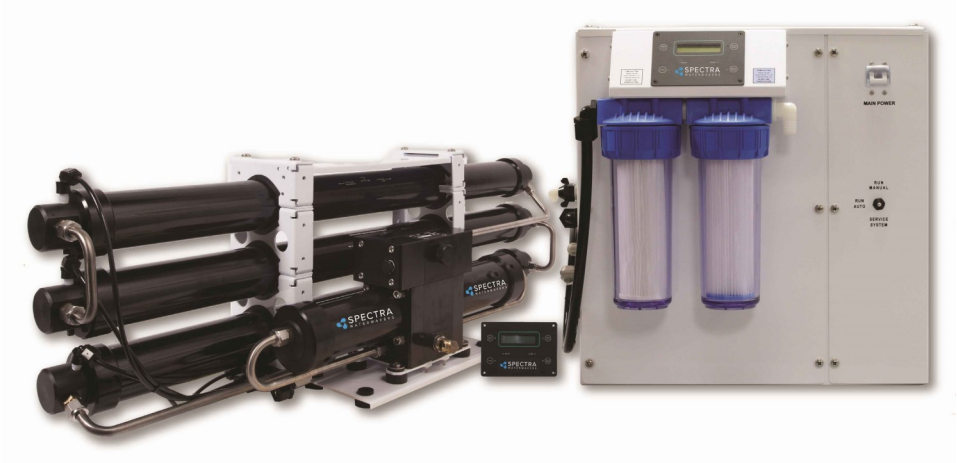
NEWPORT 700-1000 MK ll-Z
INSTALLATION & OWNERS MANUAL

Z-ION Ready with revised fresh water flush system
All **MK2-z** systems are pre plumbed to accept the new Z-ION disinfection system to flush the system from the inlet sea strainer



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Spectra Watermakers
20 Mariposa Road, San Rafael, CA 94101
Phone: 415-526-2780 Fax: 415-526-2787
Rev. November 2015

MPC Controller Quick Guide

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

Program Mode allows checks and adjustments of all system settings. Please consult your manual before making any adjustments. See page 74.

Auto Run

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

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

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

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

Auto Store

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

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

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

Stop (or Start)

Press once to start or stop system.

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

Press and hold to toggle between **Run High Mode** and **Run Low Mode**

Alarm Display

Push to silence alarm

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

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

Thank you for your purchase of a Spectra Newport system. Properly installed, it will provide years of trouble free service. Please read through the installation instructions and the system layout prior to attempting the install. Like any piece of mechanical equipment, the system will require inspection and service, so plan ahead for service access, and install “service loops” in cabling. If a dealer is installing the system for you, review the location of the components to ensure the installation will meet your approval upon completion.

Newport Installation Quick Start
Important Details for Installer

1. The system must have a dedicated sea water inlet to guarantee a constant flow of water to the system. The inlet should be as low in the boat as possible with a dedicated, forward-facing scoop-type thru-hull fitting.

2. Both the Newport 700/1000 Mk II feed pump module and the Clark Pump/Membrane module must be installed in a well ventilated compartment where **temperatures will not exceed 120F (48C).** Many engine compartments exceed this temperature when underway. Warranty will be void if the installation does not meet this requirement.

3. Follow the wire gauge charts in the instructions! Using larger wire than specified is acceptable.

4. If you are separating the Clark Pump/membrane assembly, please review the high pressure tube assembly instructions. Improper assembly will cause failure!

5. Run, test, then sea trial the complete system before assuming it is operational. If the boat is in fresh or dirty water, see Dry Testing with an Artificial Ocean on page 40. After testing, make sure the flush cycle operates properly. The water going overboard at the end of the flush should only taste slightly salty and measure <1000 PPM salinity.

6. The MPC control must be powered 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 about 7 gallons (27 liters) per flush.

7. The MPC 5000 control must be de-powered after the system is put in storage.

8. Spectra dealers are responsible for educating the vessel owners on the operation and maintenance of the system. Please walk through the entire installation with our customer.

9. Please have the owner fill out the warranty card or register online.

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Installation

Getting Started

Unpack the system and inspect it to make sure that it has not been damaged in shipment. Freight damage must be reported to the carrier within 24 hours.

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 smaller installation parts are listed on the plastic bags' pick list.

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

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

Lay out the system. Ensure that there is clearance around the components for removal of filters and system service. Make sure you have adequate tubing, hose, and cable before starting. Additional parts may be ordered.

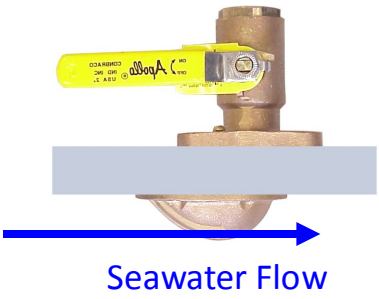
Newport 700/1000 MkII-Z shipping list:

- Newport feed pump module with MPC 5000 and mag drive pump
- High Pressure Pump and Membrane Module - 20 % Clark Pump
- NP 700/1000 Boost Pump and Sea Strainer Module
- NP MKII-Z flush module
- Newport install kit
- Newport service kit
- Clark Pump inlet hose assembly (SUB–NP– MK2–ILHA)
- 5/8-inch hose, 25 feet
- 3/4-inch black spiral suction hose, 25 feet
- 3/8-inch low pressure tube, blue, 25 foot roll
- 3/8-inch low pressure tube, black, three 25 foot rolls

Installation Basics

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

Thru-hull
Not Supplied.



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

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

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

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

Double clamp all hose connections below the waterline.

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

Secure the piping away from moving objects such as engine belts and hatches. Prevent chafe on the tubing as required. Test and inspect all piping and hose clamps after several hours of operation.

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

Wiring

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

Components

Fresh Water Flush Module

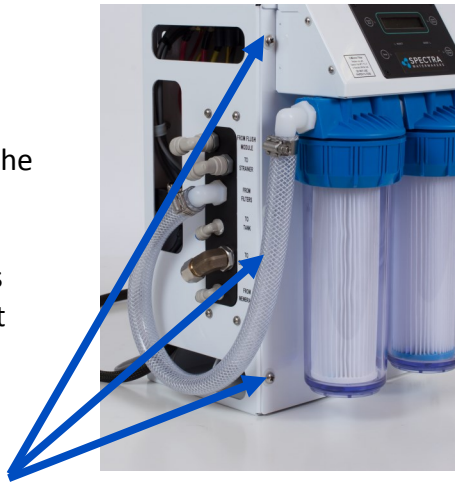
The fresh water flush module may be located in any convenient location near the feed pump module. It should be mounted vertically with 2” below the housing for filter changes. Do not install over electrical equipment. The unit contains a charcoal filter for the flush water, a shut off valve, and flush water pressure regulator. **If you ordered your system with the optional Z-Ion, it will replace the filter bowl on the feed pump module, and have an additional control box. WITH THE Z-ION, PHOTOS OF THE FEED PUMP MODULE WILL LOOK SLIGHTLY DIFFERENT. SEE PAGE 31 FOR Z-ION INSTALLATION AND INSTRUCTIONS.**

Boost Pump Module with Sea Strainer

The boost pump module should be mounted vertically with sea strainer accessible and which can handle some water spillage. The boost pump **MUST** be installed below the waterline to ensure that it will prime. If allowed to run dry it will fail.

Feed Pump Module

Mount the feed pump module on a vertical surface, up to 3-feet (1.0M) above the waterline. It is <u>preferable</u> to mount as low as possible. Locate in an area that allows easy access to the filters and the left hand side of the enclosure. Keep future maintenance in mind when choosing a location, and do not mount above water-sensitive equipment. The feed pump has overheat protection and will not operate properly at ambient temperatures over 120F (48C).



Remove the 6 Philips screws on the front cover (three on shown side and three on the other) to access the mounting holes in the back of the enclosure.

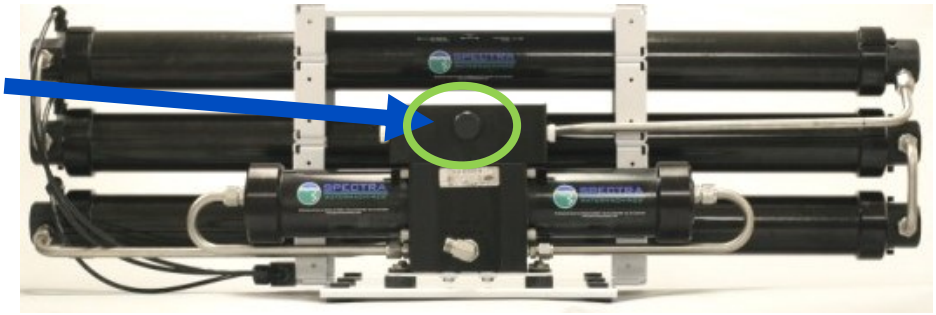
Components continued...

Remote Display Panel

The remote control panel can be mounted anywhere dry and convenient. Cut a 4-9/16” (116 mm) wide by 2-7/8” (68mm) high opening for the panel. Take care not to damage the plugs on the ends of the cable when routing. **Use only a Spectra-approved cable.** The cable is not a standard LAN cable or phone cord.

Clark Pump/Membrane Module

Pressure Relief Valve



This module must be installed in an area that maintains a temperature below 120F(50C). It may be placed as high in the boat as you desire, and mounted in any position, even upside down. Make sure that the area around and under the pump does not have any water sensitive equipment, as water will be spilled during any repairs or if a leak occurs. Allow for easy access to the pressure relief valve.

The Clark pump/membrane module comes complete with a mounting system. Be sure to use the supplied washers on the rubber feet.

Plumbing Schematic

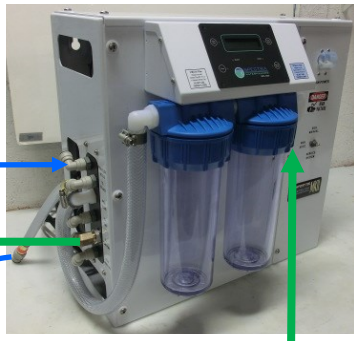
From the Clark pump brine discharge connector use the supplied 5/8 (16 mm) clear braided vinyl hose with Quick Connect fitting to the brine overboard fitting.

Use the grey 3/4-inch reinforced PVC hose with pre-installed hose-to-high pressure adapters to connect the Clark Pump feed water inlet to feed pump manifold. **Do not shorten!**

The optional Z-ION will replace the Fresh Water Flush module

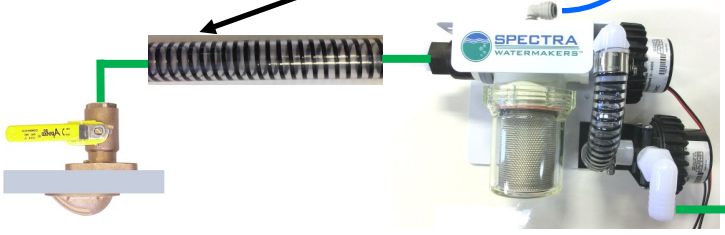
Flush water from ship's pressure water system 25 psi (2bar) minimum

3/8-inch black tube to "From Flush Module"



Use the 1/2-inch vinyl hose with the Quick Connect fitting between the pigtail labeled "To Strainer" and the top of the sea strainer. (See following pages.)

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



Plumbing Detail

Allow access to the left side of the feed pump module for attaching tubing, and for operating the manual button on the diversion valve.

Feed water inlet from boost pump. Leave enough extra length in this hose to allow the front cover to be moved aside for service access to the inside of the box.

Manifold (Left side of feed pump module):

Pigtail attaches here

Flush water inlet from flush module

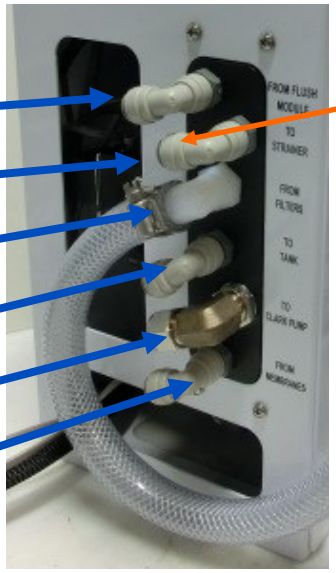
Flush tubing to strainer

Feed water inlet from filters

Product water outlet to tank

Feed water outlet to Clark pump

Product inlet from membrane



Ten feet (3M) of grey 3/4” PVC hose is pre-cut and fitted with high pressure adapters at both ends for connecting the feed water outlet on the feed pump manifold to the Clark Pump feed water inlet. This entire length of this hose acts as a shock absorber for pressure spikes generated by the cycling of the Clark Pump. If you need this hose to be longer than ten feet it can be ordered, **but this hose MUST NOT BE SHORTENED, or damage to the feed pump may result, voiding the warranty**.

Plumbing Detail continued...

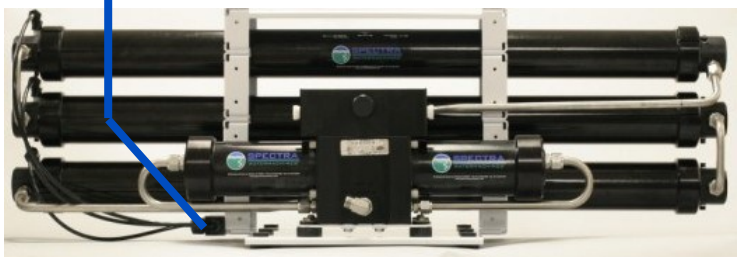
Product Water Tubing

Product water tubing is 3/8-inch (9.5 mm) Parker tubing. ***See the Parker tube fitting assembly diagram on page 21***. Product water goes from the membrane into the pump module manifold where it passes through the flow meter, the salinity probe, and the diversion valve. If the salinity is below the set threshold, the diversion valve energizes and the product water is sent to the tank from the manifold product outlet. If the diversion valve is not energized the product goes back into the feed water.

Connect the product outlet on the product water manifold, under the membrane housings, to the product inlet fitting on the pump module manifold using the supplied 3/8-inch **black** nylon tubing.

Route the **blue** product water tube from the **blue** product water outlet fitting on the feed pump module manifold into the top of the water tank. Install a tee in the water tank fill or tap a pipe thread into an inspection port in the top of the tank. Do not feed the water into a manifold or bottom of the tank. Make sure there is no restriction or back pressure in this plumbing: **It must maintain less than 5 PSI (.35 bar) of back pressure, or the system will be impaired or damaged.**

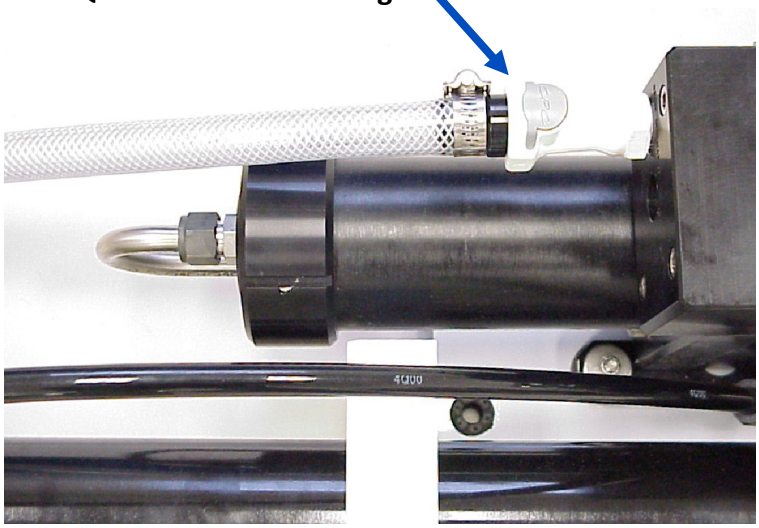
If the length of product water tubing supplied with the watermaker is insufficient, use a larger size hose.



Plumbing Detail continued...

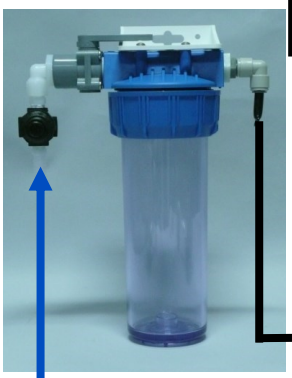
Brine Discharge
Route the brine discharge from the quick disconnect fitting to a location above the waterline using the supplied 5/8" hose. The quick disconnect may be placed on either side of the Clark Pump.

Quick Disconnect Fitting

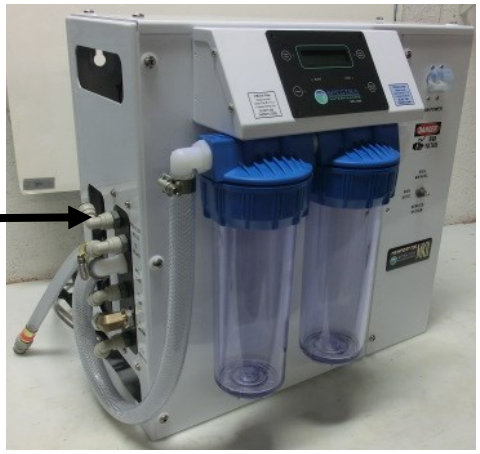


Fresh Water Flush
Run a feed line from the domestic cold pressure water system to the 1/2-inch hose barb on the fresh water flush assembly. This hose must be pressurized when the boat is unattended for the fresh water flush system to function properly. **The domestic fresh water pump must be able to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

The Z-Ion option will replace the Fresh Water Flush module



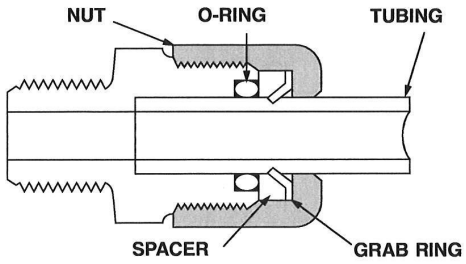
To Flush water Inlet on pump module manifold



Fresh water from boat's pressure water system

Fast & Tite® Thermoplastic Fittings

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



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

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

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

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

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

Working Pressures for Fast & Tite® Fittings

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

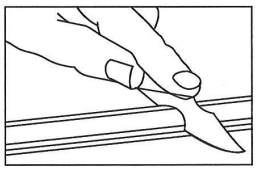
Ratings are based on use with copper tubing, and in all cases represent the maximum recommended working pressure of the fitting only. Working pressures (vs. temperatures) of other types of tubing may limit the tube and fitting assembly to pressures lower than shown above. Consult factory for recommendations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

Temperature Range:

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

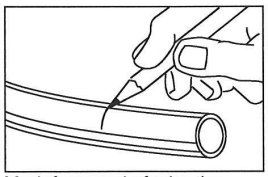
Fast Assembly

Step 1.



Cut the tube squarely and remove any burrs.

Step 2.



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

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

Step 3.

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

Step 4.

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

Step 5.

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

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

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

John Guest Super Speedfit Fittings

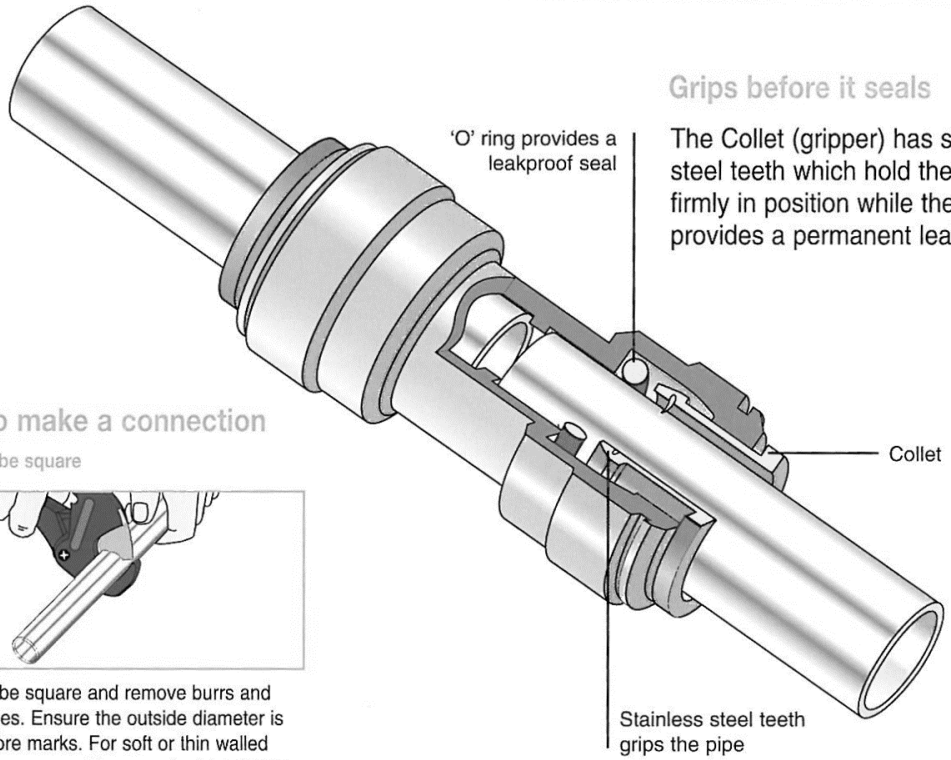
How Super Speedfit Works

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

Materials of construction

Super Speedfit fittings are made up of three components:

Bodies are produced in an acetal copolymer or polypropylene.
'O' rings are Nitrile rubber or EPDM.
Collets are produced in acetal copolymer or polypropylene with stainless steel teeth.



Grips before it seals

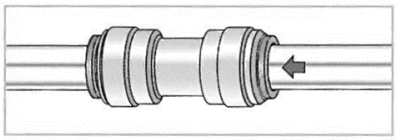
The Collet (gripper) has stainless steel teeth which hold the tube firmly in position while the 'O' ring provides a permanent leakproof seal.

How to make a connection

Cut the tube square

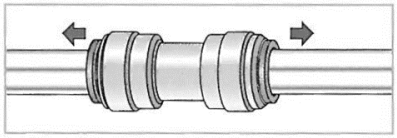
Cut the tube square and remove burrs and sharp edges. Ensure the outside diameter is free of score marks. For soft or thin walled tube we recommend the use of a tube insert

Push up to tube stop



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

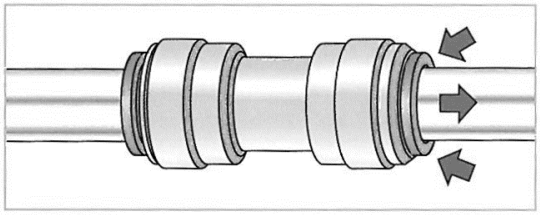
Pull to check secure



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

To disconnect

Push in collet and remove tube



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

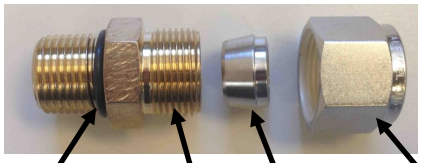
Spectra High Pressure Tube Fitting Assembly Instructions

The high pressure module has up to twelve high pressure fittings, two on each cylinder on the Clark Pump, two on each of the pressure vessel end caps, and two 90-degree elbows on the back of the Clark Pump. As the compression fitting is tightened, it compresses a ferrule onto the stainless tubing, fixing the ferrule permanently to the tube and holding the compression nut captive.

The body of the fitting seals to the underlying component with an O-ring. On the Clark Pump cylinders and the end caps this O-ring is compressed by tightening the entire fitting. The O-rings on the 90-degree fittings on the back of the Clark Pump have captive nuts and washers, which compress the O-rings without turning the entire fitting.

If a tube fitting leaks it can sometimes be resealed by just tightening. You must use two wrenches, a 13/16-inch wrench to hold the base, and a 7/8-inch wrench to turn the compression nut. The 13/16-inch wrench will need to be thin so as not to interfere with the compression nut. If this doesn't work, disassemble the fitting, grease liberally with silicone grease (the ferrule and the threads) and re-tighten firmly.

The base O-rings should be **gently** compressed to achieve a good seal, and may be damaged by overtightening.



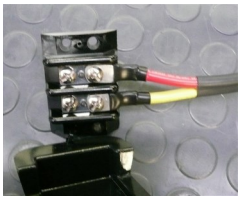
Nickel-Bronze High Pressure Straight Fitting

Nickel-Bronze High Pressure Elbow

Electrical: 24-Volt DC Versions

The Newport 700/1000 Mk II 24-volt DC systems have a power inlet harness with a terminal block, a 2-conductor boost pump cable, and a 50’ (15M) cable for the MPC-5000 display.

A DC motor speed controller sets the run speed and also slows the motor to the flush and service speeds. **Do not install it in hot or poorly ventilated locations. Allow access to the motor speed controller**.



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.

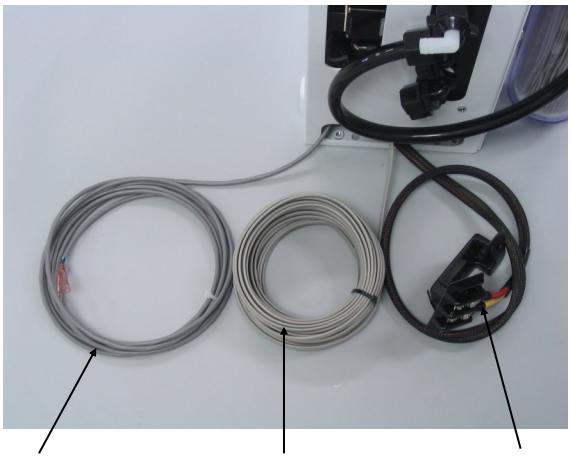
Check the wire size chart below for appropriate wire sizes. DC power feeds should be uninterruptible to insure proper operation of the AutoStore feature. Avoid house breaker panels that could be easily tripped.

DC Wire Size Guide (24 Volt):

Protect with 35 Amp fuse or circuit breaker.
Size the wire for 30 Amps.
#10 Gauge (6mm²) up to 10 feet (3M)
#8 Gauge (10mm²) up to 20 feet (6.1M)
#6 Gauge (16mm²) up to 30 feet (9.4M)
#4 Gauge (25mm²) up to 50 feet (15M)

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

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



Boost pump cable

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

Power inlet harness with terminal block

Motor Power Supply Breaker

Motor Speed Controller

Manual Control Switch

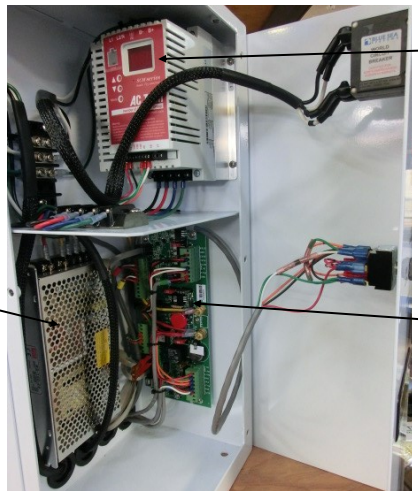
MPC-5000 Board

Electrical: 110 & 220 Volt AC Versions

AC versions have an AC power connection and an AC (110 or 220) to 24-Volt DC converter to power the electronic controls and boost pumps. The MPC-5000 control box houses an AC variable frequency motor drive (VFD) and the MPC-5000 control board. The VFD serves several functions:

- Allows the machine to run with almost any AC frequency. Regardless of the input conditions the drive will hold a constant motor speed.
- Outputs three-phase AC to the motor.
- "Soft starts" the motor, allowing the watermaker to be run from a very small generator since it requires no additional start-up amperage.
- Slows the motor to the flush and service speeds.

The VFD has over-temperature shutdown protection. **Do not install it in hot or poorly ventilated locations. Allow for access to the VFD for programming**.



Electrical: 110 & 220 Volt AC Versions continued...

AC power connections should follow the wire and breaker sizes in the tables below, with an appropriately-sized AC breaker at the power source, usually the main AC distribution panel.

110-Volt AC System Wiring

Use a 15 amp circuit breaker

Wire Length	AWG Wire Size	Metric Size
To 25 feet (7.5M)	12 AWG	4mm²
25 feet to 50 feet (7.5M to 15M)	10 AWG	6mm²
50 feet to 75 feet (15M to 23M)	8 AWG	10mm²

220-Volt AC System Wiring

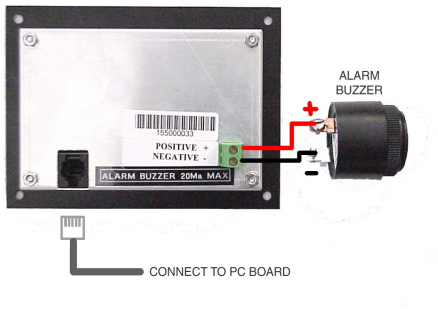
Use a 10 Amp circuit breaker

Wire Length	AWG Wire Size	Metric Size
To 25 feet (7.5M)	14 AWG	2mm²
25 feet to 50 feet (7.5M to 15M)	12 AWG	4mm²
50 feet to 75 feet (15M to 23)	10 AWG	6mm²

Wire length is measured from source circuit breaker or fuse to control terminal block (one direction/single conductor).

Electrical: All Systems

Route the control cable through the boat to the MPC display location. Be careful not to damage the connector or get it wet.

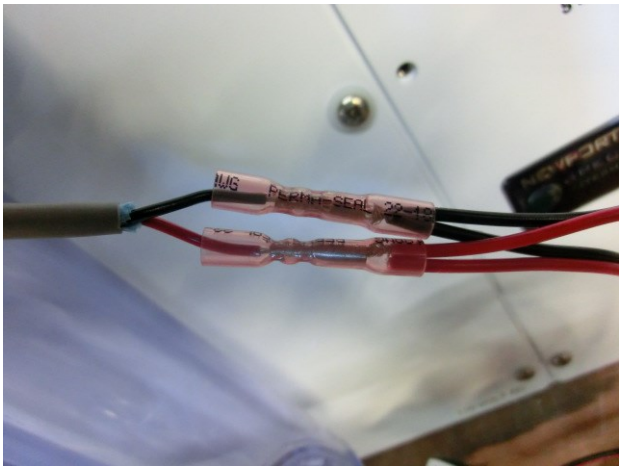


Display Jacks

Boost Pump Wiring

The boost pump module contains two boost pumps that run sequentially and simultaneously when the system is taking in sea water. It doesn't matter which pump we call Pump 1 or Pump 2, because they both run at the same time.

- On all systems an 18 gauge duplex cable, pre-fitted with heat shrink butt connectors, supplies power to the boost pumps from the feed pump module.
- Crimp the butt connectors onto the two sets of wires for the boost pumps. Once connected, heat the butt connectors to create a watertight seal.



MPC 5000 Tank Switch Installation and Operation

By installing a float switch at the top of your water tank**,** the watermaker can shut itself down and fresh water flush itself when the tank is full.

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

If the tank remains full for extended periods, the watermaker will automatically fresh water flush itself, as programmed under the Flush Interval (see pages 42 and 74).

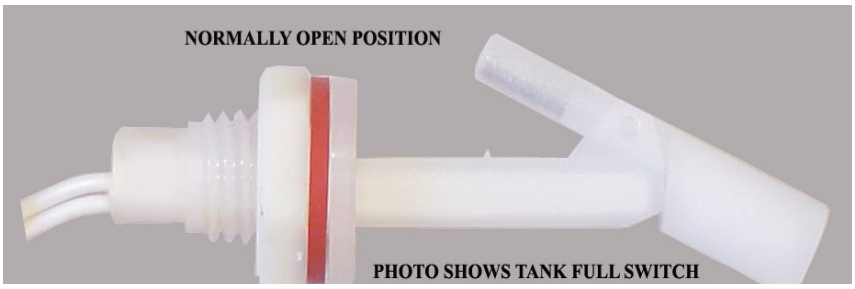
The float switch is connected to terminals on the green 10 pin connector on the MPC circuit board, labeled **Float Switch 1.** There is no polarity. **Float Switch 2** is for land-based applications only, and will be bridged with a jumper wire in marine installations. See the wiring diagram on the next page.

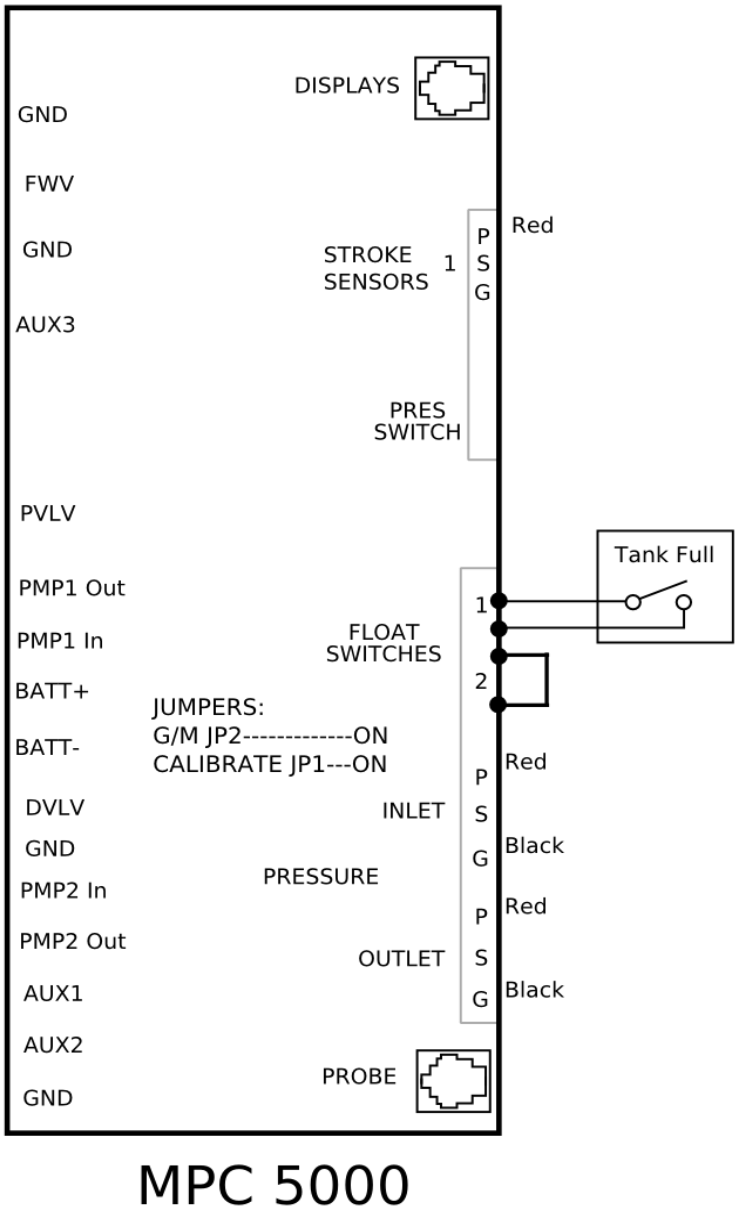
Spectra uses two types of float switch, the side-mounted float switch (EL-SWT-SMLV) and the top-mounted Tank Full Switch (EL-SWT-LV). Either may be used, depending on the geometry of your tank.

To use this mode the watermaker must be started with the **Stop/Start** button or the **Auto Run** button. The watermaker will then fill the tank automatically and enter the Autoflush Mode, fresh water flushing itself according to the programmed Flush Interval.

If you are using the tank full switch, DO NOT press and hold the Auto Run button, as this will enter the AutoFill Mode and the watermaker will not function properly.

Note: It is possible to have tanks switches on multiple tanks. Contact Spectra factory for advice.





Tank Switch Wiring: Tank full switch wired to Float Switch 1 terminals; jumper across Float Switch 2 terminals

Optional Z-Ion Protection System

The Z-Ion, developed by Spectra, is a device with protects the entire system from fouling for extended periods without fresh water flushing or storage chemicals (pickling).

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

The Z-Ion does not protect against freezing, so in freezing climates pickling with propylene glycol is still required. There may still be cases where you need to pickle your system with SC-1 storage chemical or propylene glycol, so we recommend you carry one of these products at all times.

If your system was ordered with the Z-Ion, it will require only some basic wiring and commissioning, laid out in the following pages.

If you didn't order you system with the Z-Ion, it may be retrofitted to any Spectra system.

Z-Ion

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

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

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

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

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

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

Z-Ion Installation

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

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

All newer systems (after October 2014) have a pigtail for the Z-Ion, marked green, wired to the MPC circuit board in the feed pump module. Simply plug the connector from the Z-Ion, also marked green, into the pigtail, and the electrical installation is complete. The Z-Ion will receive both DC power and its signal to operate from this connection.

If your system is being retrofitted for a Z-Ion, this pigtail, or similar wiring will need to be installed. Please contact the factory.

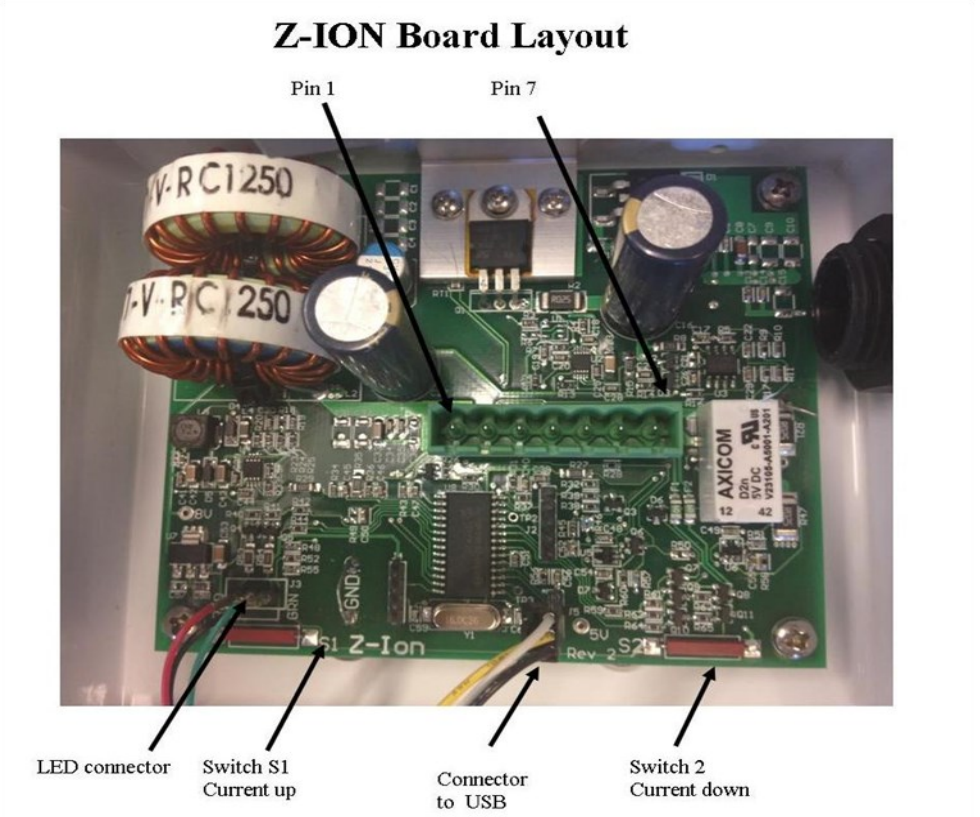
Testing the Z-Ion

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

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

Once the installation is complete and the unit is powered up, carry out a fresh water flush per the instructions. The LED on the Z-ION controller should start flashing as the unit cycles. Close to the end of the flush cycle, take a sample of the brine discharge. If the brine discharge thru-hull isn't accessible you will need to take a sample from the brine outlet on the Clark Pump, or use the brine discharge service hose (see pages 54 to 56). Once you have obtained a sample, first check it with a salinity monitor to make sure the salinity is below 1000 PPM. Next, use the copper test kit to make sure there is about 1 PPM of copper in the flush water.

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



Operation

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.**

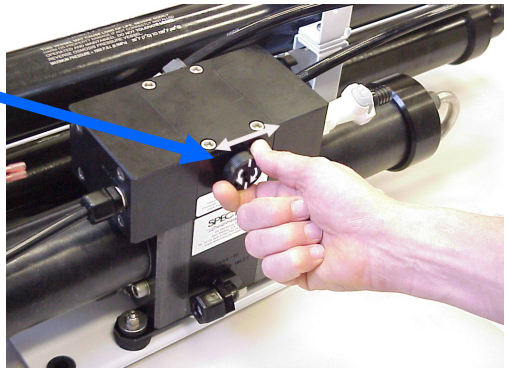
Avoid running the system if the vessel is in contaminated water, such as in a dirty harbor or canal. The system should be fully run tested before leaving port. It is preferable to sacrifice a pre-filter by running the system in turbid water rather than wait to get offshore to discover a problem or deficiency in the installation. If the location or weather prevents proper testing refer to the section Dry Testing with an Artificial Ocean on page 40.

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, or the system will not prime

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." Check that it is open.
   - Push the Alarm/Display button to silence alarm

New System Start-Up and Testing continued...

4. Press **Auto Run** Button

The system will go into a start mode; the flush valve will open for 30 seconds to prime the system and then the feed pump will start. The system should fully prime within 60-90 seconds and the feed pump will sound smooth. Check the strainer and the brine discharge for water flow. There should be no bubbles anywhere in the intake hoses. **If the feed pump continues to sound 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 purge mode to protect your system. If you wish, **you can bypass the purge sequence** and initiate a normal start by pressing both "**Auto Run"** and "**Stop"** simultaneously. The message "Purge Mode Bypassed" will appear. Ensure that you have thoroughly purged all chemicals from the system or you will damage the membrane.

5. After the purge sequence the display will alarm with the message "Close pressure relief valve." **Close the valve** and proceed by pressing **Auto Run** again. **If your system has been stored with propylene glycol, additional purging is recommended: Flip the manual switch to RUN MANUAL, and run the system WITH THE PRESSURE RELIEF VALVE OPEN for an additional 4-6 hours.**

6. The system will now run under pressure and make water. The display will read **"purging product water."** This mode diverts 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.

7. After the ten minute product purge the system will go into operational mode. You may now start and run your system as you desire. You will not have to go through the purging mode again unless you depower the system. If you do, you can bypass the purge mode by pushing **Stop** and **Auto Run** buttons at the same time. It is best to use the **Auto-Run** button to run the machine, which defaults to the automatic fresh water cycle. If you shut down the system using the **Stop** button, use the **Auto Store** button to begin the fresh water flush cycle.

8. Check that the system is operating within its normal parameters. Compare with the chart on the next page

Nominal Operating Parameters

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

Product Flow
Newport 700 Mk II: 29-30 GPH (60-64 LPH)
Newport 1000 Mk II: 39-41 GPH (147-155 LPH)

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

Feedwater Pressure
Pressure range 180-215 PSI (13-16 BAR)
Pressure will be higher with cold or high salinity feed water, and lower with warm water or low salinity.

Filter Condition
PREFILTER warns when filters are getting dirty. Clean filters as soon as convenient. If the graph reaches full scale the machine will automatically slow down to low speed. If it reaches full scale again it will alarm ‘Service Pre-filters” and shut off the watermaker.

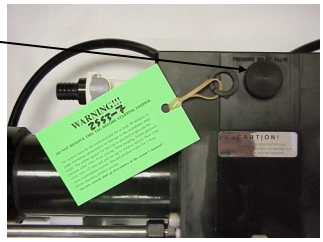
The MPC 5000 board is fully programmable from the remote display. Instructions on how to access and adjust the operating parameters are on page 74 of this manual.

Dry Testing with an Artificial Ocean

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

1. **Open the pressure relief valve on the Clark Pump. Remove the green tag and spacer.**
2. Power up the system. Bypass the purge mode by pushing **Stop** and **AutoRun** simultaneously. "PURGE MODE BYPASSED" should appear.
3. Hold down the **Auto Store** button for five seconds to run a full flush cycle. Do this **six** times to purge the storage chemicals, a 36 minute process.
4. Replace the brine overboard hose with the brine service hose per figure 1.
5. Push the **Auto Store** button again to fill the bucket with fresh water from the brine discharge service hose (hose attached to Clark Pump). Press **Stop** when the bucket is full.
6. Mix the salt to the proper proportion or use an aquarium hydrometer to adjust the salinity level to a specific gravity of 1.025. Fresh water in the watermaker will further dilute the concentration when you begin operation.
7. Disconnect the quick release fitting from the pigtail coming from the "To Strainer" port on the manifold and connect the intake service hose per Figures 2 and 3. Route both service hoses into the 5 gallon (20 liter) bucket. Disconnect the product tube from the diversion valve, and using another small piece of tube, route it into the bucket.
8. Push the **Auto Run** button, allow the system to prime and then close the pressure relief valve. The system should build pressure shortly and start making water, with the brine and product water recombining in the bucket to be cycled again. This will gradually heat the water. Do not let the water temperature exceed 120 deg. F (49 deg. C).
9. Run the system under pressure, checking for proper operation and leaks. After testing the system, replace the brine discharge hose, product tube, and fresh water hose from the strainer. You can now flush the system by pressing the **Auto Store** button.

Remove tag and washer



OPEN PRESSURE RELIEF VALVE

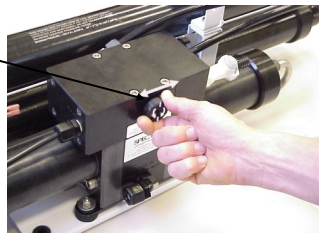


Fig. 1

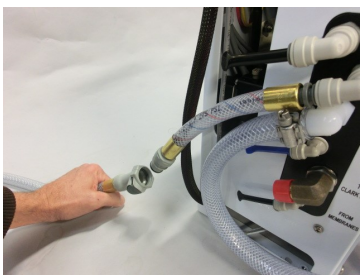


Fig. 2

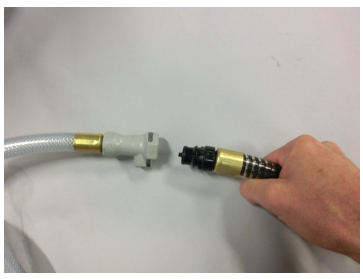


Fig. 3

Normal Operation and Fresh Water Flush

If the system has been pickled or stored, use the New System Startup procedure on page 37.

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

1. Check to see that the inlet and brine discharge seacocks are open.
2. Push **Auto Run** one or more times. The display will read “RUN AUTO MODE” then “STARTING” with a 30 second priming countdown timer. After priming, the display will read “RUN AUTO MODE” with a countdown timer. The machine will run for one hour for each time the button is pushed, then shut off and automatically do a fresh water flush.
3. Run the system until you have filled your tank or have made enough to meet your requirements for several days.
4. After the system fresh water flushes and shuts down it will enter the **Auto Store** mode, which will flush the system at programmed intervals. See the next page.
5. You may stop the system at any time with the **Stop** button. If the **Stop** button is pressed during operation, the system will not flush itself or go into Auto Store mode.

Auto Store mode: The timer counts down the hours until the next fresh water flush.

Run High Mode and Run Low Mode

By pressing and holding the **Stop** button you can toggle back and forth between Run High Mode and Run Low Mode. Run High Mode is the normal setting for maximum production, but Run Low Mode may be selected for lessen power consumption or to lower the feed pressure. The system will automatically drop to low mode when it senses abnormally high feed pressure, low voltage, or badly clogged pre-filters.

Note: The optional tank full float switch will shut off the system from any mode. If the system was started by the **Auto Run** button the system will flush and then re-flush at programmed intervals (1-30 days) when the tanks are full. 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. The system will perform a fresh water flush and then go back into Auto Store mode.

Auto Store

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

As described in Normal Operation and Fresh Water Flush on page 41, the Auto Store function flushes the watermaker at programmed intervals. As long as the watermaker is flushed with fresh water every 5 days (30 days with the Z-Ion) you need not store the system with chemicals.

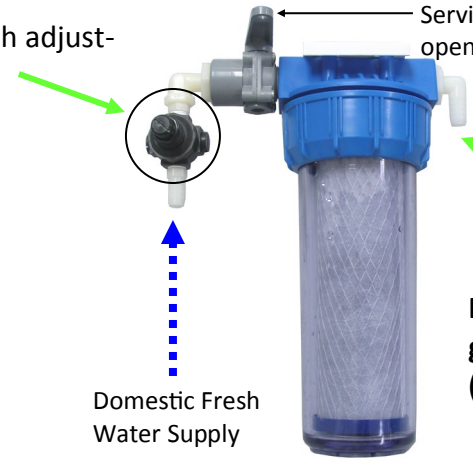
- Make sure there is enough water in the fresh water tanks to supply the watermaker for more than the expected time of operation in the Auto Store mode. If there isn't enough fresh water in your tank, seawater will be drawn in to make up the difference, and the system will not be completely flushed with fresh water. The Newport 700/1000 Mk II requires about 7 gallons (26 liters) for each flush. The boat's pressure water supply must be on and stay on while the system is in Auto Store mode. If these conditions cannot be met, then pickling with SC-1 storage chemical or propylene glycol is preferable.
- Make sure the pressure relief valve on the Clark Pump is closed.
- The system must be continually powered during the Auto Store mode. Turning off the power will disable the automatic fresh water flush and damage may occur.
- **Pressing the Auto Store button once** will flush the system and then activate the flush interval cycle: The display will read "FRESH WATER FLUSH" with a countdown timer, and the feed pump will run. After 7 or 8 minutes (adjustable) the pump will stop, the display will read "FLUSH TIMER INTERVAL," and the countdown timer will reflect the number of hours until the next flush.
- **Pressing and holding the Auto Store button for 5 seconds will engage a one-time flush.** The display will read "FRESH WATER FLUSH" while flushing, then the default display will appear when finished. The system will not re-flush at programmed intervals.
- **Pressing the Stop button** will cancel the Auto Store Mode.

Flush Adjustments

The default flush adjustments for your Newport 700/1000 Mk II are usually about right to ensure that sea water is thoroughly flushed out of the watermaker using the least amount of fresh water. However, due to different lengths of hose runs, different rates of flow, and different pressures in shipboard fresh water systems, the flush duration can be optimized for your boat. The flush cycle is set in three adjustments: the pressure regulator, the pump speed, and the flush duration:

1. Check/Adjust the pressure regulator (see pictures on next page)
The charcoal filter in the fresh water flush circuit is rated for 1.5 GPM (6 LPM). If your house pressure water system pushes more than 1.5 GPM through the charcoal filter (4.5 gallons in 3 minutes) then chlorine won't be adequately removed from the flush water. The flow regulator can be adjusted to make the flow rate as close as possible to 1.5 GPM. Place the output hose from the charcoal filter into a bucket and open the service valve. Turn the center screw on the pressure regulator to adjust the flow:

Flush Adjustments continued...



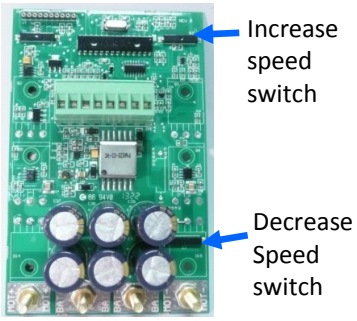
Note: If your system was ordered with the optional Z-Ion, the Z-Ion will replace the fresh water flush module, but the adjustments will be the same.

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

2. Check/adjust the feed pump flush speed: Disconnect the brine discharge overboard hose from the quick connect on the side of the Clark Pump, and replace it with the brine discharge service hose from your service kit (see pages 54-56). Run the brine discharge service hose into a graduated bucket.

On DC Models:

Under the top of the feed pump module, mounted over the MPC circuit board, is the pump speed controller. On the speed controller board are two magnetic reed switches for adjusting the pump motor speed. The switches are narrow black or silver bars, 5/8" (16mm) long. The increase speed switch is labeled S2; the decrease speed switch is labeled S3. Each time a small magnet is placed near the switch with the pump is running, the motor speed will change slightly.



Push the Auto Store button. The flush valve will open and water will flow backwards through the filters and strainers. After about 30 seconds the back flush will end and the feed pump will come on, starting the forward flush of the Clark Pump and membrane. Once the feed pump starts, measure the flow from the brine discharge service hose. Once again you should measure 1.5 GPM (5.7 LPM), or slightly less. If more than 1.5 GPM comes from the brine discharge, slow down the feed pump; if less comes from the brine discharge, speed up the feed pump. Once you've adjusted the speed correctly, the speed controller will stay programmed for this speed during fresh water flushes.

Flush Adjustments continued...

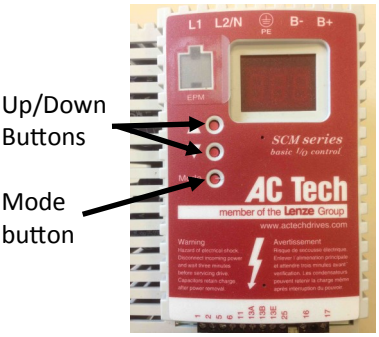
For AC Models:

Mounted under the top of the Feed Pump Module is a VFD feed pump motor control. **WARNING, ELECTRICAL HAZARD: 120-VOLT OR 220-VOLT AC POWER WILL BE PRESENT ON THE TERMINAL BLOCKS WHILE ADJUSTMENTS ARE BEING MADE!**

The Lenze/AC Tech speed controls set the feed pump motor speed by modulating the ship's AC 50 or 60 HZ power, thus altering the pump speed. **Do not change any setting except parameter 32: flush speed.**

VFD motor speed control:

Push the Auto Store button on the MPC display. The flush valve will open and water will flow backwards through the filters and strainers. After about 30 seconds the back flush will end and the feed pump will come on, starting the forward flush of the Clark Pump and membrane. Once the feed pump starts, measure the flow from the brine discharge service hose. Once again you should measure 1.5 GPM (5.7 LPM), or slightly less. If more than 1.5 GPM comes from the brine discharge, slow down the feed pump; if less comes from the brine discharge, speed up the feed pump:



1. To enter PROGRAM MODE push the **Mode** button. This will activate the password prompt. The password is 25. Enter the password with the up and down buttons. When the display reads 25, press **Mode** again.
2. The display will read P01 to indicate that you have entered program mode. Using the **up** button select **Parameter 32 (P32).** Press **Mode** to display the current setting. The speed settings are displayed in Hertz (cycles per second, AC output power frequency.) Use the up and down buttons to change the setting. *Do not change the setting more than 3 Hertz at a time*. Press **Mode** to enter the new setting.
3. The pump speed will change, and the controller will enter parameter select mode. To continue changing the same parameter until the desired pressure or flow rate is achieved, press the **Mode** button two more times. This will bring you back to Program mode in the same parameter. If no buttons are pushed for two minutes the controller will require the password to be entered again.

3. Check/Adjust the flush duration: Detailed instructions about how to access the programming function and set the flush duration can be found on page 74, Programming from the Display. Set the flush duration so that the fresh water flush comes to an end just as the salinity of the brine discharge drops below 1000 PPM, or no longer tastes brackish. You can either taste the brine discharge, or measure it with a handheld salinity meter. Since the flush duration can only be adjusted in round minutes, you may want to lessen the duration by one minute, to save water, or increase by one minute to ensure a thorough flush.

Alarm Override and Manual Operation

In the event of a sensor failure resulting in a shut down due to a false alarm, the failed sensor can be overridden using the programming function on the display (page 74). High Pressure, Service Prefilter, System Stalled (airlock), and Salinity Probe Failed can all be overridden and the system will still run automatically with all other functions intact. The red LED next to Alarm/Display will flash continually when one of the sensors is overridden. **Be absolutely certain that the alarm is false before overriding the automatic controls.**

In the event of complete MPC control failure, the system may be operated manually as follows:

- Switch on the feed pump by setting the manual toggle switch to RUN MAN. The automatic safety controls are disabled in manual mode. 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.

- Always discard the product water for the first few minutes of operation as the initial product water may not be potable. Take a water sample by loosening the product tube fitting at either the feed pump module or the membrane outlet. Check it with a handheld salinity meter or taste it.

- The diversion valve is an electrically operated three-way valve, which is normally energized by the MPC controls in order to send water to the tank. **It will not open automatically in manual mode, and must be opened using the mechanical override button. The valve is located behind the access opening on the left side of the feed pump module**. Push the manual override button in and rotate 1/4 turn clockwise to open the valve.

Diversion valve manual override button

Push Diversion valve button down and turn 90 degrees to manually open valve

Maintenance, Storage, and Troubleshooting

Suggested Spares

Short term cruising, weekends etc.

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

Cruising 2 to 6 months at a time.

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

Longer than 6 months

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

Common Parts:

Item	**Part Number**
SC-1 STORAGE CHEMICAL	KIT-CHEM-SC1
SC-2 CLEANER	KIT-CHEM-SC2
SC-3 CLEANER	KIT-CHEM-SC3
BASIC CRUISE KIT B	KIT-BCK-B
OFFSHORE CRUISING KIT	KIT-OFFSH1
5 MICRON FILTER	FT-FTC-5
20 MICRON FILTER	FT-FTC-20
CHARCOAL FILTER	FT-FTC-CC
6” STRAINER SCREEN	FT-STN-6S
OIL/WATER FILTER	FT-FTC-OW
FEED PUMP HEAD	PL-PMP-240MAG5
6” STRAINER O-RING	SO-STN-6SS
FILTER HOUSING O-RING	SO-FHS-3PCS10
SALINITY PROBE	EL-MPC-SP4

Maintenance

General

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

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

The Seawater Strainer

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

The Pre-filters

Service the pre-filters as soon as possible after the pre-filter condition graph begins to rise. If the filter condition graph gets all the way to "Replace" the machine will slow down. When display reaches "Replace" a second time the alarm will sound and the system will shut down to prevent damage. If cleaning and re-using filter elements, clean when the first segment appears on the filter condition bar graph on the LCD display.

To service the filters close the thru-hull, open the housings, remove the old filters, clean out the housing bowls, and reassemble the housings with new 20 and 5 micron filter elements. The 5 micron filter goes downstream from the 20 micron. Leave dry until next startup.

Use only Spectra-approved filters or you may void your warranty. The filters may be cleaned up to 3 times with a soft brush and water in a bucket, dragged behind the boat underway, or hung overboard overnight. Drying in the sun helps remove odors. Occasionally, lightly lube the O-rings with silicone grease.

Oil/Water Separator (Optional)

To install oil water separator capability, add a second filter housing UPSTREAM of the 20 and 5 micron housings. Service as you would per the instructions above.

The Charcoal Fresh Water Flush Filter

Replace the charcoal filter element at least every 6 months. This filter protects the membrane by removing chlorine from the flush water. Use only a Spectra-approved replacement. See page 63.

Maintenance continued...

The Feed Pump and Clark Pump

The feed pump and the Clark Pump require no routine maintenance except inspection for leaks. Tighten any hose clamps or fittings that show signs of leakage. The high pressure fittings threaded into the Clark Pump have O-ring seals with a straight thread. These should never leak and should never be over-tightened. If one of the tube nuts starts to leak, it can be un-threaded, sealed with a bit of silicone grease or oil, and tightened with two wrenches very tightly. See instructions on page 23.

The Membrane

Always perform a flow test (page 60) before cleaning your membrane. Cleaning shortens the lifespan of membranes, so only clean a membrane if you have ruled out other possibilities for low production or poor water quality. The leading cause of fouling is biological growth that forms when the system is left unused without flushing or pickling. Fouling from mineral scaling can happen under certain seawater conditions, or from rust. Monitor the product salinity and feed pressure for higher than normal readings, take environmental conditions into considera-tion:

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

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

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

See the **Cleaning Procedure** on page 56 for complete instructions.

Introduction to Spectra Chemicals

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

Note: Never use any chemicals with the system pressurized! Always open the pressure relief valve 1/2 turn. Always follow the instructions for purging the chemicals as shown in the New System Startup section (page 37) of your owner's manual.

Storage

SC-1 prevents biological growth when your system is idle. It should not be used as a cleaning chemical, nor will it protect your system from freezing. On the Newport 70/1000 Mk II two jars of SC-1 are mixed with 1 to 2 gallons of product of dechlorinated fresh water in a bucket and circulated through the system for 10 minutes. This treatment will protect the system for six months, after which the SC-1 treatment must be repeated. To use SC-1, follow the instructions for **Storage Procedure** on page 54.

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

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

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

Introduction to Spectra Chemicals continued...

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

See **Winterizing with Propylene Glycol** on page 55.

Propylene glycol can be difficult to flush from a membrane, especially after extended storage periods. This results in high salinity water (high PPM) and residual flavor in the product water. We recommend flushing the system WITH THE PRESSURE RELIEF VALVE OPEN for 4-6 hours after storage with propylene glycol—the longer the better. If, after extended flushing, you still experience low product water quality, cleaning with SC-2 usually removes all traces of propylene glycol and returns the salinity to the level it was before storage with propylene glycol. See the **Membrane Cleaning Procedure** on page 56.

Cleaners

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

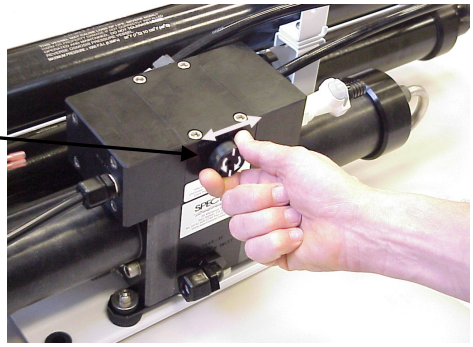
SC-2 is an alkaline cleaner used to remove light oil, grime and biological growth. It is most effective if heated to 120 deg. F (49 deg. C), which is difficult on a boat. In most cases the water quality will increase in PPM (salinity) after an SC-2 cleaning. After a few hours it should recover to near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

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

For cleaning with either SC-2 or SC-3, see **Membrane Cleaning Procedure** on page 56.

Storage Procedure

1. Close the intake seacock.
2. Push **Auto Store** to fresh water flush the system. Press Stop to cancel the flush interval timer, then push **Auto Store** again, to flush the system a second time.
3. Remove the quick disconnect fitting from the brine discharge outlet of the Clark Pump, per photo below, and replace it with the quick disconnect brine discharge service hose. Lead the brine service hose into the bucket.
4. Push the **Auto Store** button and run the feed pump until you have one gallon of fresh water in the bucket from the brine discharge service hose, then press **Stop**.
5. Mix 1 container of SC-1 storage compound with the water in the bucket.
6. Remove the hose from the "to strainer" pigtail on the feed pump module and install the inlet service hose from the service kit, per photos below. Lead this hose into the 5 gallon (20 liter) bucket as well.
7. **Make sure the pressure relief valve on the Clark Pump is OPEN (un-pressurized) by turning 1/2 turn counterclockwise**



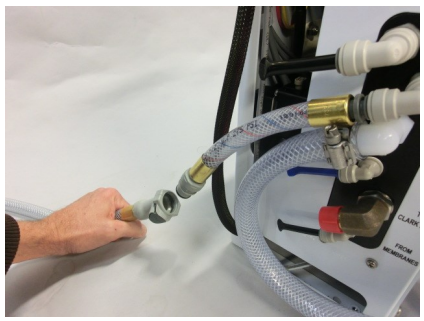
8. Turn on the feed pump by moving the manual control switch on the MPC 5000 control box to SERVICE SYSTEM. The solution will be drawn from the bucket with the service hose, and returned to the bucket from the brine discharge service hose. Circulate the storage chemical in the system for approximately 10 minutes. Stop the feed pump by moving the switch back to the RUN AUTO position.

Clean Up

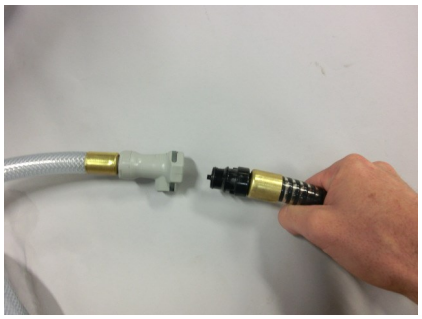
Remove the brine discharge service hose from the Clark Pump, and replace the brine discharge hose that leads to the thru-hull. You may now pump the bucket dry by moving the manual control switch on the MPC Control Box back to SERVICE SYSTEM. Stop the feed pump by moving the switch back to RUN AUTO.

Remove the inlet service hose and reattach the hose from the sea strainer to the "to strainer" pigtail. Drain and clean the strainer and any filters in the system. Reassemble dry. Leave the pressure relief valve open, since the next time you run the system you will need to purge the storage chemicals with the system unpressurized. Turn off the power to the system.

Connecting brine discharge service hose



Removing hose to sea strainer from the "to strainer" pigtail.

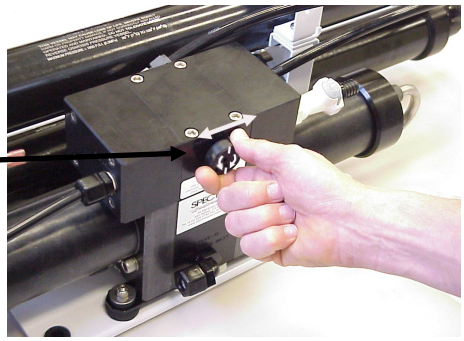


Attaching intake service hose to the hose connecting to the sea strainer.

Winterizing with Propylene Glycol

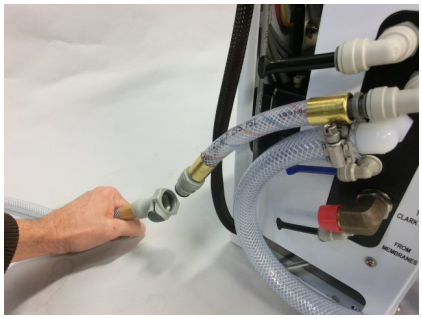
See description of propylene glycol formulations, and purging from system, on pages 52-53.

1. Close the intake seacock.
2. Push **Auto Store** to fresh water flush the system. Press **Stop** to cancel the flush interval timer, then push **Auto Store** again, to flush the system a second time.
3. Remove the hose from the "to strainer" pigtail, install the inlet service hose from the service kit, and lead the hose to the bottom of a bucket. Connect the brine service hose, and run it into a second container.
4. Pour 1 gallon (4 liters) of propylene glycol of appropriate concentration (see pages 52-53) into the bucket with the intake service hose.
5. **Make sure the pressure relief valve on the Clark Pump is OPEN 1/2 turn (un-pressurized).**

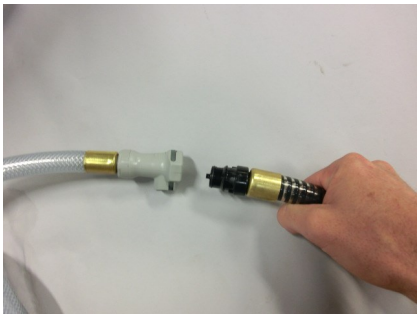


6. Run the feed pump by switching the manual switch on the MPC control box to SERVICE SYSTEM until about a gallon of water has flowed from the brine discharge service hose, or antifreeze appears. Propylene glycol will look slightly different, and feel more slippery, than water. Stop the pump by moving the switch back to RUN AUTO. Add more propylene glycol to the intake bucket if necessary.
7. Lead the brine discharge service hose into the intake bucket of propylene glycol. Move the switch back to SERVICE SYSTEM. The service hose will now draw propylene glycol solution from the bucket, and the brine discharge service hose will return it. Run the feed pump and circulate the propylene glycol for 10 minutes.
8. Stop the feed pump. Drain the seawater strainer, the hose leading to the boost pump module, and the hose between the boost pump module and the feed pump module. Disconnect the product tubing from the membrane housing and blow residual water out of the tubing. Empty the charcoal filter housing and flush water lines. Leave the pressure relief valve open, since the next time you run the system you will need to purge the system unpressurized.

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



Removing hose to sea strainer from the "to strainer" pigtail.



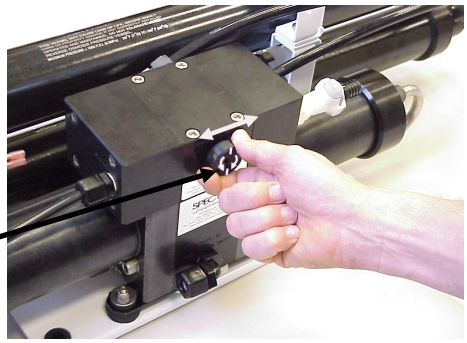
Attaching intake service hose to hose to sea strainer.

Connecting brine discharge service hose

Membrane Cleaning Procedures

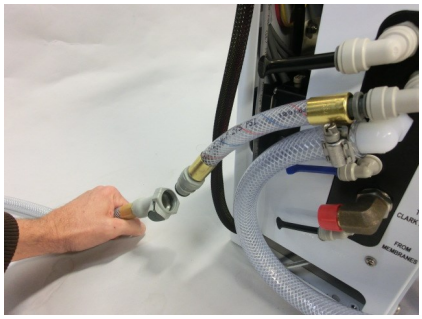
Spectra cleaning compound (SC-2 or SC-3) must be mixed with fresh water at a ratio of 1 container of compound to 3 gallons (12L) of unchlorinated water. An average of two gallons (8L) of water is already present inside a Newport 400 MkII system, so this water must be figured into the mixture. A Newport 400 MkII system requires one container of compound per cleaning.

1. Close the intake seacock.
2. Push **Auto Store** to fresh water flush the system. Press Stop to cancel the flush interval timer, then push **AutoStore** again, to flush the system a second time.
3. Remove the quick disconnect fitting from the brine discharge outlet of the Clark Pump, and replace it with the quick disconnect brine discharge service hose. Lead it into a 5 gallon (20 liter) bucket. Push the **Auto Store** button and run the feed pump until one gallon of fresh water runs into the bucket from the brine discharge service hose. Press **Stop**.

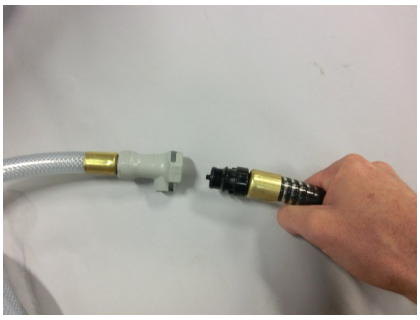


4. Remove the hose from the "to strainer" pigtail and install the inlet service hose from the service kit. Lead both hoses into the bucket.
5. **Make sure that the pressure relief valve on the Clark Pump is open (un-pressurized).**
6. Mix the cleaning chemical in the bucket. If possible, heat the solution to 120 F (49 C).
7. Move manual switch on the MPC control box to SERVICE SYSTEM. The intake service hose will draw solution from the bucket and the brine discharge service hose will return it. Circulate the solution through the system in this manner for 45 minutes. Stop the pump and let it sit overnight if the solution is cold.
8. Replace the brine discharge overboard hose and run the pump until the bucket is empty by moving the manual switch to SERVICE SYSTEM. Return the switch to RUN AUTO. Follow the New System Startup procedures to flush the chemicals out of the system **(DO NOT CLOSE the pressure relief valve!)**
9. The system may now be restarted, flushed, or stored.

Connecting brine discharge service hose



Removing hose to sea strainer from the "to strainer" pigtail.



Attaching intake service hose to the hose connecting to the sea strainer.

Troubleshooting Newport 700-1000 MkII Systems

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

Newport 700-1000 MkII Fault Alarms

SYMPTOMS	PROBABLE CAUSE	REMEDY
"System Stalled" ("system stalled" may alarm when using the control panel to run system for servicing with the pressure relief valve open– use manual override switch instead)	• Pressure relief valve open • Intake thru-hull closed • Airlocked system • No signal from Rotoflow meter	• Close pressure relief valve • Check thru-hull • Purge air • Clean or replace Rotoflow meter
"High Pressure"	• Blocked brine discharge • Fouled membrane	• Check brine discharge • Clean membrane
"Voltage Too High" "Voltage Too Low"	• Battery voltage too high or low • Loose wires or poor connections	• Charge batteries • Check charging voltage • Check power connections
"Re-starting"	• No signal from Rotoflow meter at startup. • System airlocked	• See remedies above for "system stalled"
"Check Fuse" (followed by fuse number)	• Blown fuse at circuit board	• Check first for cause, then replace fuse (mini automotive type ATM). See page 80.
"Service Prefilter"	• Clogged filters • Loose or defective pressure sensor wires	• Install new filters • Check sensor wiring • With clean filters, recalibrate Low Vacuum Limit or Clean Pressure (see pages 78-80).
"Salinity High"	• High product water salinity • Chlorine damage to membranes • Defective salinity probe or cable, cable disconnected	• Check for low feed pressure • Check for leaks at high pressure hoses • Remove and clean probe contacts. Check calibration • Check cable connections • Clean membrane

Poor Product Water Quality

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

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

LOW SYSTEM FLOW OR PRESSURE will equate to lower product quality (higher PPM). Newport systems, which have a higher feed to output pressure ratio (See nominal pressures under Flow Test, page 65), as well as a higher feed flow/membrane area ratio, often produce water in the 150-300 PPM range.

DAMAGE TO THE MEMBRANE by chlorine contamination. Flushing the system with chlorinated water will irreparably damage the membrane. Charcoal filters are used to absorb any chlorine which might be present in flush water. They must be of proper specification to be suitable. See page 63. There is no test for chlorine damage except the process of elimination of other causes.

DIRTY OR SCALED membranes. A dirty (foreign material), scaled (mineral deposits), or contaminated (bacterial growth) membrane can result in poor water quality and abnormal operating pressures. If operating pressures are above normal, then cleaning is indicated. If the system pressures are within operating normal range, cleaning may have little result. Avoid cleaning as a diagnostic tool. Low water quality after storage with propylene glycol can usually be remedied by extended flushing or an SC-2 cleaning. (See pages 52-53.)

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

If system flow (product plus brine) is within specifications (see page 61), 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.

Newport 700/1000 Mk II Flow Test

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

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

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

If no asymmetry is noted, continue with this test.

You will need a graduated bucket and a stopwatch. Measurements must be very accurate, as errors of just a few percent will skew the results. For DC systems, log the voltage at the feed pump at the same time. Confirm at least 25 volts on 24-volt systems. You may have to run the engine or battery charger during the test.

Take two measurements and compare them with the NOMINAL PARAMETERS table. The first measurement is the product flow alone. The second is the product flow combined with the brine discharge flow to get the total flow or feed flow. You may take these measurements by two methods:

1. First time the product flow into a graduated pitcher, then divert both the product flow and brine discharge together into a bucket to measure total flow.
2. Divert the product flow into the pitcher while diverting the brine discharge into the bucket. Time the flow of both. After calculating the product flow, pour the pitcher of product into the bucket of brine to measure total flow.

The ratio of product flow to total flow gives us our recovery rate, as a percentage. If the percentage is below the minimum it indicates an internal leak in the Clark Pump.

1. **Product Flow**: Product flow is expressed in Gallons Per Hour (GPH) or Liters Per Hour (LPH), by this equation:

   3600 ÷ time in seconds x quantity of water in gallons or liters=GPH or LPH
   There are 3600 seconds in an hour.
   Example: It took 3 minutes and 35 seconds to collect 1 gallon of product water.
   3600 ÷ 215 x 1 = **16.74 GPH** (3 minutes, 35 seconds is 215 seconds)
   Example: It took 2 minutes and 25 seconds to collect 2.5 liters of product water.
   3600 ÷ 145 x 2.5 = **62.07 LPH** (2 minutes, 25 seconds is 145 seconds)

2. **Total Flow or Feed Flow:** Feed flow or total flow (brine + product) is expressed in Gallons Per Minute (GPM) or Liters Per Minute (LPM) , by this equation:
   60 ÷ time in seconds x quantity of water in gallons or liters = GPM or LPM
   Example: It took 1 minute and thirty-seven seconds to collect 5 gallons of total flow.
   60 ÷ 97 x 5 = **3.09 GPM** (1 minute, 37 seconds is 97 seconds)
   Example: It took 53 seconds to collect 12 liters of total flow.
   60 ÷ 53 x 12 = **13.58 LPM**

3. **Recovery Rate:** Product Flow ÷ Total Flow = Recovery Rate %
   Example: 6.5 GPH product flow = **.063 or 6.3%**
   1.7 GPM total flow x 60
   (you must first multiply total flow by 60 to convert from GPM to GPH)

In order to make good quality product water, you need the proper amount of feed water flow, as in the table below. Compare the product flow to the total feed flow. Product flow should be 18.5% of total flow for a Newport 700/1000 Mk II. If product percentage is low, you may have an internal leak in the Clark Pump.

	Amps		Feed	Feed	Static *	Feed Flow				Product Flow			
System	24V	MAX	Presure	Pres	Pres-	Flow		MIN	MIN	Flow	Flow	MIN	MIN
			PSI	bar	PSI	GPM	LPM	GPM	LPM	GPH	LPH	GPH	LPH
NP 700 HI	≈ 22	25	≈ 180	≈ 12.6	≤ 80	2.6	9.8	2.5	9.5	29	109.6	26	98.3
NP 700 LO	≈ 15	18	≈ 165	≈ 11.6	≤ 80	1.75	6.6	1.65	6.2	21	79.4	19	71.8
NP 1000 HI	≈ 26	28	≈ 200	≈ 14	≤ 80	3.6	13.6	3.5	13.2	41	155.0	39	147.4
NP 1000 LO	19	21	≈ 165	≈ 11.6	≤ 80	2.5	9.5			30	113.4		

***pressure relief valve open ½ turn**

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

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

Technical Bulletins

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

PREFILTERS

During normal operation, the feed water is filtered in two stages. First it passes through a fine mesh metal sea strainer, which protects the boost pump from foreign materials and sea creatures. After passing through the boost pump, the feed water passes the filter housings containing the 20 and 5 micron elements, removing very fine particles that could damage the feed pump or Clark Pump and shorten membrane life. An additional carbon filter prevents the entrance of chlorine during fresh water flushing (see next page).

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

When operated for only an hour or two per day in inland or near-shore waters, the trapped plankton will begin to decay in the filters long before the elements plug up. The decaying plankton and bacteria will cause a rotten egg smell in the product water. This decay will set in overnight in tropical waters, or after a week or two in higher latitudes. If handled gently and changed regularly before they get too smelly, filters can be cleaned several times. (See Maintenance, page 50.)

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

CHARCOAL FILTERS

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

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

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

Charcoal filter, Spectra part number FT-FTC-CC

Performing a Fresh Water Flush with a Failed Salinity Probe

In the event of a “Salinity Probe Failed” alarm on the remote display the alarm function can be defeated to allow the system to remain in the Auto Store mode until repairs can be facilitated. Access the program mode, as outlined on page 74, Programming from the Display. Scroll through the menus until you reach the Disable Salinity heading. Press the Auto Store button once, this will change the setting from NO to YES. Wait 40 seconds for the display to timeout and return to the default screen. Press Auto Store once. The system will begin Auto Store Mode, flushing itself and then initiating the flush interval timer as outlined on page 42.

Performing a Fresh Water Flush with a Failed Inlet Pressure Transducer

In the event of a “Service Prefilter” alarm on the remote display **that cannot be cleared by replacing the pre-filters**, the alarm function can be defeated to allow the system to remain in the Auto Store mode until repairs can be facilitated. Access the Program Mode, as outlined on page 74, Programming from the Display. Scroll through the menus until you reach the Disable Prefilter heading. Press the Auto Store button once, this will change the setting from NO to YES. Wait 40 seconds for the display to timeout and return to the default screen. Press Auto Store once. The system will begin Auto Store Mode, flushing itself and then initiating the flush interval timer as outlined on page 42.

VP-2: ADJUSTING THE AC SPEED CONTROL (AC SYSTEMS)

WARNINGS: 120 OR 220-VOLT AC POWER WILL BE PRESENT ON THE TERMINAL BLOCKS WHILE ADJUSTMENTS ARE BEING MADE! MISADJUSTMENT OF PUMP SPEED CAN CREATE EXCESSIVE SYSTEM PRESSURES THAT MAY CAUSE DAMAGE OR INJURY.

The Lenze/AC Tech SCM & SCL speed controls set the feed pump motor speed by modulating the frequency of the ship's AC 50 or 60 HZ power, providing precisely the desired output pressure and flow in the three different modes. The speed control is Spectra factory preset and should only be adjusted after contacting the factory. Do not change any setting except parameter 31: run speed, parameter 32: flush speed, or parameter 33: service speed.

To change a speed setting run the watermaker in the mode in which you want to change the speed. For example, if you want to change the speed the pump runs at while making water, have the unit actually making water.

Enter PROGRAM MODE by pushing the Mode button. This will activate the password prompt. The password is 25. Enter the password with the up and down buttons. When the display reads 25, press Mode. The display will read P01 to indicate that you have entered program mode. Using the up and down buttons select the desired Parameter (e.g. P31 for setting run speed.) Press Mode to display the current setting. The speed settings are displayed in Hertz (cycles per second AC output power frequency.) Use the up and down buttons to change the setting. Do not change the setting more than 3 Hertz at a time. Press Mode to enter the new setting. The pump speed will change, and the controller will enter parameter select mode. To continue changing the same parameter until the desired pressure or flow rate is achieved, Press the Mode button two more times. This will bring you back to Program mode in the same parameter.

If no buttons are pushed for two minutes the controller will require the password to be entered again.

VP-8: SPECTRA DC MOTOR SPEED CONTROLLER (DC-ONLY SYSTEMS)

DC-powered Newport model watermakers shipped after January 1, 2007 are equipped with a Spectra feed pump speed controller. The 12 and 24-Volt DC models use the same speed controller. Three preset, and one variable speed are available. Changes in run speed change the feed water flow rate during Auto Run and when the manual switch is in the Manual Run position. Changes to the run speed setting will affect the product flow rate, system power consumption, and feed pressure. The flush speed setting regulates the flush water flow rate during Auto Store mode. Newport models also have a service speed, actuated by the manual toggle switch.

On the speed control circuit board are two magnetic switches for adjusting the pump motor speed. The switches are narrow silver or black bars about 5/8" (16mm) long. The Increase Speed switch is labeled S2 and is located near the upper right corner of the board. The Decrease Speed switch is labeled S3 and is located to the right of the six cylindrical capacitors. Each time a small magnet is placed near the switch while the pump is running, a signal will be sent to the controller, changing the selected speed setting, and the pump will speed up or slow down slightly.

SETTING FLUSH SPEED: Flush speed should be set to run the pump slowly enough that the vessels fresh water system can supply a sufficient flow of water through the charcoal filter, so that no sea water is drawn in during the flush cycle. The maximum flow through the Charcoal filter is 1.5 GPM (5.7 LPM), so at flush speed the pump must discharge less than this amount.

SETTING RUN HIGH SPEED: Run High Speed should be adjusted so that the watermaker produces the specified amount of product flow at the specified power consumption and nominal feed pressure. Since feed pressure and power consumption vary with sea temperature and salinity, it may be desirable to adjust the Run Speed to optimize the pressure or power consumption in very cold or high salinity waters.

SETTING RUN LOW SPEED: Run low speed can be adjusted to minimize energy consumption by comparing product flow to amperage to achieve the lowest possible amp hours per gallon.

SERVICE SPEED: Limits the feed flow through the membranes during cleaning procedures and pickling to maintain feed pressure below 50 PSI.

MAXIMUM CURRENT LIMIT: The current limit is adjusted at the factory and can not be adjusted in the field.

MPC 5000 Programming and Controls

Introduction to the MPC 5000

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

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

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

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

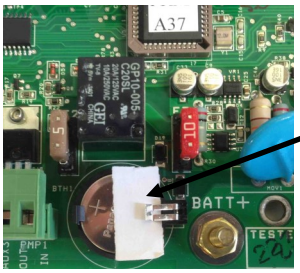
The battery back-up feature allows for temporary power interruptions without detrimental effects on the system. In some cases your watermaker will continue to function in its last known operating state.

Spectra MPC 5000 Operation Guide

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

Newport 700/1000 MkII systems use a single feed pump and speed controller with two added boost pumps to ensure adequate water supply to the feed pump. These systems have two pressure sensors: The first is mounted before the feed pump to measure boost pump pressure and filter condition. The second is mounted after the feed pump to measure feed water pressure to the Clark Pump.

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



Battery Isolation Tab

JP2 Jumper on (all Mk II systems)

Newport systems use software Version A-37

JP1 Jumper on (all systems)

USB Type B Computer Connection

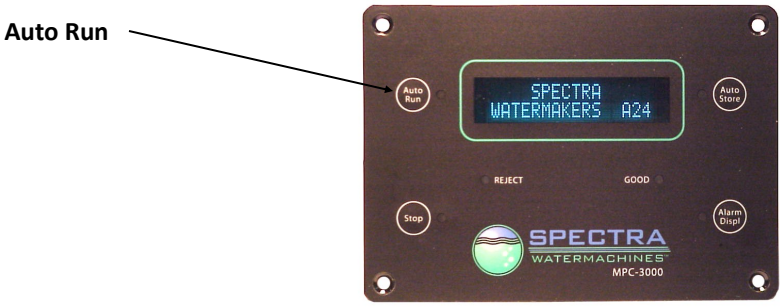
Battery

MPC 5000 Circuit Board

MPC 5000 Display Controls

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

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



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

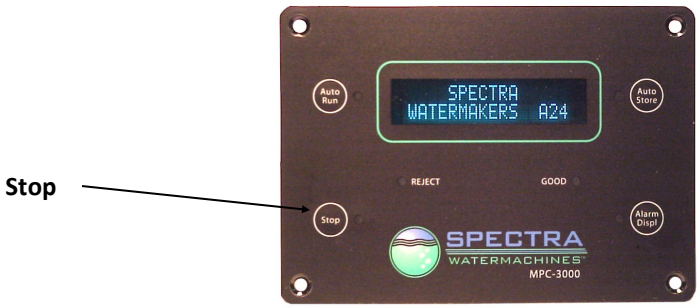
- The fresh water flush solenoid will open and the feed pump will run.
- At the end of the fresh water flush cycle, the MPC will start the flush interval timer (factory default flush timer interval is set to 5 days; 30 days if your system includes the optional Z-Ion).
- At the end of the flush timer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

MPC 5000 Display Controls continued...

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

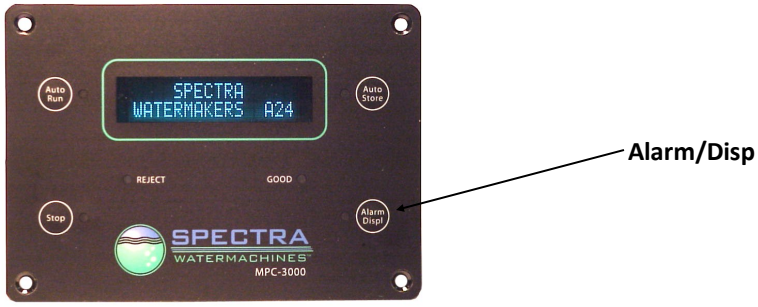
- The fresh water flush solenoid valve opens for 20 seconds to prime the feed pump. The display counts down from 10, then feed pump will run.
- The system will run indefinitely until the user ends the run cycle by pressing either the Stop or Auto Store button.
- **If the Stop button is pressed to end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

Pressing and holding the Stop button with toggle between **Run High Mode** and **Run Low Mode.**



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

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



MPC 5000 Display Controls continued...

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

- In this mode the system will automatically start, flush, store and restart itself based on the tank level. This mode requires that the optional float switches are installed in your tank, as detailed on pages 28-29.
- **It is not advisable to operate your watermaker unattended. Severe damage to the vessel, watermaker, or other equipment may result.**

Auto Run for 5 seconds:
Auto Fill Mode

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

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

Auto Store for 5 seconds:
Single Flush Mode

Programming from the Display

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

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

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

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

- **Alarm/Displ**: Scrolls through the various programming windows.
- **Stop:** Selects the digit in the Rotoflow meter calibration constant window to be changed. Has no function in other windows.
- **Auto Run:** Changes the selected parameter down one unit per push.
- **Auto Store:** Changes the selected parameter up one unit with per push.

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

The programming windows and their functions:

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

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

PRESSURE RANGE: For the Newport 700-1000 Mk II's 0-250 PSI pressure gauge, select **High**.

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

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

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

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

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

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

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

PRESSURE LIMIT: If the pressure at the feed pump discharge exceeds this set point the unit will shut down and alarm "High Pressure." The left hand number on the display is the real time feed pressure, as read by the sensor (marked red) on the feed pump output. The number on the right is the high pressure limit. Factory default is **250 PSI**.

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

SALINITY CAL: This window is used to calibrate the salinity sensor. The number on the left is the real time salinity reading and the number on the right is the calibration setting. Increase the setting to raise the reading. The factory default setting is **60**. See **Salinity Probe Calibration** on page 77 for details.

INLET OFFSET: This parameter calibrates the boost pressure sensor found on the intake manifold of the feed pump (marked yellow). The number on the left is the real time pressure reading and the number on the right is the offset. The reading can be increased or decreased by putting a positive or negative number in the offset setting. Factory default is 0.0.

OUTLET OFFSET: Outlet Offset calibrates the sensor on the outlet of the feed pump which is used to determine feed pressure (marked red). The number on the left is the real time pressure reading and the number on the right is the Offset in PSI or bar. Factory default is 0.0.

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

FLUSH DURATION: This parameter sets the length of the fresh water flush in minutes. Factory default is **7** for the Newport 700 Mk II. For the Newport 1000 Mk II it is **8**.

PUMP ON TIME: Sets the length of time, in seconds, that the feed pump will cycle on during a fresh water flush. Should be the same as Flush Duration. Factory default is **360** for the Newport 700 Mk II; **480** for the Newport 1000 Mk II.

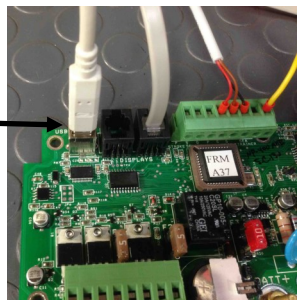
PUMP OFF TIME: Sets the time in seconds that the flush valve is open, but the feed pump is not running. This function is not used on Newport models, so factory default is 0.

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

CLEAN PRESSURE: This should be set to one whole number below the pressure seen at the inlet sensor when the system is running with brand new pre-filters. After installing new filters, run the machine by flipping the toggle switch on the MPC box to RUN MAN. The number on the right is adjusted to be one whole number below the number on the left, which is the inlet sensor reading. This parameter sets the “Clean” end of the pre-filter condition bar graph. Factory default is **15**.

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

Type B connector plugged into MPC circuit board



Salinity Probe Calibration

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

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

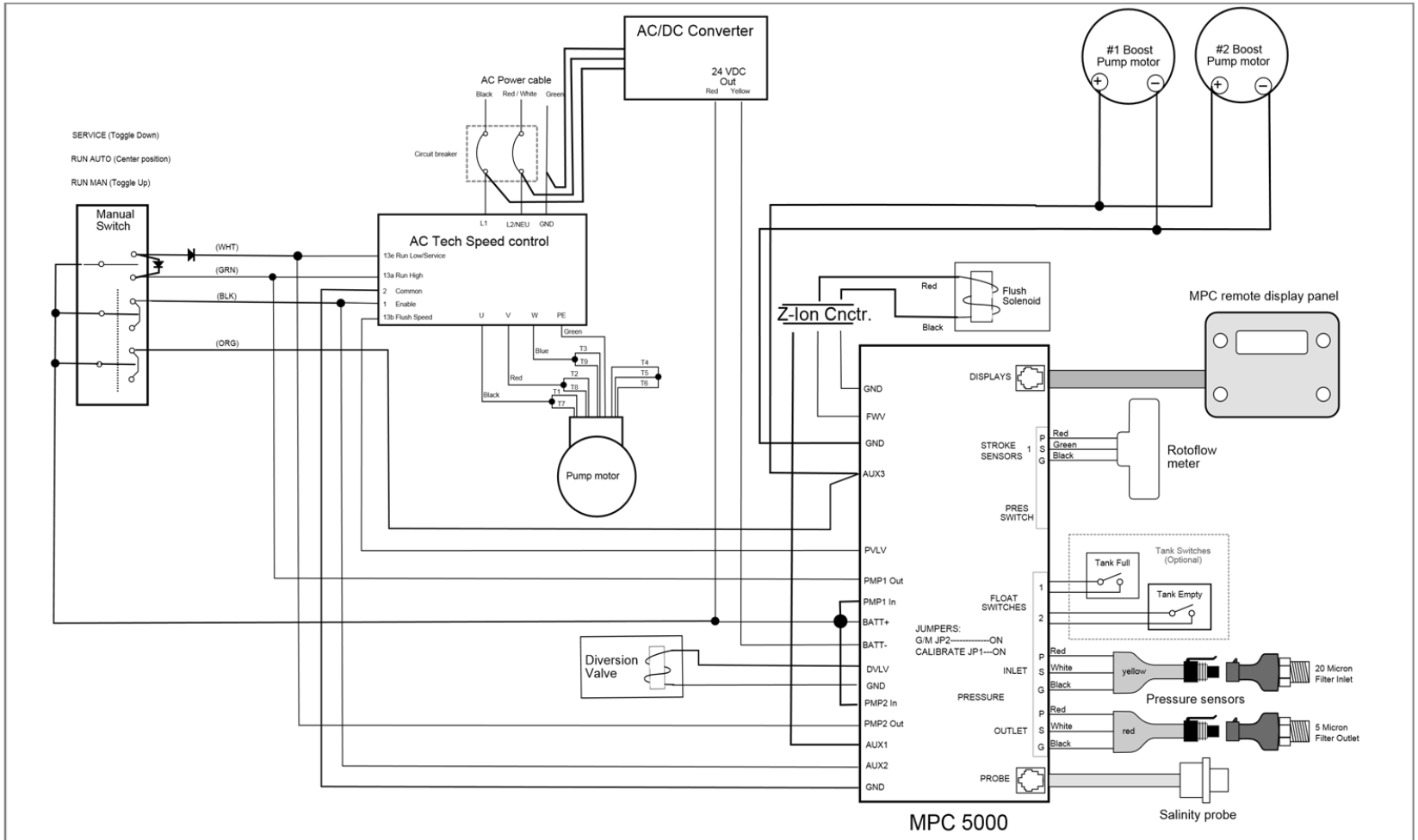
The salinity level in PPM can be seen on the remote display.

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

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

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

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



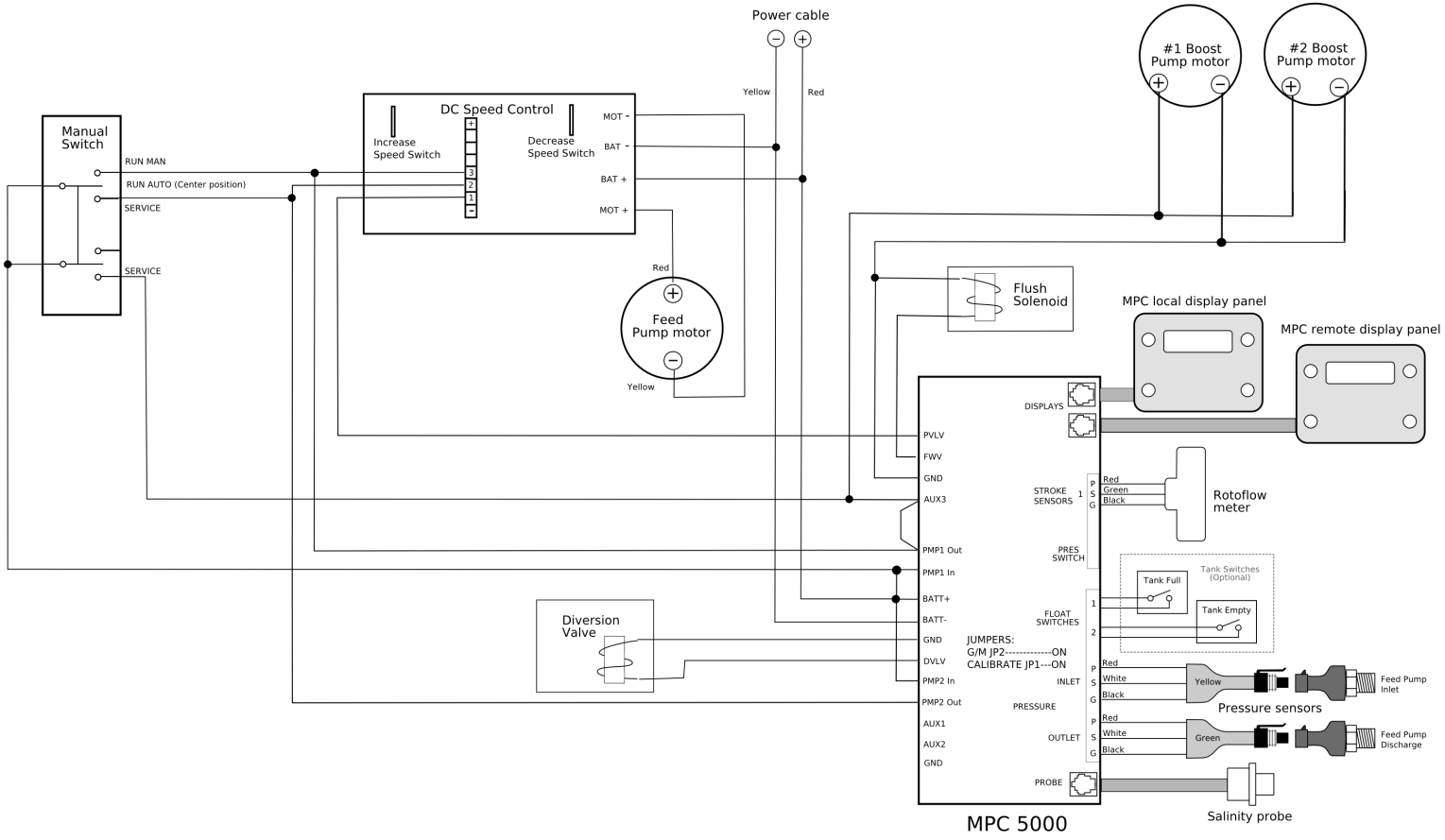
Revision History	
Date	Description
02/20/08	Add Jumper AUX 3 to PMP1
06/21/10	Add DC to DC Converter for 12V
07/20/11	Remove Jumper, Reconfigure Switch Wiring, Add Diodes to Switch; Remove Boost Relay
04/19/13	Add Z-Ion Connector to FWF Solenoid
06/24/15	Add Relay to 12 Volt Boost Pump Circuit
10/30/15	Add 24VDC Converter

Newport MK 2 AC MPC-5000

Revision: 2008-FEB-20

Spectra Watermakers

Dwg No WS5 rev 0



Revision History

Date	Description
02/20/08	Added Pole to Man Switch for Aux3
12/10/08	Removed Voltage Regulators on 24V Controls
06/08/09	Added Jumper b/t Aux3 and PMP1 Out

Newport 700/1000 MK II DC

Revision: 2009 - JUN 8

Spectra Watermakers

Dwg. No: WS3

MPC 5000 FUSES

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

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

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

MCP 5000 Electrical Specifications

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

Outputs:

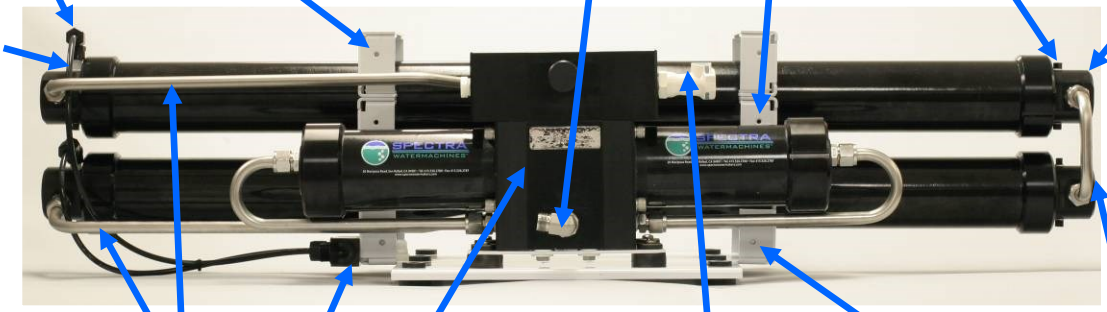
BUZZ – 100 mA DC Piezo buzzer.
PVLV – 2.5 Amp DC priming valve solenoid.
FWV – 2.5 Amp DC fresh water valve solenoid.
AUX3 – 5 Amp DC auxiliary output.
PMP1 – 15 Amp DC auxiliary water feed pump.
DVLV – 10 Amp DC diversion valve solenoid, modulated at 17% duty cycle after 2.5 seconds to reduce power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

Exploded Views and Part Numbers

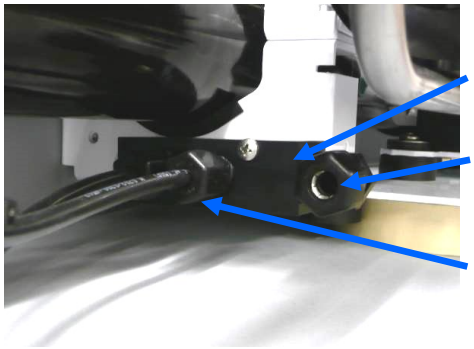
Parts ID Manual

Newport 1000 MkII Z High Pressure Module

Newport 700 MkII Z High Pressure Module



Product Water Manifold



PL-MNF-PD
PRODUCT MANIFOLD
700/1000

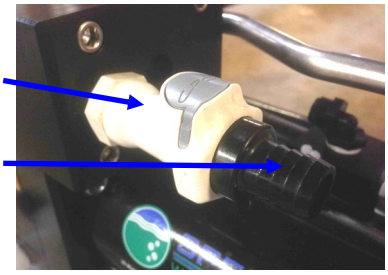
PL-MTE-3/8X3/8P
3/8"NPT X 3/8"TUBE
FITTING ELL.NYL

PL-MTS-1/4X1/4P
1/4"NPT X 1/4"TUBE
FITTING ST. NYL

Brine Discharge Quick Connect

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

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

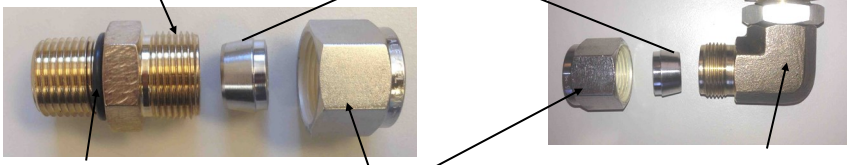


High Pressure Fittings

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

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

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



Connector O-RING
SO-HPP-CT

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

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

Sea Strainer & Boost Pump Module

FM-ZION-SBPBRK
Z-ION STRAINER BOOST PUMP BRACKET

PL-BHF-3/8TPIEJG
3/8" TUBE PLUG-IN ELBOW

PL-BHF-3/8TSTJG
3/8T BULKHEAD FITTINGNST. JG

EL-FP-BPLDC824
300-1K BOOST PUMP
8-24VDC 1/2"NPT

PL-HBS-3/4X3/4
3/4" NPT X 3/4" HOSE BARB ST. NYLON

PL-CKV-1M3/4FWS
1"MPT X 3/4" FPT
CHECK VALVE W/S

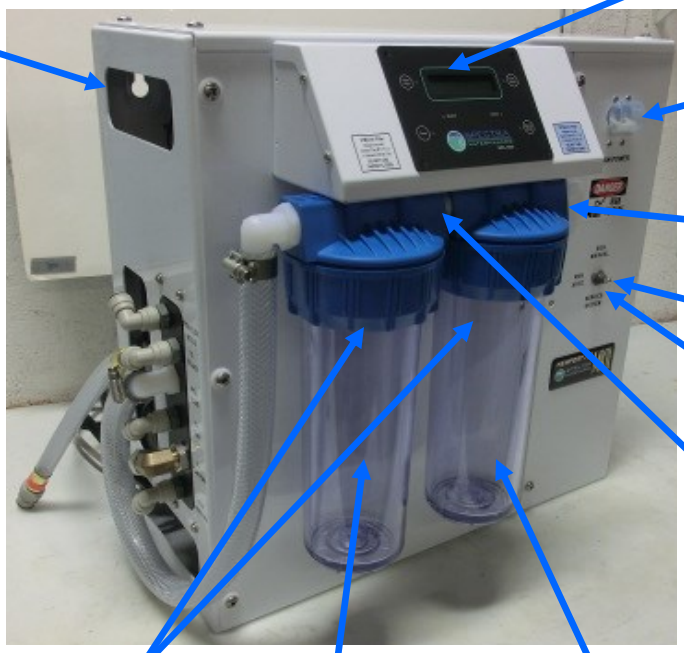
PL-CLP-114CAR
1-1/4" CARLON CLAMP

FT-STN-6
6" SEA STRAINER

PL-BSH-1x1/2N
1" NPT x 1/2" FPT HEX REWDUCER NYLON

PL-FHB– 1/2x3/4E
1/2"FPT x 3/4" HOSE BARB NYLON

Newport 700/1000 MkII Z Feed Pump Module (All Versions)



FM-NPC-MKII1K
NEWPORT 700/1K
MK-II CHASSIS

EL-MPC-RMCD
MPC REMOTE CONTROL (LCD)

EL-BRK-BRKB2P
BREAKER BOOT
PANEL MOUNTED
2 POLES

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

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

EL-SWT-TSBHC
TOGGLE SWITCH
BOOT SEAL

PL-NP-3/4N
3/4" NPT CLOSE
NIPPLE NYLON

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

FT-FTC-5
5 MICRON FILTER ELE-
MENT

FT-FTC-20
20 MICRON FILTER ELE-
MENT

PL-HBE-3/4x3/4
3/4"NPT x 3/4" hose barb
elbow

PL-SLN-1/4D12M
1/4" DIVERSION
VALVE 12 V (MNF)

EL-SSR-250
PRESSURE TRANSDUCER
(250 PSI)

PL-HBE-1/2x3/4
1/2"NPT x 3/4" hose barb elbow

PL-MTE-3/4S1/2B
3/4"-16S X 1/2"TUBE
90DEG. AL-BRZ

EL-MPC-SP4
SALINITY PROBE 4th GEN-
ERATION

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

PL-SWF-3/8X3/8
3/8"NPT X 3/8" TUBE
FITTING ELL JG

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

Newport 700/1000 MkII Z Feed Pump Module (All Versions) cont.

PL-SLN-1/4O12SP
1/4"1-WAY SOLENOID VALVE 12V W/O VB

EL-SSR-ABS
ABSOLUTE PRESSURE SENSOR

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

PL-CLP-10SS
#10 HOSE CLAMP

EL-SSR-IFM
INLINE FLOW SENSOR

PL-MTE-3/4S1/2B
3/4"-16S X 1/2"TUBE 90DEG. AL-BRZ

SUB-NP-MK2-INT
NEWPORT MK-II INTAKE MANIFOLD

EL-MPC-SP4
SALINITY PROBE

EL-MCD-1/2NCG
1/2" NYLON LIQUID-TIGHT CORD GRIP

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

PL-PMP-240MAG5
MAG5. DRIVE VANE PUMP 240 GPH C250

PL-CLP-10SS
#10 HOSE CLAMP

PL-HBE-7/8SX3/4
7/8"-14S X 3/4" HOSE BARB EL SS.

PL-MTE-7/8SX1/2
7/8"-14S X 1/2" TUBE FITTING EL SS.

Cabling

EL-TM-30A3
TERMINAL BLOCK 30A 3 CIRCUIT (AC VERSIONS)

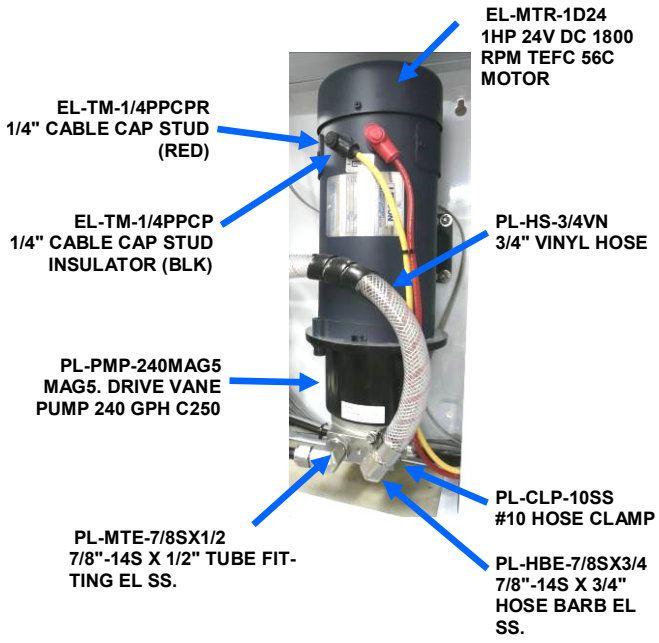
EL-TM-30A2
TERMINAL BLOCK 30A 2 POS. (DC Versions)

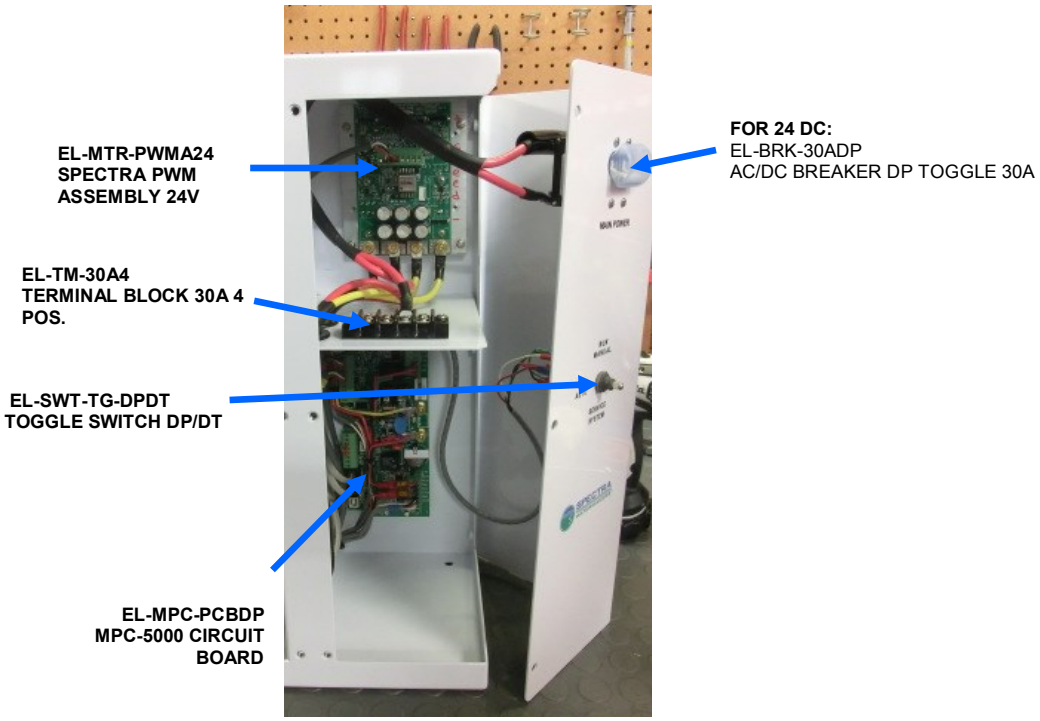
EL-MPC-CBL50
50' MPC REMOTE CONTROLLER CABLE

EL-BC-22-18HS 22-18 AWG BUTT CONN. W/HEAT SHRINK

EL-CBL-18-2
18 AWG X 2 CABLE

Newport 700/1000 MkII Z Feed Pump Module (24-Volt DC Version)





Newport 700/1000 MkII Z Feed Pump Module (AC Versions)

For 110 AC
EL-MTR-SPCAC110
3/4 MOTOR SPEED CONTROLLER AC 110
For 220 AC
EL-MTR-SPCAC220
3/4 MOTOR SPEED CONTROLLER AC 220

For 110AC:
EL-BRK-30ADP
AC/DC BREAKER DP TOGGLE 30A
For 220AC:
EL-BRK-15ADP
AC/DC BREAKER DP TOGGLE 15A

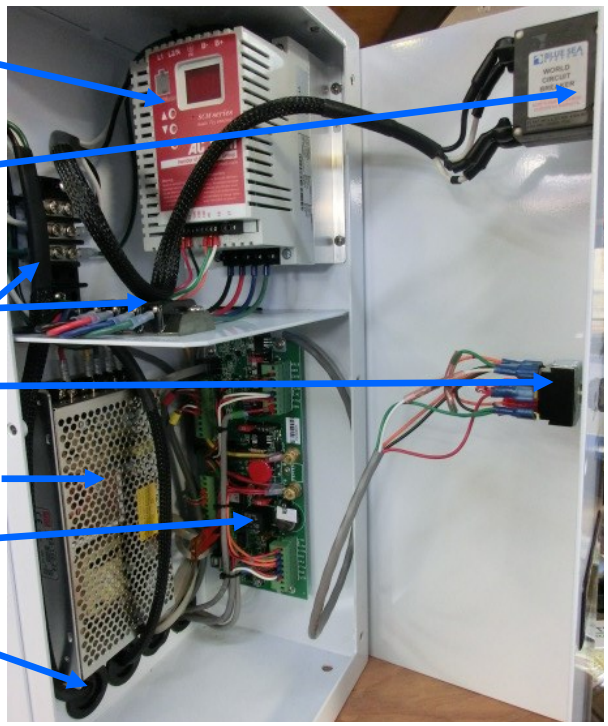
EL-TM-30A4
TERMINAL BLOCK
30A 4 POS.

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

EL-PS-24V150W
24V 6.5A POWER
SUPPLY 110/220 IN

EL-MPC-PCBDP
MPC-5000 CIRCUIT
BOARD

EL-HWR-DPG
DIAPHRAM
GROMMET PVC
BLACK



EL-MTR-3/4AC220
3/4 HP, 240 VAC,
3 PHASE, 56C MOTOR

Fresh Water Flush Module

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

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

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

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

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

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

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

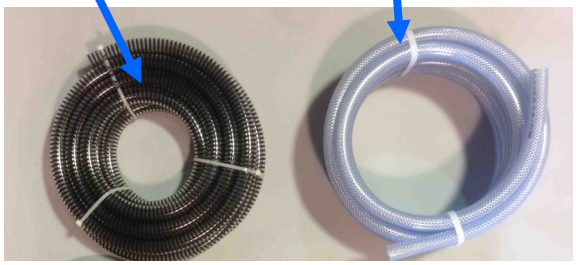
FT-FTH-10L3PCS
10" LOW PRESS. FILTER HOUSING 3 PCS

FT-FTC-CC
CHARCOAL FILTER (inside housing)

Hoses and Tubes

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

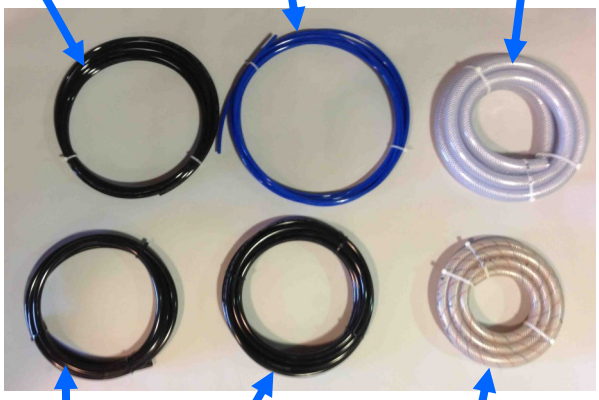
PL-HS-5/8VN
5/8" VINYL HOSE



PL-NLT-1/4LP
1/4" Low Pressure Tube

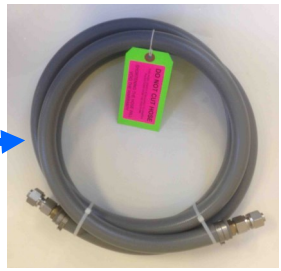
PL-NLT-3/8LPB
3/8" Blue Low Pressure Tube (Product)

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



SUB-NP-MK2-ILHA
NP MK-II 700/1K Inlet Hoe Assembly (10-foot)

PL-HS-3/4PVCGR
Hose w/o end fittings

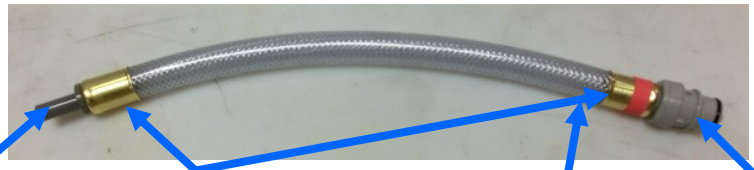


PL-NLT-3/8LP
3/8" Low Pressure Tube (Flush)

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

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

Quick Disconnect Pigtail (installed at "to strainer" fitting on feed pump)

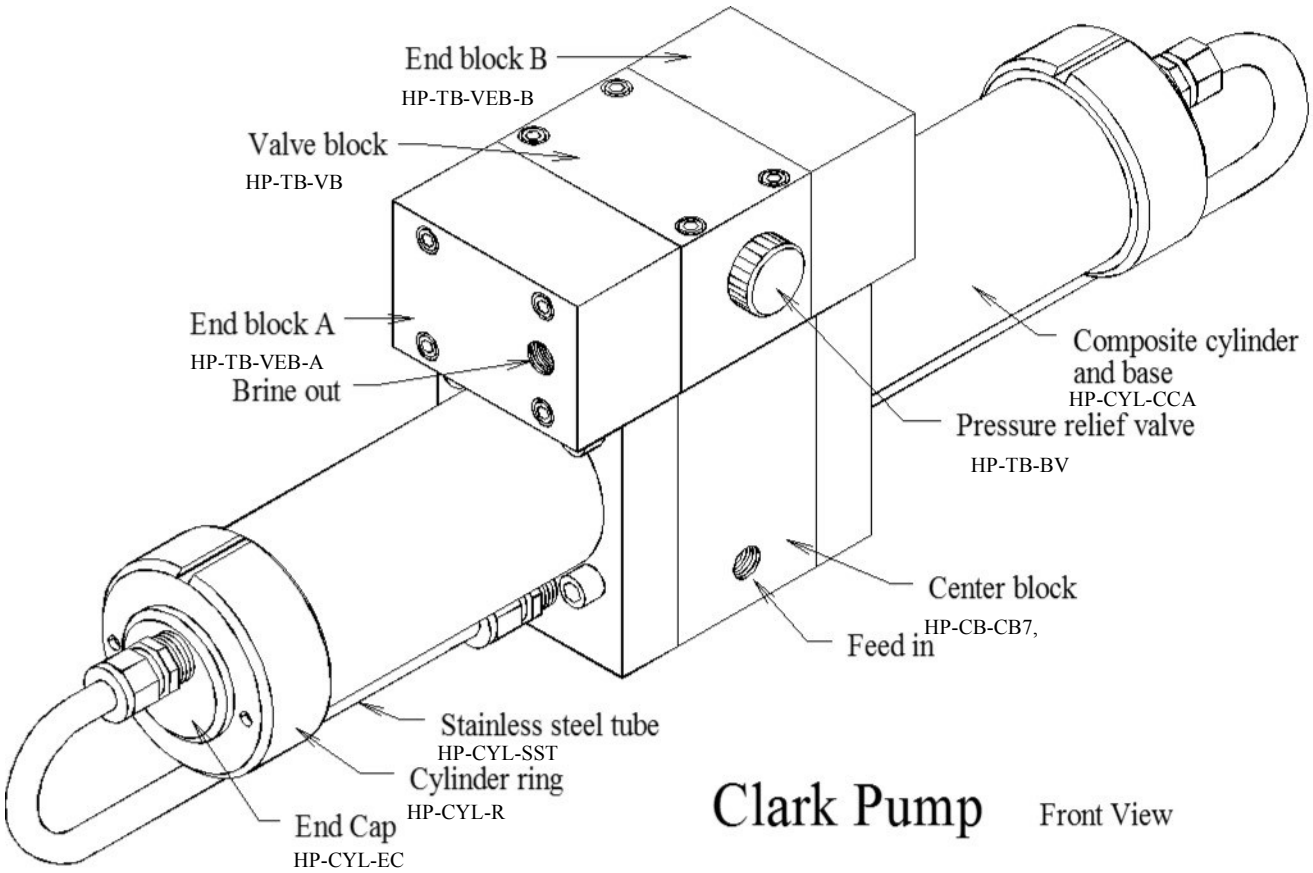


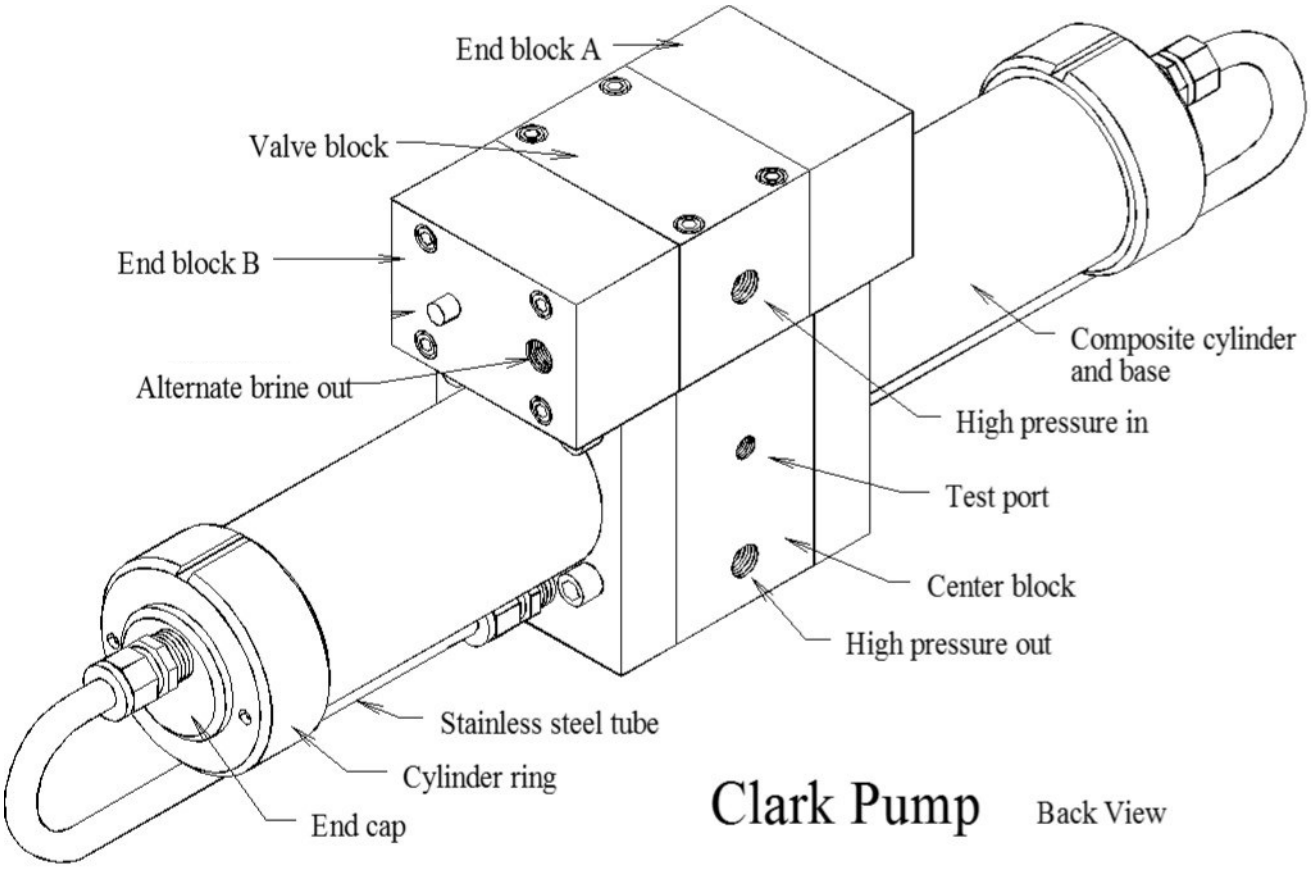
PL-HBA-3/8Tx1/2
3/8"T STEM x 1/2" HOSE BARB ADAP.

PL-HF-.75IDX1BR
Brass ferrules for 1/2-inch hose

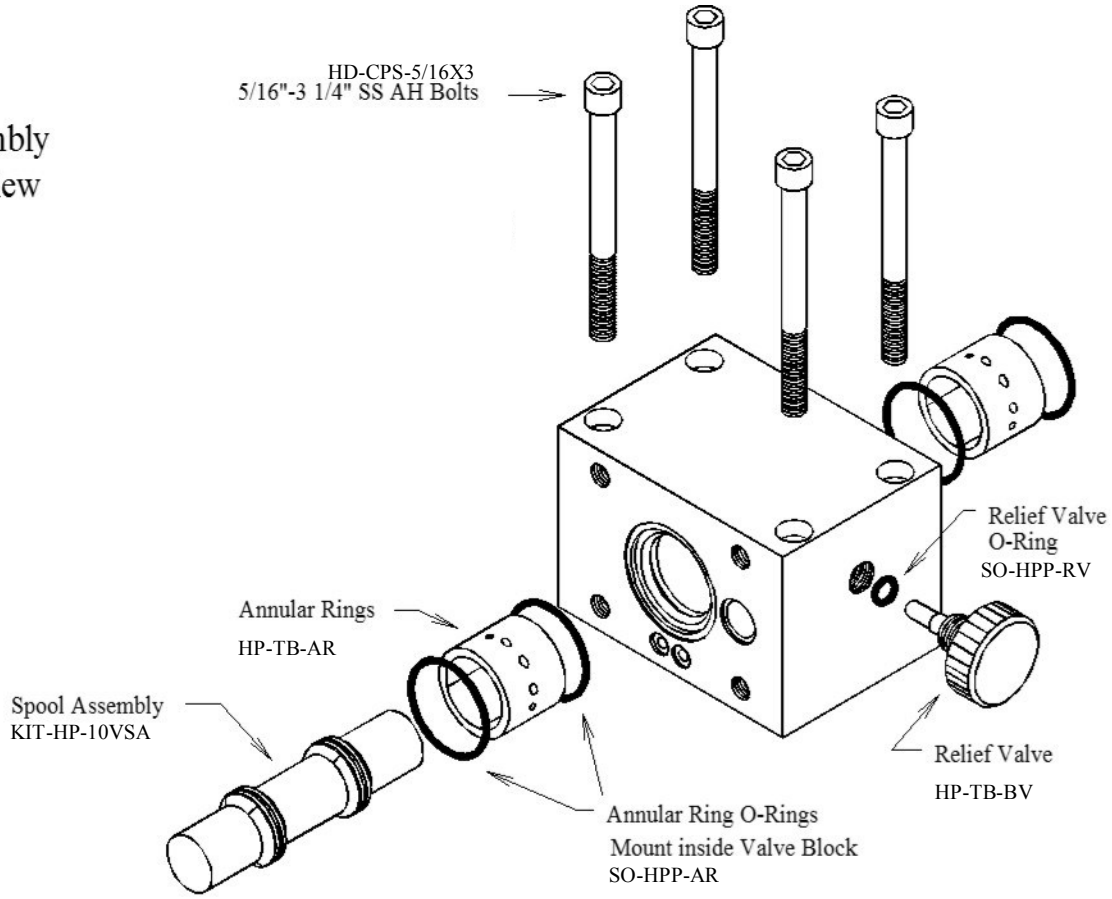
PL-HS-1/2VN
1/2" VINYL

PL-QDC-1/2HBISV
1/2" HB QUICK DISCT. INSERT w/ VALVE

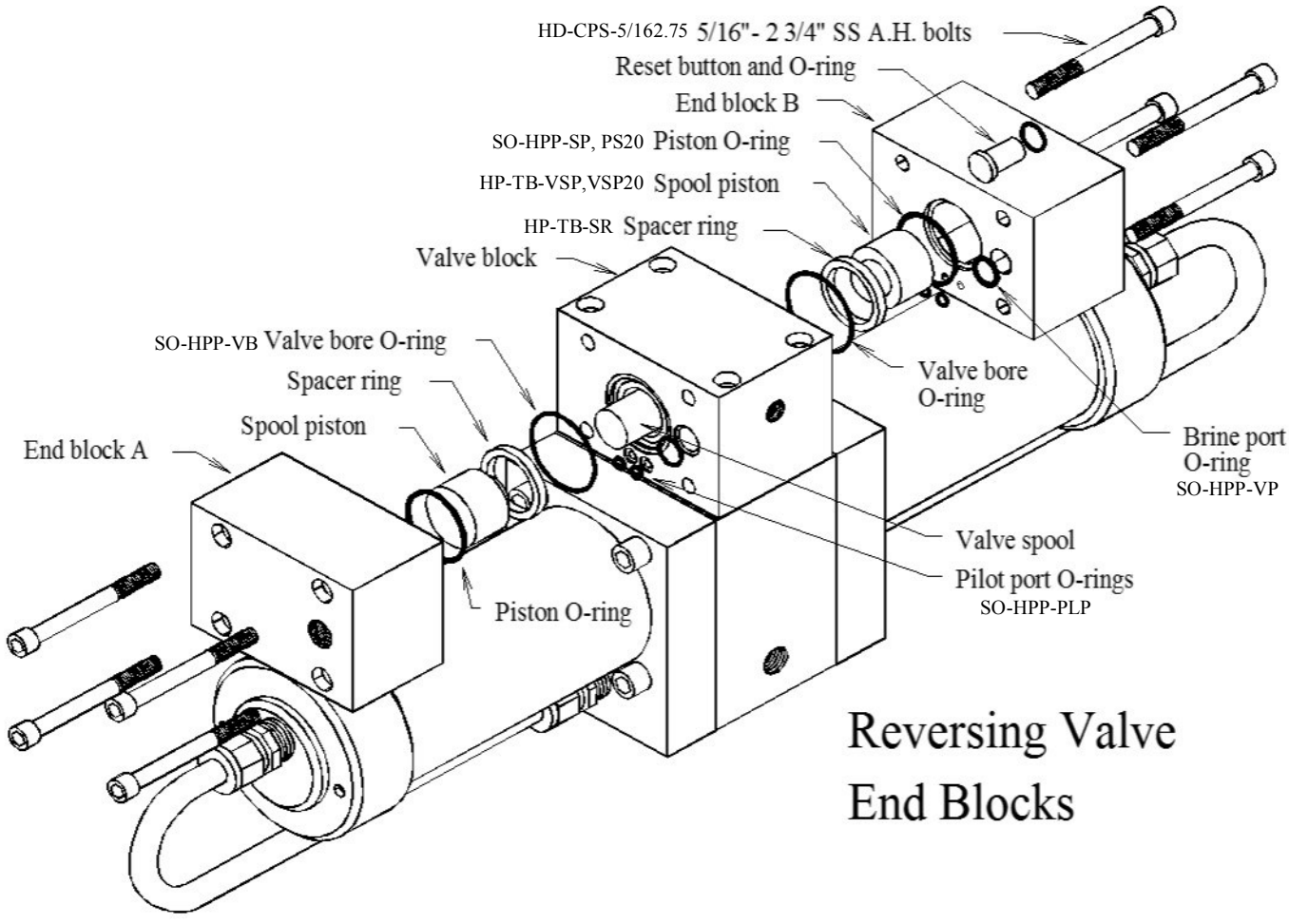

End block B
HP-TB-VEB-B
Valve block
HP-TB-VB
End block A
HP-TB-VEB-A
Brine out
Composite cylinder and base
HP-CYL-CCA
Pressure relief valve
HP-TB-BV
Center block
HP-CB-CB7,
Feed in
Stainless steel tube
HP-CYL-SST
Cylinder ring
HP-CYL-R
End Cap
HP-CYL-EC
Clark Pump
Front View


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

Spool Assembly Exploded View

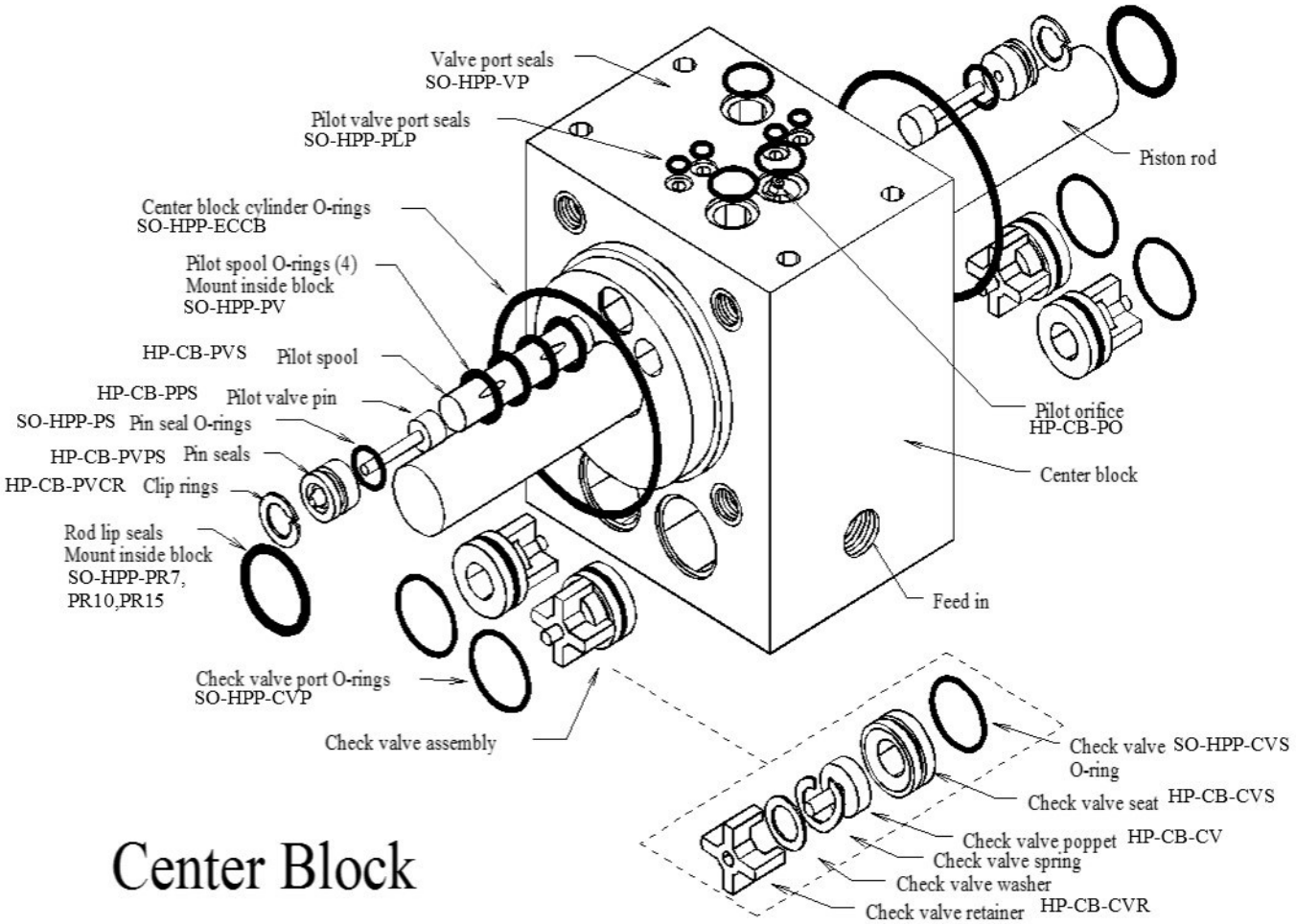


Valve Block



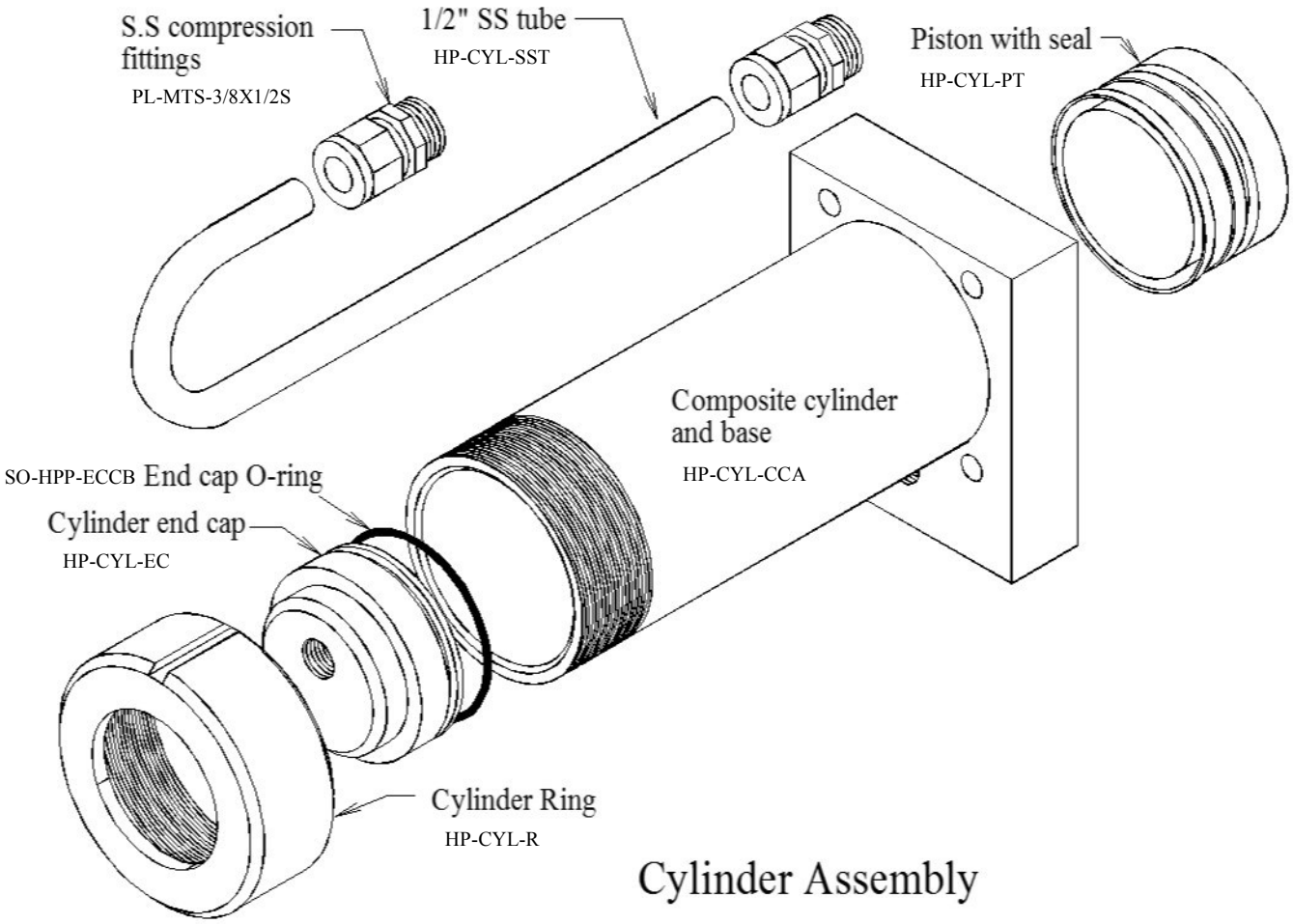
Reversing Valve End Blocks

Parts



Center Block

Parts



Cylinder Assembly