



LB 1800/2800/4000 Modular

Installation and Operating Manual



Spectra Watermakers
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Introduction

Welcome to Spectra Watermakers, your trusted solution for water purification needs. Introducing the Spectra LB-1800/2800/4000, equipped with the revolutionary Spectra Pearson Pump. This cutting-edge high-pressure pump, featuring integrated energy recovery, empowers users to purify up to 75 gallons of seawater per hour (120 gph for the LB-2800) on as little as 750 watts of power. With proper installation and maintenance, your system promises years of delivering high-quality, potable fresh water.

We encourage you to take a moment to familiarize yourself with this manual before operating the machine. Your understanding ensures optimal performance and longevity of your investment

Parts List:

- 1x Spectra Pearson Pump High Pressure Module
- 1x Electrical Control Box
- 1x Valve and Gauge Panel
- 2x 20" Prefilter Housing
- 1x 20 Micron Prefilter
- 1x 5 Micron Prefilter
- 1x Service Kit
- 1x Installation/Users Manual
- 1x Installation Kit

***Please inspect the contents of your shipment to ensure that all parts have been included. Any missing or damaged parts not reported to the factory with 1 business day of taking delivery will be considered lost and replacements will be supplied at list price.**

Valve and Gauge Panel Connections

Limit Switches The Normally Closed terminals on the membrane pressure switch are connected to the controls and will stop the system if it exceeds 850 psi. The Feed Pressure limit switch is also wired to the *Normally Open* terminals and will close when the feed pressure exceeds 10psi. **The Feed Pressure must be over 10psi and the membrane pressure must be less than 850psi for the run circuit to stay latched.**

Membrane Pressure Connect the 1/4" white high pressure tubing to the 1/4" Stainless fitting on the gauge panel and the 1/4" fitting the Pearson Pump. Follow the instructions on page 17 for fitting assembly instructions.

Filter Condition Gauge The 1/4" John Guest push fittings on the gauge panel "Filter Condition" valve are connected to the same type of fittings on the filter housings. Connecting the inlet and outlet correctly allows you to see the pressure drop across the filters and gauge filter condition.

Product Inlet The 1/2" black tube connects the product water from the membrane array to the gauge panel.

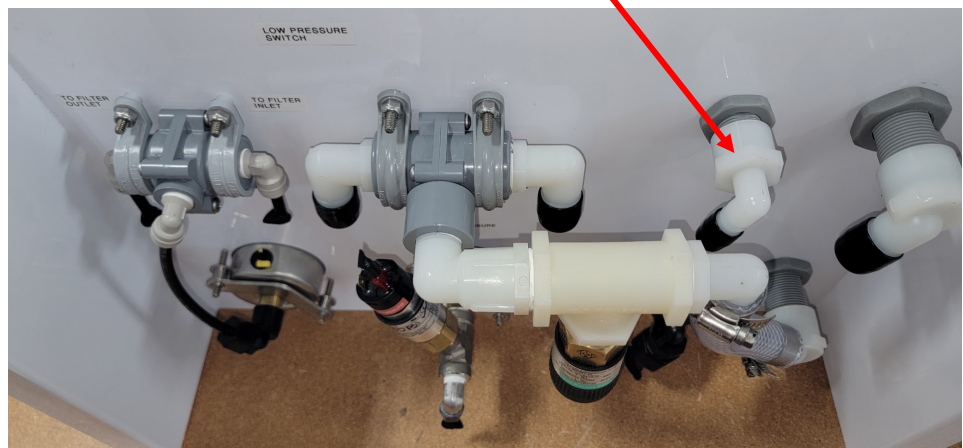
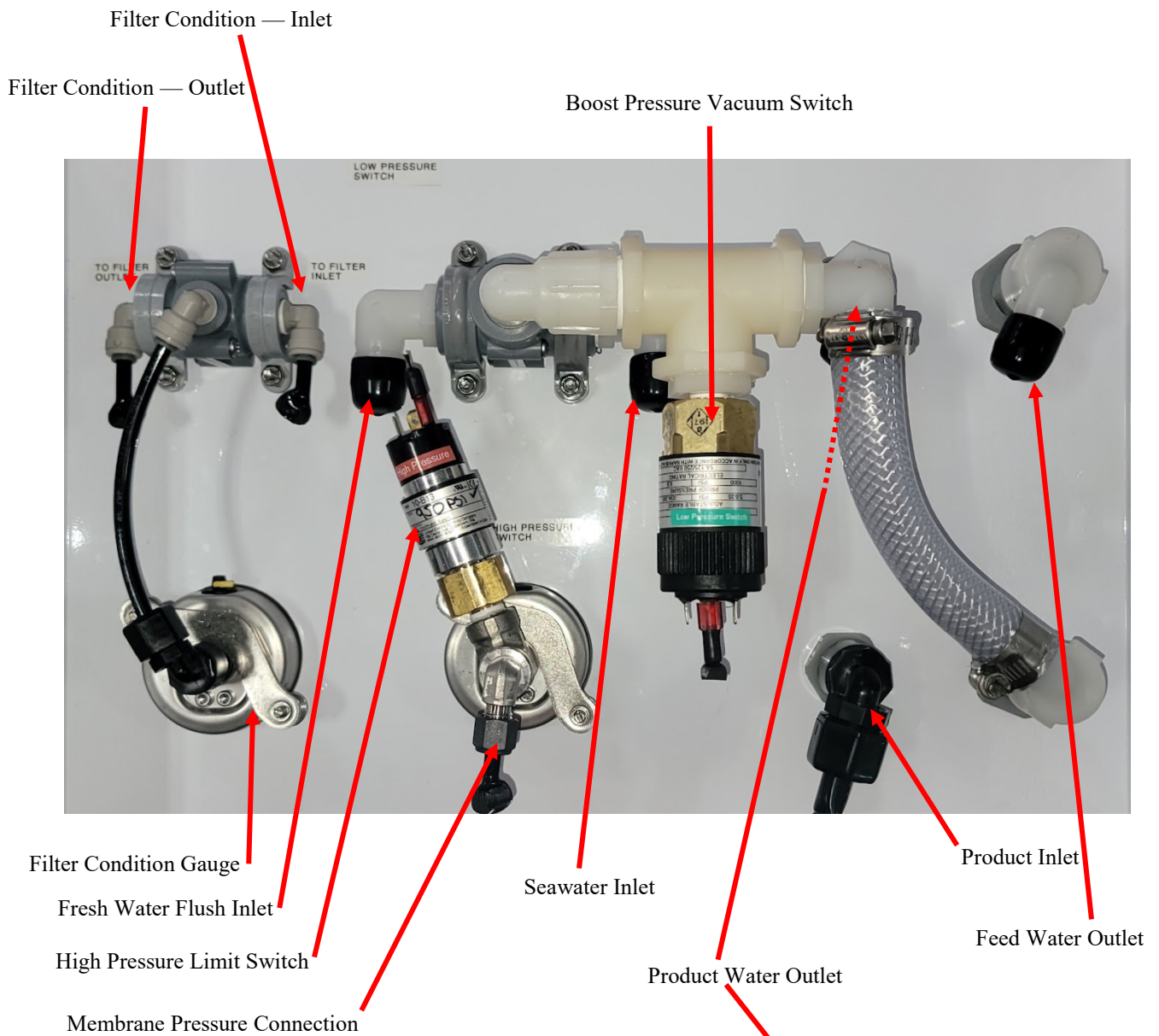
Product Outlet Use 1/2" vinyl hose to connect the product water out of the gauge panel to your storage tank. If the rise to the tank is more than 3m (10ft.) a check valve must be installed to protect the membranes from back pressure during shut down. Do not install valves in the product line that will restrict the flow and product outlet should always be open to atmosphere so the water falls into the storage tank.

Seawater (Feed water) Inlet Connect the supplied 3/4" vinyl hose outlet of the 5 micron filter housing to the Seawater Inlet fitting on gauge panel.

Fresh Water Inlet Connect one end of the supplied 1/2" vinyl hose to the Fresh Water Inlet on the Control Panel to a pressurized, un-chlorinated fresh water source. This water will serve as the fresh water flushing supply source. **Use a charcoal filter if the water is chlorinated to protect the membranes from damage.**

Feed Water Outlet Connect one end of the supplied 3/4" nylon braided pressure hose to the 3/4" hose barb fitting on the backside of the Control Panel, connect the opposing end of the nylon hose to the feed water inlet of the Spectra Pearson Pump on the high pressure assembly.

Valve and Gauge Panel Connections - Back of Panel



Component Descriptions

The Spectra LB-1800/2800/4000 watermaker is designed to be installed in a building or pump house so the system is not exposed to the elements. Feed water must be supplied to the unit at 6gpm (22 lpm) at a minimum of 10psi (0.7bar) and a maximum of 20psi (3.5 Bar). A media filter, which must be sourced independently by the consumer, can be used to reduce the consumption of the cartridge filters. The watermaker separates the feed into two streams, brine and product. The brine stream contains the concentrate left over after the product water is removed and should be discharged to a drain at least 8ft. (2.5m) above the pump head to provide a small amount of back pressure on the pump. This back pressure can also be accomplished by installing 10mm (3/8") restrictor at the end of the brine discharge line. There must be an air gap on the brine discharge as suction will not allow the Pearson pump to operate properly. Brine discharge requirements vary by local jurisdictions



20" Prefilter Housings Depending on how the feed water filtration is configured there are several options to how the two housings can be used. The outlet housing must contain a 5 micron filter and depending on local conditions you can either use a 5 (for added protection) or 20 micron filter in the inlet housing and both should be mounted within 10 feet of the Control Panel. Allow 3 - 4" of clearance on the bottom of the filter bowl to easily remove the filter housing when changing filters. Do not install the prefilter module over any electrical

device or outlet as water will be spilled during filter changes.

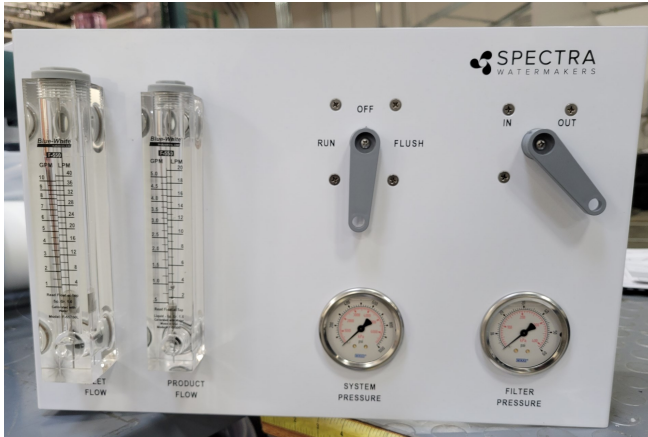
Spectra Pearson Pump High Pressure Module This module contains the Spectra Pearson Pump, and:
Two (2) 4" x 40" seawater membranes for an **LB 1800**
Three (3) 4" x 40" seawater membranes for the **LB 2800**
Four (4) 4" x 50 seawater membrane the **LB 4000**.



All high pressure fittings between the membranes and the pump come pre-assembled and connected with 316 SS JIC 37 degree female flare fittings. It is possible to remote mount the Spectra Pearson Pump from the pressure vessels by obtaining a longer hoses.

The Spectra Pearson Pump **MUST** be installed in an upright position, with the vented oil cap facing up.

Component Descriptions - Cont.



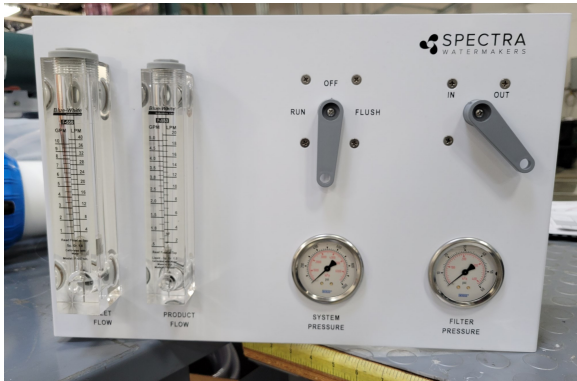
The **Valve and Gauge Panel** has the analog gauges and valves mounted used to monitor and operate the system. There is a flow meter for the feed and one for the product water. One three-way valve controls the feed water source to switch between running and flush water.

The three way valve on the right is connected to the filter pressure gauge and allows you to switch between measuring the inlet and outlet pressure to quickly determine the condition of the prefilter. A new filter should show no pressure difference and you should change the filter when the pressure difference is more than 5 psi.

Control Box The FRP watertight box (when corner screws are used) contains the electrical controls for the unit. This box should be mounted away from any water source or where it could get sprayed or wet. Should the need arise to open the electrical box after installation, use caution as there are live electrical wires inside. It is always recommended you disconnect all power to the unit before opening the control box.



Component Descriptions - Cont.



The **Valve and Gauge Panel** has a series of analog gauges and valves mounted for easy reference to system operation. There are two flow meters, one to measure the inlet flow from the feed pump and the other to measure the product water flow rate. One three-way valve controls the feed water source to switch between running and flushing.

The three way valve on the right is connected to the filter pressure gauge and allows you to switch between measuring the inlet and outlet pressure to quickly determine the condition of the prefilter. A new filter should show no pressure difference and you should change the filter when the pressure difference is more than 5 psi.

Ideally the gauge panel and the Control Box are in close proximity so you can adjust the pump speed while monitoring the flow rates and pressures.

Control Box The VFD speed control for the pump is the only control required for the water-maker. The pressure switches are wired into the “Stop” circuit for the VFD so there are two conditions that will stop the system:

- Feed pressure drops below 10 psi
- Membrane pressure is above 850 psi

Note: The system will not start unless there is at least 10 psi of feed pressure. We recommend a boost pump with a speed control so the feed pressure can be adjusted so the feed pressure is 20psi after the filter array (with clean filters). This will allow for a 10 psi pressure drop (as the filters clog) before the system will stop due to low feed pressure.

AC Control Box



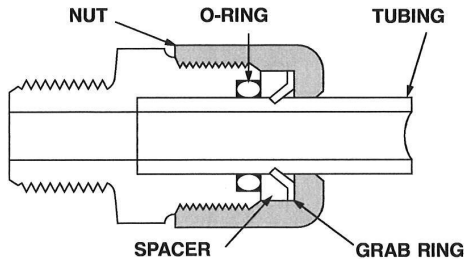
DC Control Box



Parker Tube Fitting Assembly Procedure

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 seal 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

Tube O. D., in.	Air-Oil-Water Pressure in PSI		
	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

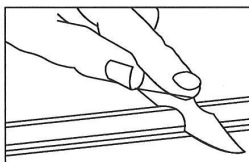
Ratings are based on use with copper tubing, and in all cases represent the maximum recommended working pressure of the fitting only. Working pressures (vs. temperatures) of other types of tubing may limit the tube and fitting assembly to pressures lower than shown above. Consult factory for recommendations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

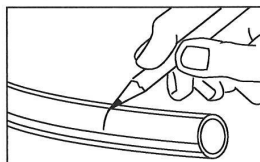
Fast Assembly

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 controls 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:

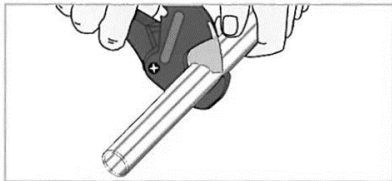
Bodies are produced in an acetal copolymer or polypropylene.

'O' rings are Nitrile rubber or EPDM.

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

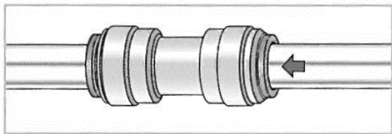
How to make a connection

Cut the tube square



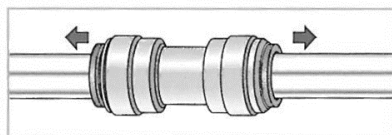
Cut the tube square and remove burrs and sharp edges. Ensure the outside diameter is free of score marks. For soft or thin walled tube we recommend the use of a tube insert

Push up to tube stop



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

Pull to check secure



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

Grips before it seals

'O' ring provides a leakproof seal

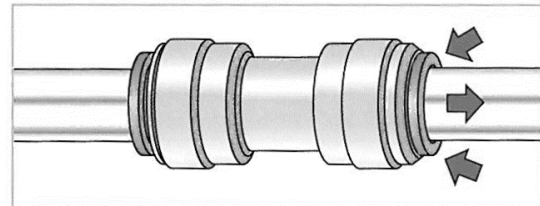
The Collet (gripper) has stainless steel teeth which hold the tube firmly in position while the 'O' ring provides a permanent leakproof seal.

Collet

Stainless steel teeth grips the pipe

To disconnect

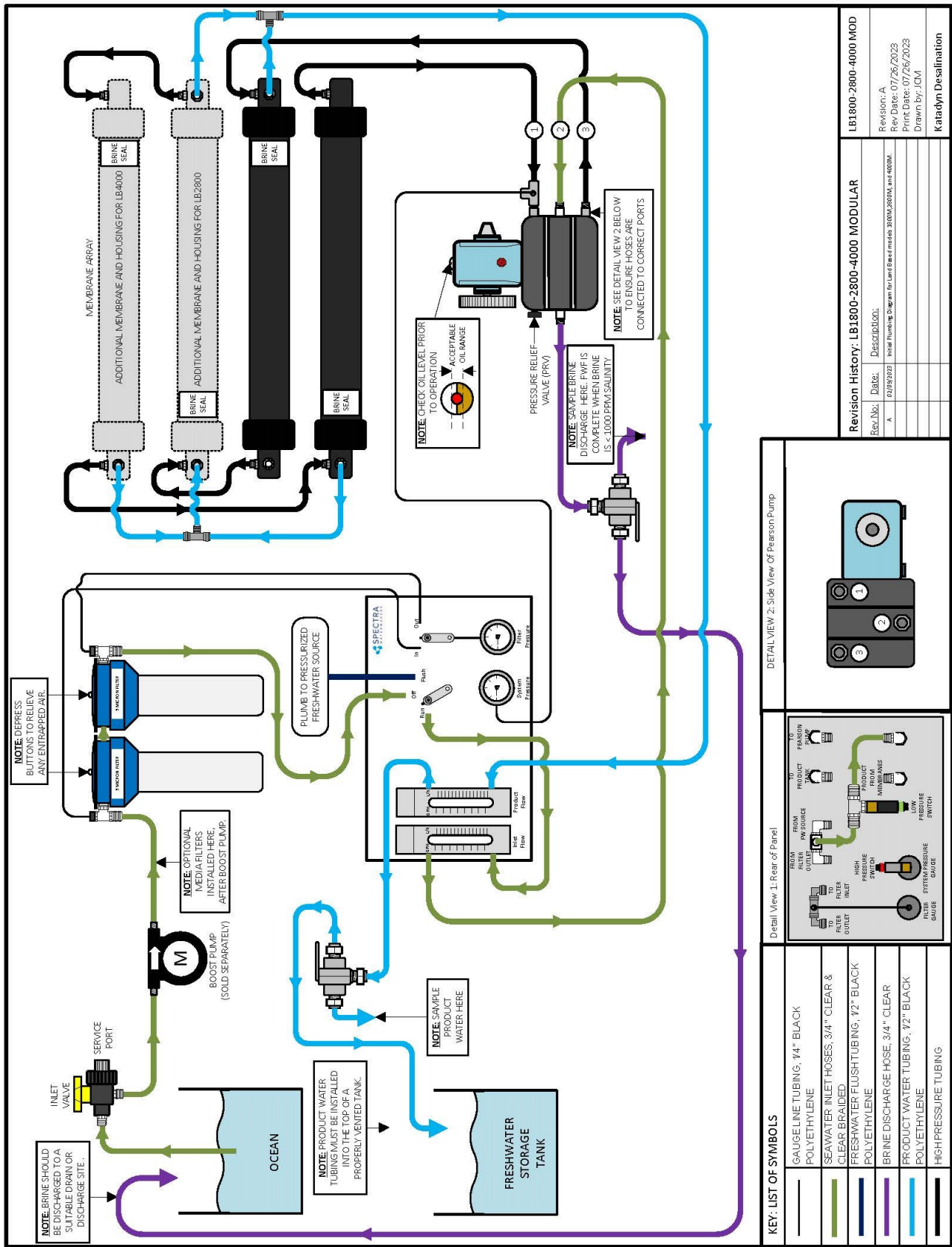
Push in collet and remove tube



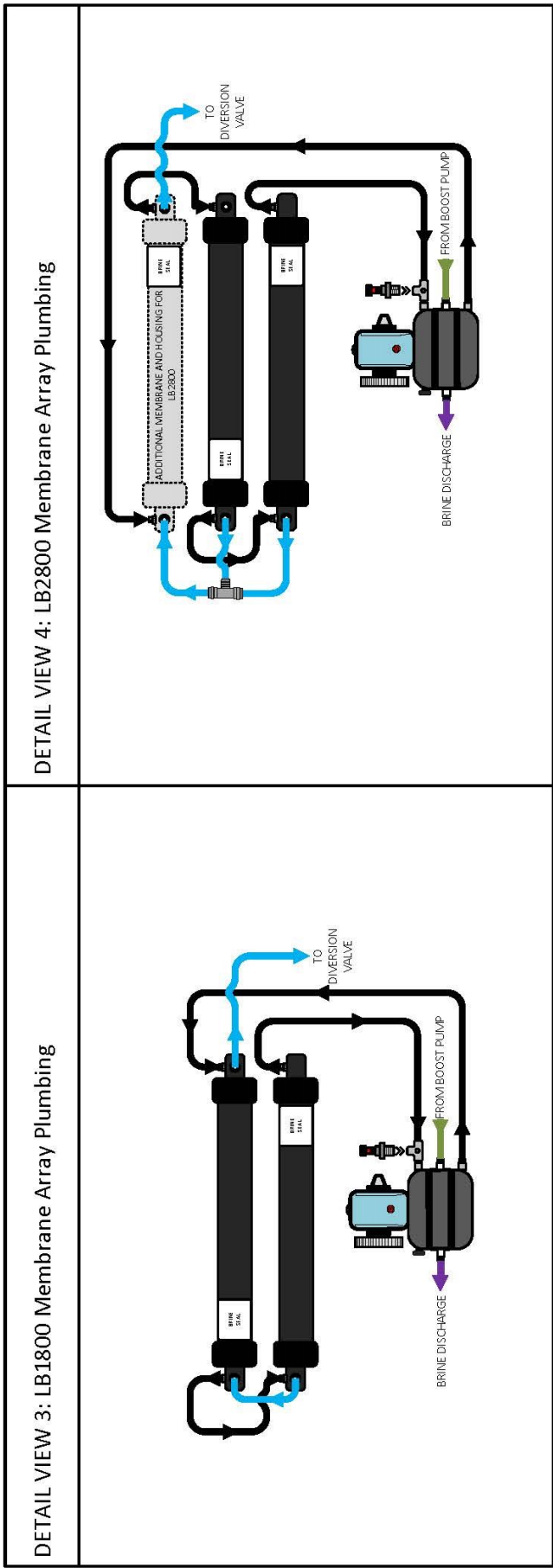
To disconnect, ensure the system is depressurized, push the collet square against the fitting. With the collet held in this position the tube can be removed.

LB 1800-4000M Plumbing Schematic

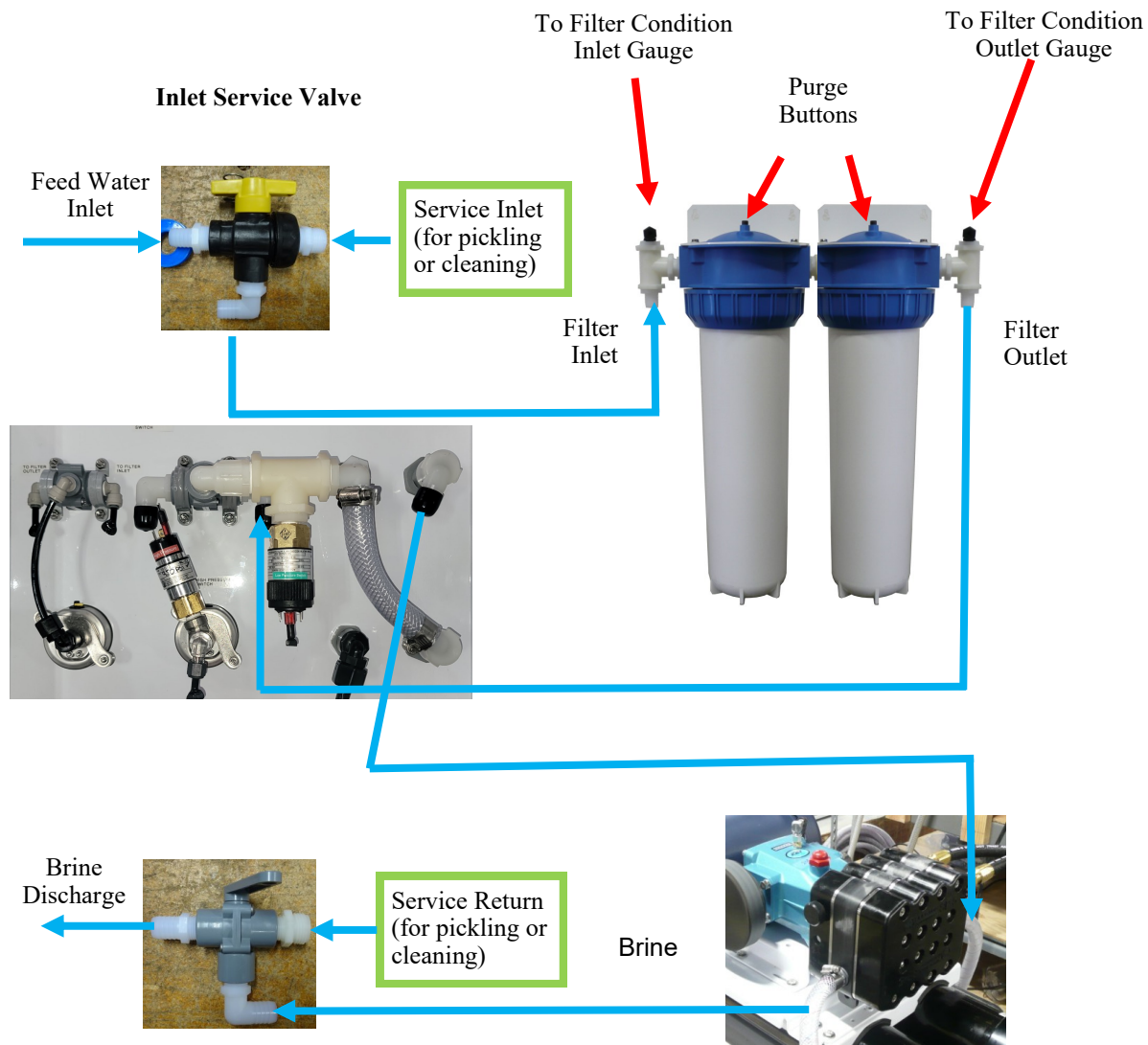
Note: The inlet and discharge service valves should be installed so the service hoses (when installed) can both be place inside the same bucket. To clean or pickle the system chemicals will be recirculated through the system and must be done with no air in the circulation loop.



LB 1800-4000M Plumbing Schematic Cont.



Plumbing Connections



Install the 3/4" 3-way Inlet service valve in front of the **Prefilter** and connect the Filter Outlet to the Feed Water Inlet on back of the control panel (see opposite).

Attach the 1/4" High Pressure tubes for the filter pressure gauge to the corresponding fittings on the inlet and outlet sides of the filter.

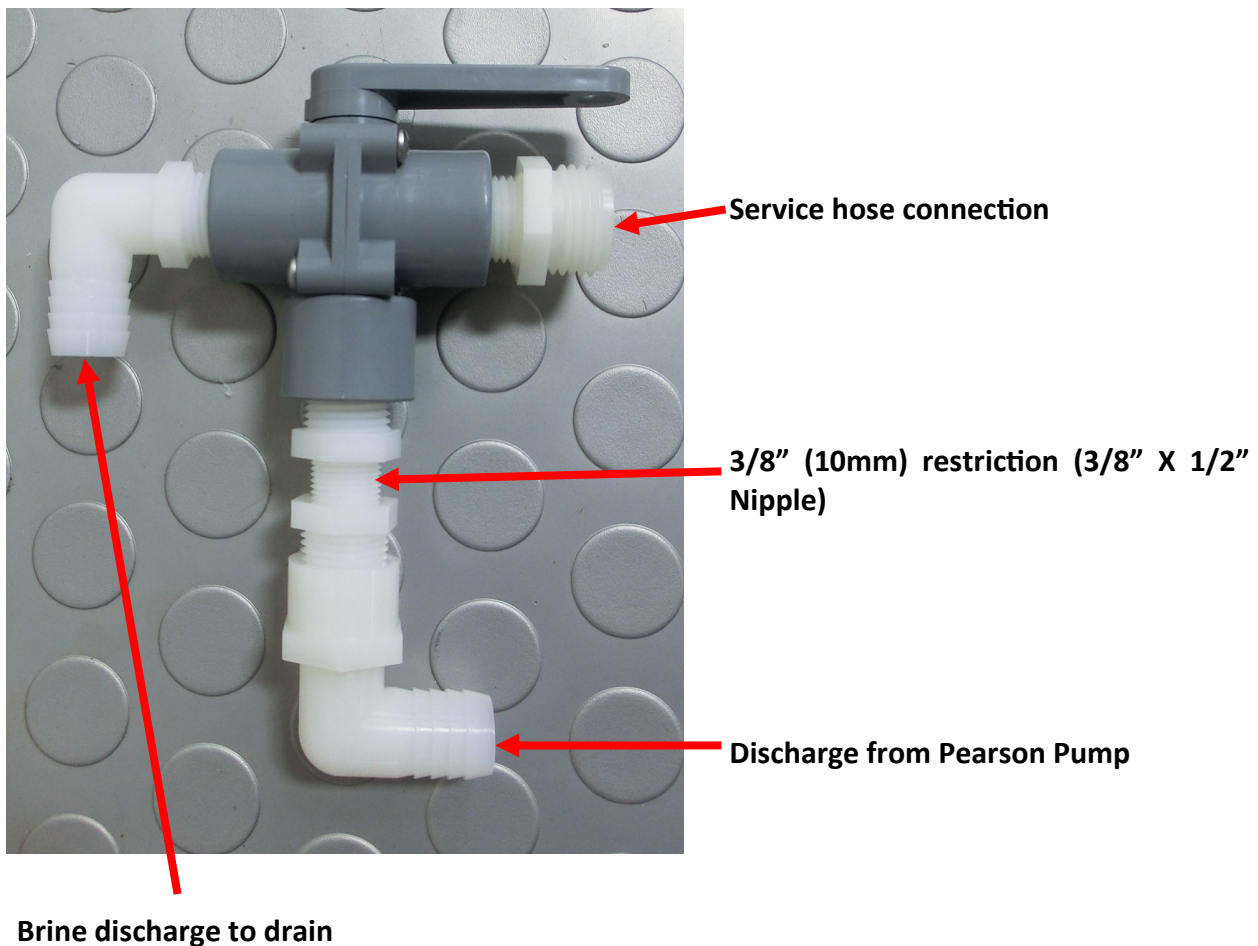
Connect the 3/4" braided vinyl hose on the outlet of the Feed Water Flow meter to the feed water inlet on the Spectra Pearson Pump.

Spectra Pearson Pump Connect the 3/4" braded vinyl hose to the 3/4" hose barb fitting on the Spectra Pearson Pump. Install the 1/2" 3-way service valve in the brine discharge line. Lead the brine discharge output to a storm drain, injection beach well, or other discharge water location. Consult local authorities for a regulations regarding brine discharge requirements.

Plumbing Connections Cont.

Brine Service Valve Restrictor –Assembled at Factory

The system is more tolerant to changed in feed pressure and knocking is reduced if there is a restrictor in the brine discharge line. This restriction creates 3-5 psi of back pressure in the discharge which will increase that range of acceptable feed pressure.



Plumbing Connections - Cont.

Product Water Outlet Connect the 1/2" black tubing to the product water outlet fitting on the membrane end cap. Lead the 1/2" hose to the bottom fitting of the product flow meter on the Control Panel. Connect the product flow meter outlet fitting at the top of the flow meter to the common port (bottom of the T) of the supplied 3-way sampling valve, one port should be plumbed to a sampling tap, and the other should be plumbed to the potable water storage tank.

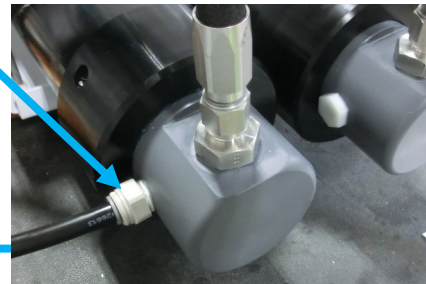


Product Flow Meter
Outlet (to storage tank)
Not shown, see page 12

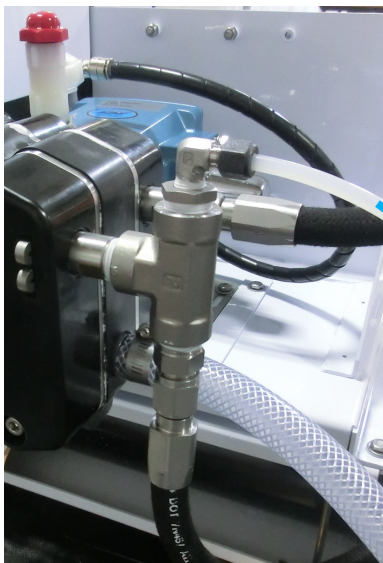
Product Water to
Inlet of Flow Meter

Product Outlet: To remove tube or plug, push tube into the fitting, then press and hold the gray collar into the fitting body to pull the tube out.

Note: the single product outlet fitting may be different on your unit.



Membrane Pressure Gauge Connect the 1/4" high pressure tube to the port on the Pearson pump and to the backside of the Membrane Pressure gauge on the Control Panel.

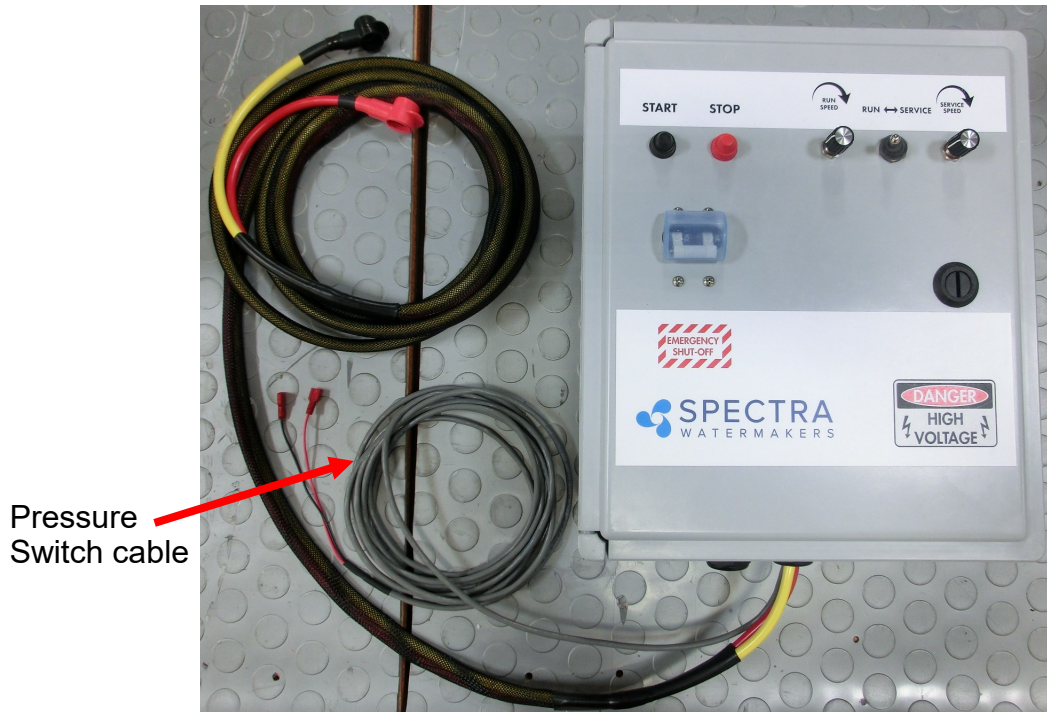


Connect
Membrane Pressure Gauge



Electrical Connections

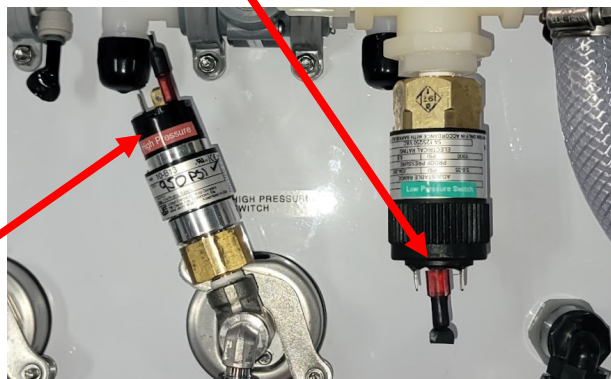
DC Systems



Mount the Electrical Control Box within 6 feet (2meters) of the motor for the Spectra Pearson Pump. Mount vertically and in a dry location, preferably above the pump assembly to ensure proper ventilation across the heat-sink and so that no water will accidentally spill on the switches or speed control knob.

Connect the DC Cables coiled outside the control box to the DC positive and negative posts on the Spectra Pearson Pump Motor.

Connect the **Feed (Low) Pressure Switch (Green)**



and High Pressure Switch (Red)

to the cable from the control box to the pressure switches on the back of the Control Panel. There is no polarity, just connect one of the cable ends to each of the pressure sensors (there is an open terminal on each switch). This creates a closed contact circuit once the feed pressure exceeds 10psi. As long as the feed pressure is above 10psi and the membrane pressure is below 900 psi the system will run.

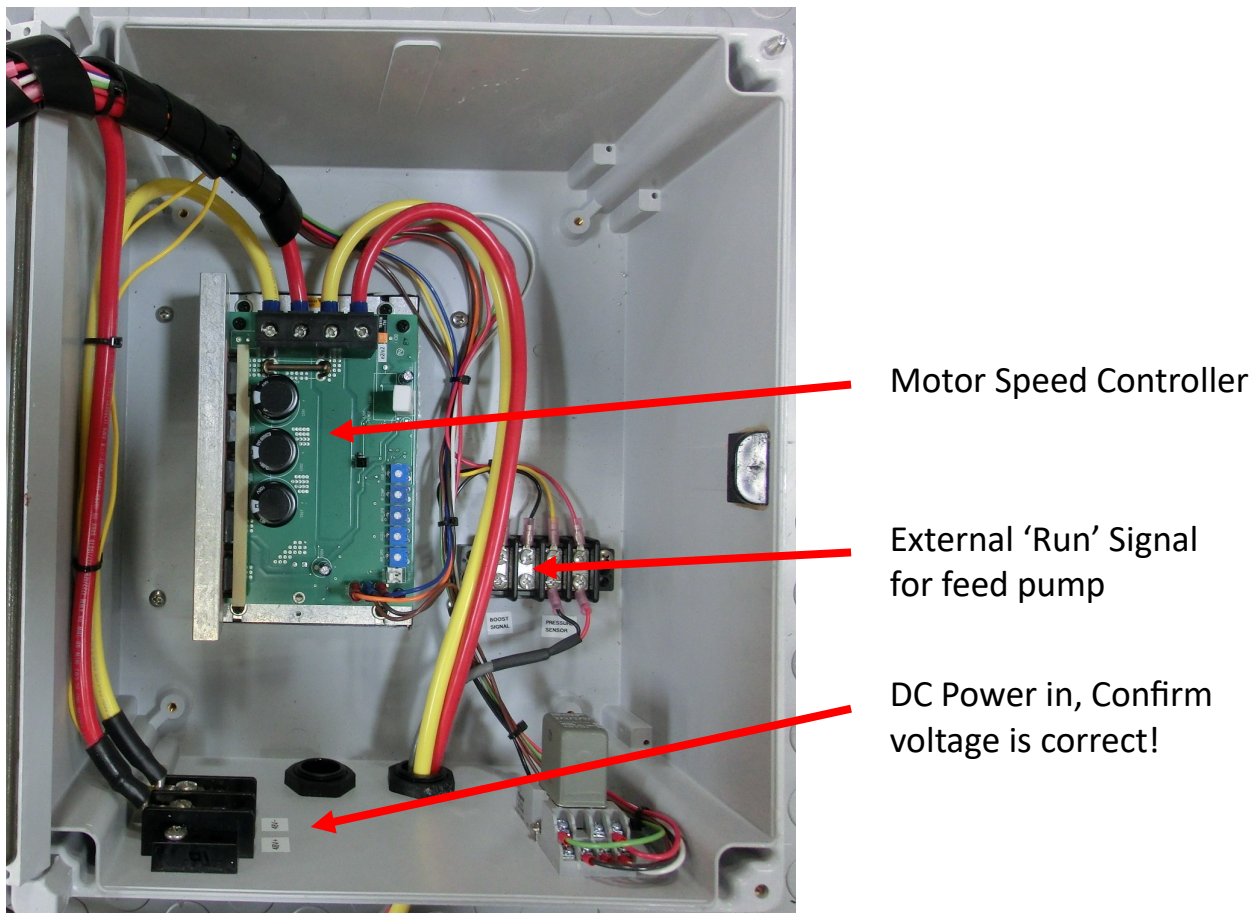
Electrical Connections

DC Systems Only

Connect the main DC Power leads from the DC Bus to the 2 position buss bar located above the speed controller. Connect the DC + to the Red Conductor and DC - to the Yellow conductor.

The 'External Run Signal' provides DC line voltage to trigger a relay for an external well pump, this circuit can handle a maximum of 5A. This is only a closed contact run signal and will require an external motor control for the pump. **DO NOT RUN THE BOOST PUMP DIRECTLY FROM THIS BUSBAR!**

It is recommended that these cables connect to a supply pump controller as a 'Run' signal, or that they be wired such that they activate an external relay capable of handling the required current load of the supply pump. Contact the factory for any concerns.



Electrical Connections

AC Systems Only

- Mount the control box so the attached gray pressure switch cables will reach the switches on the back of the control panel.
- Insure the power switch on the front of the control box is in the off position.
- Connect the AC Cable to a properly grounded and circuit breaker protected power source (leave power off).

This is a Variable Frequency Drive that converts single phase input to three phase for the motor connected to the Pearson Pump.

Speed Control adjusts the speed of the Pearson Pump

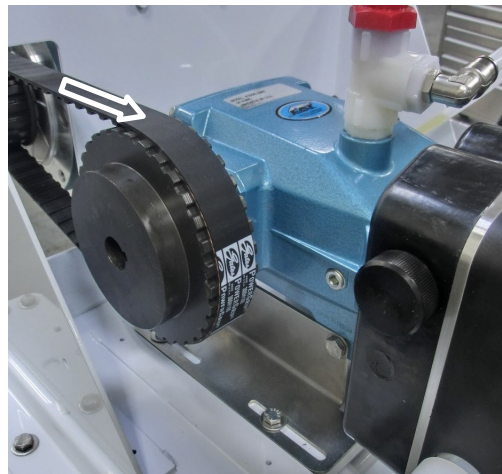
Start/Stop Switch

Main Power Switch



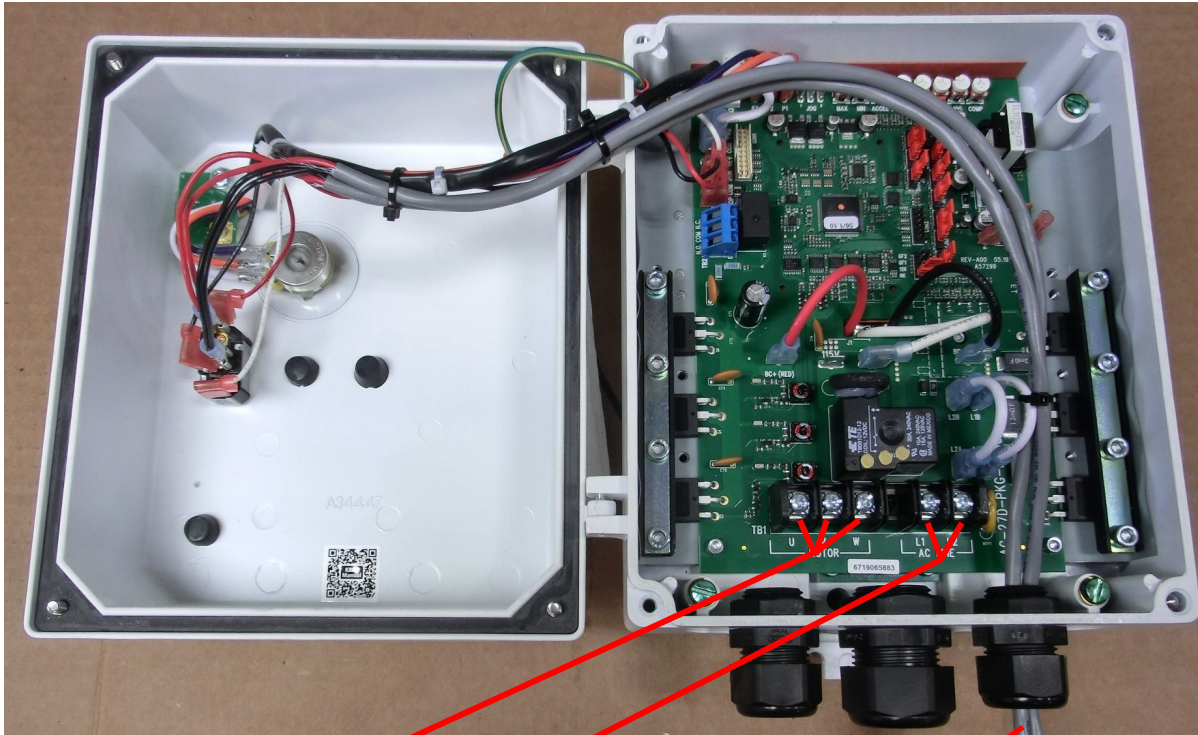
Note: Confirm the motor is turning in the correct direction or the crank case will not be properly lubricated.

Switch any of the line leads for the three phase motor to reverse direction.



Electrical Connections

AC Systems Only



3 Phase Pearson Pump
motor connections

220VAC power
input

Pressure Switch cables
connect to the N/O
(Normally Open)
terminals on the
pressure switches.

There are either two Spade connectors or a single
multi pin connector on the end of this cable
(depending on which pressure switch was used).

If the terminals on the switch are not marked they are:

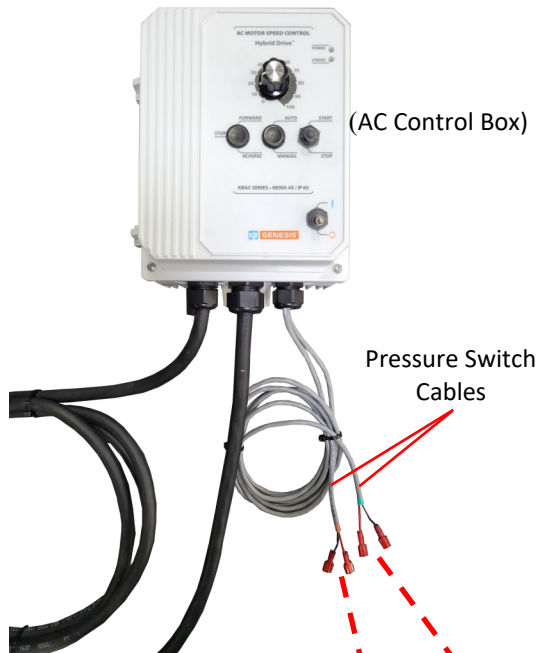
Note: When connecting the pressure switch
cables from the KB Drive to the High (Red) and
Low (Green) Pressure Switches, **there is no
polarity**. For connection details, continue to next
page.

N/C
N/O
Common



Electrical Connections

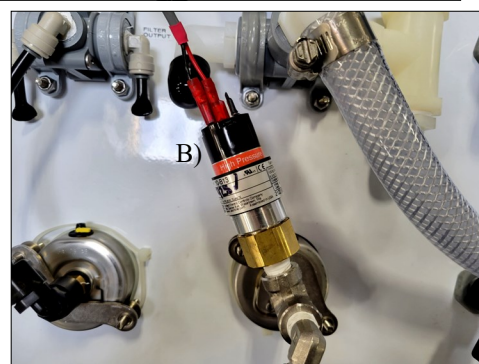
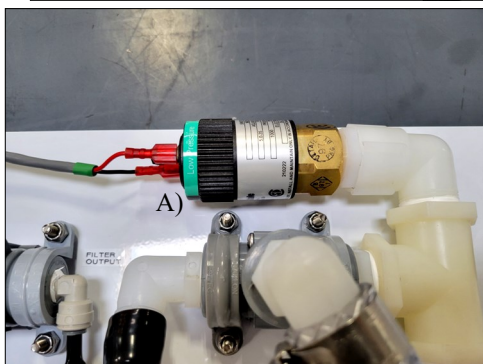
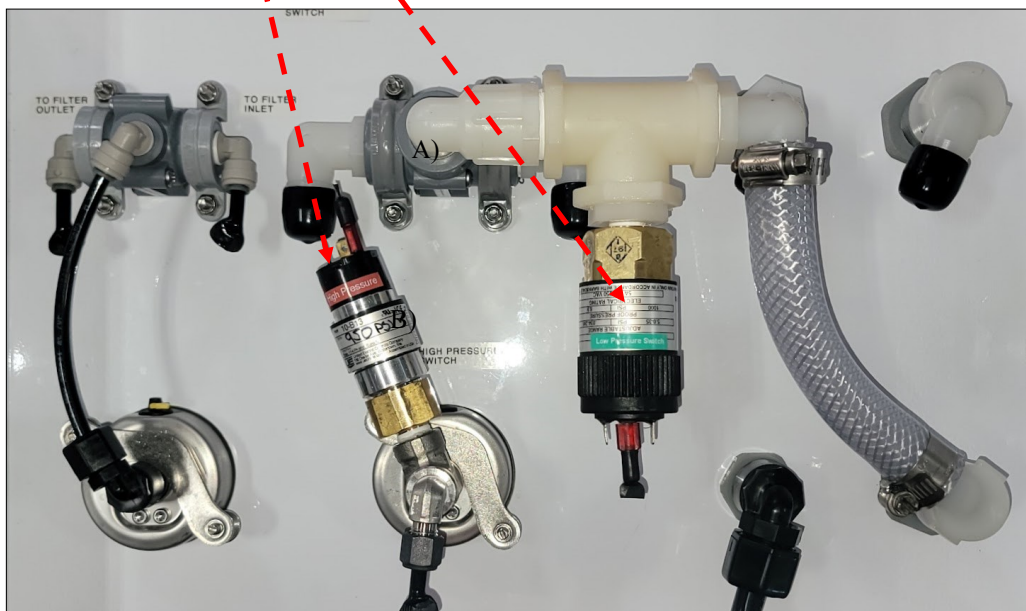
AC Systems Only - Cont.



Before powering up your AC LB Modular system, be sure to connect the Pressure Switch Cables from the AC Control Box to the High and Low Pressure Switches on the back of the Plumbing Panel.

A) The Low Pressure Switch (Green) sits horizontally at the top of the Plumbing panel. Connect both quick-connects on the green cable to the two terminals on the Low Pressure Switch. There is no polarity.

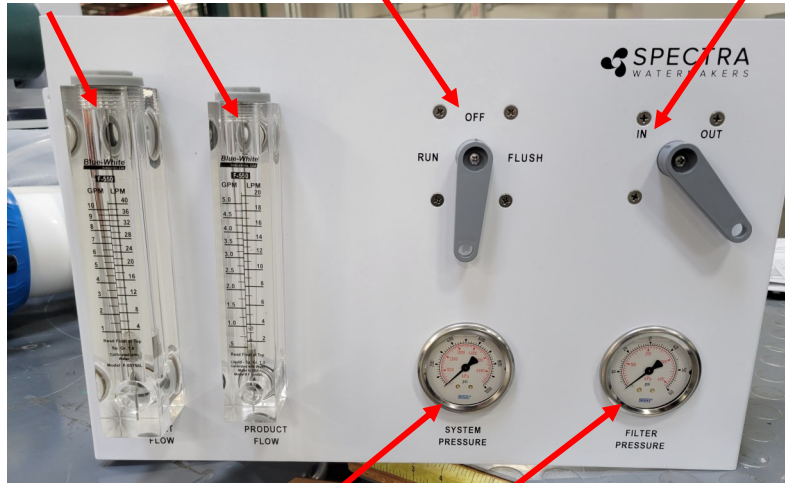
B) The High Pressure Switch (Red) sits at an upward angle at the center of the plumbing panel. Connect both quick-connects on the red cable to the two terminals on the High Pressure Switch. There is no polarity.



Valve and Gauge Control Panel

Product Flow Meter
Feed Flow Meter
Feed Water Source Selector Valve (run or flush)
Shown in OFF position
Prefilter Condition Selector Valve
Inlet of filter or outlet of filter
Shown measuring Inlet

Feed Flow Meter



Membrane Pressure

Prefilter Condition Gauge

Check the filter condition daily and change filter(s) if the difference between **IN** and **OUT** is more than 5 psi

Prefilter Bleed Button



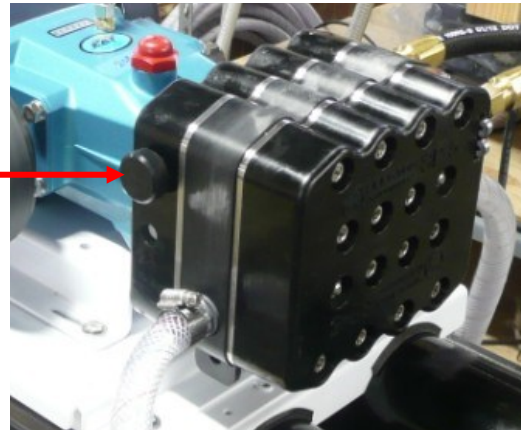
Each prefilter is equipped with an air purge button. If the system has difficulty priming, run the Boost / Well pump with the purge button depressed until all air is bled from the feed line.

Initial Startup (Purging Storage Solution)

Note: The crankcase in this unit shipped from the factory with oil in the crankcase and tape over the crankcase vent. Confirm that the crankcase is roughly half-full of oil before starting the watermaker (there is a sight glass on back of the crankcase).

When starting the machine for the first time ensure the product water is going to a drain until it becomes potable. Propylene Glycol is use as a storage solution and while is potable it does have a slight flavor, which will dissipate with use.

- Ensure that there are filters in the filter housing(s).
- The Feed water valve in RUN position and the filter condition selector valve to IN so it will measure the Feed pressure on start up.
- **Open the pressure relief valve on the Pearson Pump 1 turn.**
- Turn on the power and turn the power switch (circuit breaker) ON.
- Turn on the feed water pump and eonfirm that there is 10 to 20 psi (max) and at least 6 gpm available at the Feed Water Inlet.
- Bleed Prefilter of any air (see picture opposite)
- **Note: The system will not run if the feed pressure is below 10psi as this is required to close the run/safety switch circuit.**
- To start the Purge cycle set the toggle switch to 'Run' and then push and hold the 'Start' button until the feed water pressure reaches 10 PSI.



When the pressures and flows have stabilized adjust the pump speed control knob until the Feed flow meter reading is about 4.5 GPM. **DO NOT EXCEED 60 PSI MEMBRANE PRESSURE WHILE PURGING OR DAMAGE TO THE MEMBRANE WILL OCCUR! Start slow and increase as the system stabilizes.**

Run the watermaker for at least one hour with the pressure relief valve open to Purge the preservatives from the membranes.

After one hour close the pressure relief valve and water will begin to flow out of the Product hose. Discard this product water for at least 20 minutes.

After 20 minutes test the water for salinity and taste. When the salinity is good and the water tastes acceptable, turn off the 'Run' switch and restart the watermaker according to the Normal Operation Instructions, or fresh water flush the watermaker if the machine will not be used until later.

Normal Operation

Note: If the system contains preservative or antifreeze, or if the condition of the membrane is unknown, follow the “Initial Startup” (purging) instructions on the previous page. When in doubt, Purge the system before running at pressure.

Starting: Set the product sampling valve (if used) to send the product to a drain. Turn the feed valve to the ‘RUN’ position and set the Pump Speed Control to Zero.

Turn power on to speed controller.

All valves in the product line must be open and unobstructed. Product must be allowed to flow freely at all times.

DC Systems

Hold ‘Start’ button down until the feed pressure exceeds 10psi (0.7Bar). If you release it too soon just push it again.

AC Systems

Push momentary switch to start and turn speed knob to engage the Pearson Pump.

Make sure there is power to the external feed pump.

Inlet flow should be visible through the flowmeter and bring pressure should be above 10 psi.

When the pressures and flow rates have stabilized, adjust the Pump Speed Control Knob to increase the feed flow to 5.5 to 6 GPM. **When adjusting the feed flow, DO NOT EXCEED 850 PSI MEMBRANE PRESSURE!**

After about one minute water will begin to flow out of the product hose. Test the product quality and when it is within an acceptable range (anything below 1000 ppm is potable) the product can go to your storage tank.

Operation: Monitor the Filter Pressure gauge during operation by checking the difference between the IN to OUT and comparing the gauge reading by moving the valve from between IN and OUT, there should be very little difference when the filter is new and clean. The pressure difference begins to climb as the filter clogs and when the differential has increased by 5psi (0.35 bar) the prefilter should be changed. If the Filter Outlet Pressure drops below 10psi (0.7 bar), the machine will stop.

Monitor the sound of the Spectra Pearson Pump. If the Pearson pump makes a heavy knocking noise, or very loud rattling noise it is cavitating or there is air in the feed water. Excessive cavitation or air in the feed water inlet will permanently damage the pump.

Stopping: Stop the machine at any time by turning the ‘Run’ switch down to the ‘Off’ position.

Fresh Water Flushing - DC System

It is always a good idea to flush the watermaker after each production cycle. If the system is not used to make water the flush process should be repeated once every 3-5 days, depending on climate (shorter cycle in warm climates) to prevent bacteria growth.

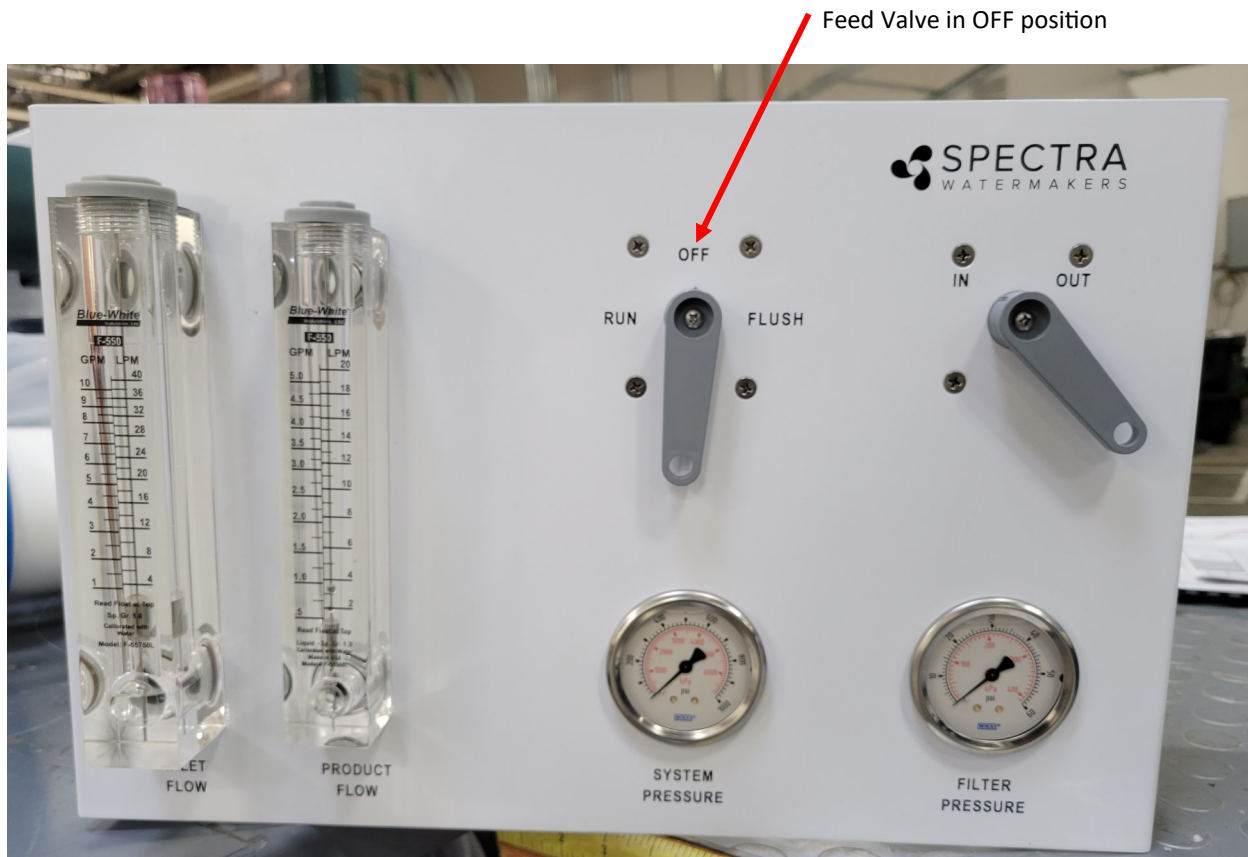
Turn off the feed water supply pump and close the Feed valve (OFF).

The pressure relief valve can remain closed.

Turn the Feed Valve to the FLUSH position.

Turn on the 'Flush' Switch on the Control Box. The machine will start and water will flow from the brine hose. Ensure water flow by checking the inlet flow meter.

Stop the machine when the brine discharge water salinity is below 1,000ppm (1,000 mg/L).



Fresh Water Flushing - **AC** System

It is always a good idea to flush the watermaker after each production cycle. If the system is not used to make water the flush process should be repeated once every 3-5 days, depending on climate (shorter cycle in warm climates) to prevent bacteria growth.

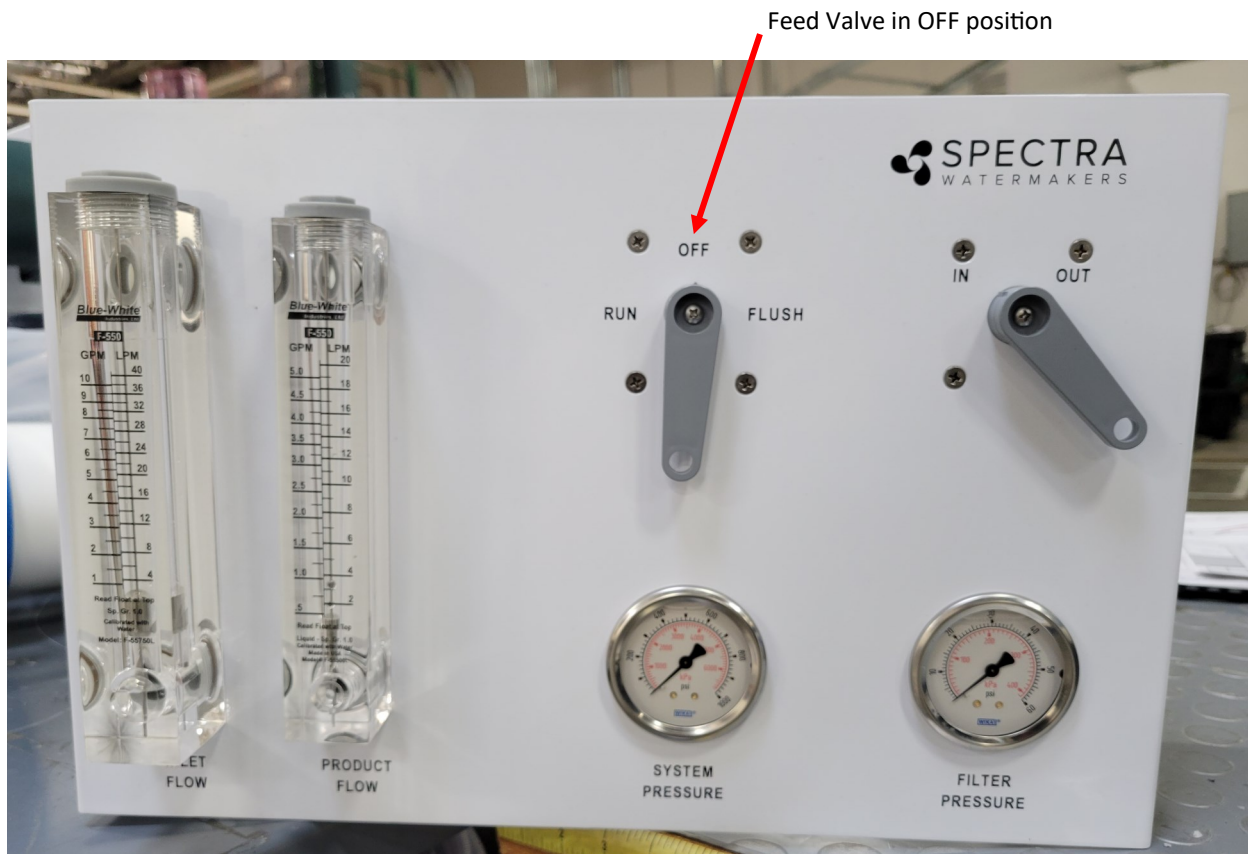
Turn off the feed water supply pump and close the Feed valve (OFF).

The pressure relief valve can remain closed.

Turn the Feed Valve to the FLUSH position.

The machine will start and water will flow from the brine hose.

Stop the machine when the brine discharge water salinity is below 1,000ppm (1,000 mg/L).



Maintenance

General

In installations where the unit is running 24/7 it is prudent to perform a weekly visual inspection. Pressures and flow rates should be recorded in the log for reference.

Repair any leaks as soon as possible. Periodically inspect the entire system for leaks and any chafing on the tubing and hoses. Check for corrosion around the fittings. If any rust or corrosion appears around fittings, remove, clean, and reassemble the fitting. Rust is a sign of crevice corrosion inside the fitting and must be dealt with promptly or the fitting will fail.

Some salt crystal formation around the layers of the Pearson Pump mating surfaces is normal. Wash down any salt encrusted areas with a damp cloth. Keep the all the watermaker components clean, dry, and salt free.

Pearson Pump Maintenance Intervals

The high & low pressure seals should be replaced every 2500 hours. This can be done with the pump in place in about one hour. Inspect belt drive for wear and replace as indicated.

The Pearson Pump head should be rebuilt at 10,000 hours of operation. This can typically be done in about three hours.

The 5 Micron Filter

A clogged prefilter will cause the controls to shut down the watermaker. **Avoid letting the filters to get so dirty the unit shuts down automatically.**

After a filter change it may be necessary to expel the air from the feed line using the purge button, located on top of the filter housing.

When the system is put into storage, remove, rinse, and re-install the 5 micron filter dry to impede corrosion.

The 5 micron filter must be properly maintained to protect the Spectra Pearson Pump. Use only Spectra approved filters.

Use food-grade silicone grease on the O-ring to ensure a proper seal between the filter bowl and lid.

Do not use any petroleum based product, such as Vaseline or mineral oil, as it will cause the filter housing bowl to fail.

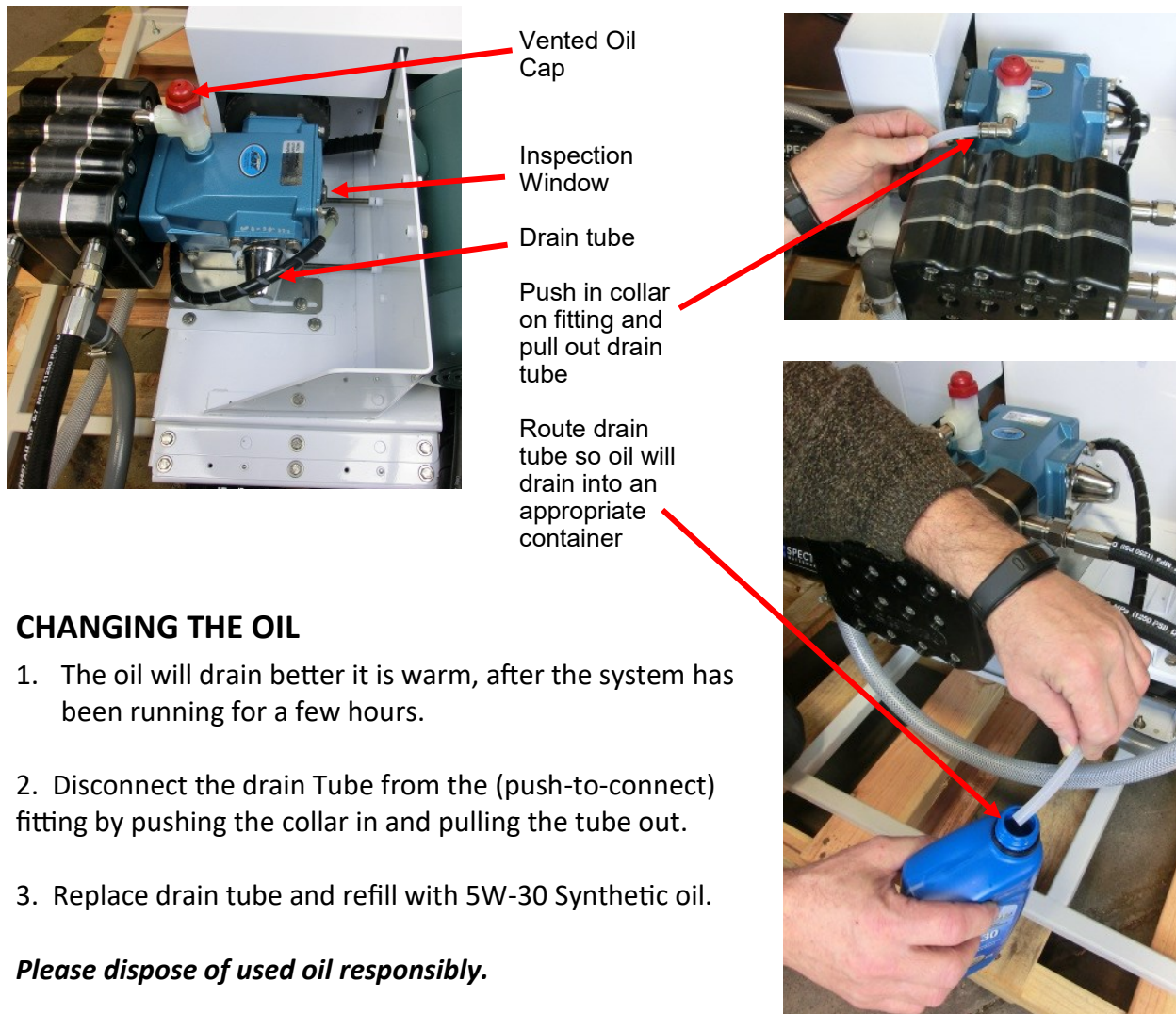
Maintenance - Cont.

GEARCASE LUBE OIL

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

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

The oil in the crankcase should be changed every 5,000 hours or when the oil appears milky. Note that if the oil appears milky it is time to change the seals as water is getting into the crankcase from the pump head. There is an inspection window on the back side of the crankcase that will show the oil level and condition.



CHANGING THE OIL

1. The oil will drain better if it is warm, after the system has been running for a few hours.
2. Disconnect the drain Tube from the (push-to-connect) fitting by pushing the collar in and pulling the tube out.
3. Replace drain tube and refill with 5W-30 Synthetic oil.

Please dispose of used oil responsibly.

Long Term Storage

If the machine will not be used for more than five days it should be treated with preservative. Spectra Watermakers Preservative SC-1 powdered preservative may be used if there is no danger of freezing. **Do not use other brands of preservative, they will damage the equipment!** If there is danger of freezing Propylene Glycol potable water antifreeze should be used instead of Spectra Watermakers SC-1. **The Pressure Relief Knob on the Spectra Pearson Pump must be open one full turn while circulating preservatives or cleaning compounds!**

Spectra SC-1 is a special storage compound used by the US Navy. It is formulated to be compatible with the modern engineering plastics and composites in the Spectra pumps. Do not use any substitute except propylene Glycol, and SC-1 Storage Compound. SC-1 has to be mixed at a ratio of one Spectra SC-1 container to 3 gallons (12L) of fresh water to have the proper solution. An average of 6 gallons (22L) of water is already in the system which has to be figured in the mixture ratio. Then add 3 gallons of fresh unchlorinated water to the inlet, totaling 9 gallons of water volume. Three packets of SC-1 to the 9 gallons of water is considered a proper ratio of SC-1 to water.

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

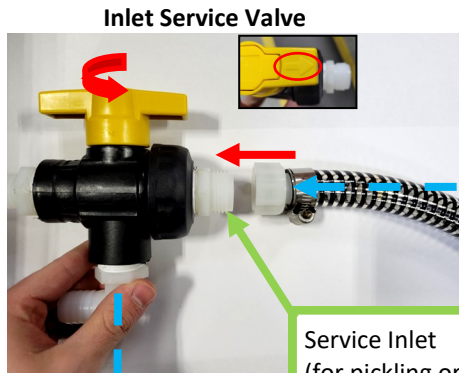
Attach the intake and discharge service hoses to the corresponding connectors on the service valves. Place the intake service hose and the brine discharge service hose into the bucket with the storage chemical mixture.

Open the pressure relief valve on the Spectra Pearson Pump.

- 1.
2. Turn the 'Flush' switch up to the 'On' position. The preservative will begin to circulate. Circulate the solution for about ten minutes.
3. Push the Stop button. Remove the brine hose from the bucket and put it in a drain.
4. Turn on the 'Flush' switch again. The machine will pump the remaining solution to the drain.
5. Turn the flush switch to the 'Off' position when the bucket is empty.
6. **Leave the pressure relief knob open.** The watermaker can now be stored for up to six months. If the machine has not been used for six months the preservative procedure should be repeated.

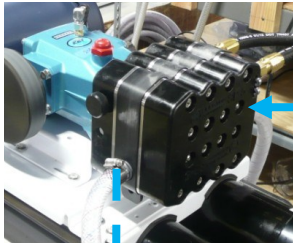
Long Term Storage Connection Guide

Connect the 3/4" Suction Hose in the Service kit to the Service Inlet on the 3-Way Ball Valve. Turn the arrow on the yellow handle so that the arrow now points toward the Service Inlet.



Service Inlet
(for pickling or cleaning)

Place one end of the suction hose in a 5 gallon bucket of the pickling solution so long as the bucket is within one or two feet of the Service Inlet. The Pearson Pump will only provide minimal suction.

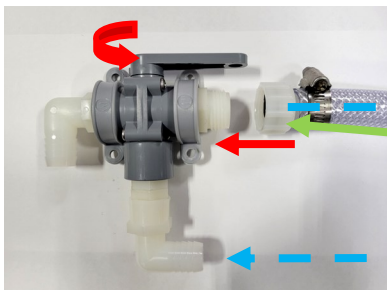


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**Note: You will need to disconnect the hose from the Inlet Service Valve to the Prefilters. Connect the end of the hose that was previously connected to the Prefilter hose barb to the hose barb on the Pearson Pump Inlet.



Connect the 3/4" vinyl hose to the Service Return. The lever on the 3-Way Valve **must** be pointing toward the Service Return. Place the other end in the 5 gal bucket.



Service Return
(for pickling or cleaning)

Storing with Antifreeze (Winterizing)

Antifreeze System Flushing Instruction

Preparation:

- Ensure the system has been thoroughly flushed with fresh water.
- You will need approximately 5 US gallons (20 liters) of propylene glycol potable water antifreeze*.

Initial Setup:

- Open the pressure relief knob.
- Attach the intake and discharge service hoses to the corresponding connectors on the service valves.
- Place the intake service hose into the bucket with the propylene glycol.
- Lead the brine discharge service hose to a drain.

Flushing Process:

- Turn the 'Flush' switch on the control box to the 'On' position.
- Water will begin to flow out of the brine hose into the drain.
- When antifreeze begins to come out of the brine hose, turn the 'Flush' switch to the 'Off' position.
- Place the end of the brine hose in the bucket with the propylene glycol.
- Turn the 'Flush' switch on again to begin circulating the antifreeze.
- Circulate the antifreeze for 10 minutes.

Final Steps:

- Turn the 'Flush' switch off.
- Put the end of the brine hose to the drain again.
- Turn on the 'Flush' switch to pump the antifreeze in the tank into the drain.
- Turn the 'Flush' switch off when the bucket is empty.
- Leave the pressure relief knob open.
- The 5-micron prefilter can be removed, and the filter housing left empty at this point**.

***Use the most concentrated formula propylene glycol available, –100 formula or greater concentration.**

****Be sure to replace the 5-micron filter before running the system again.**

The Membranes

Membranes need to be cleaned only when feed pressures have risen 10% or production has dropped 10% *due to fouling*, or if the product quality degrades. Causes of fouling are: Biological growth that occurs when the system is left unused without flushing or pickling, mineral scaling if the feed water contains carbonates, sulfates, silicates or other sparingly soluble salt, or Colloidal particles can also clog the membrane. Monitor and keep a log of the product salinity and feed pressure for higher than normal readings for the conditions. Look for all other causes before cleaning the membrane, i.e. feed water temperature and salinity, pump speed, hose restrictions as Membrane life can be shortened by unnecessary cleaning.

There are two types of cleaners: acid and alkaline;

- Acid cleaner (SC-3) will remove mineral scaling.
- Alkaline cleaner (SC-2) is used to remove biological by-products, oil, and dirt particles that get past the prefilters.

The acid cleaner should be used first. If the membrane fails to respond to both cleanings, this is an indication of another problem with the system, or that it is time to replace the membrane. Contact Spectra Watermakers before removing a membrane.

Membrane Cleaning

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

For normal cleaning, the SC-3 Acid Cleaning Compound is used first, then the SC-2 Alkaline Cleaning Compound. If known bio-fouling is present, the SC-2 may be used first. Using warm water if possible, up to 120°F (50°C) is recommended as it greatly enhances the ability of the cleaners to do their jobs.

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

Spectra Cleaning Compounds (SC-2 or SC-3) must be mixed with unchlorinated fresh water at a ratio of 1 container of compound to 3 gallons (12L) of water to have the proper solution. About 4 gallons (16L) of water is already present inside a Land Based Modular system. This water has to be figured into the mixture. An LB Modular system will use 2 containers of compound.

SC-2 and SC-3 are never mixed together. Do not use them for storage pickling solution.

Cleaning Procedure:

You will need 5 gal (20 L) of chlorine free water and the system must have already been thoroughly flushed. 1 lb. (.5 kg) of Spectra Watermakers cleaning chemical into the water and stir. It will dissolve in about an hour. Some of the chemical may not dissolve completely, this is normal.

Position a bucket as high and as close as possible to the Spectra Pearson Pump. Do not perform this procedure with the bucket more than 2 feet below the inlet to the Spectra Pearson Pump.

Open the Pressure Relief Valve. Install the inlet service hose and the brine discharge service hose on the corresponding service valves and lead them into the bucket containing the cleaning solution.

If possible, heat the solution to 120 F (50 C) to provide maximum cleaning power. Turn the 'Flush' switch to the 'On' position. The cleaning chemical will begin to circulate. Circulate the solution for about ten minutes.

If heating the solution is not possible, allow the system to soak for several hours. Occasionally start the pump by turning on the flush switch to agitate the solution.

When finished cleaning, remove the brine hose from the mixture and put it in a drain. Turn the flush switch on again to pump the remaining solution to the drain.

Turn the 'Flush' switch off when the bucket is dry.

Remove and replace intake hose so the system is now setup for normal operation.

When putting the system back into service, follow the Purge instructions for New System Startup.

Spectra Watermakers Troubleshooting Procedures

Symptom	Probable Cause	Remedy
Spectra-Pearson Pump knocks and bangs loudly	Air in system Boost Pressure too high or too low	- check feed water delivery system and pressure - adjust feed pressure
System will not stay running or stops for no reason	Insufficient feed pressure, low pressure switch stops unit <10psi	- filter clogged - feed pump not running - adjust feed pump speed or pressure regulator
System will not start or will not stop running	Faulty pressure switch	-replace pressure switch
System not making water	Pressure relief valve open	- close pressure relief valve

Specifications

Power consumption will vary with changes in feed water flow rate, salinity and temperature.

On standard seawater the 1800 will draw ≈800 watts and the 2800 will draw ≈1200 watts. The boost pump for the feed will typically draw 150 to 300 watts depending on the lift and distance required for pipe runs.

Electrical Input (AC single phase)

240 volt systems: 208, 220, 230, 240 volts 50/60 Hz

110 volt systems: 110, 115, 120 volts 50/60 Hz

24 and 48 VDC systems:

Feed Water Supply - Do Not Exceed Factory Recommended Max/Min values

Minimum Pressure: 10 psi, (0.7 bar)

Maximum Pressure: 20 psi, (1.4 bar)

Recommended Flow Rate: 6 gpm (22 lpm)

Total Dissolved solids: 0-45,000 mg/L

pH range: 4-11

Continuous free chlorine: 0 ppm

Temperature: 0° to 45° C

Turbidity: 1 NTU max

Silt Density Index: 1 max (after pre-filtration)

Product

Salt Rejection: 99.5%

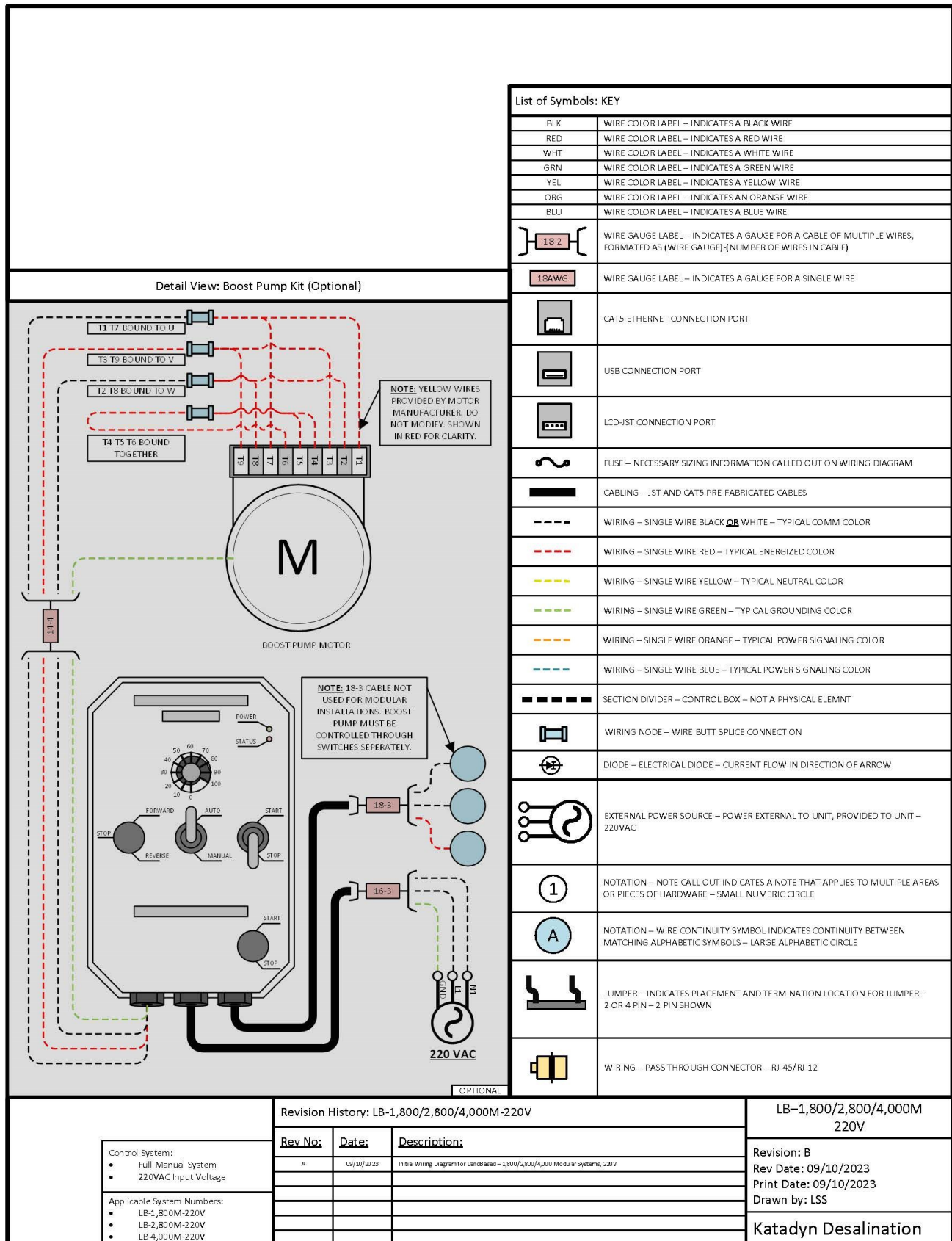
Flow: 1800—1.25 gpm, (4.8 lpm), 2800 1.9 gpm (7.2 lpm)

Lubricant:

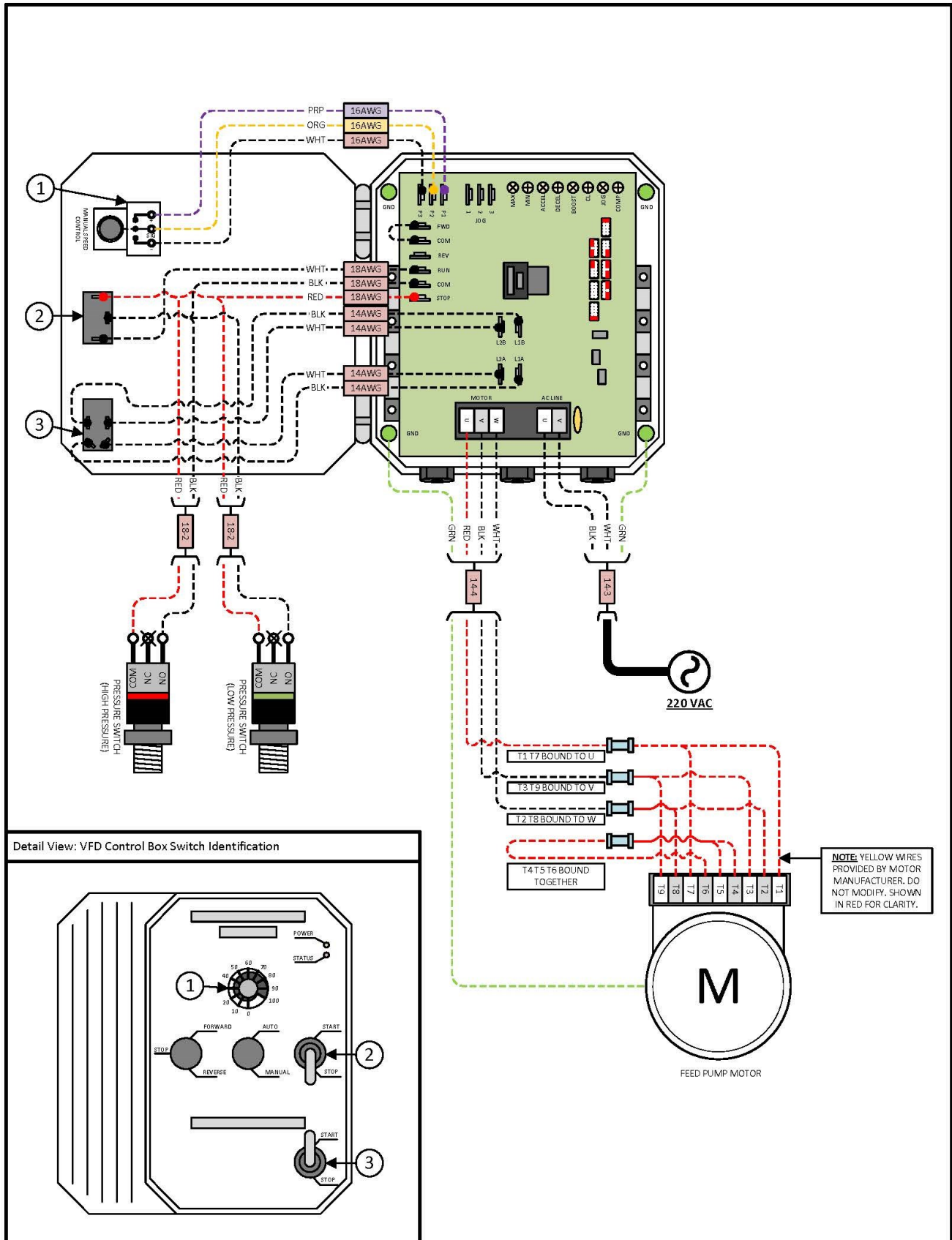
O-rings and seals: Dow Corning Silicon Grease

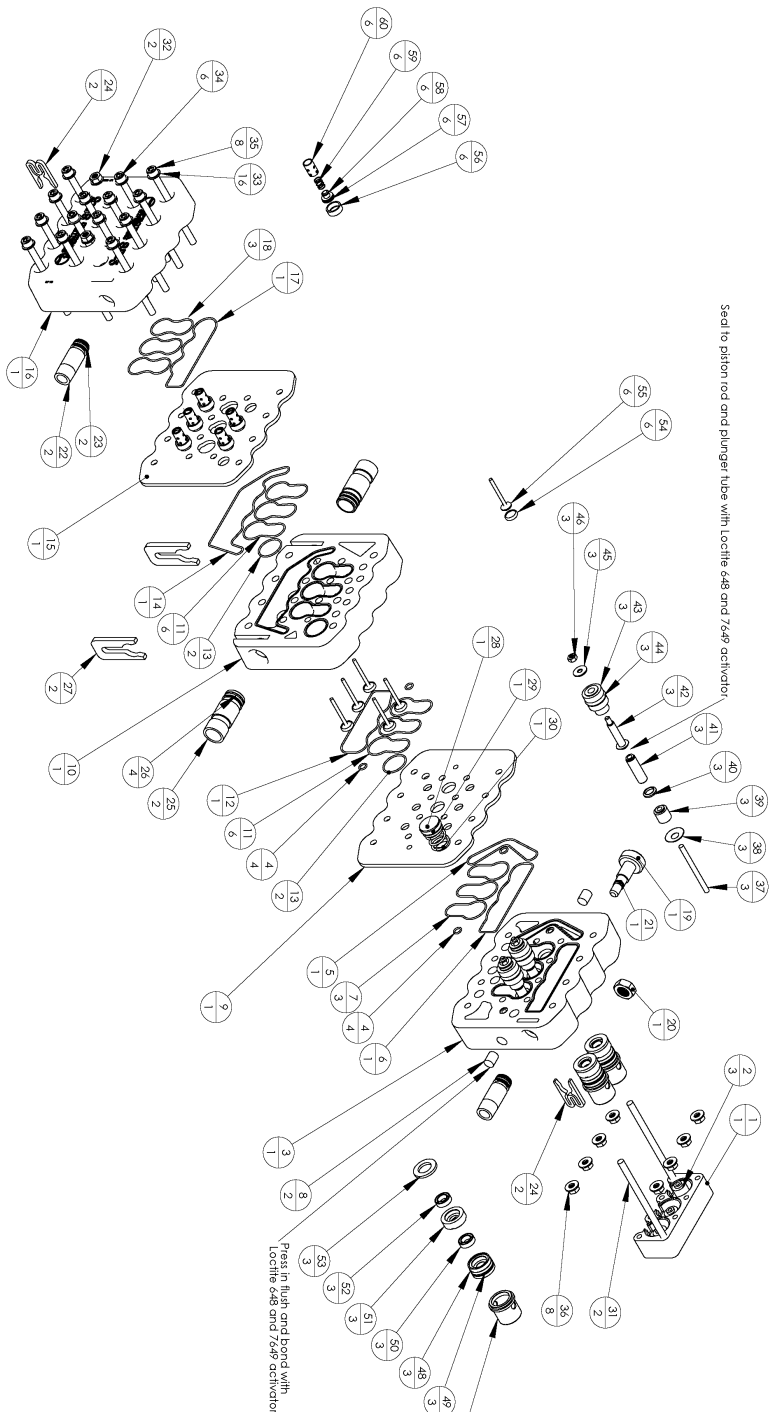
Crank Case: 5W-30 or equivalent synthetic motor oil

AC Wiring (220V) - LB 1800/2800/4000



AC Wiring (220V) - LB 1800/2800/4000



[illegible]

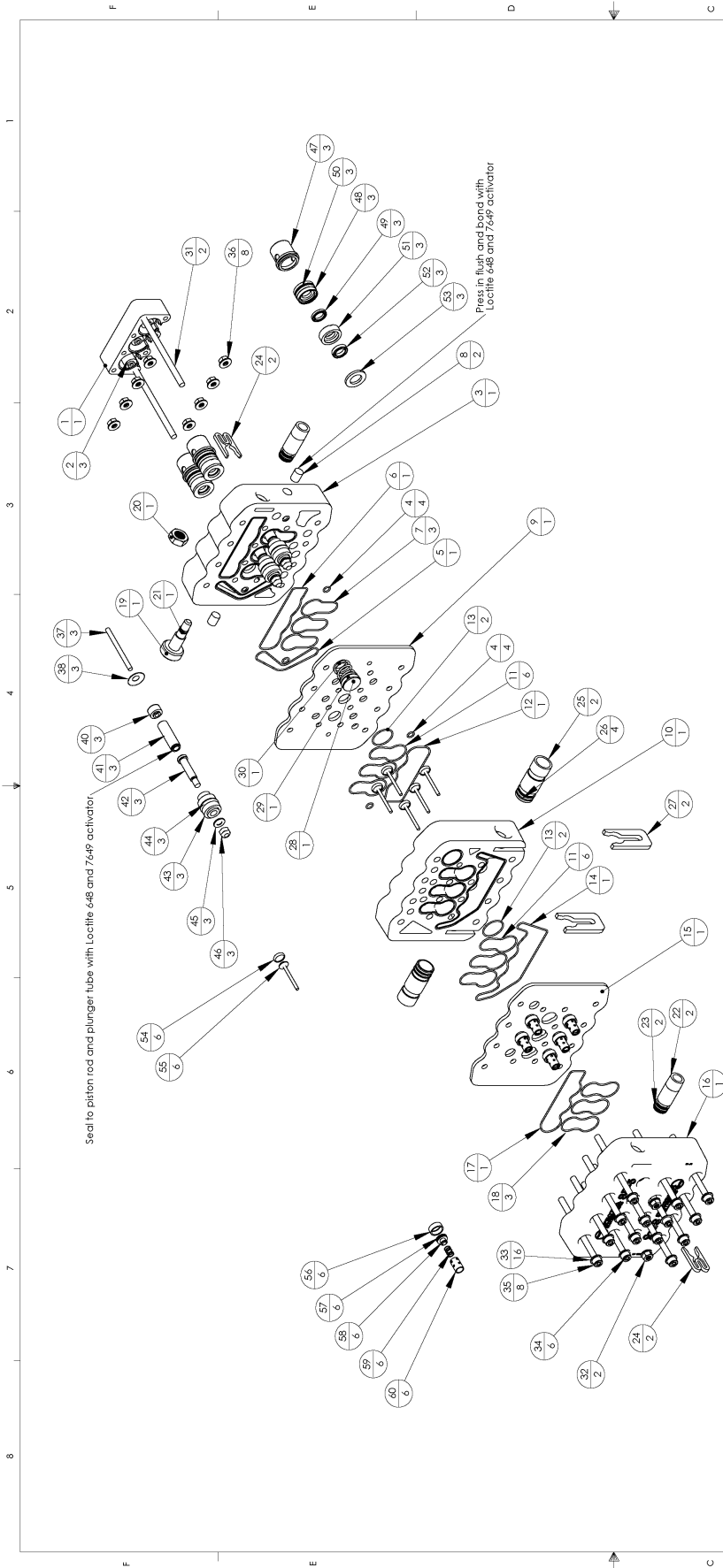
SP5M 5CP Assembly 20% Rev D Exploded

Contact	Spectra Watermakers
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Phone	(415)-526-2780
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E-mail	customerservice@spectrawatermakers.com
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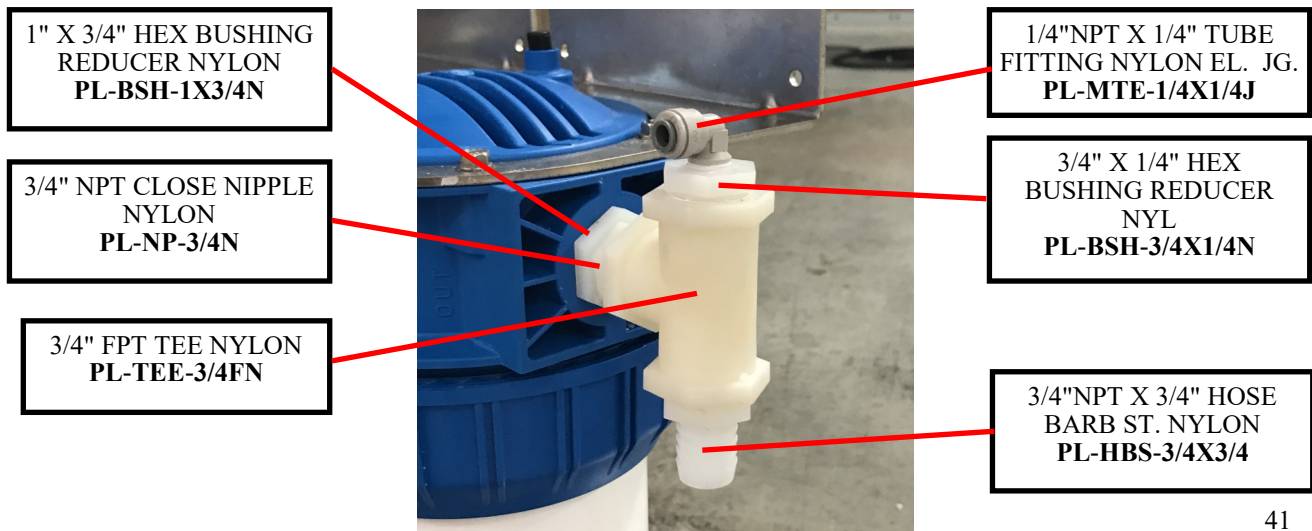
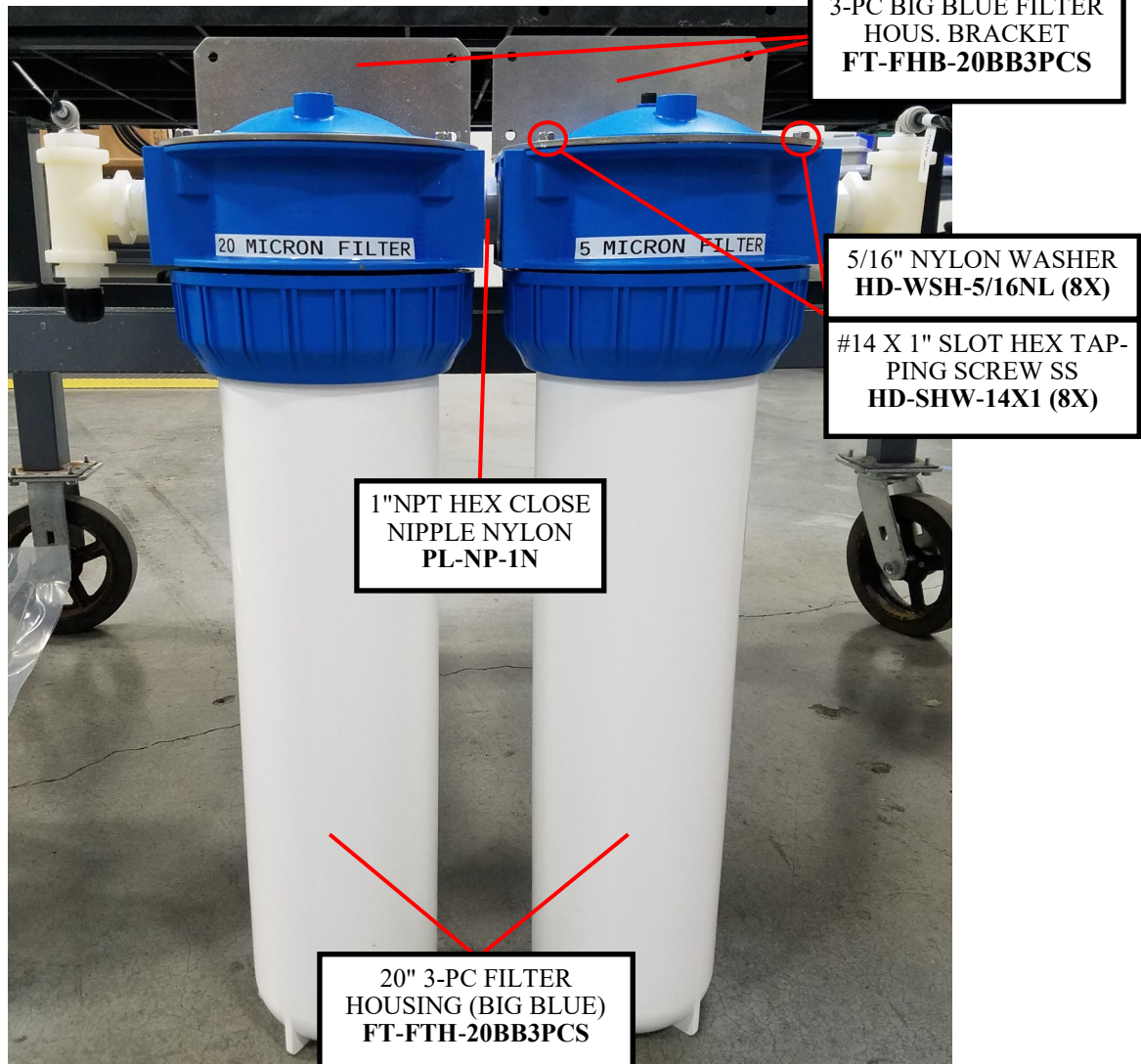


ITEM NO.	Part Number	QTY.	Description	ITEM NO.	Part Number	QTY.	Description	ITEM NO.	Part Number	QTY.	Description
1	PP-5MCP-CCAC	1	PP5M CRANK CASE DRIVE/END CAT	21	SO-PP20-RV	1	PP5M O-RING RELIEF VALVE .012 N70	42	PP-5MCP-PT-RD3	3	PP5MCP PISTON ROD 30% REV B
2	NO PART #1	3	CAT SCP CROSSHEAD	22	PP-5MFT-12JMC	2	PP5M FITTING TUBE 1.2 IN JIC 37DEG	43	PP-5MCP-PT-P73	3	PP5MCP 5CP PISTON 30% REV A
3	PP-5MCP-LY1	1	PP 5MCP LAYER 1	23	SO-PP5-CP	2	PP5M FITTING O-RING 1.2 IN 017 NBR	44	SO-PP5-PD	3	PP5M O-RING PISTON/DAMPER .313 N70
4	SO-PP20-FLUSH	4	PP5M O-RING FLUSH 011 NBR SHORE 70A	24	PP-5MFT-12HPC	2	PP5M FITTING CLIP 1/2 IN HP REV A	45	PP-5MCP-HWR-M8W	3	M8 WASHER 316 SS
5	SO-PP5-WP	1	PP5M O-RING L1 RELIEF .041 N70	25	PP-5MCP-LP54NU	2	PP-5MCP-LP FITTING 3/4 NPT UHMW	46	PP-5MCP-HWR-M8N	3	M8 NYLOCK INSERT LOCK NUT 316 SS
6	SO-PP5M-L1RJ	1	PP5M O-RING L1 REJECT .043 N70	26	SO-PP20-HPF	4	PP5M FITTING O-RING 3.4IN .020 N70	47	PP-5MCP-SEAL-RT	3	PP5MCP 5CP LP SEAL RETAINER REV A
7	SO-PP5-CPL V4	3	PP5M O-RING L1 CYLINDER .031 N70	27	PP-5MFT-34LP	2	PP5M FITTING CLIP 3.4IN LP REV A	48	PP-5MCP-SEAL-L3	3	PP5MCP 5CP LP SEALCASE 30% REV A
8	PP-5M-LY1P	2	PP5M LAYER 1 PLUG REV A	28	PP-5-DOP-PT	1	PP DAMPER PISTON	49	SO-PP5-LP330	3	PP5 LP SEAL 30%
9	PP-5MCP-LY2	1	PP 5MCP LAYER 2	29	SO-PP5-PD	1	PP5M O-RING PISTON/DAMPER .313 N70	50	SO-PP5-DPP	3	PP5 SEAL CASE .023 N70
10	PP-5MCP-LY3	1	PP 5MCP LAYER 3	30	PP-5MCP-DS	1	PP5M DAMPER SPRING	51	PP-5MCP-SEAL-H3	3	PP5MCP 5CP HP SEAL CASE 30% REV A
11	SO-PP5-CPL V4	6	PP5M O-RING L3 CYLINDER .031 N70	31	PP-5MCP-MBX150	2	PP 5MCP MB X 150 STUD REV A	52	SO-PP5-HP530	3	PP5 HP SEAL 30%
12	SO-PP5M-L3WST	1	PP5M O-RING L3 WASTE .042	32	PP-HWR-HN-M8	2	M8 HEX NUT 18-8	53	PP-5MCP-SEAL-W2	3	PP5MCP 5CP HP SEAL WASHER 20% 30%
13	SO-PP5M-L3DP	2	PP5M O-RING L3 DAMPER .024 N70	33	PP-HWR-W5-M8	16	M8 WASHER 18-8	54	PP-5-VLV-LV	6	PP5 PUMP VALVE SHOE
14	SO-PP20-LY1HP	1	PP5M O-RING L3 IN .048 N70	34	PP-5MCP-SCMB140	6	M8 X 140 SKT CAP SCREW 18-8	55	PP-5-VLV-LV	6	PP5 PUMP VALVE
15	PP-5MCP-LY4	1	PP 5MCP LAYER 4	35	PP-HWR-SC-MB120	8	MBX120MM SOCKET CAP SCREW 18-8	56	PP-5-VLV-SLV	6	PP5 VALVE SLEEVE STEPPED
16	PP-5MCP-LY5	1	PP 5MCP LAYER 5	36	PP-HWR-HN-F18	8	M8-1.25 FLANGE NUT 18-8 SS	57	PP-5-VLV-LV	6	PP5 VALVE PLUG .013 N70
17	SO-PP5M-L1RJ	1	PP5M O-RING L5 OUT .043 N70	37	PP-5MCP-PG-ST	3	PP5MCP 5CP PLUNGER STUD REV B	58	PP-5-VLV-APG	6	PP5 VALVE PLUG .0508 GROOVE
18	SO-PP5M-L5CVL	3	PP5M O-RING L5 CYLINDER .032 N70	38	PP-5MCP-KW	3	PP5MCP SLINGER WASHER LARGE REV A	59	PP-5-VLV-SPR	6	PP5 VALVE SPRING
19	PP-5M-RS	1	PP5M RELIEF SCREW REV C	39	SO-PP5MCP-KW	3	CAT SCP KEYHOLE WASHER 45697 REV A	60	PP-5-VLV-VG	6	PP5 VALVE CAGE
20	PP-5M-RN	1	PP5M RELIEF NUT 5-8	41	PP-5MCP-PD1TB30	3	PP5MCP 5CP PLUNGER TUBE 30% REV A	61			

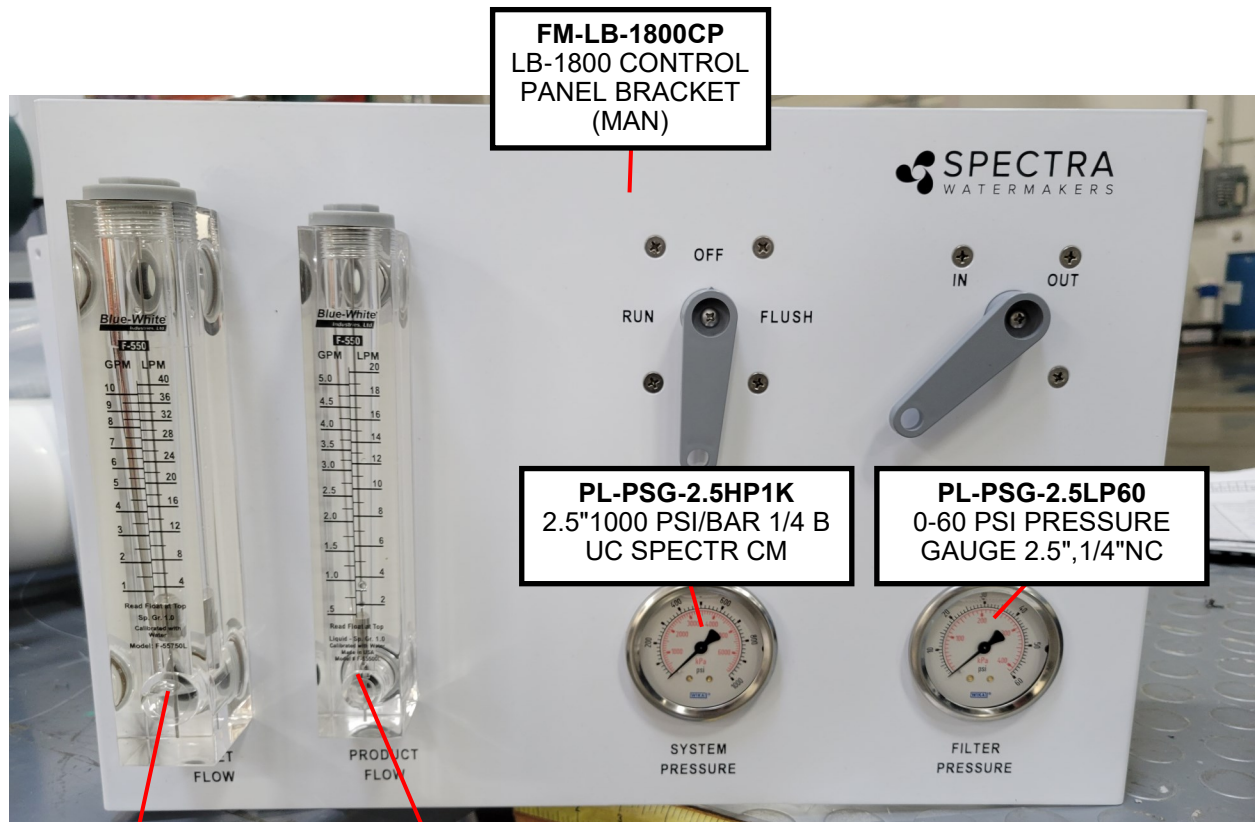
SP5M 5CP Assembly 30% Rev D Exploded													
remove all burrs and sharp edges, max. radius 0.010"													
Material													
Surface Finish													
Dimensions													
Tolerances													
SCALE: 1:10	Do not scale	Isometric Projection	Rev	Date	Purpose & Changes								
			B	110316	Layers 1, 3 & 5 use moldings from modified tool. Uses SP5 plunger tube with adaptor.								
			A		1st issue: SP5M Layer 1 Rev F, SP5M Machined Layer 3 Rev A, SP5M Layer 5 Rev E.								
SP5M 5CP Assembly 30% Rev D Exploded													
Contact: Spectra Watermakers													
Phone: (415) 525-2780													
E-mail: customerservice@spectrawatermakers.com													
						Dwg No.	2	1					
						Rev D	1	1					

LB Modular System - Parts I.D.

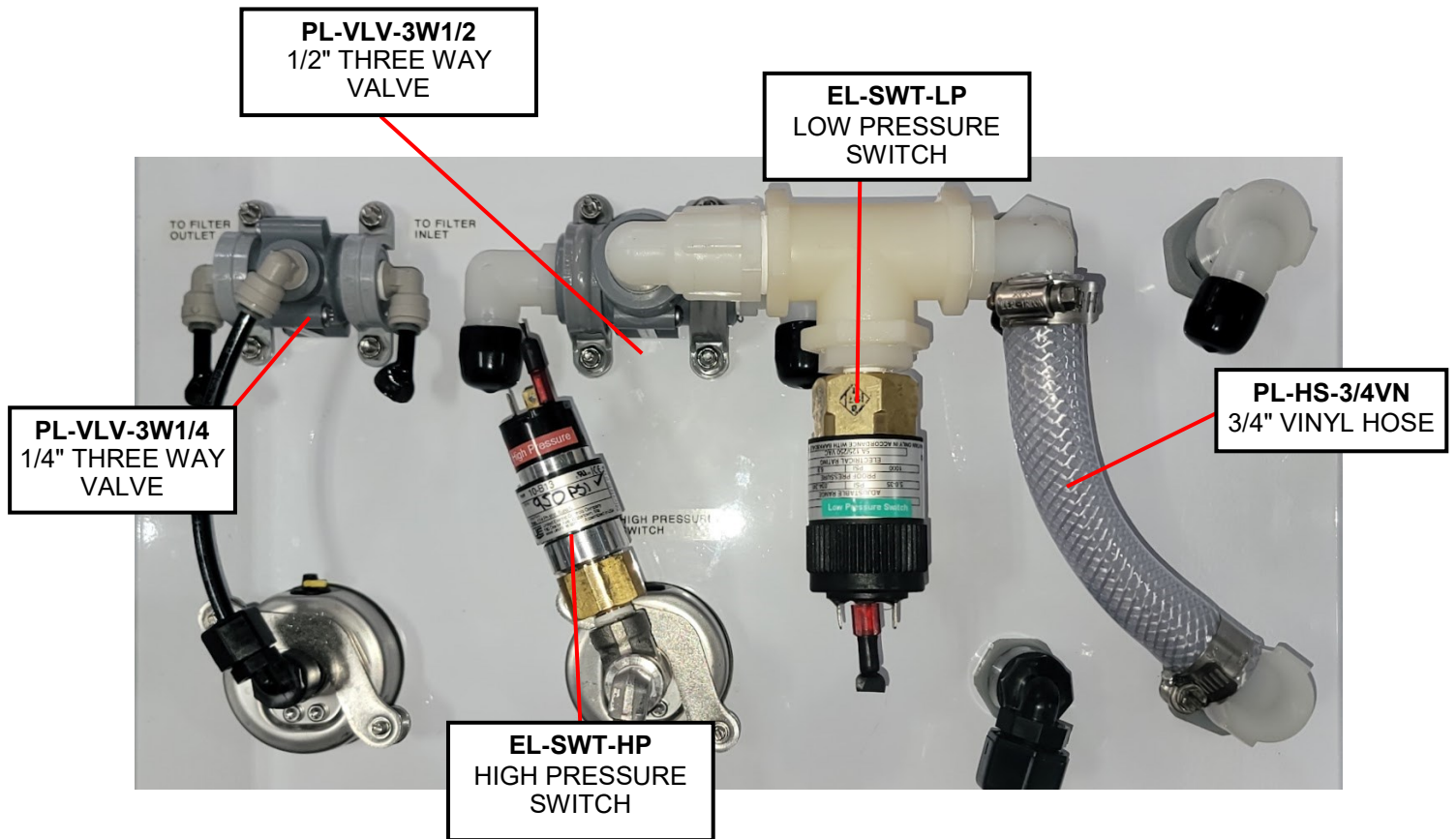
Note: Systems shown in photos may be 1800, 2800, or 4000 Modular systems. Pay attention to number of Pressure Vessels/Membranes if you need to determine what system you are viewing.



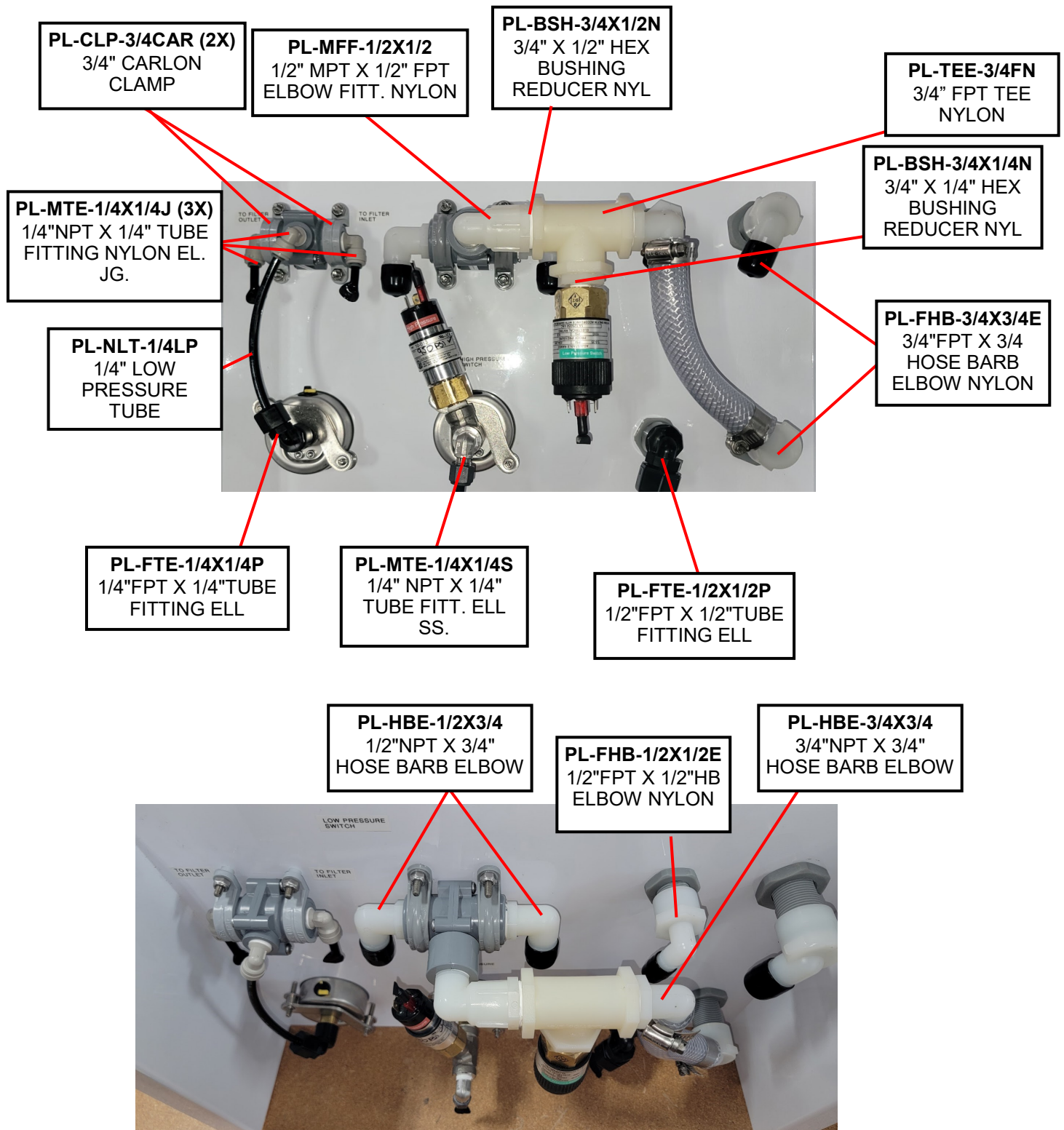
LB Modular System - Parts I.D.



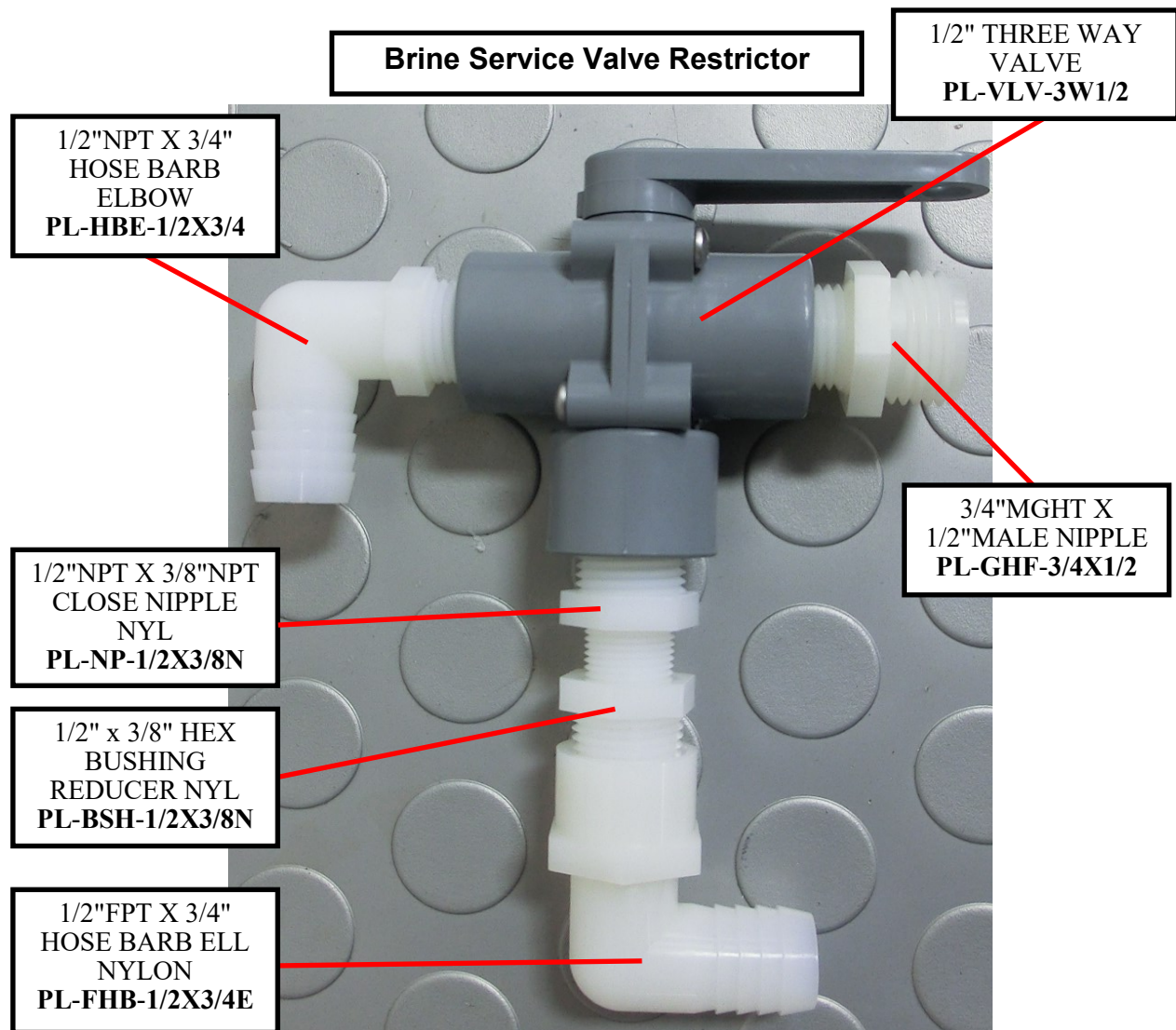
LB Modular System - Parts I.D.



LB Modular System - Parts I.D.



LB Modular System - Parts I.D.



LB Modular System - Parts I.D.

High Pressure Module

10 TOOTH LOCK
WASHER
HD-WSH-10TLO

10-24 X 3/8" PHMS
SS
HD-PMS-1024X3/8

RUBBER CUSHION
TRIM
EL-HWR-RE

1/4"-20 X 3/4" HEX BOLT
SS,
HD-BLT-1/4203/4
(x6)

1/4"-20 X 6" HEX BOLT
SS
HD-BLT-1/420X6

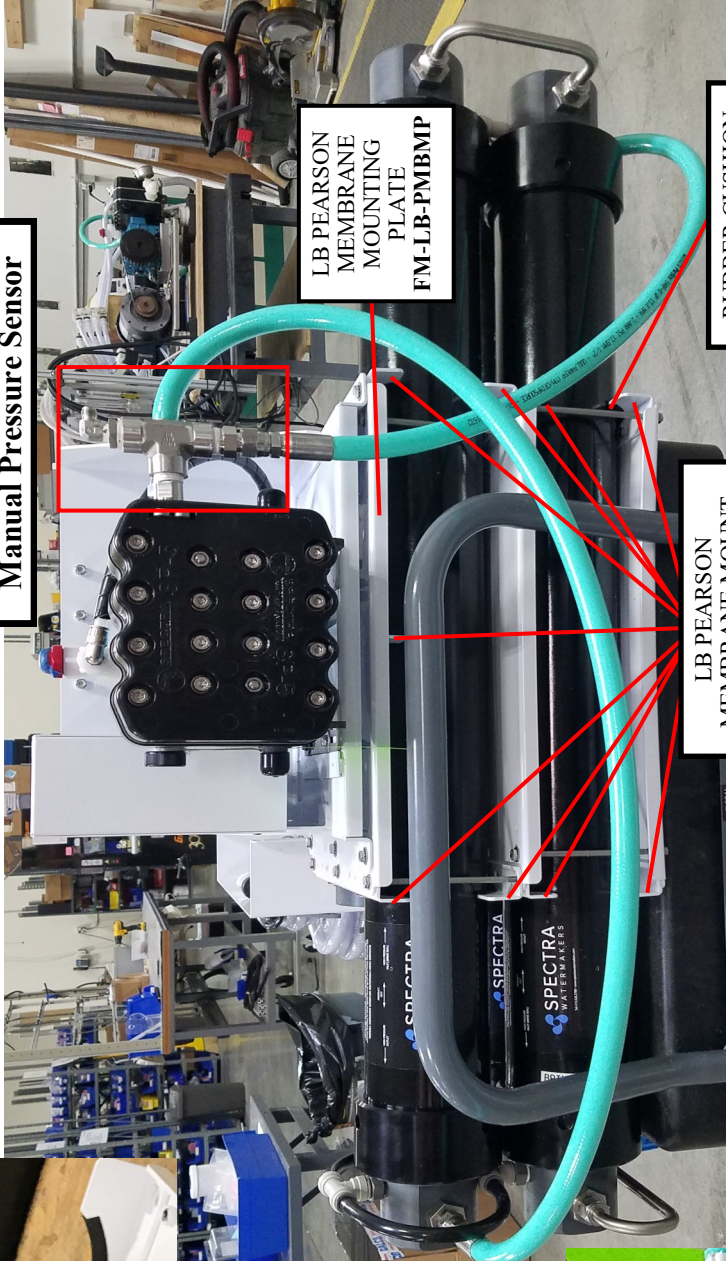
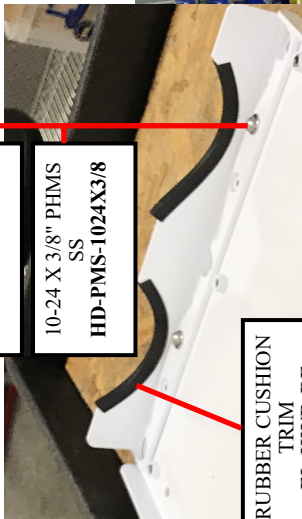
Manual Pressure Sensor

LB PEARSON
MEMBRANE
MOUNTING
PLATE
FM-LB-PMBMP

LB PEARSON
MEMBRANE MOUNT.
BRACKET
FM-LB-PMBBK (9x)

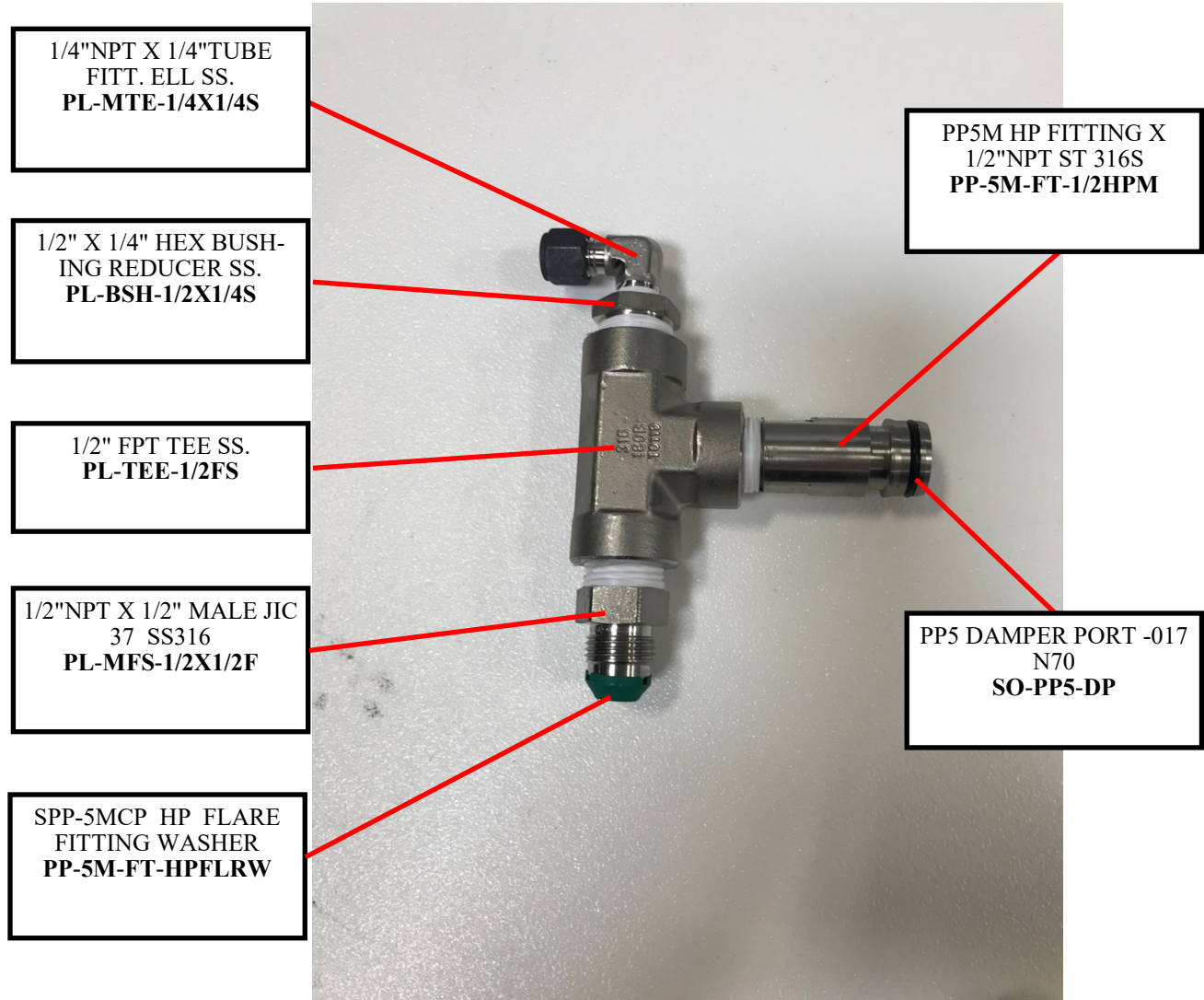
RUBBER CUSHION
EDGE TRIM
EL-HWR-RE (6FT
Total, 4.5" Pieces)

PRESSURE VESSEL
4"X40" TUBE
FT-PV-4X40
(x3)



LB Modular System - Parts I.D.

Manual Pressure Sensor



2H.P. MOTOR 220
AC 3 PH, 1750 RPM
EL-MTR-2HP220AC

4" PVC PIPE SCH 80
PL-TB-4PVC SCH80
(22.5" Long)

SPECTRA PRESSURE
VESSEL END RING 4"
FT-PV-ER4IN

4" SPECTRA END
CAP 2ND GEN
FT-PV-EC4IN2NDG

Not Pictured:
MEMBRANE SEAL
(SMALL)
SO-HPV-SMS

