



**SPECTRA**  
**WATERMAKERS™**

**VENTURA 150—200T  
MPC-5000  
INSTALLATION AND OWNER'S MANUAL**

**Section 1.....Installation, Operation, Maintenance**

**Section 2.....Controls & Programming**



**Spectra Watermakers, Inc.**  
**20 Mariposa Road, San Rafael, CA 94901**  
**Phone 415-526-2780 Fax 415-526-2787**  
**[www.spectrawatermakers.com](http://www.spectrawatermakers.com)**

Rev. 12/11



# Table of Contents

## Section 1

<b>Installation</b>	<b><u>Page Number</u></b>
Getting Started .....	4
Introduction .....	5
Suggested Spares .....	6
Installation Basics .....	7
Ventura Plumbing Schematic .....	8
Product Water plumbing .....	9
Tube Fitting Assembly Procedures .....	10
Wiring .....	11
Salinity Probe Installation.....	13
MPC Tank Switch Wiring and operation .....	14
Z Brane Installation .....	38
Membrane Pressure Vessel Relocation .....	42
Feed Pump Relocation .....	44

## **Operation**

New Systems Start Up and Testing .....	16
Dry Testing with an Artificial Ocean.....	19
Fresh Water Flush Adjustment .....	20
Normal Start Up Using the Auto Run .....	21
Manual Operation .....	22

## **Service & Maintenance**

Long Term Storage Procedures .....	23
Winterizing .....	25
Maintenance .....	26
Membranes .....	27
Membrane Cleaning Procedure .....	30
Troubleshooting Procedures, Service Bulletins.....	31
Part Numbers .....	45
Clark Pump .....	50
Wiring Schematic.....	54

## **Section 2: Programming & Controls**

Begins after pg 54

## Getting Started

Unpack the system and inspect it to make sure 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 kit list.

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

Study the system plumbing and wiring diagrams before beginning your installation. This will assist you in understanding the function of each component.

Layout the system. Before starting the installation, identify 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.

***THE VENTURA 200T IS DESIGNED FOR WARM WATER USE ONLY. DO NOT OPERATE IN WATERS BELOW 50° F (10° C)***

### Ventura 150 MPC Shipping List

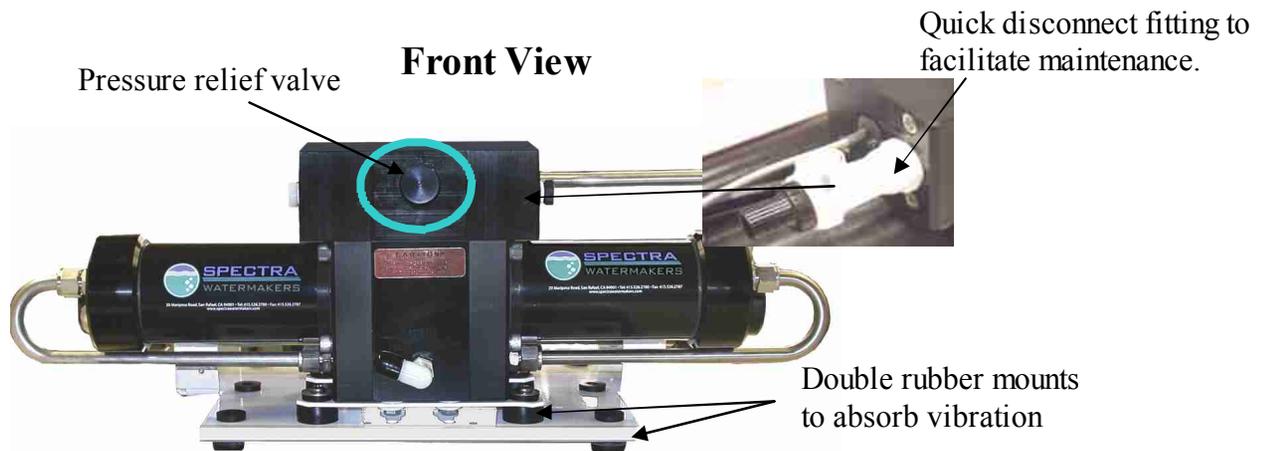
- MPC 5000
- Accumulator Assembly
- High Pressure Clark Pump and Reverse Osmosis Membrane
- Black High Pressure Filter Housings
- Feed Pump Inlet Assembly with Fresh Water Flush
- Ventura MPC Install Kit
- Ventura MPC Kit
- Service Kit
- Two 5/8" Hose (25')



## Introduction to the Ventura 150 MPC

The Ventura represents the finest watermaker for small and midsized yachts available today. The Spectra Clark Pump is matched to a 21" high rejection membrane. Properly installed and maintained it will supply years of reliable service. The MPC-5000 control pro-

*The Spectra Intensifier, known as the Clark Pump, was introduced in 1997 and has continually improved since. It holds a lifetime warranty for the original purchaser! It is built of modern non-corrosive composites and has a 21" high rejection membrane.*



The Clark Pump Membrane Module. Pre-mounted and plumbed together as a single unit. Saves time and adds reliability.



### Ventura Feed Pump Module.

Includes the feed pump, cooling fan, charcoal filter for the flushing system, flush solenoid, service valve, and service port. The module has compact and streamlined plumbing.

## Suggested Spares Ventura MPC

### Short term cruising, weekends etc.

A basic cruise kit B. This kit consists of three 5 micron filters, three 20 micron filters, and SC-1 storage chemicals.

### 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, O -ring for strainer screen, O-rings for filter housing,

## Spectra Watermakers recommended spare parts

	<b>Part Number</b>
SC-1 STORAGE CHEMICAL	KIT-CHEM-SC1
SC-2 CLEANER	KIT-CHEM-SC2
SC-3 CLEANER	KIT-CHEM-SC3
BASIC CRUISE B	KIT-BCK-B
OFFSHORE REBUILD KIT	KIT-OFFSH
5 MICRON FILTER	FT-FTC-5
20 MICRON FILTER	FT-FTC-20
CHARCOAL FILTER	FT-FTC-CC
5" STRAINER SCREEN	FT-STN-5S
OIL/WATER FILTER	FT-FTC-OW
FEED PUMP HEAD	PL-PMP-SFPH
5" STRAINER O-RING	SO-STN-5SS
FILTER HOUSING O-RING	SO-FHS-10H
20" MEMBRANE	FT-MB-20
SALINITY PROBE	EL-MPC-SP4
CHARCOAL FILTER HOUSING O -RING	SO-FHS-3PCS10

## Installation Basics

*Thru-hull  
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 1/2" to 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.

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 clockwise 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 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

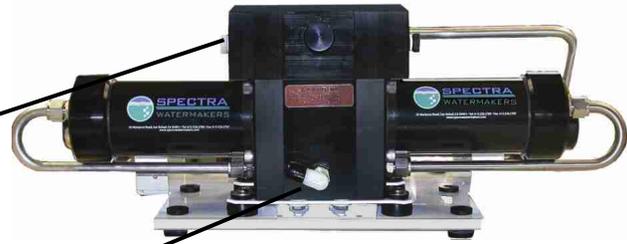
- Pay attention to wire size or system performance will be impaired
- Perform wiring to UL, ABYC, CE or applicable standards

# Ventura MPC Plumbing



**Brine Discharge** thru hull place above waterline or tee brine into another visible drain. Thru-hull not supplied

Plastic fittings should have clockwise 3 -4 wraps of Teflon tape and will thread almost all the way in. Leave the first pipe thread uncoated. Avoid getting dirt or debris in the system during assembly. Avoid tight bends and elbows. Secure piping away from moving objects and protect from chafe.



**Spectra Clark Pump** Mount in a cool location. May be oriented in any position and can be well above waterline. Leave access to the pressure relief valve. Do not mount over electrical equipment. Use supplied spacers and washers for the vibration mounts.



**Accumulator**, Install so that gauge is visible.

**20 and 5 micron filters** Do not mount over electrical equipment. Leave clearance underneath for filter change

**Red In Green Out**



**Fresh water flush inlet** to charcoal filter. Plumb to pressurized side of fresh water system.



**Sea Strainer**, Mount with Quick Block



**Feed Pump Module** Mount vertically as low as practical, no more than 4' (1.1 M) above waterline and do not mount over electrical equipment. Leave clearance below for filter change.

1/2" or 3/4" scoop strainer thru-hull and seacock for watermaker only. Mount low, in a clear flow and away from head discharge. Thru-hull is owner supplied.



**Water Flow**



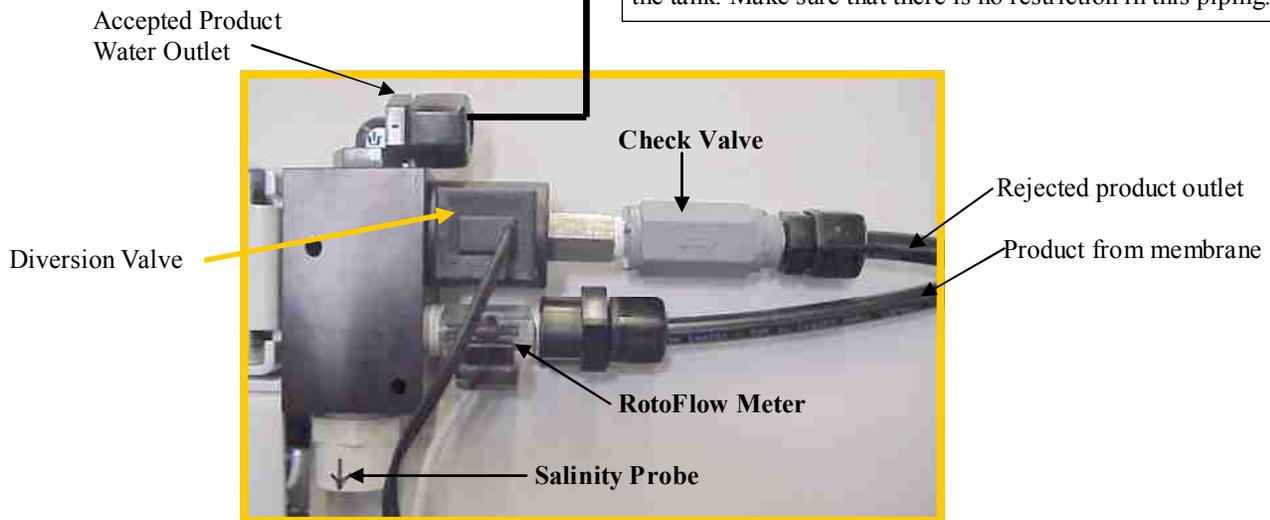
## Product Water Plumbing

Product water tubing is 1/4”(6mm) on the Ventura models. 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 MPC -5000 control determines the product water is below 750 PPM. Then the MPC 5000 control opens the diversion valve and product water is diverted into the fresh water tank. *See the Parker tube fitting assembly diagram next page for assembly instructions*

### Product to tank.

Route the product water into the top of the tank, or a tee in the water tank fill hose.

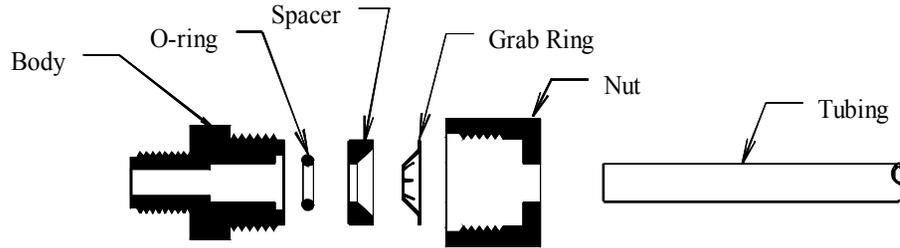
**DO NOT!** feed into a vent line, a manifold or the bottom of the tank. Make sure that there is no restriction in this piping.



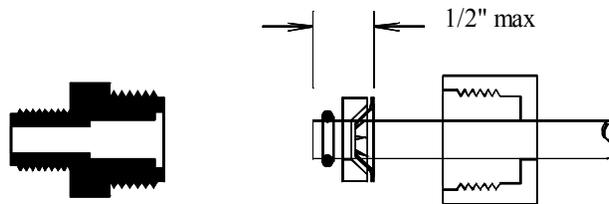
## Product Diversion Valve Manifold



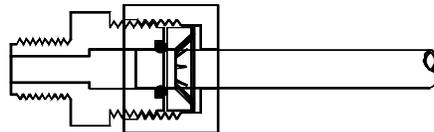
## Product Tube Fitting Assembly



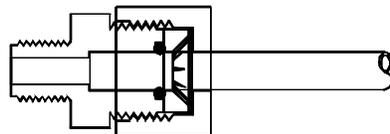
Step 1: Disassemble fitting components



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.



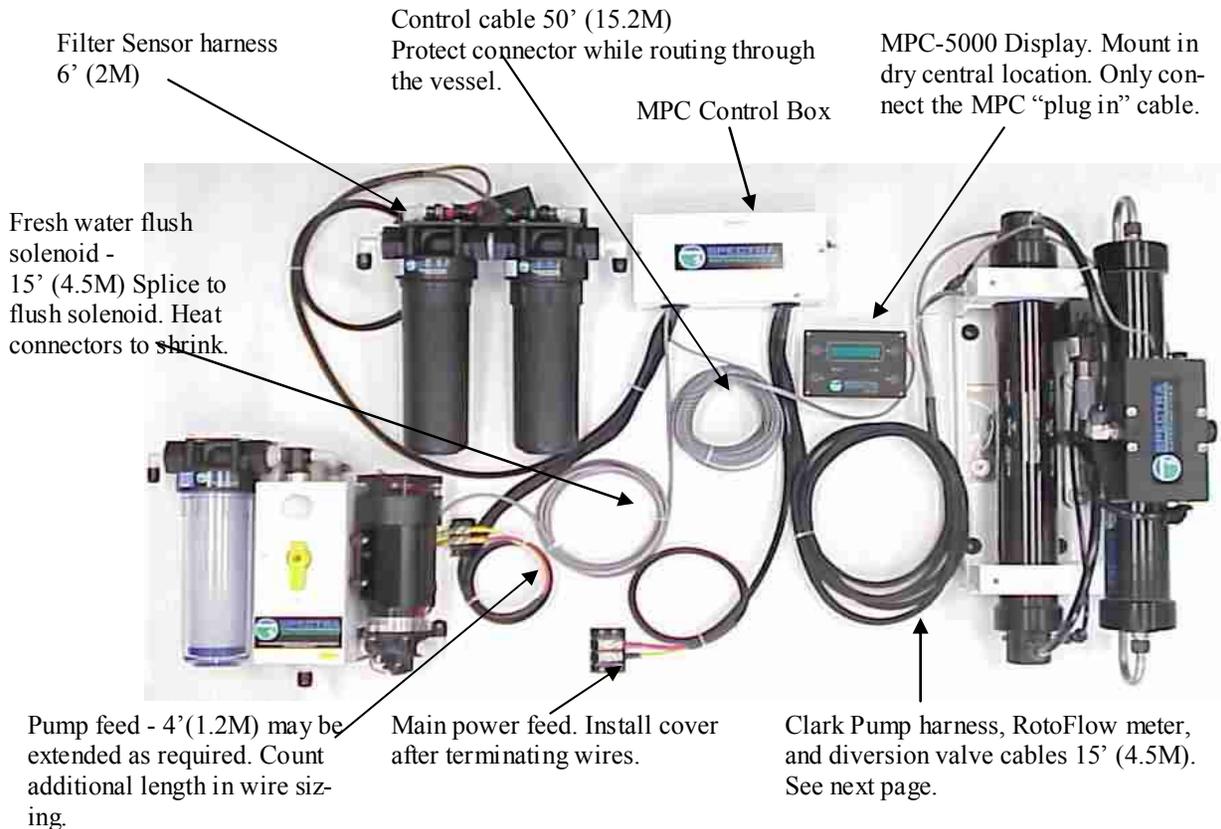
Step 4: Push the tube into the body until it bottoms out then hand tighten the nut.  
DO NOT OVER TIGHTEN!

## 1/4" Tube Fitting Assembly

## MPC-5000 Wiring

Mount the control box on a vertical surface with the wire grommets down, central to the other system components. Make sure the cables will reach all of the modules to avoid splices.

**Warning! Do not connect the main power feed until all connections are made.**



### Wire Size Guide for Ventura 12V

**Protect with 15 Amp Fuse or Circuit Breaker**

# 10 Gauge (6mm) up to 15 feet (4.5M)

# 8 Gauge (10 mm) up to 25 feet (7.5M)

#6 Gauge (16mm) up to 35 feet (10.6M)

### Wire Size Guide for the Ventura 24V

**Protect with 7 Amp Fuse or Circuit Breaker**

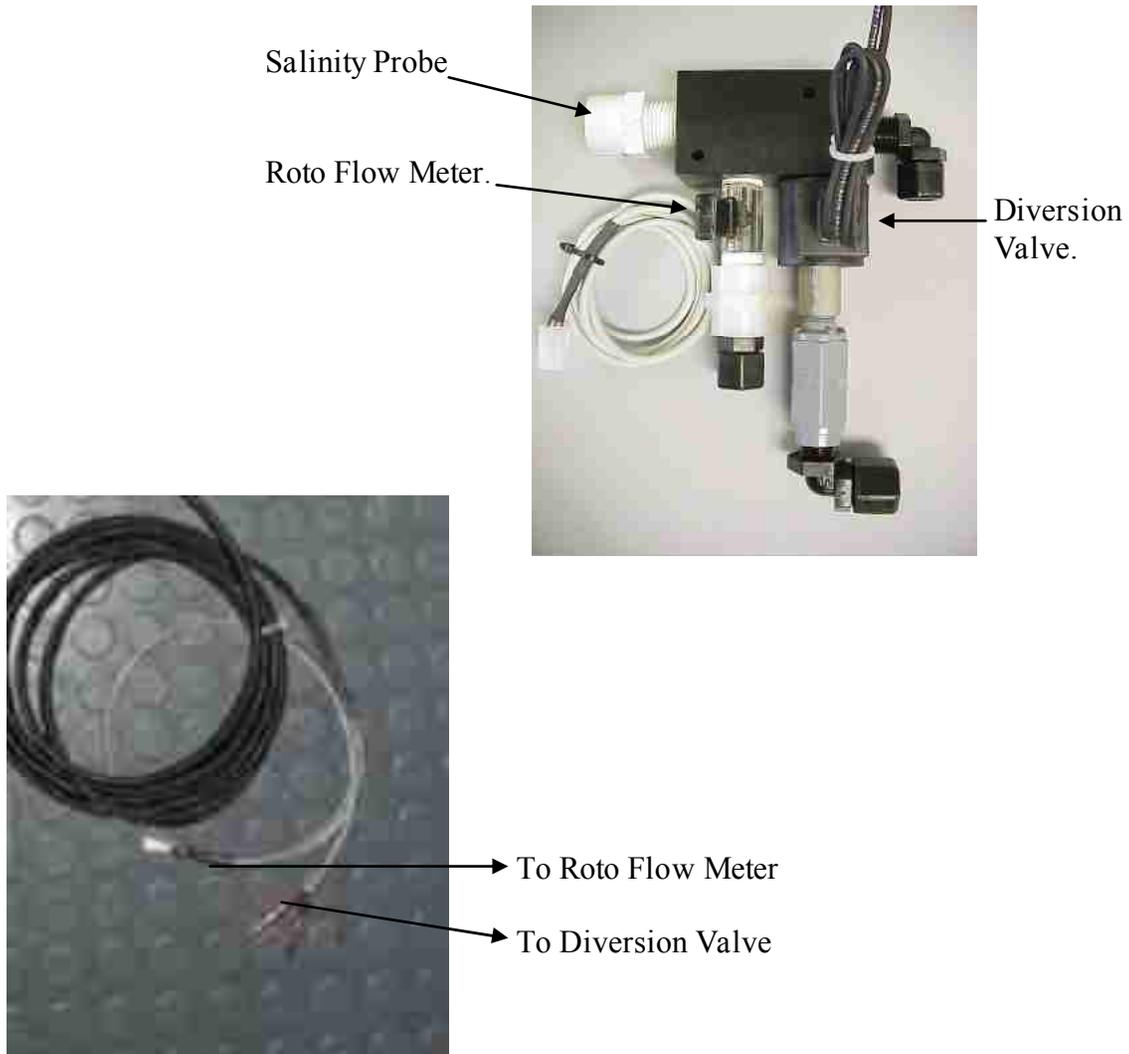
#12 Gauge(4mm) up to 10 feet (3M)

#10 Gauge (6mm) up to 25 feet (7.6M)

#8 Gauge (10mm) up to 35 feet (10.6M)

**Distances at left represent the total combined wire length (DC Pos Length+ DC Neg Length) Size cables accordingly**

## Clark Pump Harness



The RotoFlow meter measures product flow. It is supplied with a three pin plug -in connector. Plug it in to the RotoFlow cable and seal the connection with the supplied heat shrink tubing.

The salinity probe is hardwired at the probe end and uses a telephone style jack and plug on the other end. Plug the jack end into the jack marked 'Probe' in the MPC housing . Secure the wires and the MPC housing.

The diversion valve cable has two conductors. There is no polarity. Crimp the supplied heat shrink butt connectors to the diversion valve leads and heat them to seal.

## A-36 Salinity Probe Installation

All Systems purchased after 3/2010 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 all the system wiring is exposed.
- Take the RJ-12 Connector and route it 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 small 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 pressure on the existing wires inside the housing.

### Salinity Probe Installation



Remove the battery isolation tab after installing the salinity probe

Insert Salinity Probe Cable here into PROBE jack

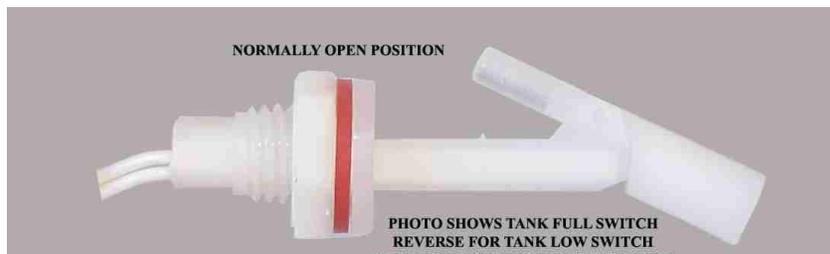
## **.Tank Switch Installation and Operation:**

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 10 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.

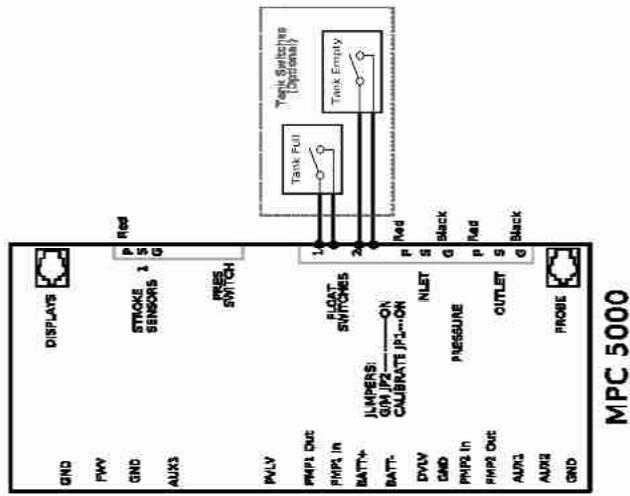
If the unit is wired for both Autostart and Autostop, it can be put into AutoFill Mode by pushing and holding the **Auto Run** button on the MPC-5000 display. In this mode the watermaker will start whenever the water level drops below the tank empty switch, so that it is open (not conducting electricity). 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 watermaker will start back up when the water level drops below the tank empty switch, 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 **Auto Flush** button. If the watermaker is in Autorun Mode it can be put into Auto-fill Mode without stopping it by holding down the **Auto Run** 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 **Auto Run** button. ***DO NOT press and hold the ‘Auto Run’ button, as this will enter the ‘Auto Fill Mode’ and the watermaker will not function properly.*** The watermaker will then fill the tank and automatically enter the Auto-flush Mode, fresh water flushing itself every 5 days until another command is given.

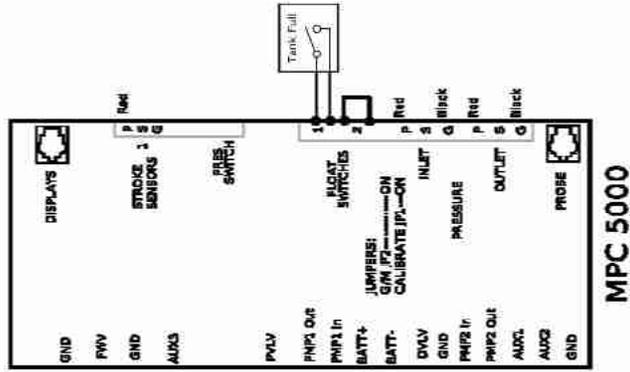
It is possible to use the Autofill Feature with 2 tanks. A double throw electrical switch must be installed in a convenient location. If only the single tank full switch is installed in each tank connect the wire from the **Float Switch 1 terminal “1”** to the common on the switch and run separate wires 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.



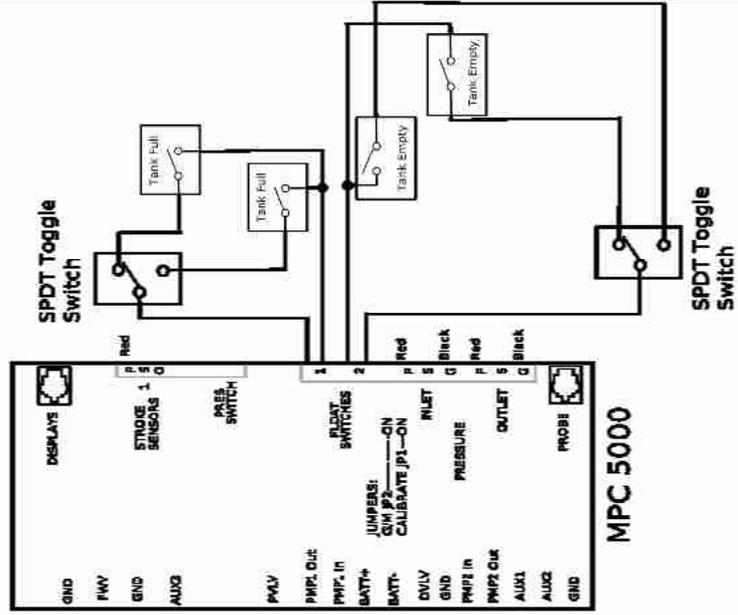
**Option 1:  
Tank Empty and Tank  
Full Switches Installed**



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



**Option 3:  
Multiple Tanks  
Connected to MPC**



## Ventura MPC New System Start-Up and Testing

Avoid running the Ventura system if the vessel is in contaminated water, such as in a harbor or canal. The system should be fully tested before leaving port. 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.**

First check:

- Thru-hull inlet valve is open and the brine discharge valve is open.
- All of your hose connections are tight.
- The green tag with the spacer under the pressure relief valve has been removed.
- The Pressure Relief Valve is open 1/2 turn.
- The switch on the MPC control box is set to the “Auto” position.

**Remove Tag and Washer!**



**Open 1/2 Turn when Purging Chemicals!**



Power up the system by turning on the circuit breaker. A message on the display will read Open Pressure Relief Valve Now after a few seconds

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

“Open pressure Relief Valve”



The system will go into a “starting mode” and the feed pump will start shortly after. The system should prime within 60-90 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.**

**Do not bypass the purge mode unless you are 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.**” This mode dumps the product water overboard for ten minutes in case there is any residual chemicals in the membrane. Carefully inspect for leaks over the entire system! Shut down the system and repair any leaks you find.
3. The system is now operational. You may start and run your system as you desire. You will not have to go through the purging mode unless you “de -power” the system for more than 5 days. If you do, you can bypass the purge mode by pushing **Stop** and **Auto Run** buttons simultaneously. When beginning to make water it is best to use the **Auto Run** button which defaults to the automatic fresh water rinse after the unit is finished making water. If you shut down the system by pressing the **Stop** button then use the **Auto Store** button to effect a fresh water flush cycle.
4. Check that the system is operating within its normal parameters. Compare with the chart on the next page.

## MPC Display Modes

Scroll through the modes with the alarm display key.

### Product

The Ventura 150 will produce 6—6.5 GPH (26—27 LPH)

The Ventura 200T will produce 7.7—8.5 GPH (29—32LPH)



### Salinity

Salinity readout displays the conductivity of the product water in parts per million (ppm). Anything below 750ppm is considered potable, and will be diverted to the tanks.



### Feed

Ventura 150 Feed Water Pressure range 60 —70 PSI (4.2—5 BAR)

Ventura 200T Feed Water Pressure range 80 —90 PSI (5.5—6.2 BAR)



### Filter Condition

When filters become partially clogged, the empty blocks on the bar graph on the MPC -5000 will gradually fill in. If the filters become fully clogged (all squares highlighted) the unit will shut off automatically and alarm 'Service Prefilters'.



## Ventura MPC 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 saltwater. Standard saltwater ocean salinity is 32 mg of salt per liter of 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 on the Clark Pump. Remove the green tag and spacer!**
  2. Turn yellow service valve on the Feed Pump Module to OFF. This will be the center (horizontal) location.
  3. Power up the control. Bypass the purge mode by pushing **Auto Run** and **Stop** simultaneously.
  4. Push the **Auto Store** button and allow it to run a flush cycle. Do this 6 times to purge the storage chemicals.
  5. Connect the Inlet and Brine Discharge Service Hoses per the photo and route them into the 5 gallon (20 liter) container. Turn your product sample valve, if installed, to the sample position. If no sampling valve is installed, temporarily route the product tube into the bucket.
  6. Push the **Auto Store** button and 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.
  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.
  10. Run the system under pressure and check for proper operation and leaks.
- After testing the system, stop and replace the brine discharge hose. Restart and drain the bucket. You can now store the system by pressing the **Auto Store** button.



Remove tag and washer



OPEN PRESSURE RELIEF VALVE



Valve in closed position



Valve in service position  
Inlet service hose connected



Connecting the brine discharge service hose

## Flush Cycle Adjustment

Before shipping from the factory the Ventura watermaker flush cycle is set to factory default settings. After initial start up, and annually thereafter, the flush cycle parameters must be adjusted to ensure that the salt water is thoroughly flushed out of the machine while using the least amount of fresh water possible.

If the fresh water supply is insufficient, seawater is drawn in to make up the difference and the system is not flushed with completely fresh water. After checking for adequate flush water flow, check the “Flush Duration” using *Programming Function* from the MPC 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. (Further instructions about how to access the Programming Function can be found in **part two** of this manual)

## Automatic Store Cycle

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

- 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. The Ventura requires about 3 –3.5 gallons (11—13 liters) every 5 days.
- Make sure the boat’s 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 on the Clark Pump is closed.
- The system must continually be powered during the Auto Store Mode. Turning off the power will disable the five day automatic fresh water flush and damage may occur.
- **Pressing the Auto Store button once** will start a flush and then activate the 5 day flush cycle. The feed pump will start, the flush water solenoid will open and the display will read “FRESH WATER FLUSH” with a countdown timer. After 3 minutes 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 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 will appear when finished.
- **Pressing the Stop button will** cancel the Auto Store Mode.

## Ventura MPC Operation

### Normal operation

**If the system has been pickled or stored, use the “New System Startup” procedure.**

1. Check to see that the inlet seacock is open.
2. Push the **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. If you receive a “**System Stalled**” error code, there is no water flow through the system. Open the pressure relief valve on the Clark Pump and bleed the air out of the feed pump.
3. Run the system until you have filled your tank or have made enough to meet your requirements for several days.
4. When the unit shuts down it will enter the “Auto Store” mode, which will flush the unit every five days unless you run it to make water, the unit is de-powered, or the **Stop** button is pressed.
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 Flush” mode.

Remember that you need to run the system almost a half hour to make enough flushing water. You may notice that the system output is higher when charging your batteries this is because the watermaker is voltage sensitive.

**Storage mode. The timer counts down the hours until the next flush cycle.**



**Warning! Understanding automatic fresh water flush system is essential for it to be effective.**

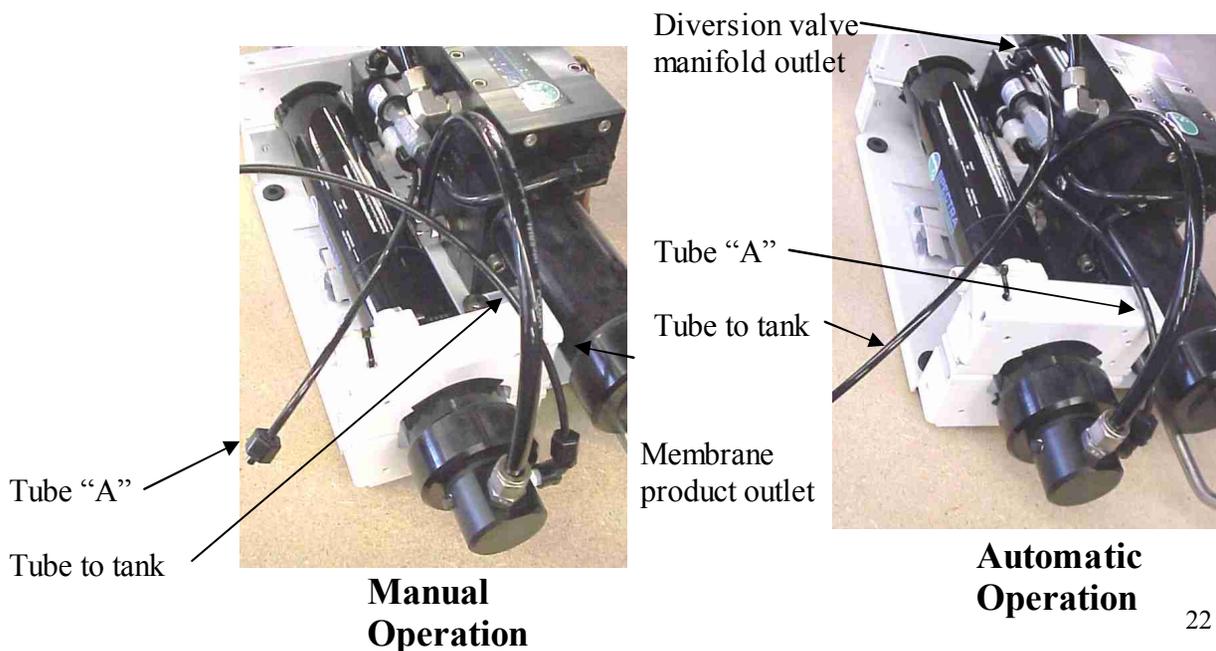
1. Make sure that the system has continuous power. De -powering system will stop flush cycle.
2. Make sure the boats domestic water system is “On” and there is adequate water in the tank for the extended period.

## 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 all be defeated. The pressure sensors and salinity probe can also be calibrated from the display. Complete instructions are found in Part 2 of this manual under “Programming from the Display.” **Be absolutely certain that the alarm is false before defeating the automatic controls.**

**In the event of complete MPC control failure**, the system may be operated manually using the Manual/Auto switch on the MPC Control Box.

- For manual start up, set the switch to MANUAL. Shut the unit down if the Clark Pump does not cycle. In manual operation, the salinity probe and the diversion valve will not operate and must be bypassed. Product water must be taken directly from the membrane product water outlet. The automatic safety controls are disabled in manual mode.
- Bypass the diversion valve as follows:
  - Disconnect the 1/4 inch tube “A” that runs between the membrane product outlet and the RotoFlow meter. Product water will run out of the 1/4 tube.
  - Taste the product water before sending it to a tank. Always discard the product water for the first few minutes of operation. The initial product water from the system may not be potable.
  - Disconnect the product -to-tank tube from the diversion valve manifold outlet and connect it to the membrane product outlet fitting.
- To shut down manually, set the switch on MPC control Box to AUTO .
- To manually flush, collect 3 gallons of product water in a bucket. Connect the Inlet Service Hose to the service connection on the Feed Pump Module (opening above yellow service valve). Place the service valve in SERVICE position. Start the feed pump with the manual switch on MPC Control Box by turning to RUN MAN. Run the feed pump until the bucket is empty and turn the yellow service valve back to RUN, and disconnect Inlet Service Hose.



## Long Term Storage Procedures

Watermakers are best when 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. A Fresh Water Flush every five days will greatly reduce biological growth but may not stop it completely. You can also protect you watermaker with the optional Z-Brane water treatment system. These systems protect the membrane from bio-fouling with out the use of storage chemicals.

### System Storage or “Pickling”

If the system is to be left unused for more than five days, perform the following storage procedure.

A system can be stored for up to six months with SC -1 Storage Compound.

The procedure introduces a chemical compound into the system that prevents biological growth. This procedure requires de-chlorinated water which can be made with the charcoal filter. **Charcoal filters last a maximum of 6 months once wetted.**

*Spectra SC-1 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. If you wish to use glycol for storage, follow the ‘Winterizing Instructions’. SC-1 Storage Compound has to be mixed at a ratio of 1 container to 3 gallons (12L) of fresh water to have the proper solution for short term storage.*

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



## Ventura MPC Storage Procedure

1. Turn the yellow service valve on the Feed Pump Module to OFF (horizontal position)
2. Perform two fresh water flushes by pushing the **Auto Store** button .
3. Remove the cap on the service port on the Feed 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 with a quick disconnect Brine Discharge Service Hose. Lead the both hoses to a 5 gallon bucket or container.
4. Push the **Auto Store** button and run the feed pump until you have one gallon of fresh water in the bucket. Stop the system. Fresh Water should enter the bucket from the Brine Discharge Service Hose.
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 “Service” position (pictured below).
8. Turn on the feed pump using the manual control switch on the MPC-5000 Control Box (MAN RUN). Circulate the storage chemical in the system for approximately 10 minutes. Turn off the feed pump when finished.



### Clean Up

Remove the Brine Discharge Service hose from the Clark Pump, and replace the original hose that leads to the thru-hull. You may at this point, if you choose, pump the bucket dry by using the manual control switch on the MPC Control Box. Stop when the bucket is empty.

Turn the service valve 180° back to its original position, and remove the Inlet Service Hose. Close the seacock; drain and clean the strainer and any filters in the system. Reassemble dry.



Service valve Off



Service hose connected  
Service valve in service position



Brine disconnect fitting

## Winterizing

1. Turn the yellow service valve on the Feed Pump Module of OFF (horizontal).
2. Push **Auto Store** to fresh water flush the system. Flush the system twice
3. Connect the Inlet Service Hose to the Feed Pump Module (above the yellow service valve, and lead the hoses to a 5 gallon service bucket.
4. Turn the yellow service valve on the Feed Pump Module to the “Service” position.
5. Pour 2 gallons (8L) of Propylene Glycol in the bucket.
6. **Make sure that the pressure relief valve on the Clark Pump is OPEN (un-pressurized).**
7. Turn on the feed pump using the manual switch on the MPC Control Box (RUN MAN) until antifreeze appears in the Brine Discharge overboard hose. Add more glycol to the bucket if necessary.
8. Stop the pump. Disconnect the Brine Discharge overboard hose and connect the Brine Discharge Service Hose, and lead it to the service bucket. Start the pump and re -circulate the remaining antifreeze for 10 minutes.
9. Close the seawater intake thru -hull and turn the yellow service valve to OFF. Drain the strainer and the hose leading to the Feed Pump Module.
10. Disconnect the product to tank tube and blow the water out of it with compressed air.



Service Valve in OFF position



Open the Pressure Relief Valve



Service Valve in SERVICE position



Connecting Brine Discharge Hose

## 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 seawater strainer's stainless steel element should be inspected, removed, and cleaned as needed. Be careful to 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, rinse, and reassemble dry to impede corrosion. Check frequently during operation.

### The Prefilters

- Service the pre-filters on a regular basis. The MPC will alarm when the filters reach a 10 PSI (.7 BAR) pressure drop. If you use the system until it stops at a 10 PSI differential (.75 BAR) then the filters will have to be discarded.
- To service the filters, turn the yellow service valve to OFF, open the filter housing, and discard the old filters. Clean out the housing bowl then reassemble the housings with new 5 and 20 micron filter elements. Leave dry until next startup.
- Use only Spectra approved filters or you may void your warranty. The filters may be GENTLY cleaned up to 3 times with a soft brush and water in a bucket. Occasionally, lightly lube the filter housing O-ring with silicone grease.

### Oil Water Separator (Optional)

To install oil water separator capability, remove the 20 micron filter from the dual filter housing and replace with the oil water separator element. 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 fresh flush water. Use only a Spectra replacement!

### 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 stainless steel 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 silicone seal, and, using two wrenches, tightened very tight.

## The Membranes

- Always perform a flow test before cleaning your membrane. Cleaning shortens the lifespan of membranes so only clean after you have investigated all other potential causes. The leading cause of fouling 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 seawater conditions and from rust. Monitor the product salinity and feed pressure for higher than normal readings, take environmental conditions into consideration.
- Cold feed water or clogged filters can cause high pressure.
- Low product flow is usually due to low voltage, or a worn Feed Pump / 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 (SC-3) will remove mineral scaling and is generally used first.
- The alkaline cleaner (SC-2) is used to remove biological by-products, oil, and dirt particles that get past the prefilters.

If membrane performance is reduced and the system has 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.

### **If known bio-fouling is present, the SC-2 may be used first.**

If the history of the system is unknown or has been left “unpickled” for an extended length of time and biological growth is present, consider cleaning with SC-2. Use dechlorinated fresh water and do not pressurize the system (leave the pressure relief valve slightly open when cleaning).

De-chlorinated fresh water can be obtained by running water through your Spectra charcoal filter.

### **Test to see if biological growth has occurred.**

Before running the system, remove the prefilters 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 and lead to a bucket. Open the pressure relief valve one turn, and manually run the system for 30 seconds (metal toggle switch on Feed Pump Module). Examine the brine water: if it is discolored 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 start up procedure” and run normally. Check for performance. Clean the membranes **only if** performance is reduced.

Warm water is ideal for cleaning membranes. One way to do this is to find a camp stove and use a large stainless steel pot to heat the solution to 120° F (48 C), you might have to periodically stop and reheat the solution.

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



**Please Perform a FLOW TEST before you clean your membrane.** The change in production is normally caused by something other than the membrane unless the system has been left unused for long periods of time. Excessive cleaning can damage your membrane.

## HS LF-2 FLOW TEST/ SHURFLO

Before the test, change all filters and clean the strainer. Make sure that there are no leaks. Check for 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 pressures very closely. Make sure that on each shift everything is even from side to side. If the feed pressure or time between shifts of the Clark Pump is different (asymmetrical) on one stroke from the other, 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. Ask for “ [CP-5 Clark Pump Checkout](#) ” instructions.

If no asymmetry is noted, continue with this test.

### **NOTE:**

Make sure the ShurFlo overpressure cutout switches (p/n PL -PMP-SFPH), are set to 125 psi. With pump running, close the brine service valve. The feed pressure should rise to 125 psi and the pump should shut off. If the pumps shut off at a lower pressure see “ [SF-2 Adjust ShurFlo Pressure Switch](#)” bulletin.

1. Measure and log the product flow GPM (LPM) and the feed pressure with pump pumps running. Use a graduated container and timer to measure the flow. Log the voltage at the feed pumps at the same time. Confirm at least 12.5 or 24.5 volts at the pump. You may have to run the engine or battery charger during the test.
2. Measure the total flow rate of the system. Run the system making water and divert BOTH the brine discharge AND product water into a bucket. Time how long it takes to make a given amount of water.

In order to make good water, you need the proper amount of feed water flow. Each pump alone should produce 1.5 gallons per minute (5.7 lpm).

Compare the product flow to the total feed flow. Product flow should be 9.5% of total flow for a 200 model. If product percentage is low, you may have an internal leak in the Clark Pump.

For every  $\frac{1}{10}$ <sup>th</sup> of a gpm feed water flow loss, we will lose about  $\frac{1}{2}$  gallon per hour of product flow and the salinity will go up 100ppm.

Low feed flow combined with low system pressures (see [Misc-4: Nominal Pressures](#)) is most frequently due to worn ShurFlo pump heads (p/n PL -PMP-SFPH).



## CLEANING CHEMICALS 101

Spectra Systems use four types of chemicals: SC-1, SC-2, SC-3, and propylene glycol antifreeze.

**NOTE: Never use any chemicals with the system pressurized!** Always open the pressure relief valve on Clark Pump  $\frac{1}{2}$  turn. Always purge a system containing chemicals for at least 20 minutes unpressurized before pressurizing (closing the pressure relief valve) and making water.

**CLEANERS:** Cleaning can shorten a membrane's life. Avoid unnecessary cleaning. Avoid cleaning as a diagnostic tool.

**PROCEDURE:** Cleaning solutions are most effective if heated to 120 °F. On a boat, this is not easy to do. We recommend circulating the solution through a metal pot on the stove, or consistently taking a scoop out of the cleaning bucket – warming scoop of cleaning mixture on the stove - then pouring scoop back into the cleaning bucket.

If you cannot heat the solution, circulate the cleaning solution for several hours and then let solution sit in the watermaker over night.

*In most cases the water quality will increase in PPM after an SC2 cleaning.* It might take several hours for your system to return to normal production.

**SC-3 is an acid cleaner** used to remove mineral and scale deposits. This is used in the same way as the SC-2. **In most cases SC-3 is used first**, and if no results are achieved, proceed with the SC-2. SC-3 cleaning should lower the product PPM and over all pressures. Scaling is a slow process that may take several months or years. SC -3 is less harmful to the membrane than SC-2 and will almost always improve the performance of an older membrane.

**SC-2 is an alkaline cleaner** used to remove light oil, grime, and biological growth. If you have cleaned your filters, filter housing, and fresh water flushed your system several times and the product water continues to smell consider using SC -2.

## 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 to have the proper solution. An average of two gallons (8L) of water is already present inside a Ventura system. This water has to be figured into the mixture. A Ventura system will use one container of compound.*

### Cleaning Procedure:

1. Turn the yellow service valve on the Feed Pump Module to OFF. Push **Auto Store** to effect a fresh water flush. Flush your system twice.
2. Connect your Inlet Service Hose to the Feed Pump Module (above the yellow service valve) and the Brine Discharge Service Hose to the Clark Pump. Push **Auto Store** again and allow system to flush until there is 1 gallon (4L) of water in the bucket. Stop the system. Fresh water should enter the bucket through the Brine Discharge Service Hose.
3. Turn the yellow service valve to the SERVICE position.
4. Make sure that the pressure relief valve on the Clark Pump is open (un-pressurized).
5. Mix the cleaning chemical in the bucket.
6. Start the system using the manual switch on the MPC Control Box (RUN MAN) and circulate the heated chemical solution through the system for the 45 minutes
7. Stop the pump, replace the Brine Discharge overboard hose and start 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!)**
8. Turn the manual switch on the MPC Control Box to AUTO RUN.
9. The system may now be restarted to make water, flushed, or stored.



Service valve in off position



Open the pressure relief valve!



Service hose connected



Connecting brine discharge hose

## Ventura MPC Troubleshooting Procedures

SYMPTOMS	PROBABLE CAUSE	REMEDY
Feed pump runs constantly, will not turn off	Manual override switch 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>
Pumps run intermittently, cycling on/off	Overpressure switch opening	- Adjust or replace switch
Display activates, but pump will not run	<ul style="list-style-type: none"> <li>- loose or broken pump wire connection</li> <li>- bad pump relay</li> <li>- tanks are full</li> </ul>	<ul style="list-style-type: none"> <li>- Check wiring at terminal block inside MPC</li> <li>- Test power relay, replace</li> <li>- Check tanks– system cannot be started if tanks are full.</li> </ul>
System runs, no product water delivered to water tanks, GPH bar graph shows OK, “Good” LED activated	<ul style="list-style-type: none"> <li>- diversion valve inoperative wiring fault.</li> <li>- disconnected or broken product tubing</li> <li>- valve plunger stuck</li> </ul>	<ul style="list-style-type: none"> <li>- Check wiring at diversion valve and inside control box</li> <li>- Check product tubing</li> <li>- Disassemble and clean diversion valve plunger or replace valve (contact factory)</li> </ul>
System runs, no product water delivered to water tanks, GPH bar graph 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> </ul> <p style="text-align: center;">Close Valve</p>

# Ventura MPC Troubleshooting Procedures

## Error Messages

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 RotoFlow meter</li> </ul>	<ul style="list-style-type: none"> <li>- Close pressure relief valve</li> <li>- Check thru-hull</li> <li>- Verify stroke sensor fully inserted in pump</li> <li>- Check stroke sensor 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 stalled</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> </ul>	<ul style="list-style-type: none"> <li>- Install new filters</li> <li>- Check sensor wiring</li> </ul>
<p>“Ck Sea Strainer”</p>	<ul style="list-style-type: none"> <li>- clogged strainer</li> <li>- dirty 50 Micron prefilter</li> <li>- Seacock closed</li> </ul>	<ul style="list-style-type: none"> <li>- Clean strainer screen; change 50 micron filter; check through-hull and intake hoses</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>



## ACCUMULATOR PRESSURE

All Spectra Watermakers, except the Newport 700 and 1000 series, are supplied with a pressure accumulator tank (part no. PL -ACC-TK) to be installed in the feed water line between the pre-filters and the Clark Pump.

The purpose of the feed line accumulator is to reduce the spikes in the feed pressure caused by the shifting of the Clark pump. If the accumulator is not properly charged it can lead to problems with the ShurFlo Feed Pump pressure cutout switches. The accumulators have an air valve on top similar to those found on car/ bike tires. This allows the internal air bladder of the accumulator to be precharged. The accumulator should be pumped up to about 60psi (4.5bar) 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 purpose of the fresh water flush accumulator is to allow a steady flow of 1.5 gallons per minute of flush water through the charcoal filter. The accumulator gives the water flowing through the charcoal filter somewhere to go while the feed pump is cycled off. The flush water accumulator should be preloaded to 5 psi (.35bar).



## OP-4 FRESH WATER FLUSH

The purpose of the fresh water flush is to replace the seawater in the watermaker with fresh water whenever the system is producing water. The “Auto Flush Mode” on the MPC 5000 changes the fresh water every five days that the system sits idle. The watermaker will last longer and operate better if it is always kept filled with fresh water between uses.

Most spectra watermakers are equipped with a Auto Store, automatic fresh water flush mode. This module includes a charcoal filter to remove any chlorine in the fresh water that might damage the membrane, and an electrically operated valve. The electrically operated solenoid valve opens during the fresh water flush allowing the boats pressurized water system to supply water to the system.

If the ship’s water system is unable to provide flush water at the required flow rate, sea water will be drawn in to make up the difference. This will cause the flush water to be brackish, and ineffective in preserving the watermaker. 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.

Because the pre -filters trap the plankton in the feed water they can be subject to “going anaerobic” or starting to smell like rotten eggs, as the trapped plankton decay. For this reason it is advisable to always put in clean filters if the unit is going to be left on Auto Flush Mode. In daily or regular fresh water flush the watermaker after each shutdown will help prevent this problem, but in excessively warm or fertile waters the pre-filters will need regular attention.



## SF-1 SHURFLO PUMP WON'T RUN

If the feed pump has power to it (the fan runs), but the pump won't run, the first thing to check is the pressure switch. The pressure switch, (part number: EL-FP-PS), is located on the wet end of the pump and has two red wires plugged into it. Jump the two red wires together and see if the pump runs. You can safely run the system with the pressure switch jumped, just keep an eye on the pressure gauge and don't let system pressure exceed 110 psi. Replace the switch when a spare is available.

If the pump will not run with the pressure switch jumped then it is most likely a problem with the brushes or overheat protection switch inside the motor. The motor will come completely apart by removing the two screws on the end of the motor. Remove the rear cover and paper insulator. Pull out the plastic brush holder. The thermal switch is located on one of the brush leads. With an ohmmeter, check for continuity through the switch. If it is open, you can make temporary repairs by wiring around it, being careful that your new wiring doesn't chafe on the moving parts, nor resist the springs that push the brushes on to the commutator.

If any corrosion is apparent the brushes may be sticking. Once apart clean all the carbon dust from all the parts. Clean the commutator with light sand paper. Make sure to clean the small grooves on the commutator with a small sharp tool to remove the carbon in between the segments. Adjust the springs on the brush holders so the brushes slide smoothly in and out. If the bearings are rough and binding, remove the rubber dust cover and clean the best you can, grease them, and work it free by hand. Don't service the bearing unless absolutely necessary. Reassemble in reverse order. You can hold the carbon brushes back with papers clips inserted through the slots in the brush holder so they don't hang up on the bearing during assembly. Make sure the corrugated bearing shim doesn't push out, if it does, push it back into place.

This will at least keep you going until the motor can be replaced if necessary.



## SF-2 ADJUST SHURFLO PRESSURE SWITCH

The ShurFlo feed pumps are equipped with a high pressure cut out switch (part no. EL -FP-PS). This is the small black unit on the end of the wetted end of the pump (part no. PL -PMP-SFPH) where the two red wires connect. If the pressure switch is not properly adjusted the pump may cut out each time the Clark Pump cycles and the feed pressure spikes. When this happens, the production will drop and an unusual noise will be heard when operating with two pumps, but the system will function normally during one pump operation on either pump. The points in the switch will fail fairly quickly if set too low because of the constant arcing from cutting out each time the Clark pump shifts.

For all systems except the Gulfstream, the feed pump pressure switches should be set to shut off at 125 psi (8.5 bar). On the very center of the switch is a small 5/64" allen screw. Run the system on pump one and close the Brine Discharge Valve (1/2 way 90 deg) to block the flow. Watch the pressure gauge and adjust the pressure switch to shut off at 125 psi. Repeat for pump two. Turn the allen screw clockwise to increase the cut off set point.



Pressure Switch  
Adjusting Screw



## POOR PRODUCT QUALITY

With any product water quality issue, you need to check the calibration of the salinity tester that you are using before proceeding.

Membranes are not an exact science and two identical systems can have a different product quality result. World health standards deem water of up to 1000 PPM of total dissolved solids acceptable for drinking consumption. 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). Ventura systems, which have a higher feed to output pressure ratio (See MISC - 4 nominal pressures), as well as a higher feed flow/membrane area ratio, will produce water in the 150-200 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. 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. Cleaning is no better for a membrane than it is for your clothes. Avoid cleaning as a diagnostic tool.

**MECHANICAL LEAKAGE** within the membrane pressure vessel. This is an unlikely but possible cause of poor water quality with old style Codeline pressure vessels (white) that we have used in the past. The Spectra pressure vessel has a double O -ring arrangement that includes a telltale hole between them so that any salt water leaking past an O-ring will drip into the boat and not go into the product water.

If system flow (product plus brine) is 1.5 GPM or above on one pump, 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. How to perform a Flow Test is described right after the Membrane Maintenance section of your manual and also on the next page.



# SPECTRA

---

## WATERMACHINES™

### **Z-BRANE OPERATION MANUAL**



Spectra Watermakers Inc.  
20 Mariposa Rd., San Rafael, CA 94901  
Phone 415-526-2780 Fax 415-526-2787  
Email: [spectra@spectrawatermakers.com](mailto:spectra@spectrawatermakers.com)  
[Http://www.spectrawatermakers.com](http://www.spectrawatermakers.com)

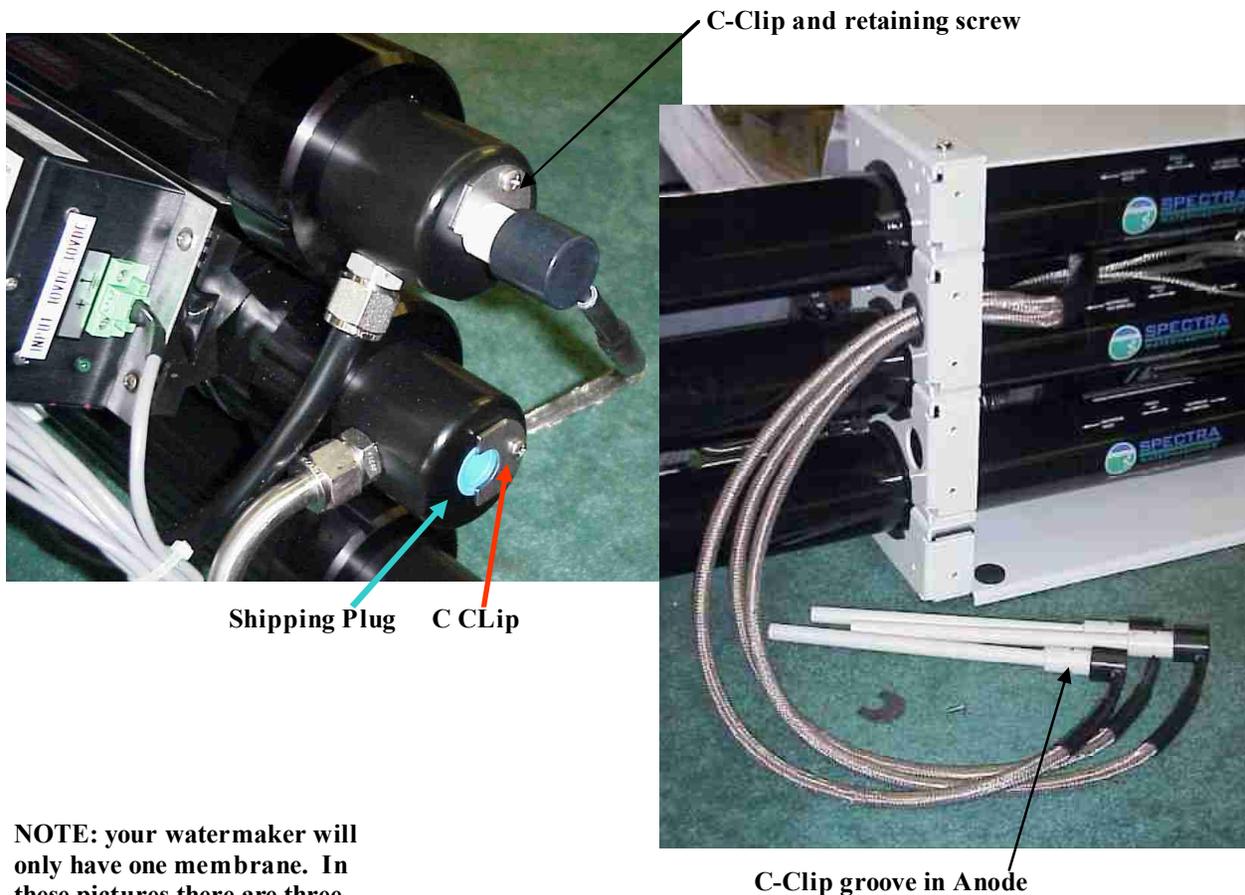
Current manuals/ZBrane 12/10/04

The **Z-brane** is a revolutionary product which applies Z-Guard High Voltage Capacitive technology to the Membrane Pressure Vessel. Always active, the Z -Brane creates an environment that is unfriendly to bio -film and bacteria. The Z technology also assists in the prevention of scale formation on the membrane surfaces. The Z -Brane 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. In cold climates Propylene Glycol is still required.

## ANODE INSTALLATION

Spectra Watermakers ship the High Pressure Module with the White Z -brane Anode(s) removed from their socket(s) to prevent shipping damage. Before the High Pressure Module (Clark Pump and Membrane) is mounted the anodes 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 plugs. Insert an anode into membrane. Insert the anode until the groove is flush with the membrane end plug, the C -clip will slip into the groove. Install the C-clip screw to secure the clip.



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

## WIRING

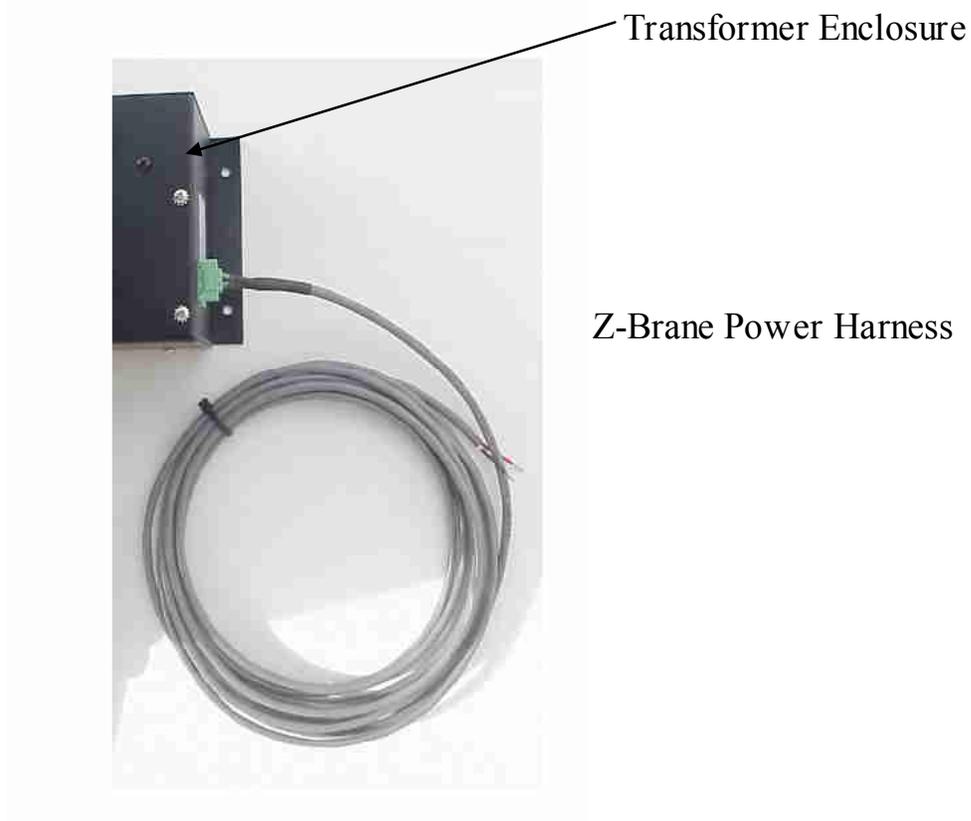
The Z-Brane system is integral with the watermaker unit and only requires continuous 12V or 24V DC power to be operative.

**Note: There is no reason to open the transformer enclosure. Do not service this unit unless it is disconnected 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 when the watermaker is in operation and when 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.

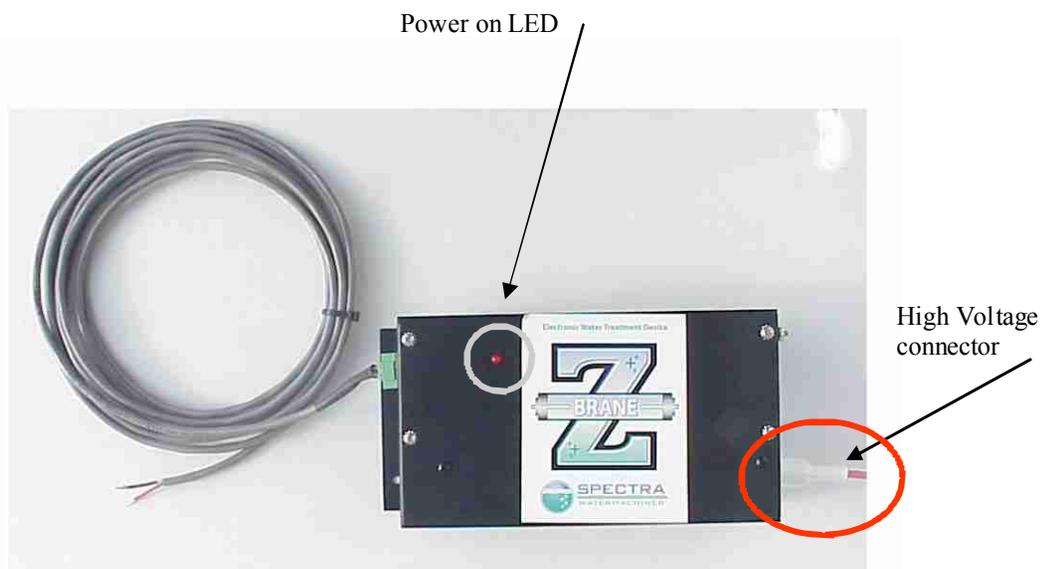
**Red is Positive (+) , Black is Ground (-)**



## 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 biofouling and have protection against scaling. We recommend flushing your watermaker after each use. This will protect your membrane and also prevent corrosion in the feed water system. Thoroughly Fresh Water Flush the water-maker several times before leaving the vessel.

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



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

Contact the factory if modifications are required.

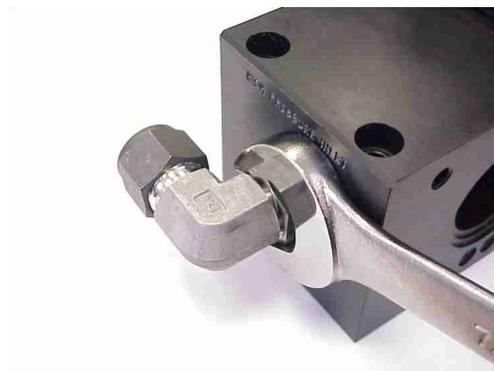
## Membrane Pressure Vessel Relocation

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 fittings 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 which seal with an O-ring and should be seated all the way in, but need only to be snug, not tight as with tapered threads. Hold the fitting with a wrench while installing the tube.

The fittings on the Clark pump have an O-ring seal and can be re-oriented 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

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 the tube assembly after it is installed.

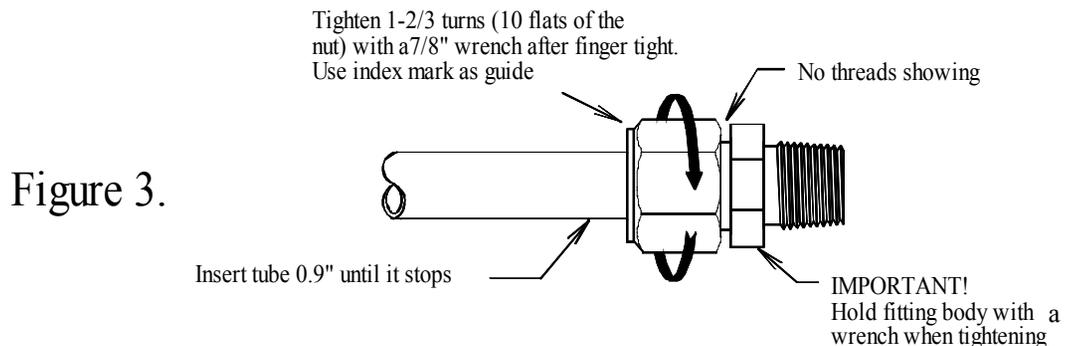
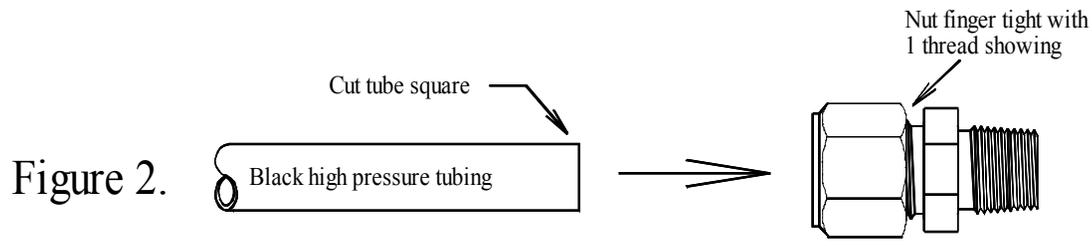
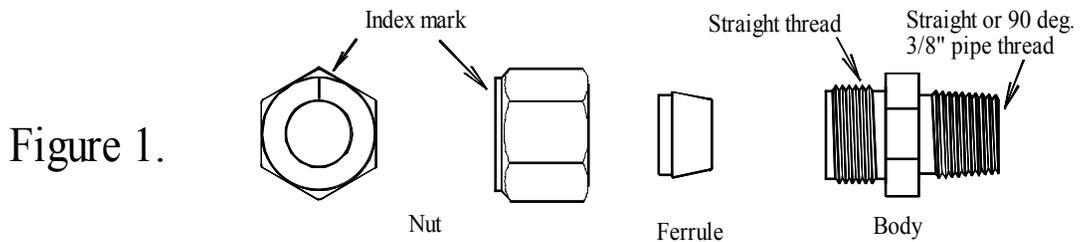
**Refer to figure 1.** If a fitting has been disassembled, reassemble as illustrated. The notch on the ferrule must engage the inside of the nut properly for the nut to seat down fully. Once the tube is inserted the ferrule and nut will naturally align.

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

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

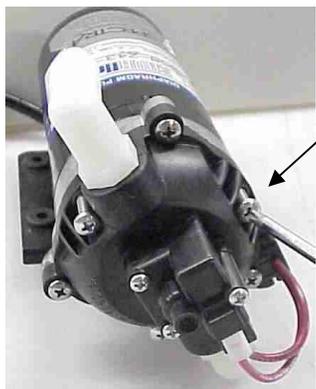
Make sure these fittings are tight on initial assembly or they will fail!

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



## Feed Pump Relocation

If you do not have adequate space to install the Feed Pump Module it is possible to remove and relocate the feed pump. Before you install the module, disconnect the hose that connects the feed pump to the module plumbing. Remove the cooling fan and the heat sink from the pump. Both are friction fits with no fasteners. Remove the 4 machine screws holding the pump to the module.



With the pump on a flat surface. Remove the three screws that hold the pump head on. See Fig1

Re-orient the pump head 120 degrees. See Fig2

Reinstall the screws and tighten firmly. See Fig3

Now the feed pump may be installed where you wish. Do not install with the pump head over the motor in case of leaks. Wire size may have to be increased if wire runs are longer.

Fig 1



Fig 2



Fig 3

# Part Numbers

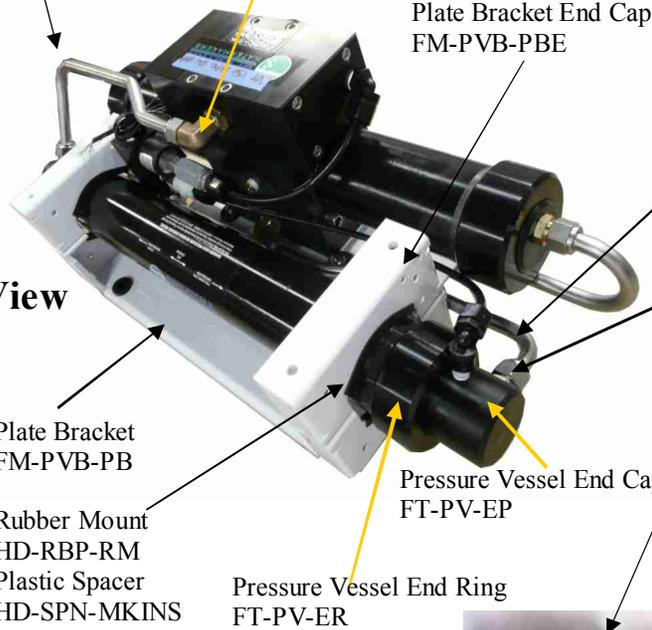
## Front View



Pump to Pressure Vessel  
Upper SS Tube:  
PL-TB-HP-HPTVUS

Pump to Pressure Vessel  
Upper SS Tube:  
PL-TB-HP-HPTVUS

## Rear View



STAINLESS STEEL HIGH  
PRESSURE ELBOW  
PL-MTE-3/4S1/2B

Plate Bracket End Cap  
FM-PVB-PBE

Pump to Pressure Vessel  
Lower SS Tube:  
PL-TB-HP-HPTVLS

STAINLESS STEEL HIGH  
PRESSURE STRAIGHT  
FITTING  
PL-MTS-3/8X1/2S

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

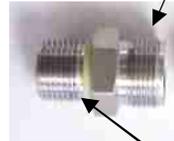
Plate Bracket  
FM-PVB-PB

Rubber Mount  
HD-RBP-RM  
Plastic Spacer  
HD-SPN-MKINS

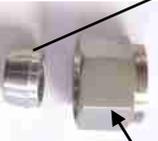
Pressure Vessel End Ring  
FT-PV-ER

Pressure Vessel End Cap  
FT-PV-EP

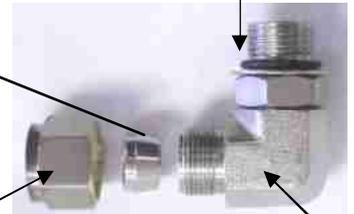
1/2" Stainless Ferrule  
PL-HWR-1/2FR



Connector O-RING  
SO-HPP-CT

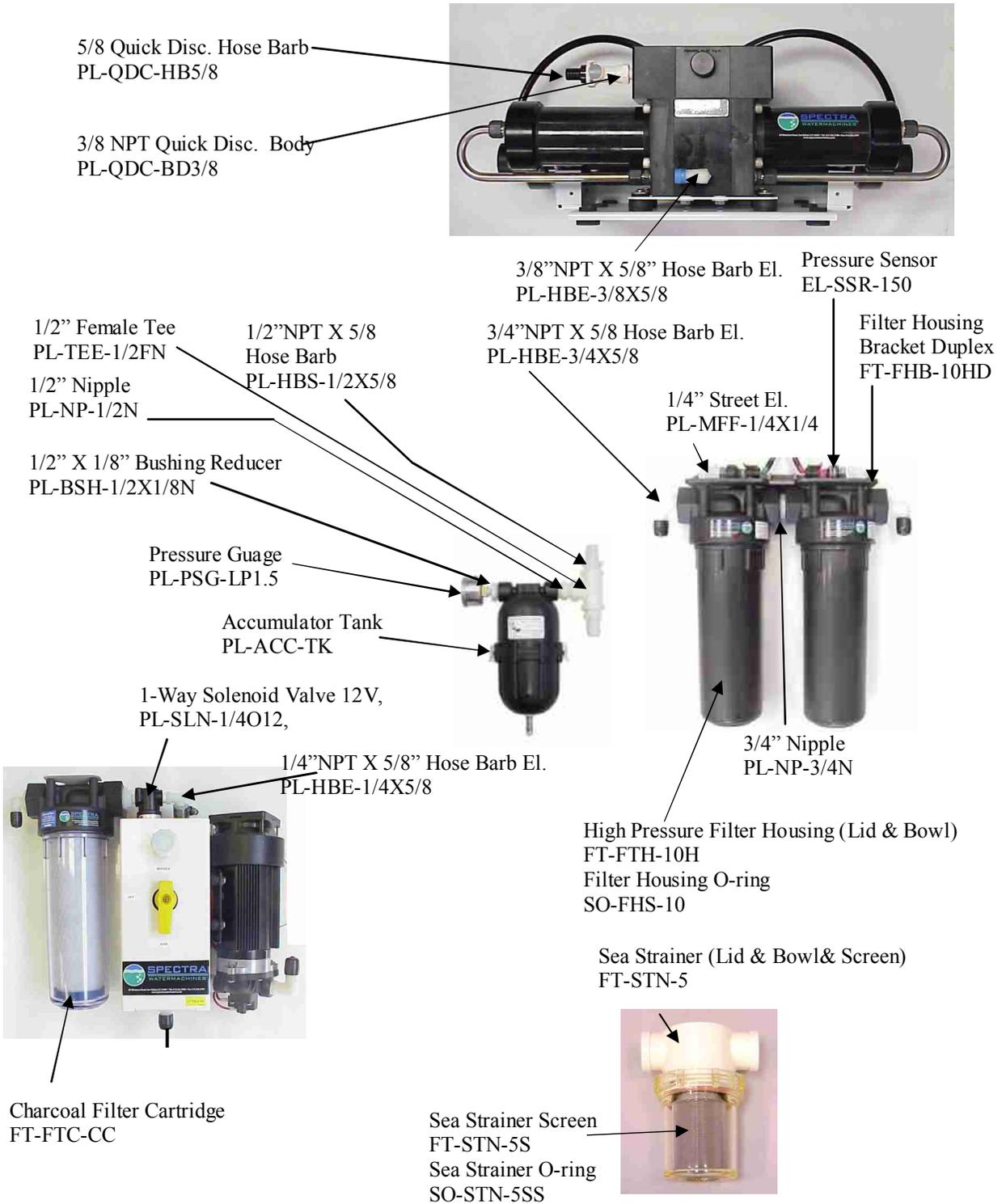


Stainless Fitting Hex Nut  
PL-HWR-1/2HN

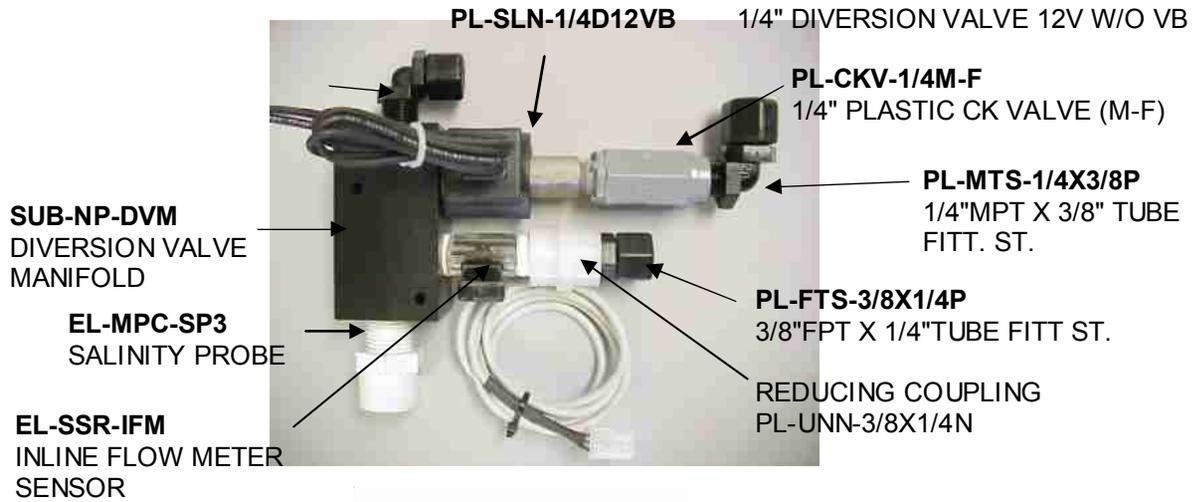


PL-MTE-3/4S1/2B

# Part Numbers



## Part Numbers



**MPC CONTROL PANEL (VFD)  
EL-MPC-RMCDFD**

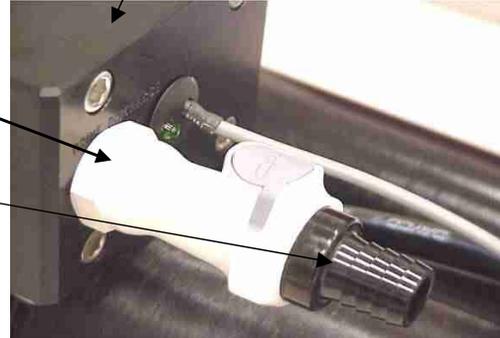


## Part Numbers

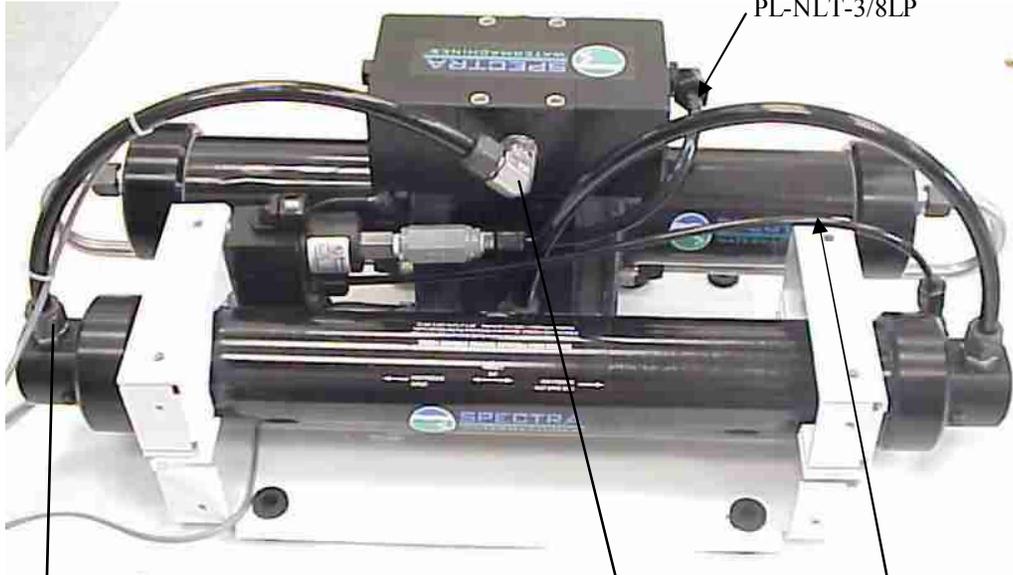
3/8" NPT Quick Disc. Coupling Body  
PL-QDC-BD3/8

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

Valve End Block B  
HP-TB-VEB-B



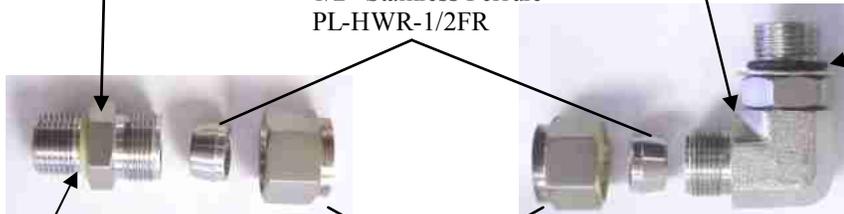
3/8" Low Pressure Tube  
PL-NLT-3/8LP



1/4" Product Tube  
PL-NLT-1/4LP

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

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



Connector O-ring  
SO-HPP-CT

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

# Part Numbers

3/4"NPT X 1/2" Hose Barb Elbow  
PL-HBE-3/4X1/2

3/4" 3-Way Valve  
PL-VLV-3W3/4

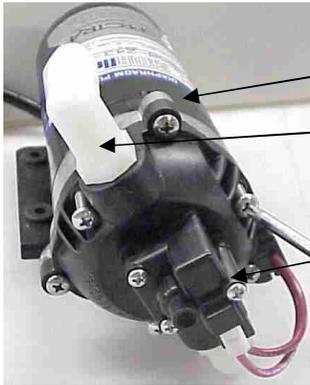
Cooling Fan 12V, 24V  
KIT-FK-12,24

Feed Pump Heat Sink  
EL-FP-FPHS

Ventura Feed Pump Bracket  
FM-VT-ITM

3/4"NPTX5/8" Hose Barb  
PL-HBS-3/4X5/8

Clear Filter Housing (Bowl & Cap)  
FT-FTH-10L3PCS  
Clear Filter Housing O-ring  
SO-FHS-3PCS10



Feed Pump 12V, 24V  
EL-FP-12V, 24V

3/8"NPT X 5/8" Hose Barb El.  
PL-HBE-3/8X5/8

Feed Pump Pressure Switch  
EL-FP-PS

Fig 1

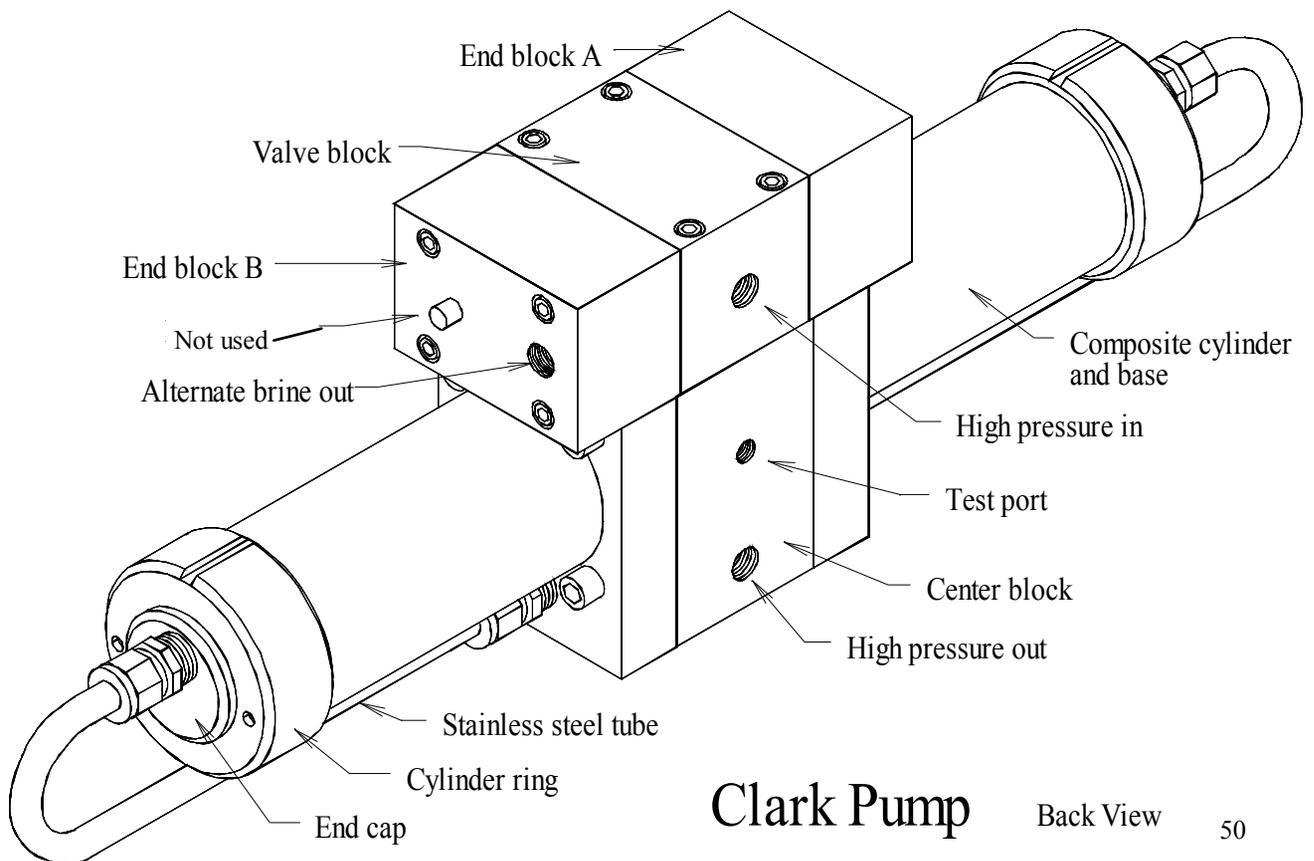
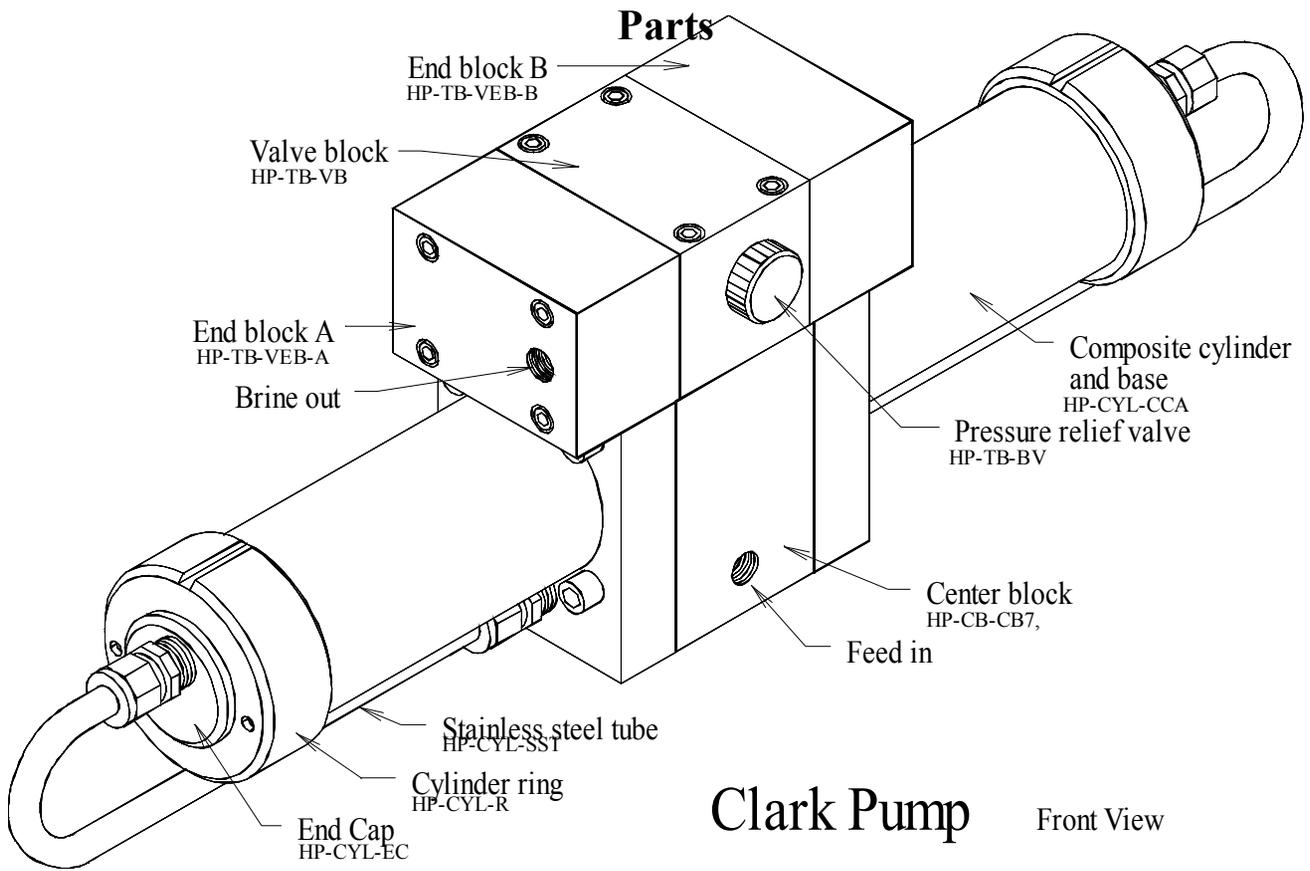
Pump Head Assembly W/Press. Switch  
PL-PMP-SFPH

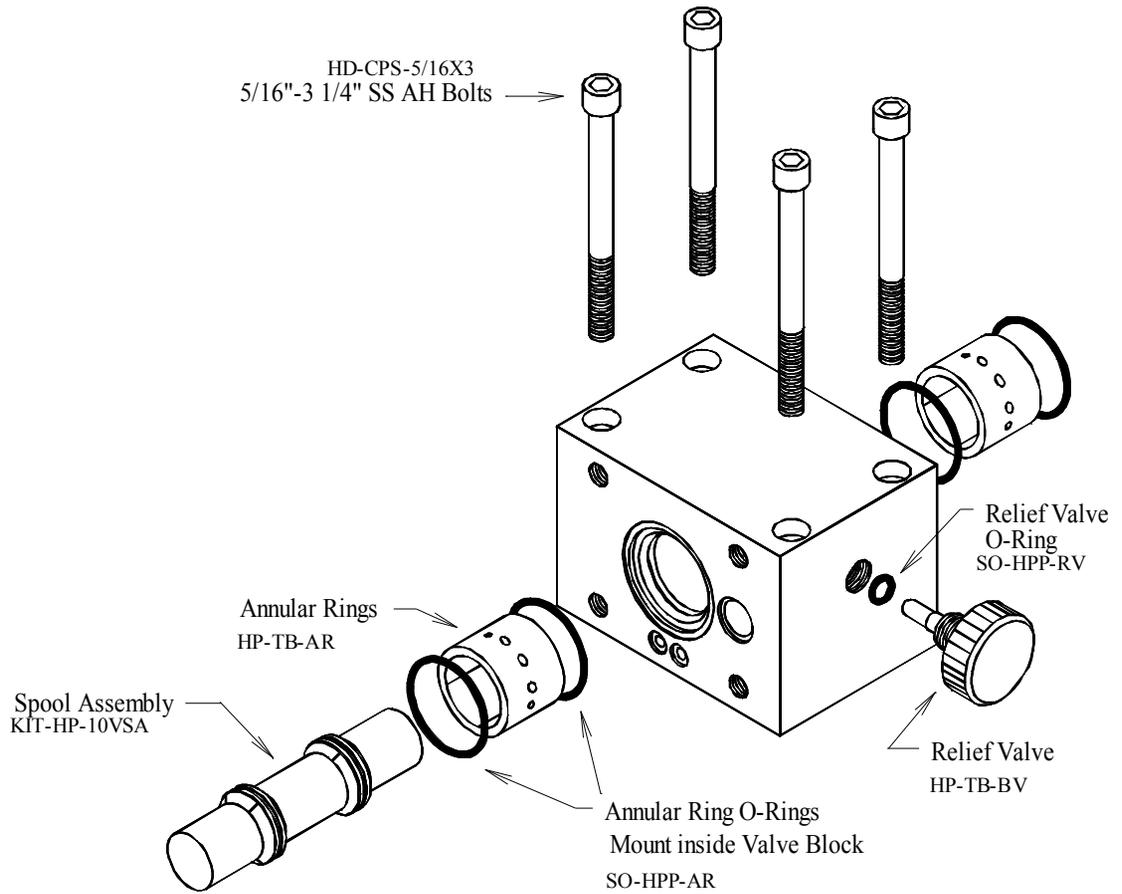


Fig 2

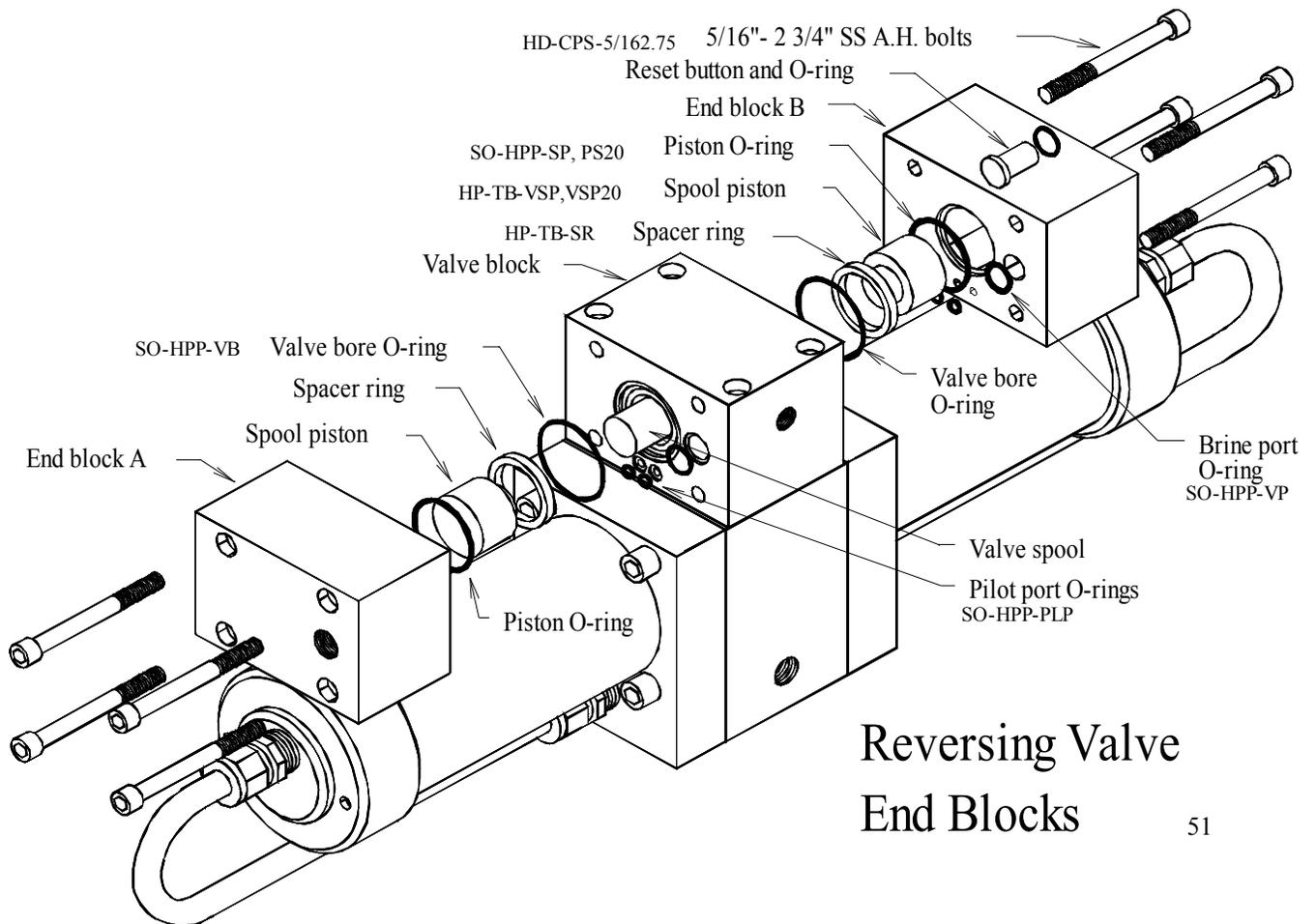


Fig 3



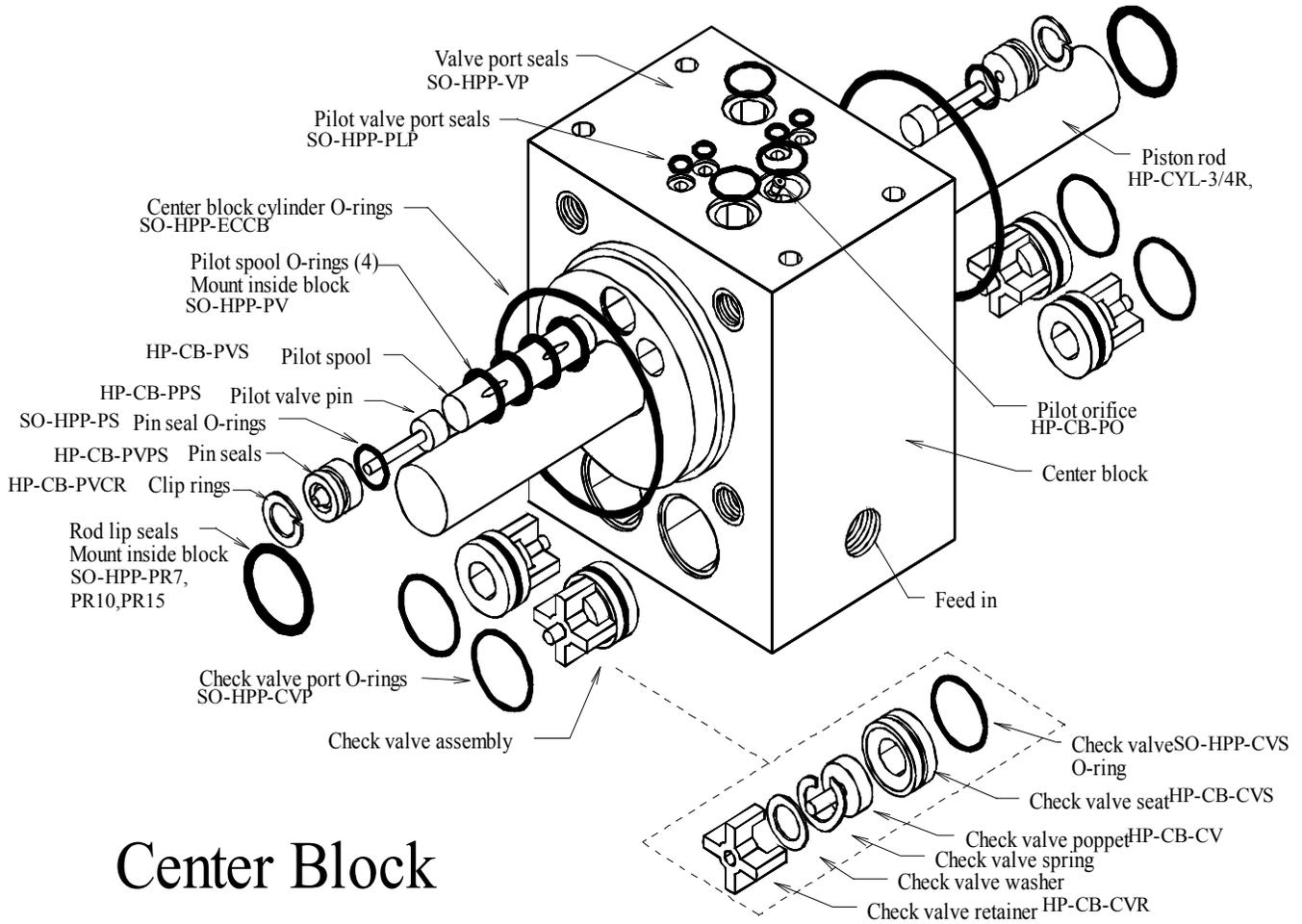


### Valve Block



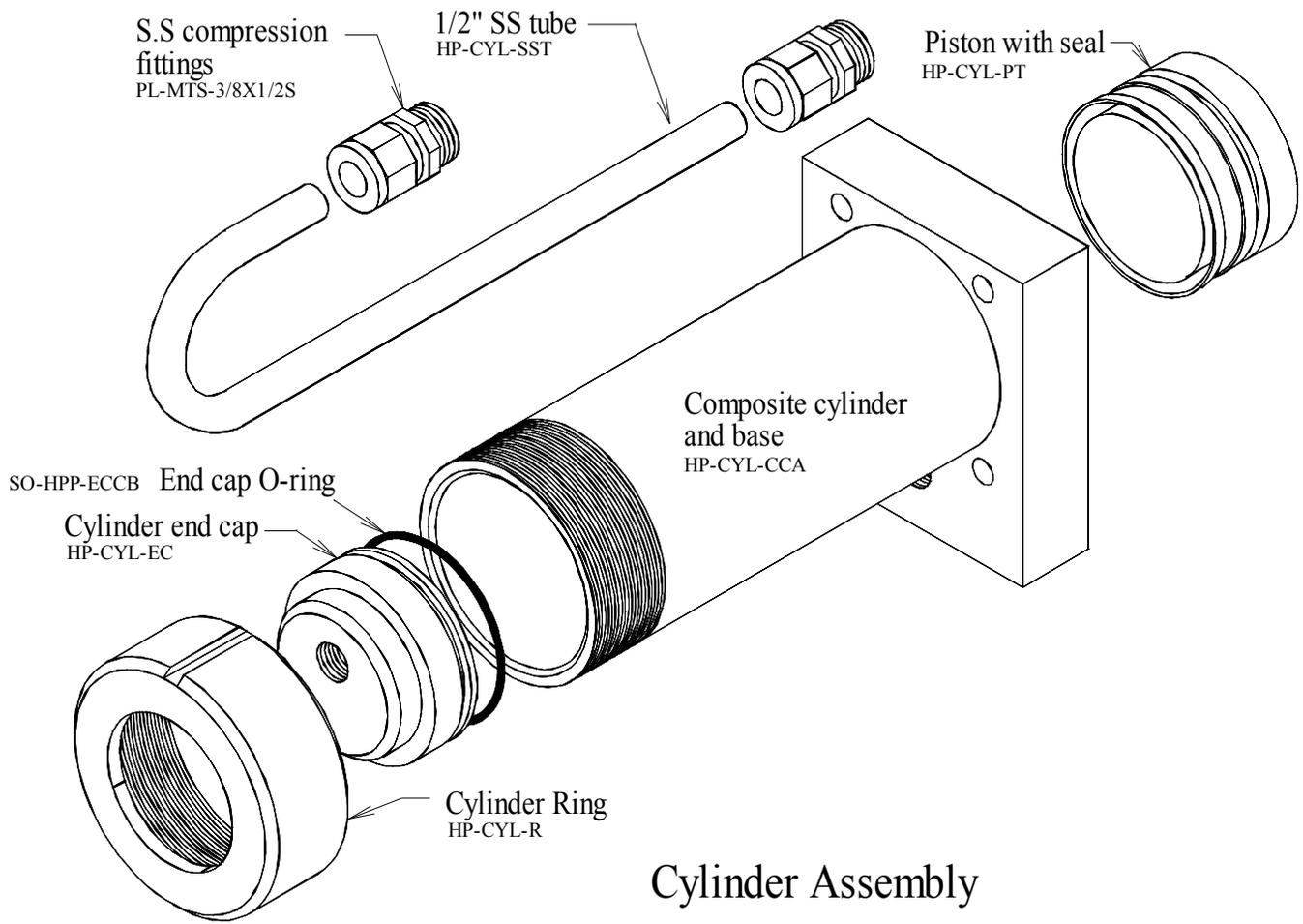
### Reversing Valve End Blocks

# Parts



## Center Block

# Parts



## Cylinder Assembly

