closed</li> <li>- airlocked system</li> <li>- no signal from flow meter</li> </ul>	<ul style="list-style-type: none"> <li>- Close pressure relief valve</li> <li>- Check thru-hull</li> <li>- Check flow meter wiring at control box</li> <li>- Replace flow meter</li> </ul>
<p>“High Pressure”</p>	<ul style="list-style-type: none"> <li>- blocked brine discharge</li> <li>- fouled membrane</li> </ul>	<ul style="list-style-type: none"> <li>- Check brine discharge</li> <li>- Clean membrane</li> </ul>
<p>“Voltage Too High”</p> <p>“Voltage Too Low”</p>	<ul style="list-style-type: none"> <li>- battery voltage too high or low</li> <li>- loose wires or poor connections</li> </ul>	<ul style="list-style-type: none"> <li>- Charge batteries</li> <li>- Check charging voltage</li> <li>- Check power connections</li> </ul>
<p>“Re-starting”</p>	<ul style="list-style-type: none"> <li>- no signal from flow meter at startup. System Air-locked</li> </ul>	<ul style="list-style-type: none"> <li>- See remedy above for “system stalled”</li> </ul>
<p>“Check Fuse” (followed by fuse number)</p>	<ul style="list-style-type: none"> <li>- blown fuse at circuit board</li> </ul>	<ul style="list-style-type: none"> <li>- Replace fuse (mini automotive type ATM)</li> <li>- Look for cause</li> </ul>
<p>“Service Prefilter”</p>	<ul style="list-style-type: none"> <li>- clogged filters</li> <li>- loose or defective pressure sensor wires</li> <li>- Sensors not calibrated</li> </ul>	<ul style="list-style-type: none"> <li>- Install new filters</li> <li>- Check sensor wiring</li> <li>- Calibrate sensors: see Programming from the Display</li> </ul>
<p>“Salinity High”</p>	<ul style="list-style-type: none"> <li>- high product water salinity</li> <li>- chlorine damage to membranes</li> <li>- defective salinity probe or cable, cable disconnected</li> </ul>	<ul style="list-style-type: none"> <li>- Check for low feed pressure</li> <li>- Check for leaks at high pressure hoses</li> <li>- Remove and clean probe contacts check calibration.</li> <li>- Check cable connections</li> <li>- Clean membrane</li> </ul>

## Operation and Repair Bulletins

The following documents are sections of our complete service bulletin set. These are available on our website [Spectrawatermakers.com](http://Spectrawatermakers.com)

### MB-2 MEMBRANE CARE

Membrane life is affected by a large number of factors and is somewhat unpredictable. A big commercial plant running 24/7 will get 10 to 12 years out of a set of membranes. But they do all kinds of fancy chemical injections and never shut the thing off. Most cruisers are lucky to get five or six years out of one. You hear of the eight or ten year old membrane now and then. The biggest killers of membranes are lack of use, chlorine damage, and improper storage.

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

After many hours of water making mineral deposits will form and must be dissolved away with an acid cleaner. Alkaline cleaners are used for biofouling. Cleaning chemicals, especially the alkaline, are not good for the membrane. Every time you clean the membrane it shortens its life. Clean only when necessary, and avoid cleaning as a "diagnostic tool".

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

Oil simply plugs up the matrix of the membrane and clogs it up. We have brought back oil fouled membranes with Joy soap (See MB-5 Cleaning with Detergent.)

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

Given good care a membrane will eventually just start to slowly fade away. The feed pressure may rise and/or the ppm go up. Hardly ever will they just fail overnight.

8/13/04

## MB-5 MEMBRANE CLEANING WITH DETERGENT

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

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

After most of the oil is cleaned out you can put the brine discharge into the bucket and run the system with the soapy water circulating as you would for the other cleaning chemicals. Rinse the system with a bucket of fresh water or the fresh water flush cycle, then flush for twenty minutes using sea water. Pressurize and test.

5/12/04

## MPC-5 PURGE MODE BYPASS

Whenever the control power (12 or 24 volt DC) has been shut off the system will prompt you through the purge mode when it is turned back on. This is because the only time the MPC-5000 should be turned off is after the system has been pickled. Purge Mode prompts the operator to open the pressure relief and then runs seawater through the system for 20 minutes to clear away the chemicals. Normally, during periods of disuse the MPC5000 will remain powered up so that it can do the five day flush cycles, and no storage solution will be present. If the control power has been interrupted but the system is not filled with storage solution, Purge Mode can be bypassed by tapping the two left hand buttons at the same time until the display reads PURGE MODE BYPASSED. The buttons must be pushed at exactly the same time. You can't hold one down and then push the other. From Purge Mode Bypassed you can run the system in any mode. 4/20/04

## OP-2 BAD SMELLING PRODUCT WATER

The reverse osmosis membrane is permeable by many gases including hydrogen sulfide, the gas that causes rotten eggs to smell the way they do. If there are bad odors in the feed water they will go through the membrane and the product water will be affected. Usually the source of the odor is from the decay of planktonic creatures trapped in the sea strainer and prefilters. These tiny oxygen loving creatures soon suffocate and die inside the prefilter housings when the unit is shut down. Once all the available oxygen is consumed, anaerobic bacteria begin to grow, causing the odor. If a unit being used frequently begins to make smelly water, it will be the prefilters that are the source of the problem. This occurs in a week or two in cold climates, but in less than one night in very warm waters like the Sea of Cortes or Red Sea. These bacteria can spread throughout the watermaker, and begin to grow on the membrane, causing poor water quality and high feed pressures.

Filling the system with fresh water after every use greatly slows this process, allowing the automated spectra units to operate with less frequent prefilter changes, but units operated for only an hour or so a day will probably need to have the filters changed due to odor before they are dirty enough to restrict water flow. Prefilters can be cleaned. We recommend that you have three sets in service, one in the unit, one set soaking overnight in a bucket of clean fresh or salt water and one set drying for the next use. After shutting down the unit remove the used prefilters and install the dry set. Leave the housings full of air until the next use. On non-automated systems, open the pressure relief when starting if there is a lot of air in the system until the air is cleared out through the brine overboard. The filters will get just as clean when soaked in sea water, but dry much faster if soaked in fresh. Given gentle handling, prefilters can be reused many times.

Bad smelling product water is usually caused by bad smelling feed water, but can also be caused by a fouled membrane if the membrane has been left unpickled. If the unit makes smelly but not salty water after a long idle period and the prefilters are new, the smell can be eliminated by running the unit unpressurized for an hour or so to flush the membrane.

Odors in the product water can also be eliminated by adding a charcoal filter in the product water line. Spectra offers a product water filter kit p/n KIT-FLT-CC.

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

8/17/04

## PF-4 PREFILTERS– Mark 2 SYSTEMS

Four different filters are used on these Spectra Watermakers to make sure that no damaging foreign materials enter the system. There are three or four filters in the system to clean the feed water of abrasive materials while the system is in operation, and a fifth filter that prevents the entrance of chlorine during fresh water flushing. Catalina MkII systems use a single 5 micron filter, a sea strainer and a charcoal filter.

During normal operation the feed water is filtered in two stages. First it enters a fine mesh metal sea strainer. This protects the boost pump from damage. After passing through the boost pump the feed water enters the filter housings containing 20 and 5 micron elements (Catalina MkII's will only pass through the 5 micron filter). These filters remove very fine particles which could damage the Feed Pump or Clark pump, and which would shorten membrane life.

Cleaning 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 a relatively short period in biologically fertile near shore waters, the prefilters will plug up, the pressure drop across the filters will rise, product production and quality will drop, and the system will sense plugged filters and give a service prefilters or check strainer alarm. Moderately dirty filters can be cleaned several times by soaking in a bucket, towing behind the boat at moderate speeds, or hosing them off.

When operated 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, and the bacteria involved in the decay 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 high latitudes. If handled gently and changed regularly before they get too smelly, filters in this service can last through dozens of cleanings.

In crystal clear blue water conditions the filters may need to be cleaned much less frequently.

The charcoal filter used in the fresh water flush system will not plug up unless you have some incredibly dirty domestic water in your boat. About six months after installation the charcoal filter element will lose its effectiveness at removing any membrane damaging chlorine which may be present in domestic water. Charcoal filter elements must be replaced every six months if there is ANY chance that chlorine could be introduced into the flush water. Charcoal filter elements cannot be cleaned.

To ensure that filter elements fit properly and remove chlorine effectively, they should be purchased at factory authorized dealers. Our element part number is FFFTC-XX. The last two digits indicate the micron rating, e.g. FFFTC-05 is for a 5 micron element. Charcoal elements are FT-FTC-CC.

06/03/04

## PF-2 CHARCOAL FILTERS

The function of the charcoal filter element, p/n FTFTC-CC, is to remove any chlorine in the fresh water flush water supply. It also removes any particulate matter. The charcoal filter we use 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. The cheap ones in most cases will only remove 60 or 70%. Also, there are aftermarket filters which are very close to, but not exactly, the same dimensions that will not seal properly in the housing. The membrane can only handle small amounts of chlorine for short periods without damage. The chlorine will damage the bonding agent in the membrane in a very short time. So if you skimp on the charcoal filter you will toast a \$595.00 membrane on the first flush. The other factor is the flow rate that the filter can handle. Because the chlorine is deactivated by a chemical reaction with the charcoal, it must remain in contact with the charcoal for sufficient period of time for the reaction to be complete. The filter we use can handle 1.5 gallons (6 litres) per minute flow, and are good for 5000 gallons (12,000 litres) at 1.5 GPM, or six months, whichever comes first. Regardless of the flow the charcoal loses its effectiveness after six months.

7/26/04





**SPECTRA**  
WATERMACHINES™

**Z-BRANE  
OPERATION  
MANUAL**

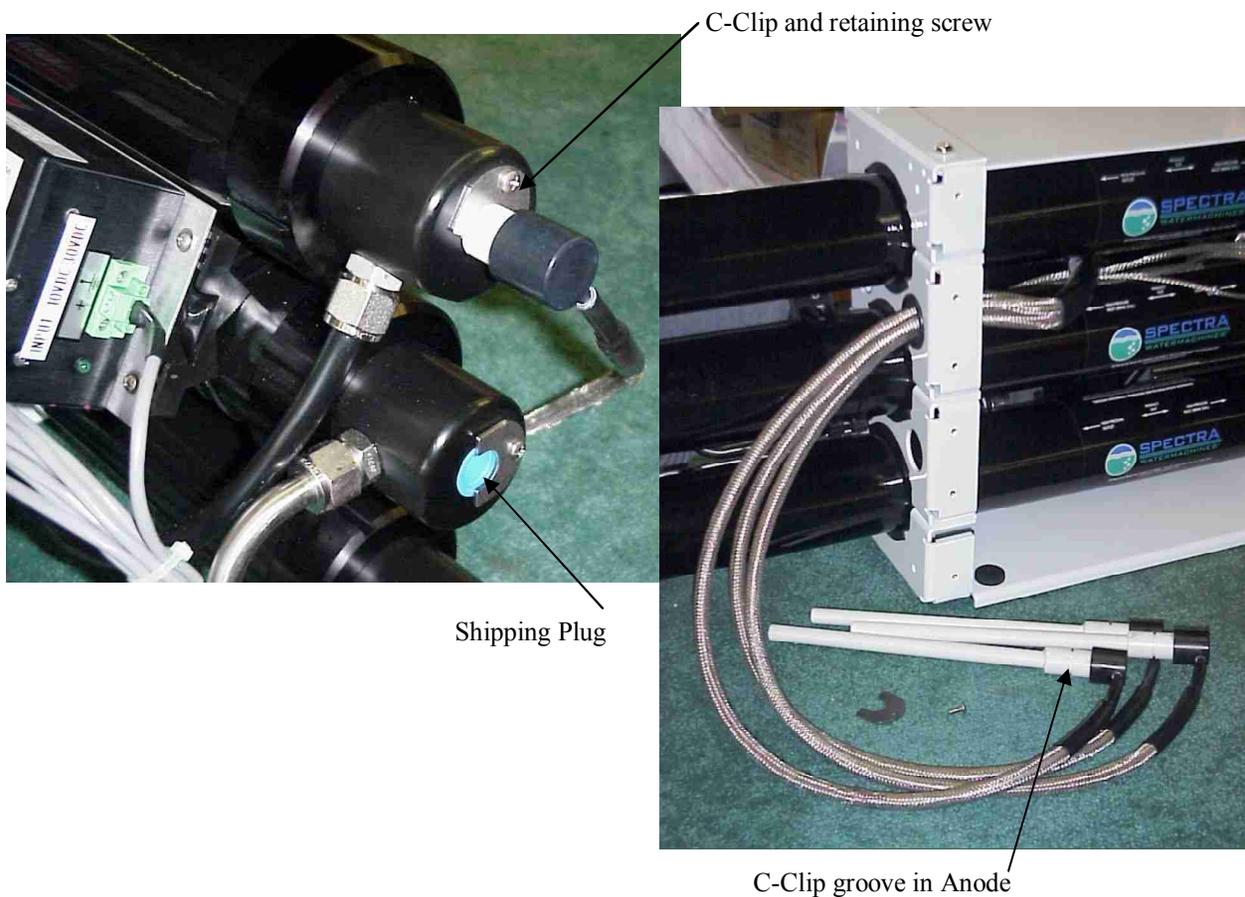


The **Z-brane** is a revolutionary product which incorporates the Z-Guard High Voltage Capacitive technology into the membrane pressure vessel. Always active, the ZBrane creates an environment that is unfriendly to biofilm and bacteria. The Z technology also assists in the prevention of scale formation on the membrane surfaces. The ZBrane allows the system to be shut down or decommissioned for extended periods of time without chemicals or preservatives. The Z-Brane will not prevent freezing so that in cold climates Propylene Glycol is still required.

## ANODE INSTALLATION

Spectra Watermakers ship the High Pressure Module with the White Zbrane Anode(s) removed from their socket(s) to prevent shipping damage. Before the High Pressure Module is mounted the anodes should be installed.

The socket(s) have been plugged with plastic plugs to keep the membranes clean and moist during shipping and storage. Remove the “Cclips” that secure the plugs, and remove the plugs. Insert an anode into each socket. It doesn’t matter which anode goes in which socket. Insert the anode until the groove is flush with the membrane end plug, so the Cclip will slip into the groove. Install the C-clip screw to secure the clip.



## WIRING

The Z-Brane system is integral with the watermaker unit and only requires continuous 12V or 24V DC power to be operative.

**Note: There is no reason to open the transformer enclosure. Do not service this unit without disconnecting the power source! There may be high voltage present.**

It is recommended that the Z-Brane be connected to a discreet continuous power source. The power must be on during the time that the system is in operation and during the time the Z Brane is used for membrane storage. If the power is obtained from the MPC then the MPC must be powered up at all times during storage. This may not be desirable.

Fuse the power at the source with a 5 amp fuse or circuit breaker.

**Red is Positive (+) , Black is Ground (-)**

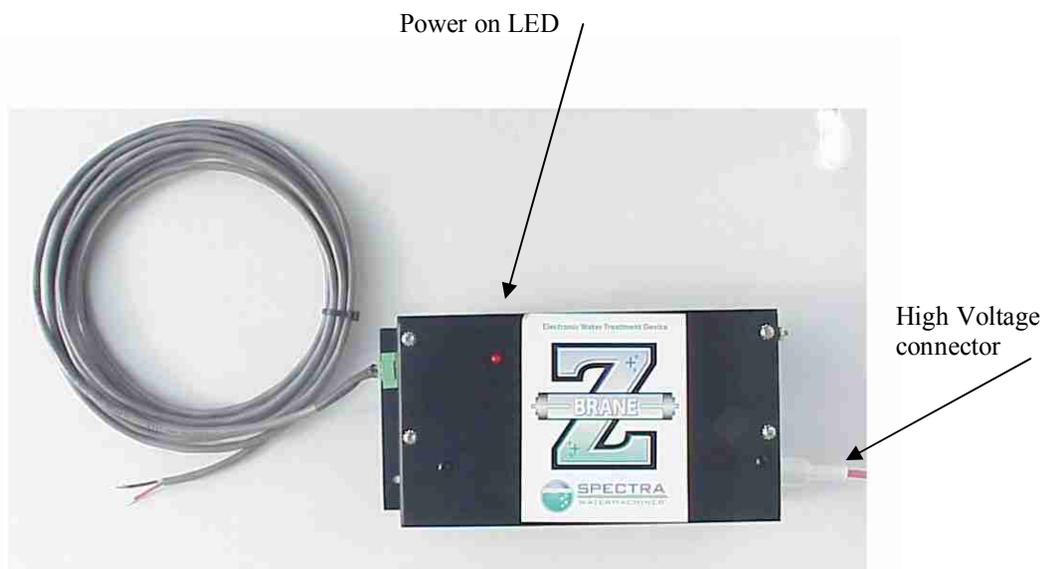


Z-Brane Power Harness

## Operation

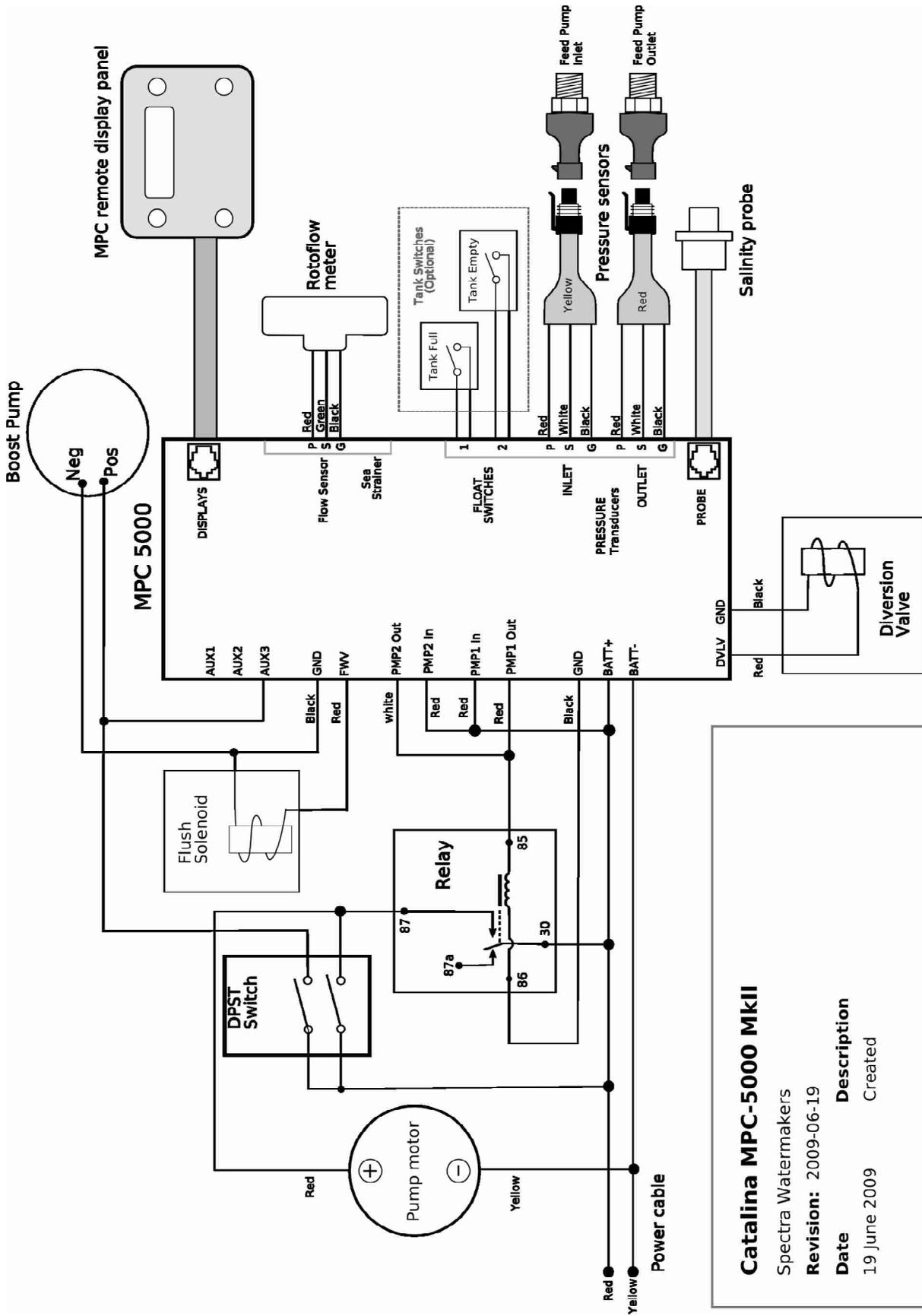
During normal operation the Red LED should be on . Power needs to be supplied to the Z-Brane unit at all times that you wish to have the biofouling and scale protection. We recommend that your watermaker be flushed after each use not only to protect the membrane but to prevent corrosion in the feed water system. To achieve full effectiveness thoroughly fresh water flush the watermaker several times before leaving the vessel.

The Z-Brane may be de-powered if the system is stored with chemicals or winterized with Glycol.

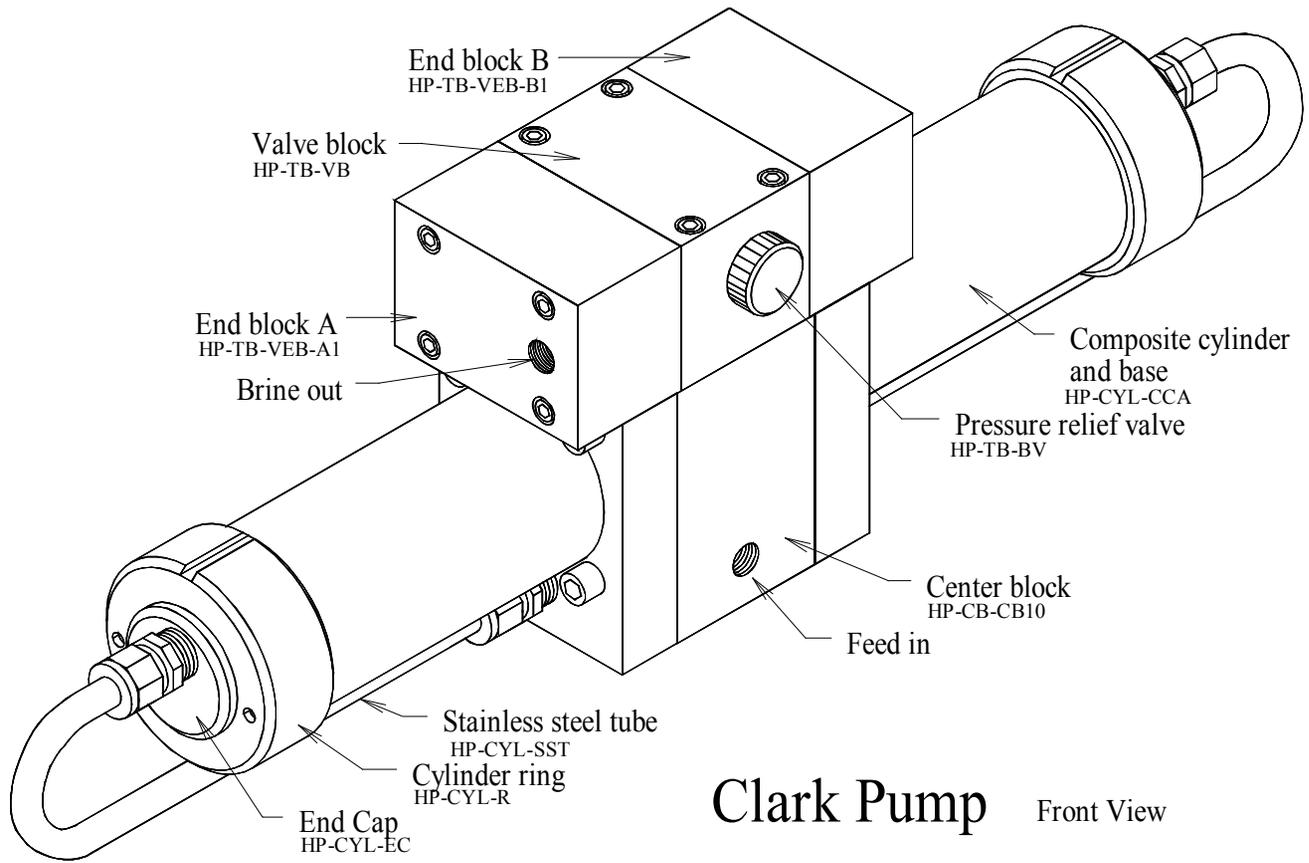


**DO NOT DISCONNECT  
OR SPLICE ANY OF THE  
HIGH VOLTAGE WIRING!**

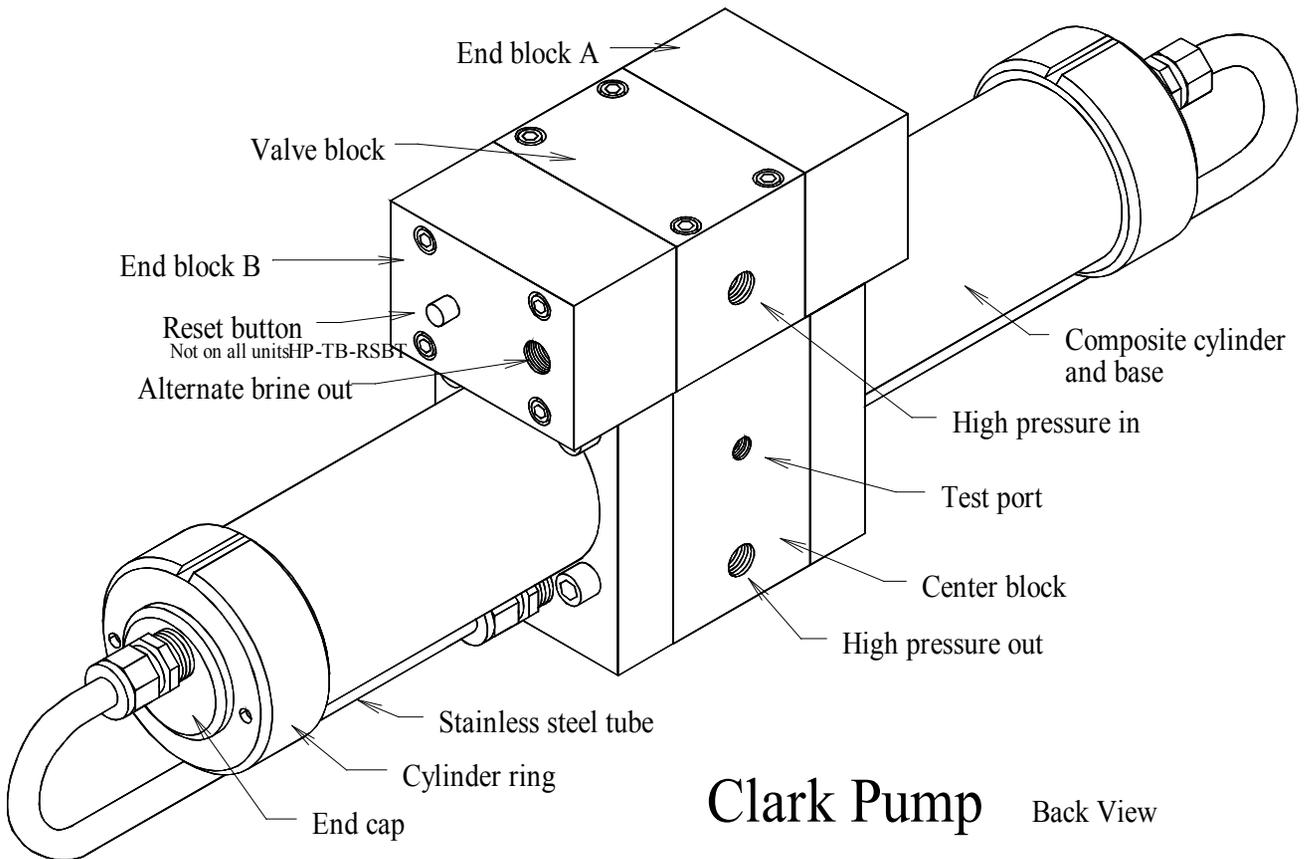
Contact the factory if  
modifications are required.



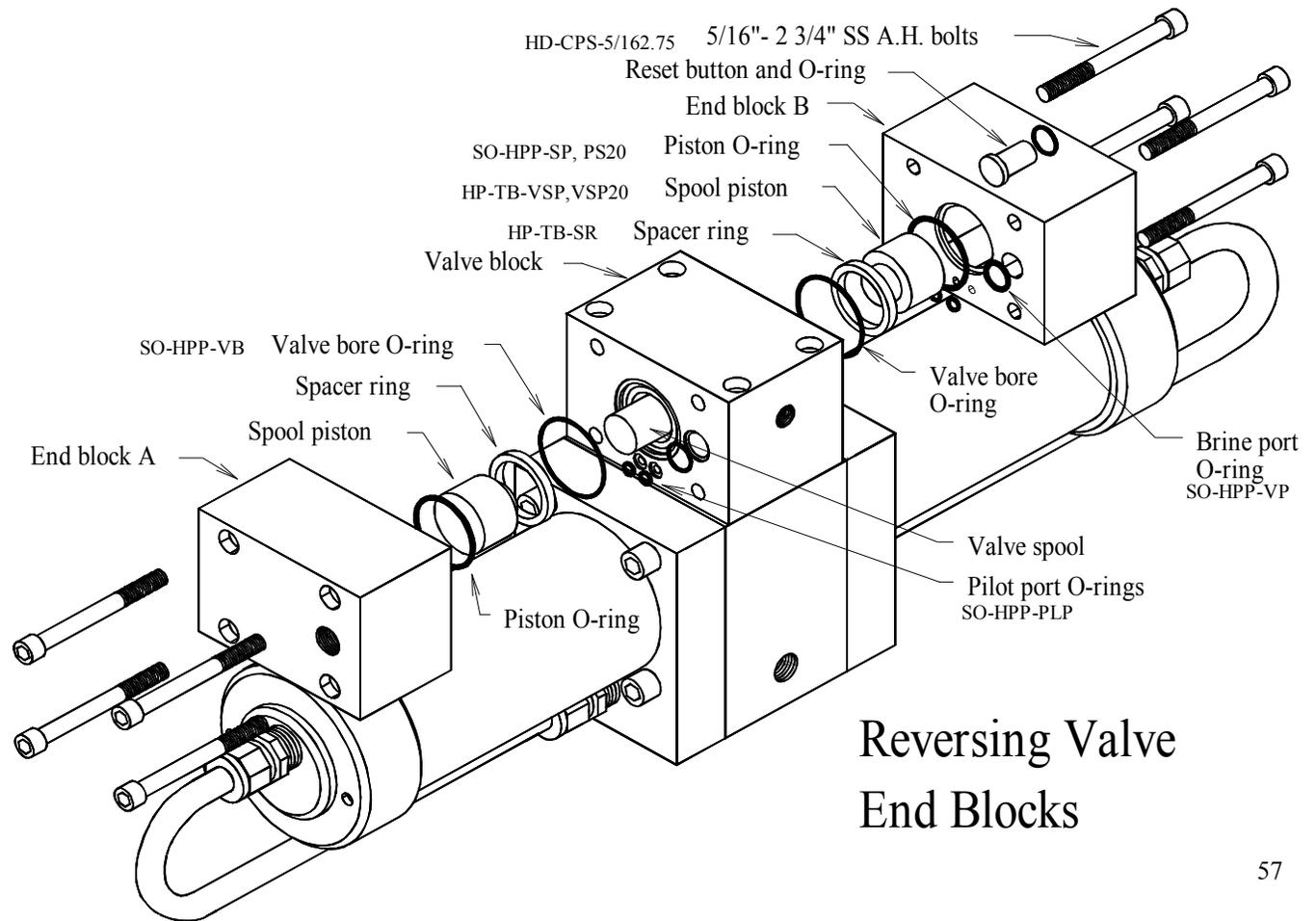
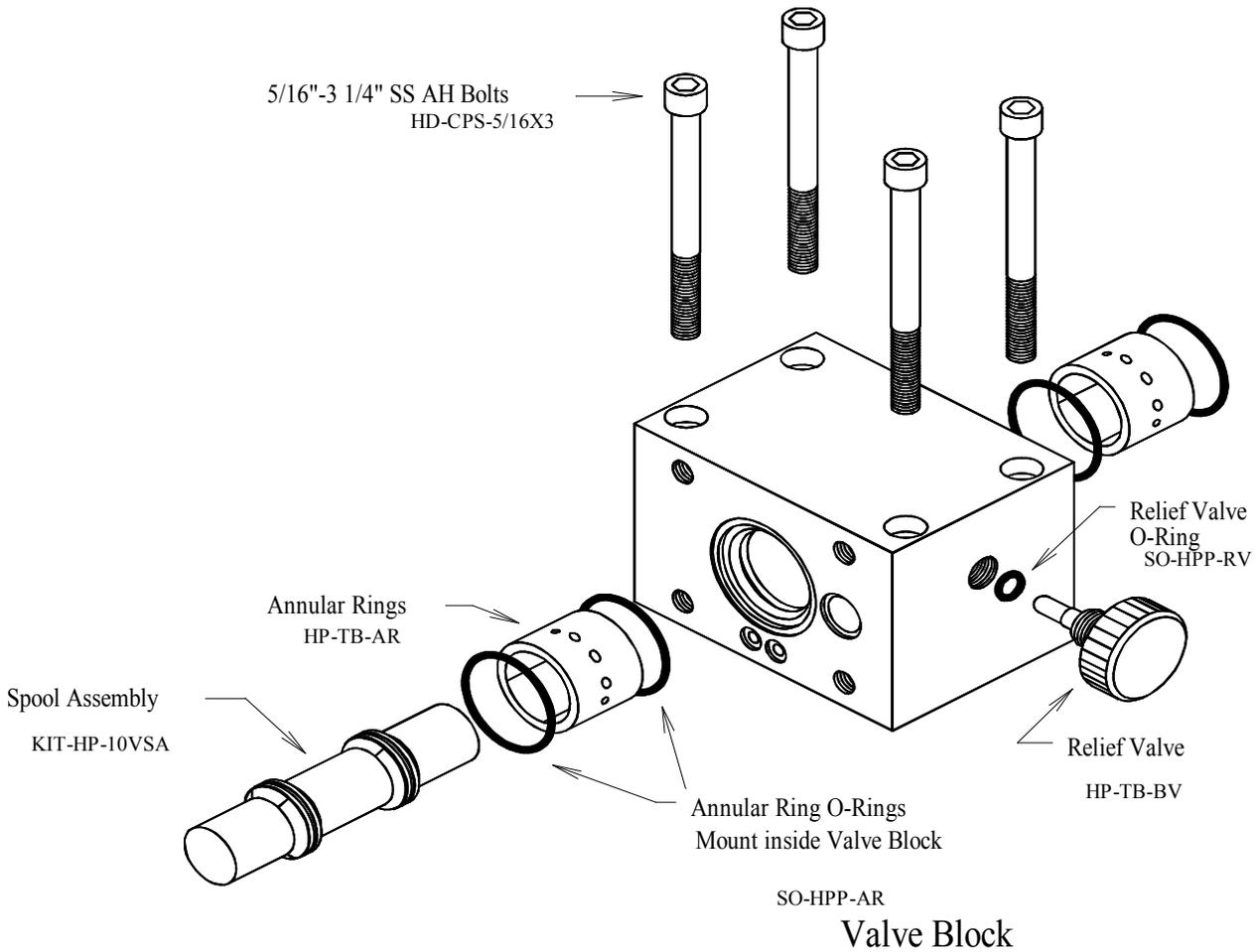
**Catalina MPC-5000 MkII**  
 Spectra Watermakers  
**Revision:** 2009-06-19  
**Date** 19 June 2009  
**Description** Created

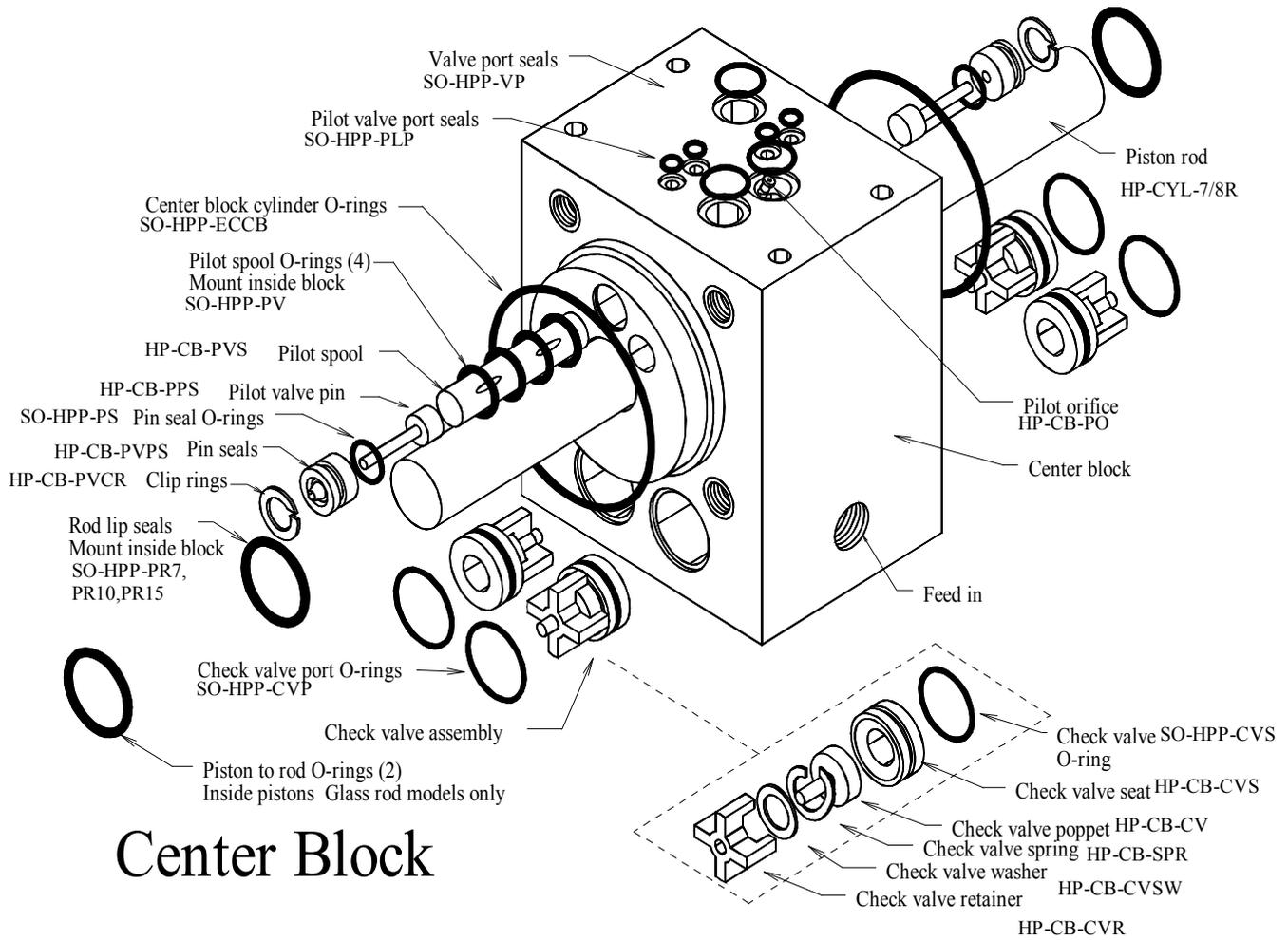


**Clark Pump** Front View

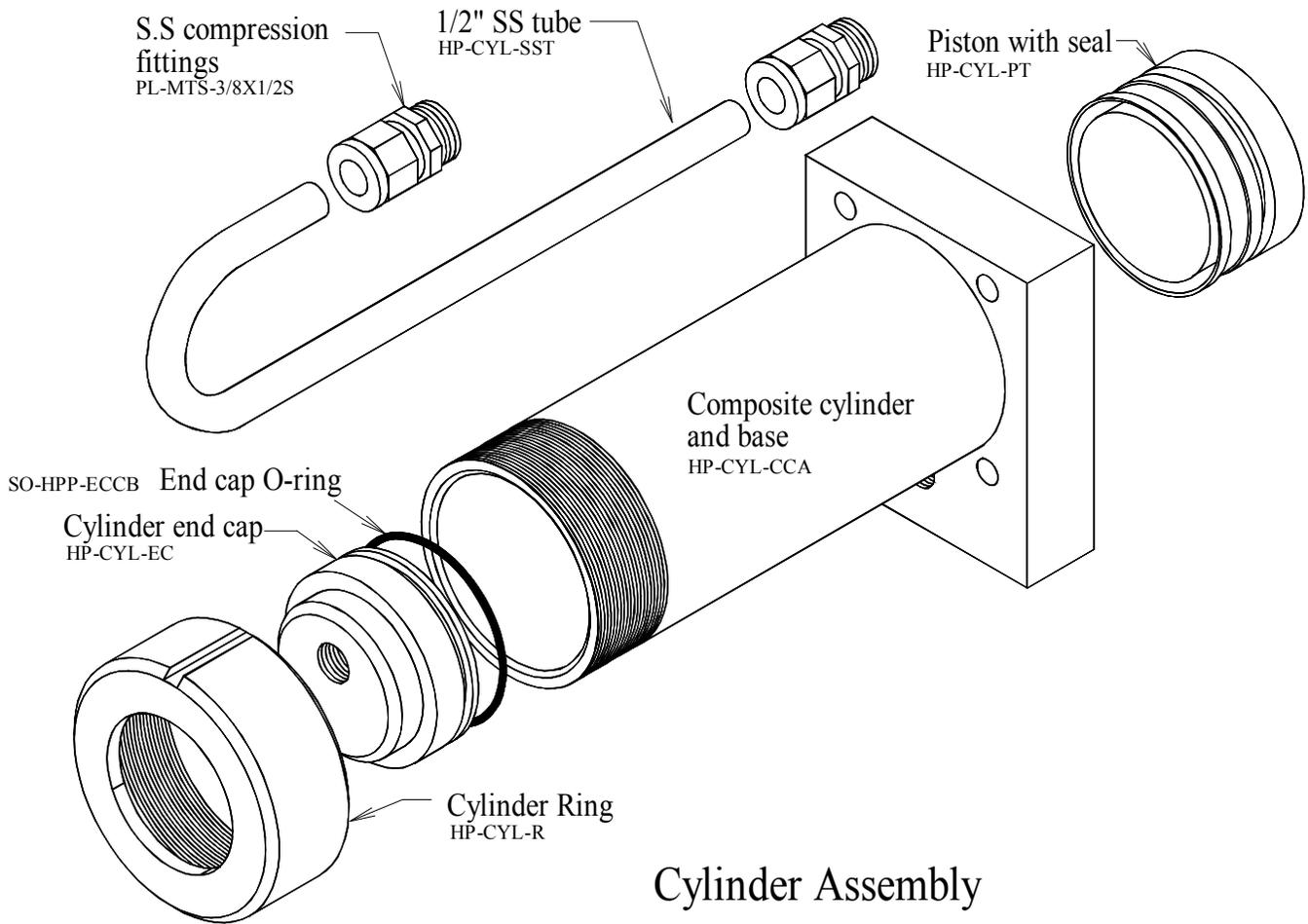


**Clark Pump** Back View





# Center Block

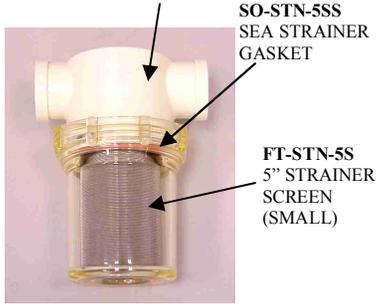


## 10% CLARK PUMP PARTS LIST

PART	DESCRIPTION	USAGE
HP-CB-CB10	CENTER BLOCK	1
HP-CB-INS	CENTER BLOCK INSERT	4
HP-TB-VB	VALVE BODY	1
HP-TB-BV	BLEED VALVE	1
HP-TB-VEB-A1	VALVE END BLOCK A 1-1/4"	1
HP-TB-VEB-A2	VALVE END BLOCK B 1-1/4"	1
HP-CB-PVPS	PILOT VALVE PIN SEAL	2
HP-CB-PPS	PILOT VALVE PIN	2
HP-CB-PVCR	PILOT VALVE CLIP RING	2
HP-CB-SPRP	CHECK VALVE SPRING PLASTIC (DELTRIN)	4
HP-CB-CVSW	CHECK VALVE SPRING WASHER	4
HP-CB-PVS	PILOT VALVE SPOOL	1
HP-CB-CVS	CHECK VALVE SEAT	4
HP-CB-CVR	CHECK VALVE RETAINER	4
HP-CB-CV	CHECK VALVE	4
HP-TB-AR	ANNULAR RING	2
HP-TB-10VSA	10% REV. VALVE SPOOLASSEMBLY	1
HP-TB-VSS	REV. VALVE SPOOL SEAL	2
HP-TB-VSP	REV. VALVE SPOOL PISTON	2
HP-CYL-EC	CYLINDER END CAP	2
HP-TB-EBP	END BLOCK PLUG	2
HP-CYL-7/8R	PISTON ROD	1
HP-CYL-PT	PISTON	2
HP-TB-SR	SPACER RING	2
HD-CPS-3/824175	3/8-24X1 3/4 CAP SCREW	8
HD-CPS-5/16X3	5/16-18X3 1/4 CAP SCREW	4
HD-CPS-5/162.75	5/16 X 2 3/4 CAP SCREW	8
HD-WSH-3/8X5/8S	3/8 X 5/8 O.D. SS FLAT WASHER	8
HP-CYL-SST	STAINLESS TUBE	2
PL-MTS-3/8X1/2S	3/8"NPT X 1/2" TUBE FITT ST SS.	4
HP-CYL-CC	COMPOSIT CYLINDER	2
HP-CYL-CCB	COMPOSIT CYLINDER BASE	2
HP-CYL-R	CYLINDER END RING	2
PILOT ORIFICE	PILOT ORIFICE	1
PL-HP-3/8N	GLASS FILLED BLACK NYLON PLUG 3/8"NPT	1
PL-HP-1/4BR	1/4 COUNTER SUNK HEX PLG.	1
PL-MTE-3/4SX1/2	3/4"MPT(ST) X 1/2" TUBE SS FITT. ELL.	2
SO-HPP-PLP	PILOT PORTS	8
SO-HPP-PS	PIN SEALS	2
SO-HPP-VP	VALVE PORTS	6
SO-HPP-CVS	CHK. VALVE SEATS	4
SO-HPP-CVP	CHK. VALVE PORTS	4
SO-HPP-VB	VALVE BORE	2
SO-HPP-ECCB	END CAP & CENTER BLOCK	4
SO-HPP-AR	ANNULAR RING	4
SO-HPP-PV	PILOT VALVE	4
SO-HPP-RV	RELIEVE VALVE	1
SO-HPP-CT	CONNECTOR O-RING	2
SO-HPP-SP1	SPOOL PISTON O-RING 1"	2
SO-HPP-Q	QUAD SEAL	2
SO-HPP-PR10	10%, 20% PISTON ROD	2

# CATALINA 300 MK II

**FT-STN-5**  
5" STRAINER



**SO-STN-5SS**  
SEA STRAINER  
GASKET

**FT-STN-5S**  
5" STRAINER  
SCREEN  
(SMALL)

**FM-NPC-SVBM**  
NEWPORT II SERVICE  
& BOOST MODULE



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

**PL-FHB-3/4X3/4**  
3/4" FPT X 3/4 HOSE BARB

**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

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

**KIT-PMP-110MRF**  
CATALINA MAG DRIVE  
PUMP

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

**PL-BSH-3/4X1/4N**  
3/4" X 1/4" HEX BUSH-  
ING 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

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

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

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

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

**FT-FHW-3PCS**  
BLUE COLLAR FILTER HOUSING  
WRENCH

**PL-MTE-3/4X3/8**  
3/4 NPT X 3/8" TUBE FIT-  
TING ELL. NYLON

**FT-FC-CC**  
CHARCOAL FILTER

**PL-MTE-1/2X3/8P**  
1/2" x 3/8" PARKER FITTING

**SUB-CT-M2-FPMA**  
CATALINA MK2 FEED PUMP MODULE

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

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

**EL-SSR-150**  
150 PSI PRESSURE SENSOR

**PL-ACC-TK**  
ACCUMULATOR TANK

**PL-MFF-1/4X1/4**  
1/4" MALE TO FEMALE ELBOW

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

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

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

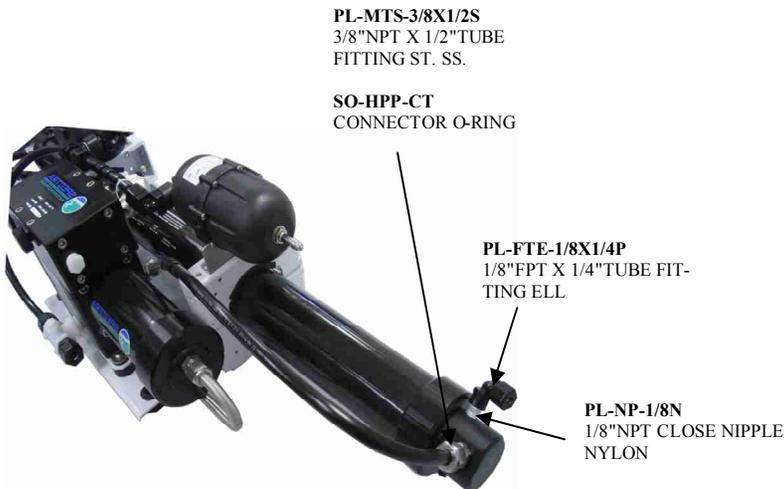
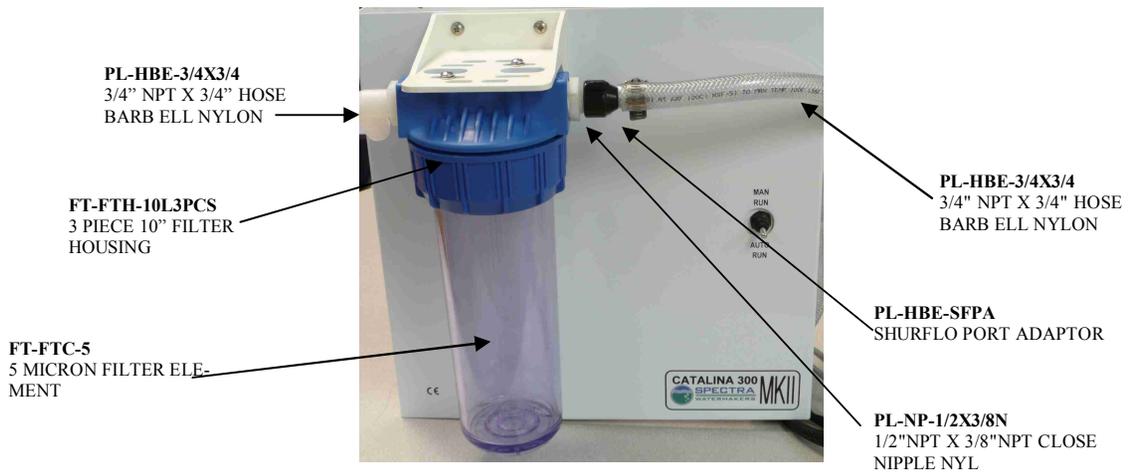
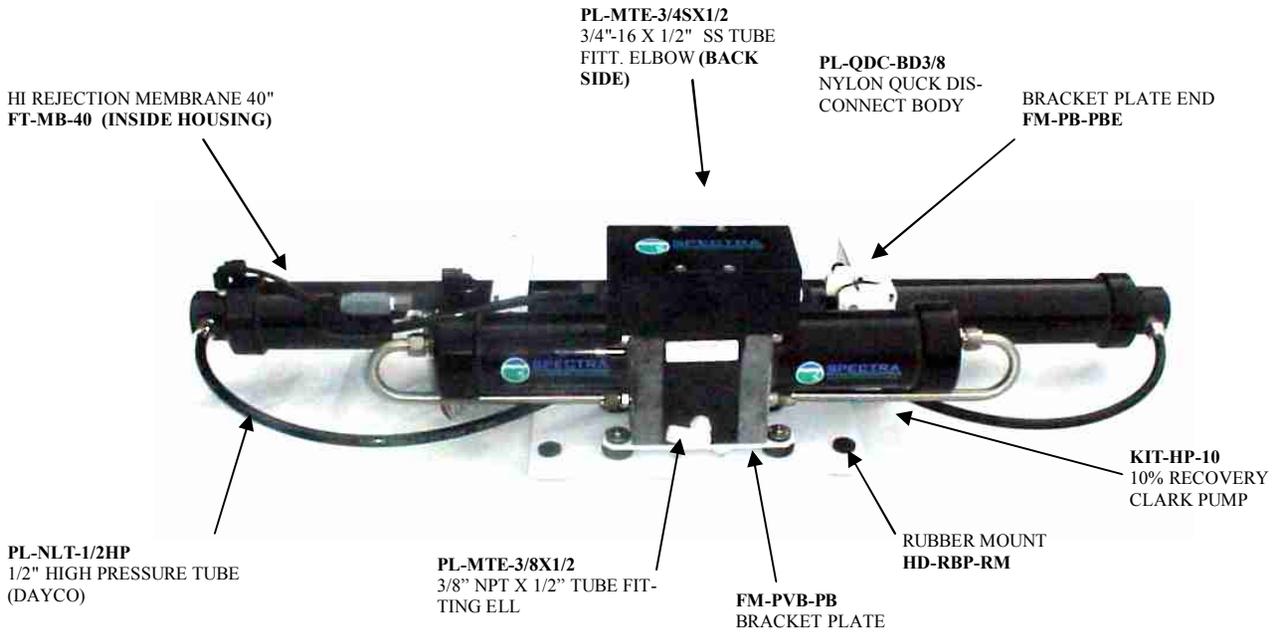
**EL-SSR-ABS**  
ABSOLUTE PRESSURE

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

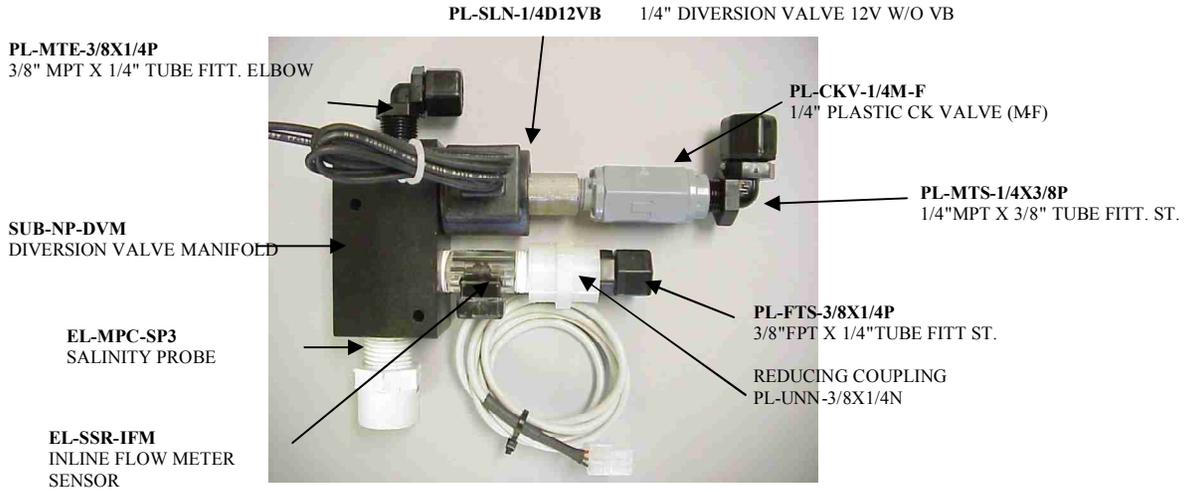
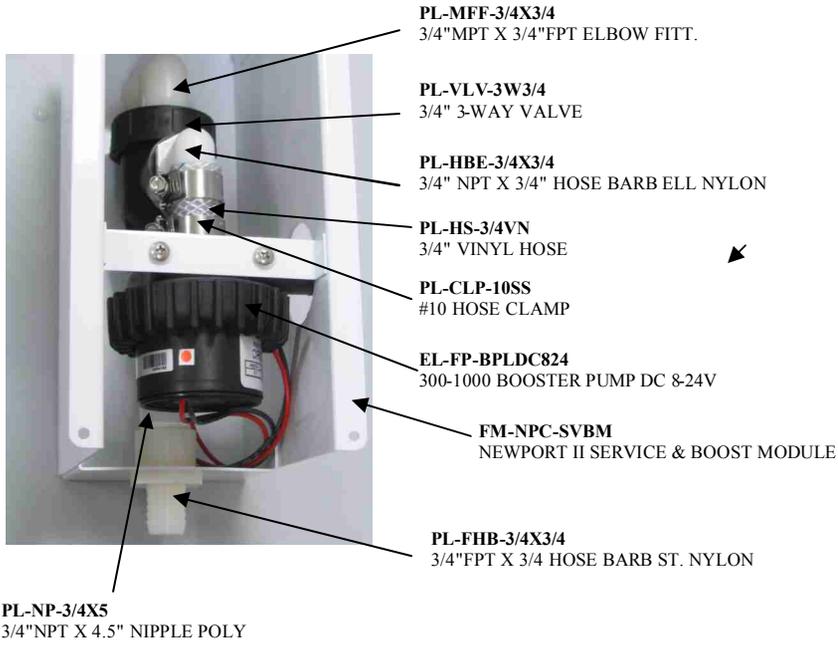
**PL-MTE-3/8X1/2P**  
3/8" NPT X 1/2"  
TUBE FITTING



# CATALINA 300 MK II



# CATALINA 300 MK II



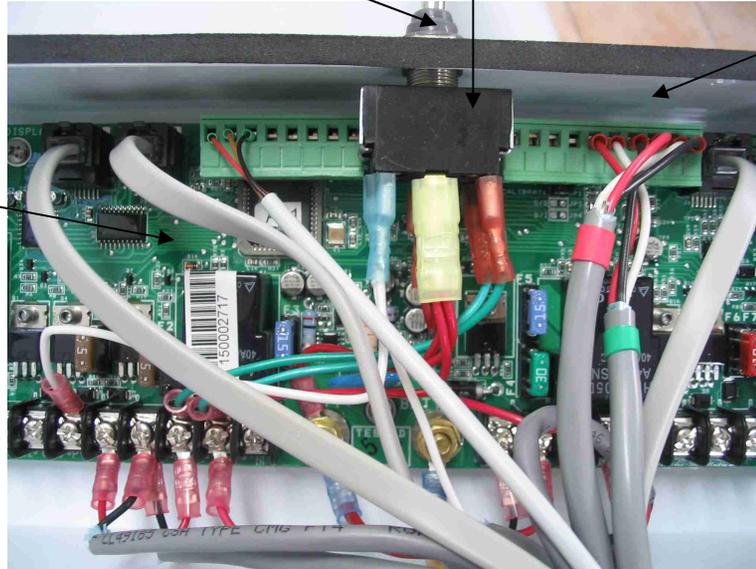
# CATALINA 300 MK II

**EL-SWT-TSBHC**  
TOGGLE SWITCH BOOT SEAL

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

**FM-MPC-MPCB**  
MPC BOX

**EL-MPC-PCBDP**  
MPC-5000 CIRCUIT BOARD



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

**PL-HS-3/4SH**  
3/4" REINFORCE SUCTION HOSE

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



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

**PL-HS-1/2VN**  
1/2" VINYL HOSE