



CABO 10,000

With SP-20 Pearson Pump Technology
Installation and Operating Manual



Spectra Watermakers
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Getting Started

Thank you for trusting Spectra Watermakers for your water purification needs. The Spectra Cabo-10,000 comes equipped with the revolutionary Spectra Pearson Pump, a unique high pressure pump with integrated energy recovery that allows users to purify up to 420 gallons of seawater per hour on as little as 3 Kilowatts. If properly installed and cared for, your system will provide you with years of high quality, potable, fresh water.

Please take a moment to review this manual before operating the machine and if you have any questions Contact: techsupport@spectrawatermakers.com

Parts List:

- Cabo 10,000 Watermaker
- 5 Micron Pre-filter Housing Assembly
- Power cable
- Installation manual
- Operators Log

Any shipping damage must be reported to the carrier within 24 hours of receipt, so please inspect the contents of your shipment to ensure that all parts have arrived undamaged. It is the responsibility of the receiver to report any missing or damaged parts to Spectra within one week of taking delivery. Spectra is not responsible for claims made outside this one week window .

Introduction to your System

The Spectra Cabo-10,000 watermaker is designed for use in seagoing vessels or platforms. Feed water must be supplied to the system a minimum of 20 gpm (76lpm) at ≈ 20 psi (1.4 Bar) pressure. The machine separates the feed water into two streams; product and brine. The brine stream contains the dissolved solids removed from the product water. Brine flow may be as high as 13 gpm (50L/min) and should be discharged above the waterline. The system requires a small amount of back pressure on the brine stream so plumb the discharge accordingly. Long runs in solid tubing will require a vacuum break so as to not create any suction at the brine discharge.

Cabo 10,000 frame is constructed of powder coated 304 stainless steel and must be positively fixed in place. includes the Spectra Pearson Pump, Motor and Belt drive system coupled to three 8" x 40" seawater membranes. All high pressure connections between the membranes and the pump come pre-assembled and tested. The high pressure hoses use 1" JIC 37 deg. flare fittings.

20" Pre-filter Housings are two 5 micron filter housings plumbed in parallel. The filter housing lids have a spring loaded "purge" button to released air from the filters. Do not install the filters above any electrical devices as some water will be spilled when changing the filters or purging air.

Note that filter housings should always be tightened hand tight, do not use the wrench. If the housing leaks when hand tightened then the o-ring needs to be cleaned and greased (silicone grease only). A small amount of silicone grease on the threads will also help the housing to seal by hand tightening.



Boost Pump assembly is to be installed below the water line in seagoing vessels. The pump will fail if there is any suction on the inlet so be sure the pump is completely flooded at all times. Land based systems will be supplied with Jet pump (that have a suction head limit of 10 ft.) or a well pump based on the specific customer requirements.



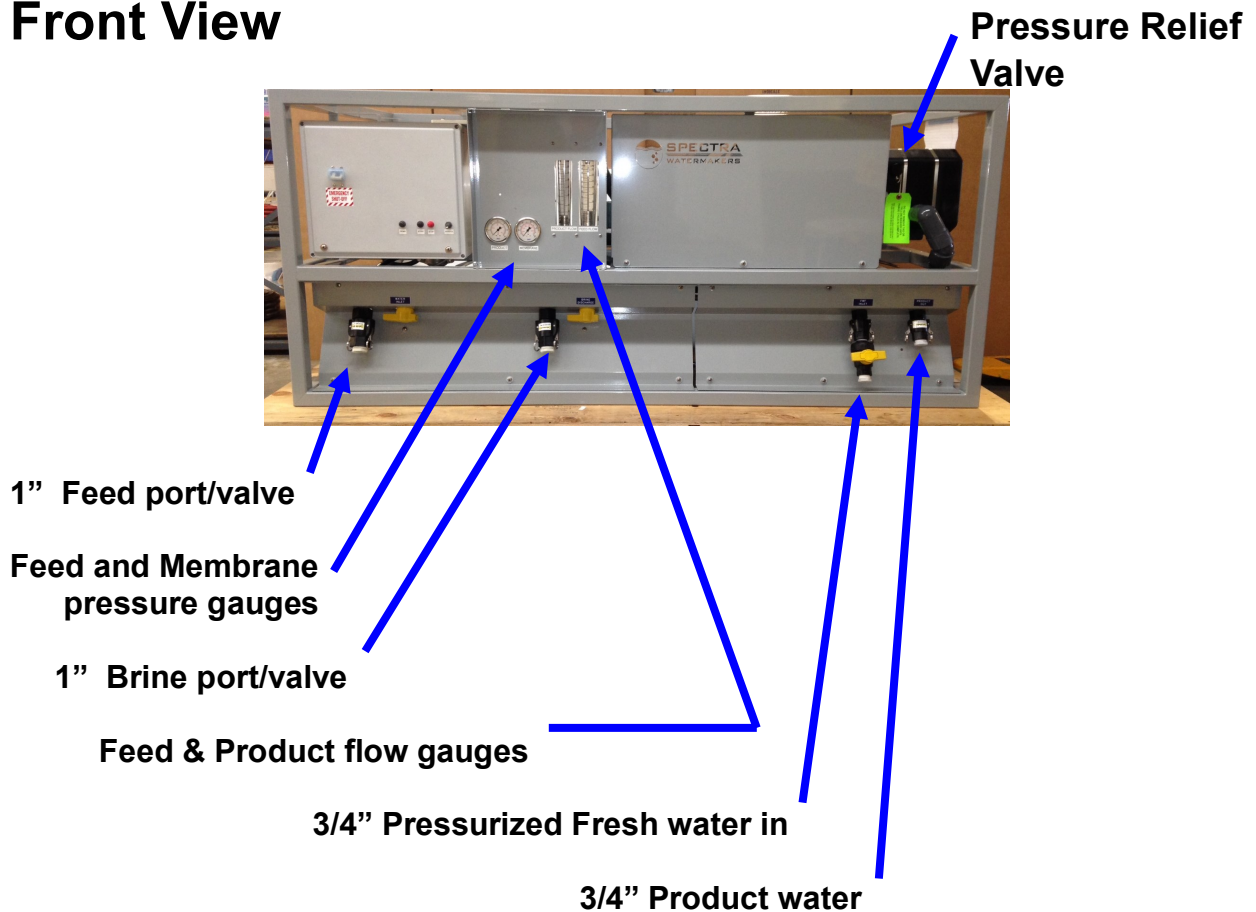
Introduction to your System, cont....

The basic system layout and controls are shown in the picture below

Control Box The molded FRP watertight box contains the speed control and the safety control circuits. This module should be kept away from any water source or where it could get sprayed or wet. Do not operate the machine with the control box open. Should the need arise to open the electrical box after installation, use caution as there is live AC in the box.

Note; For smooth and safe operation always open the pressure relief valve prior to starting or stopping the watermaker. The pressure relief valve is always open when there are chemicals in the system, failure to do so will damage the membranes.

Front View



Installation and Setup

Mounting and Service access: Your Cabo system is designed to be mounted on a level surface and properly fixed in place. There are cleats supplied with the system for mounting or holes can be drilled through the frame to bolt it into place.

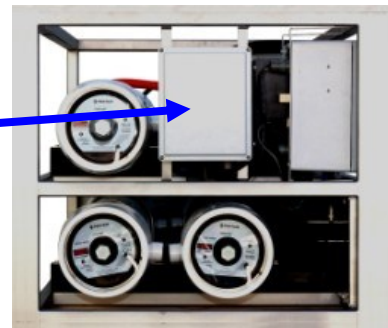
Be sure to allow for service access to the unit, we recommend:

- A minimum of 40" (1m) to the right of the unit so membranes can be changed.
- A minimum of 24" (60cm) on the front and above the unit.

Cables and Hoses: Route all hoses and power cables in the most direct route possible and do not allow hoses to kink or make excessive bends. Hoses should be supported to take any load off the fittings to reduce leaks caused by vibration. Protect all cables and hoses against chafing and size all wiring according to industry standards and local regulations. There is a 10 ft. length of SOJ power cord included (but not connected) and a strain relief built into box.

CAUTION: Undersized or improperly terminated cabling can result in serious injury or death. Always follow best industry practices when sizing, terminating, and routing cables and hoses.

Feed Water Pump: The Supplied Jet pump should be installed per the manufacturers recommendations. It is pre-wired and has a plug connector in the bottom of the feed pump control box.



An AcTech speed control for the feed pump is located in the box on the left side of the unit. There is a three position switch on the right side of the box that is; Off , full speed or variable speed. The black knob above the switch will adjust the pump speed when the switch is in the variable speed position. Full speed is intended for back-flushing the media filters.



INSTALLATION - Control System

Manual systems have simple controls, momentary buttons for priming the filters, start and stop.

The **Prime button** is a momentary switch for the feed pump (run variable speed setting).

The **Start button** does just that. You need to hold the button down until the Pearson Pump comes up to full speed.

The **Stop button** will stop the system.

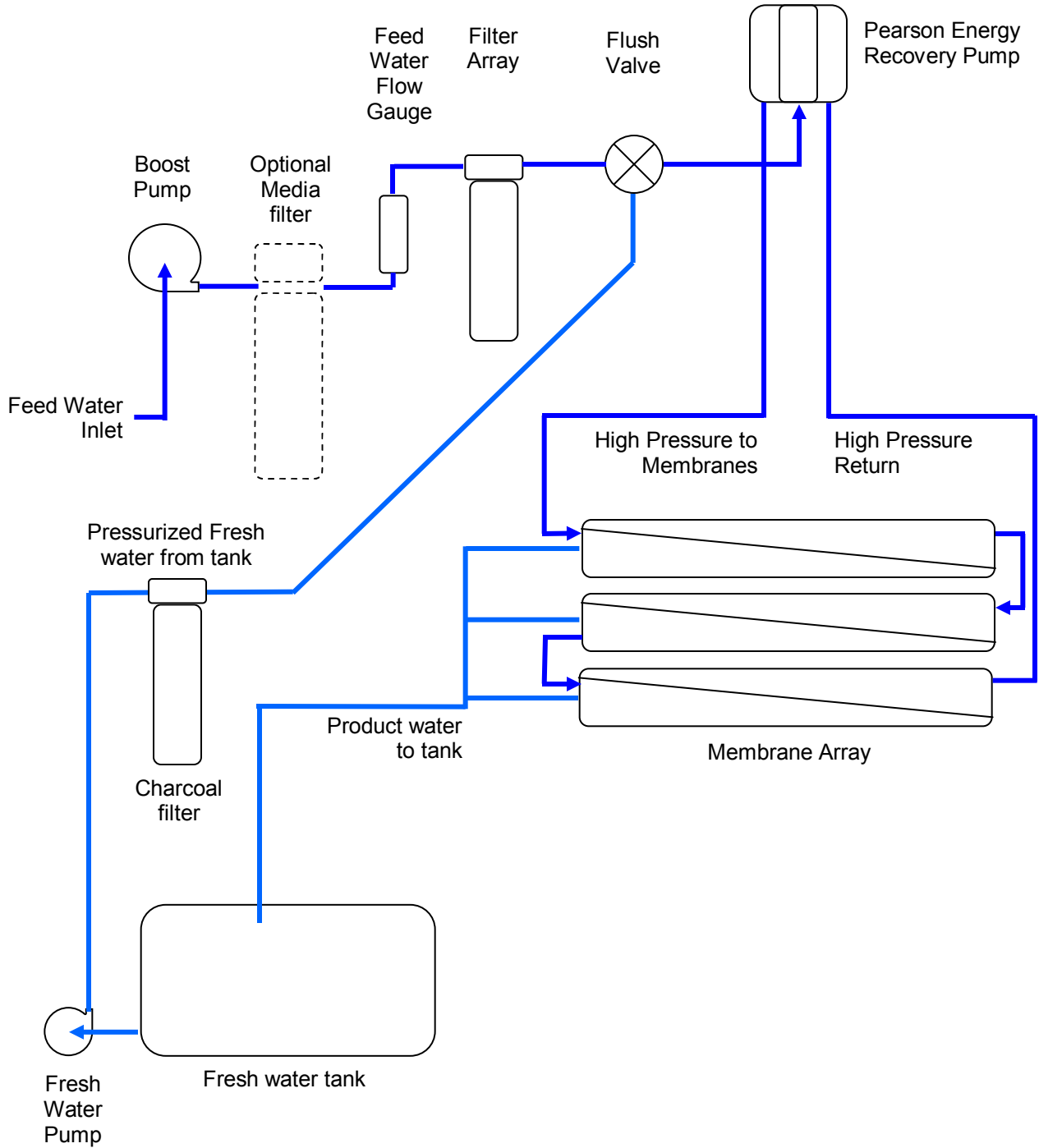
The service switch will run the Pearson Pump only (no feed pump) on service speed (about 1/2 speed or 10 gpm) for fresh water flushing, cleaning or pickling.

After the system is purged, use the brine discharge valve to restrict the flow so the **Brine Discharge Gauge** reads 20 psig (absolute pressure gauge).

There must be a vacuum break on the brine discharge line and 3 to 5 psi of back pressure on the brine discharge to allow for smooth pump operation. The valves in the Pearson Pump are opened and closed by small pressure differences and this back pressure aids the pump function. A feed pressure adjust may be necessary after the brine discharge pressure is set.



Simplified Plumbing Layout



New System Startup and Testing (Purging storage chemicals)

Use this procedure when starting a new system for the first time, when the last known state of the system is unknown, or **whenever the system contains Preservative or cleaning chemicals.**

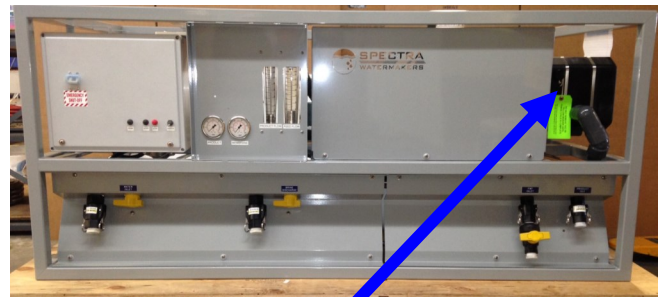
Warning! Damage will occur if the purge sequence is bypassed and the membrane is pressurized with storage chemical in it.

Note: Remove the tape over the Crankcase vent hole and check the oil level before operating the watermaker. Check the dip-stick to confirm the oil level is correct in the crankcase. Spectra recommends 76 Super Synthetic Blend SAE 5W-30 (ILSAC GF-5).

Caution; Never operate the system with the belt guard removed or the control boxes open as serious injury could occur.

1. First Check That:

- Feed water is available at the Feed Water Inlet (see page 7). Confirm both service valves are in the run position as seen in the picture at right.
- Brine discharge is connected and there are no restrictions on the line. The brine discharge will contain a small amount of propylene glycol (potable antifreeze) until the purge cycle is completed .
- Power is supplied to the control box
- The crankcase oil level has been checked
- **Pressure Relief Valve is OPEN one full turn**



2. Turn on main power switch (breaker) on control box.

- Boost pump switch to variable speed
- Adjust Feed Pump knob so there is 20 psi showing on the feed pressure gauge
- Purge filters of air



3. Start the watermaker using the Service Switch on the control box.

- Bleed air from filters during startup. The unit will be running as the service speed which is about 10 gpm of feed flow.
- Check the brine discharge for water flow. There should be no bubbles anywhere in the intake hoses and the Pearson Pump should run smoothly after priming (some knocking during start-up is normal). If the pump continues to sound rough, find the reason before continuing! Inspect the system for leaks.



New System Startup and Testing, cont...

4. Check again that air is purged from filters (buttons on top of filter housings).
5. Confirm there is water flowing from the brine discharge and **Carefully inspect for leaks over the entire system!** Shut down the system and repair any leaks you find.
6. Allow the system to complete a 30 to 60 minute purge cycle to insure all chemicals are eliminated from system (longer is always better).
7. After the purge cycle is complete, stop the system. Re-start by pressing the run button holding it down until the pump comes up to speed. Be sure the feed pump is running and adjust the speed if necessary so there is 20 psi showing on the feed pressure gauge.
8. Close the brine discharge valve slightly so the gauge shows 20 psi (absolute) of back pressure. A small amount of back pressure is necessary to allow the pump to operate at peak performance.
9. Close the pressure relief valve.
11. **Allow the system to run for an hour or so while you check for leaks.**

Note that knocking in the system indicated either incorrect feed pressure or suction on the brine discharge. If the brine discharge gauge is reading less than 15 psig or the feed pressure is less than 20 psi then an adjustment is required.**

**** This is an absolute pressure gauge that should be reading atmospheric pressure of \approx 15psig when the system is off.**

Log Book

It is highly recommended you keep an accurate daily log (or at least weekly) of the operating conditions. If any of the parameters change it may indicate that chemical treatments or mechanical repairs are required. This is one of the best tools available for troubleshooting any problems in the future.

- An increase in membrane pressure may indicate membrane fouling.
- A decrease in product water quality (higher ppm) may indicate membrane damage.
- A decrease in product water production may indicate Pearson pump damage or wear.

Normal Operation

If the system is not running and you do not know how it was shut down it is best to assume it needs to be purged. Running the system on feed water with the pressure relief valve for 20-30 minutes will clear the system of anything that would harm the membranes.

As a general rule always open the pressure relief valve prior to either starting or stopping the system. When the system is stopped let the membrane pressure drop to zero before restarting.

When in doubt open the pressure relief valve.

Over the lifespan of the system it will become important to understand the systems past performance. Many troubleshooting questions start with "how has the system been running in the past" so keeping a log of performance will be very helpful.

Log Book

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Maintenance

General

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

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

The Spectra Pearson Pump should have the plunger seals replaced annually, every 2,500 hours of operation, or when leaks are present, whichever comes first.

The 20 and 5 Micron Filters

A clogged filter will cause the controls to shut down the watermaker. Avoid letting the filters get so dirty the unit shuts down automatically and check the Prefilter pressure drop frequently during operation. Knowing the pressure drop across the filters is the best way to monitor filter loading. If you only let the pressure drop get to 5 psi you can carefully rinse the filters, let them dry and then reuse them. They will not last as long as when they are new but you can “clean” them about 3 times.

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

When the system is put into storage, remove, rinse, and re-install new dry filters to impede corrosion and fouling. Check frequently during operation.

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

Use silicone grease on the o-ring to ensure a proper seal between the filter bowl and lid. **Do not use a petroleum based product, such as petroleum jelly or mineral oil, as it will permanently damage the filter housing bowl.**

The Crankcase

Change the crankcase oil every 5000 hours or if it begins to darken in color or become milky. Milky oil indicates seal failure so replace seals if this happens. Use high quality synthetic motor oil. SAE 5W-30 or equivalent is recommended in most climates.

Belt Tension

The belt alignment and tension have been pre-set at the factory prior to shipping. Check both tension and alignment weekly for signs of wear or slipping. You should just be able to twist the belt 90 degrees when it is properly tensioned.

Replace the belt immediately if it looks worn or damaged, or if it cannot be properly tensioned.

Long Term Storage

If the machine will not be used for more than seven days it should be placed in Auto store mode or treated with preservative. Spectra Watermakers 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 while preservatives or cleaning compounds are present!**

If SC-1 chemical is to be used: You will need 1 bag of SC-1, 5 gal. (38L) of chlorine free water, and the system must have already been thoroughly flushed with fresh water. The feed water supply must be shut off.

Mix the bag of SC-1 storage chemical into a bucket of the unchlorinated water, stir until well dissolved. Warm water will allow the SC-1 to dissolve more quickly.

Attach the service hoses, place the open ends of the hoses in the bucket and turn both the service valves to SERVICE (valves in picture shown in run position)

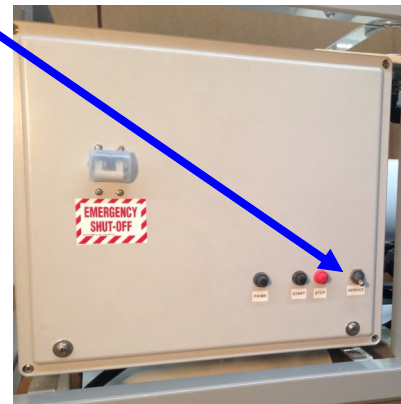
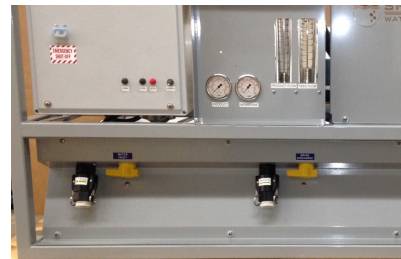
Use the Service switch on the control panel to run the pump and the preservative will begin to circulate. Circulate the solution for about 20 minutes.

Turn the Service switch to off, remove the brine hose from the bucket and put it to a drain.

Turn the Service switch to on again and pump the remaining solution out of the bucket to the drain. Turn off the Service switch before the bucket is drained.

Turn both service valves to off (vertical) so no water will circulate through the system. These valves will need to be turned to the Run position so the system is ready go through the Purge Cycle (see New System Start up) when it is time to use the watermaker again.

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.



Storing with Antifreeze (Winterizing)

You will need approximately 8 US gal (30L) of Propylene Glycol potable water antifreeze*. **The system must have been fresh water flushed thoroughly.**

Open the Pressure Relief Knob on the Pearson Pump.

Attach the service hoses, place the open ends of the hoses in the bucket and turn both the service valves to SERVICE (valves in picture shown in run position)

Use the Service toggle switch on the front of the control panel to run the pump.

Circulate the antifreeze for 20 minutes.

Turn both the service valves to the off position (vertical)

Leave the pressure relief knob open.

The prefilter housings should be drained and new filters installed.

***USE THE MOST CONCENTRATED FORMULA
PROPYLENE GLYCOL AVAILABLE, -100
FORMULA OR HIGHER CONCENTRATION.**

**We recommend a sign be placed on the frame
above the feedwater inlet and the brine discharge connections so the next
person knows what is required to restart the watermaker.**



MEMBRANE MAINTENANCE

The Membranes

- Membranes need to be cleaned only when feed pressures have risen 10% or production has dropped 10% *due to fouling*, or the product quality degrades. Causes of fouling are: Biological growth that occurs when the system is left unused without flushing or pickling, and mineral scaling if the feed water contains carbonates, sulfates, silicates or other sparingly soluble salts. Colloidal particles can also clog the membrane. Monitor 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, membrane life can be shortened by unnecessary cleaning.
- There are two types of cleaners: acid and alkaline. The acid cleaner (SC-3) will remove mineral scaling. The alkaline cleaner (SC-2) is used to remove biological by-products, oil, and dirt particles that get past the pre-filters. The acid cleaner should be used first. If the membrane fails to respond to both cleanings, this is an indication of another problem with the system, or that it is time to replace the membrane. Contact Spectra Watermakers before removing a membrane.

Membrane Cleaning

For normal cleaning, the SC-3 Acid Cleaning Compound is used first, then the SC-2 Alkaline Cleaning Compound, if necessary. 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

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

Spectra Cleaning Compounds (SC-2 or SC-3) must be mixed with unchlorinated fresh water at a ratio of two containers (16oz. Total) of compound to 10 gallons (45L) of water to have the proper solution. An LB 10,000 system has about 8 gallons of water inside it (after being flushed with fresh water so with about two gallons of water in a 5 gallon bucket you will use two containers (16oz) either of compound.

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

MAINTENANCE, cont....

Cleaning Procedure:

You will need 10 gal (38 L) of chlorine free water and the system must have already been thoroughly flushed. Mix the bag of Spectra Watermakers cleaning chemical into the water and stir until well dissolved. Some chemical may remain out of solution in the bucket, this is normal.

Open the Pressure Relief Valve on the Pearson Pump.

You will need 1 bag of the cleaning chemical to be used, 10 gal. (38L) of chlorine free water, and the system must have already been thoroughly flushed. The feed water supply must be shut off.

Mix the bag of Spectra Watermakers cleaning chemical into a bucket of the unchlorinated water, stir until well dissolved.

Attach the service hoses, place the open ends of the hoses in the bucket and turn both the service valves to SERVICE (valves in picture shown in run position)

Use the Service toggle switch on the front of the control panel to run the pump.

Circulate cleaning chemicals for up to 6 hours depending on the level of fouling present (contact Tech Support for advise on cleaning).

Turn both the service valves to the off position (vertical)

Leave the pressure relief knob open.

The prefilter housings should be drained and new filters installed.

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.

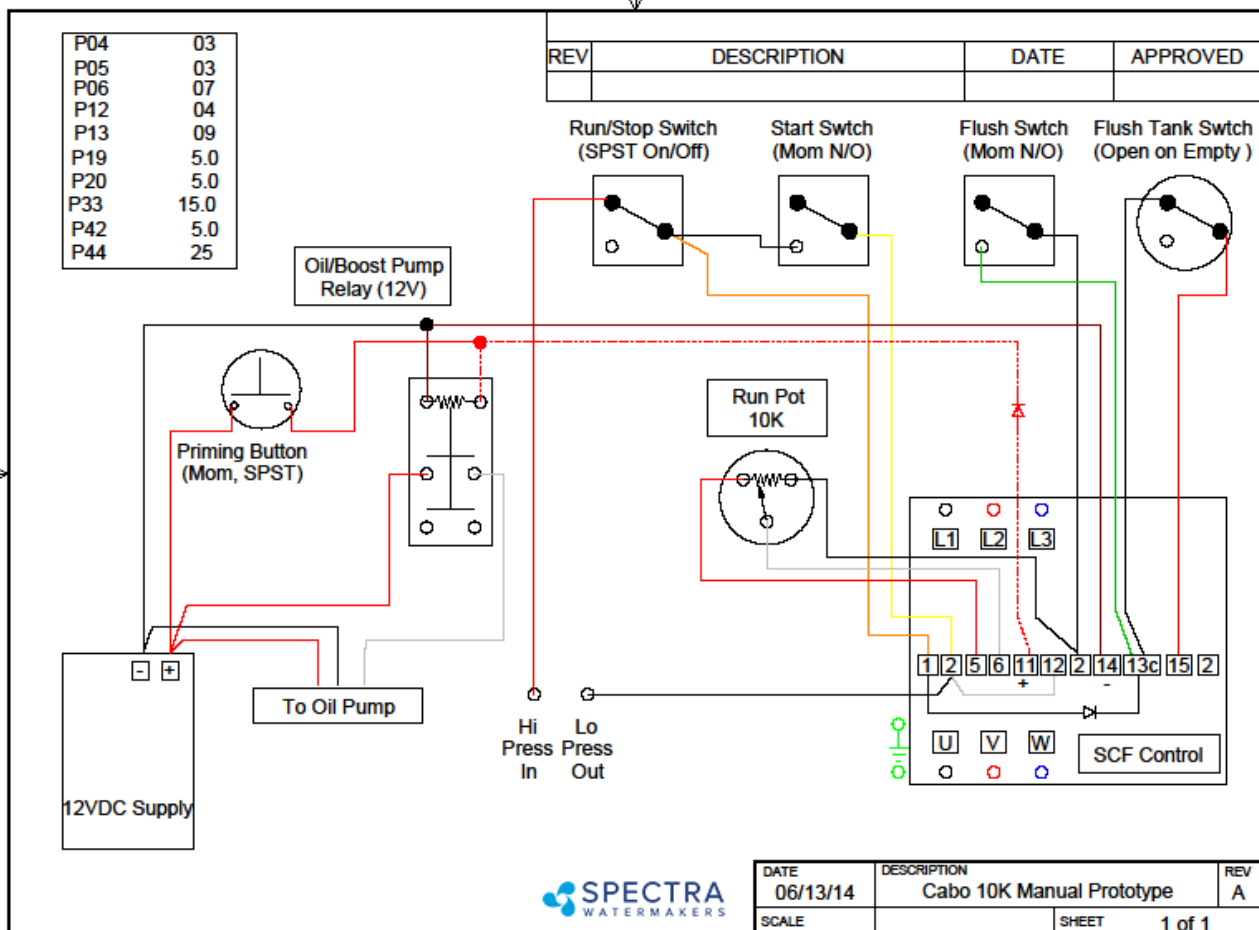


TROUBLESHOOTING

Symptom	Cause	Resolution
Pump Knocks Loudly	Incorrect Boost Pressure	Increase or Decrease boost pressure as appropriate Check Pre-filtration for blockages
	Inadequate Feed Water Supply	Check Supply Pump for proper operation and adequate flow through pre-filtration system
	Suction on brine discharge	A vacuum break (air gap) or a small restriction on the brine discharge (2-5 psi) can reduce knocking
Belt Skipping Teeth on Gear-End	Belt Too Loose	Tighten Belt
	Motor Turning Wrong Direction	Run motor in reverse direction by swapping T1 and T2 on VFD Output terminals (AC Systems Only)
Permeate Flow Decreasing	Permeate Flow Meter Not Calibrated	Calibrate permeate flow meter
	Worn High Pressure Seals	Replace seals
	Worn Damper Piston Seal	Replace Damper Piston and Seal
	Worn Piston Seals	Replace Pistons and Seals
	High Membrane Pressure	Check membrane pressure against nominal system parameters.
Recovery Ratio Increasing	Worn Pistons	Replace Pistons and seals
	Permeate Flow Meter Not Calibrated	Calibrate permeate flow meter

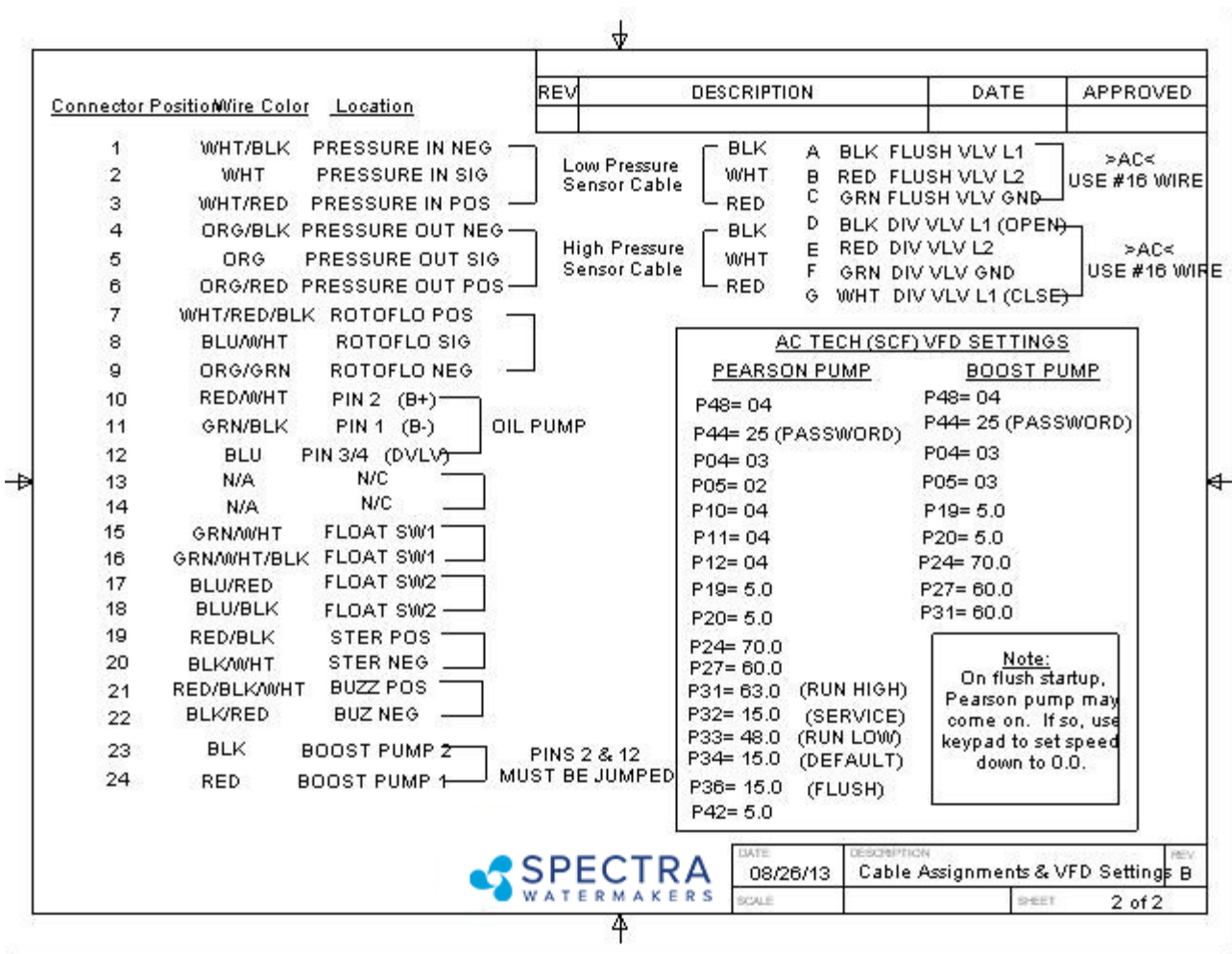
TROUBLESHOOTING

Symptom	Cause	Resolution
High Power Consumption (Decreased Energy Efficiency)	High Membrane Pressure	Check membrane pressure against nominal system parameters
	Low Boost Pressure	Check Supply Pump for proper operation and adequate flow through pre-filtration system Test motor, replace if necessary
	Motor Problems	Change oil
Pump will not run from Connect control inputs	Water in crankcase No Power to Control Box	Check All Breakers and Confirm Voltage at Connect board
	Speed control fault	Speed control display should change when running.
Alarms - Check Pre-Filter	Bad Switch/Broken Wire	Replace Switch and Re-terminate wires
Alarms - Check Pre-Filter	Clogged Pre-Filters	Replace Filters
Cannot properly adjust Clean Pressure setting	“Clean Pressure” on Connect setting incorrect	Adjust “Clean Pressure” setting on Connect (see Programming from Display)
Pump Won't Run	Insufficient Boost Pressure	Adjust Boost Pump Pressure and address any pressure drop in intake line
	Motor Problem	Check AcTech VFD for error codes, display should change if manual run or service switch is used
	VFD Problem	Check all wiring Check VFD for error codes

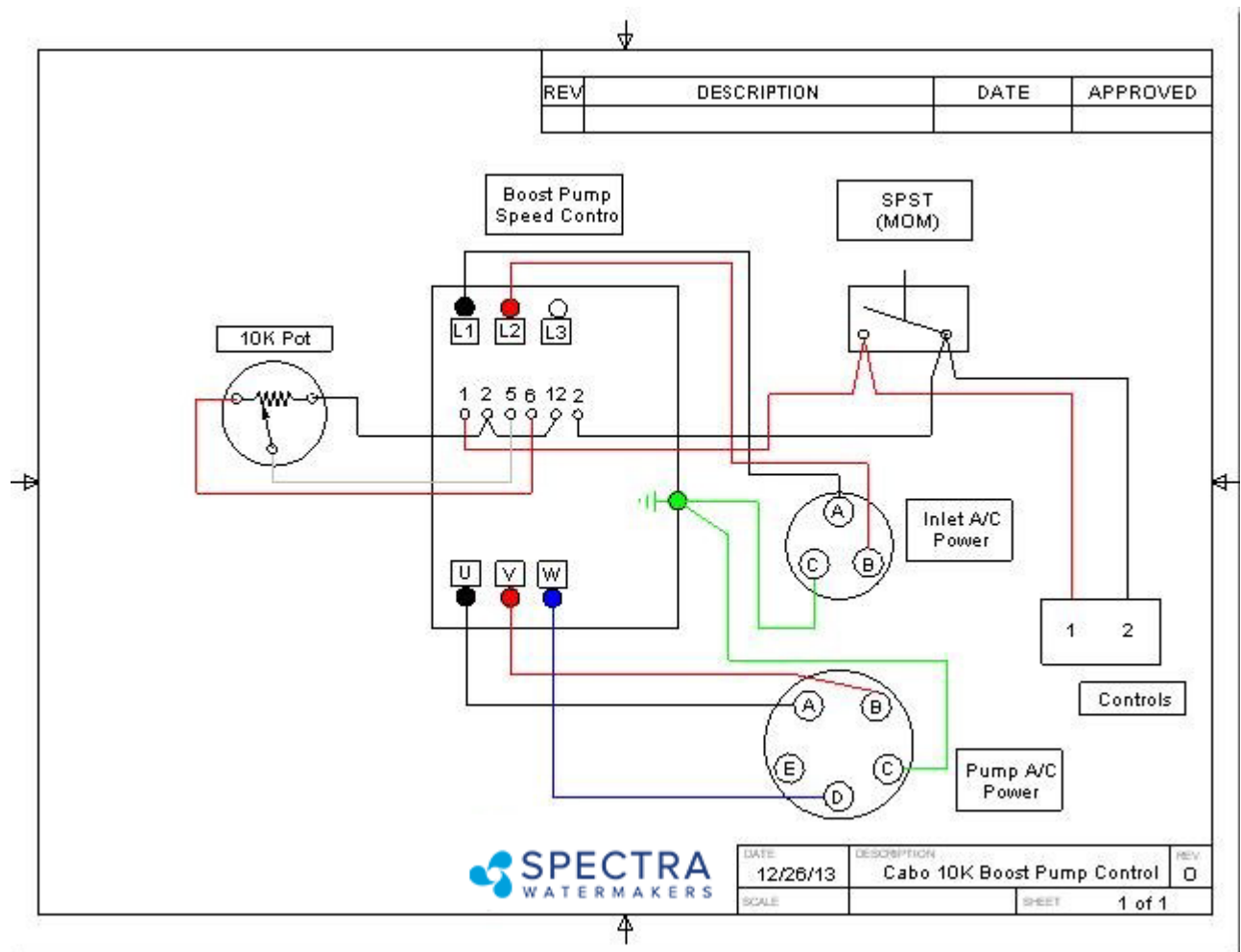


DATE	DESCRIPTION	REV
06/13/14	Cabo 10K Manual Prototype	A
SCALE	SHEET	1 of 1

Connector Pin Locations and speed control settings



Boost Pump Speed control



Specifications

Electrical Input

240 volt systems: 208-240 volts single or three phase 50/60 Hz 19.5 amps max**

** includes boost pump

Power consumption will vary depending on feed water conditions and motor RPM. Do Not Exceed Factory Recommended Max/Min values.**

Feed Water Supply

Minimum Pressure after filters: 10 psi, .7 bar

Maximum Pressure after filters*: 20 psi, 1.4 bar

Flow Rate: 20gpm, 76 L/min.

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

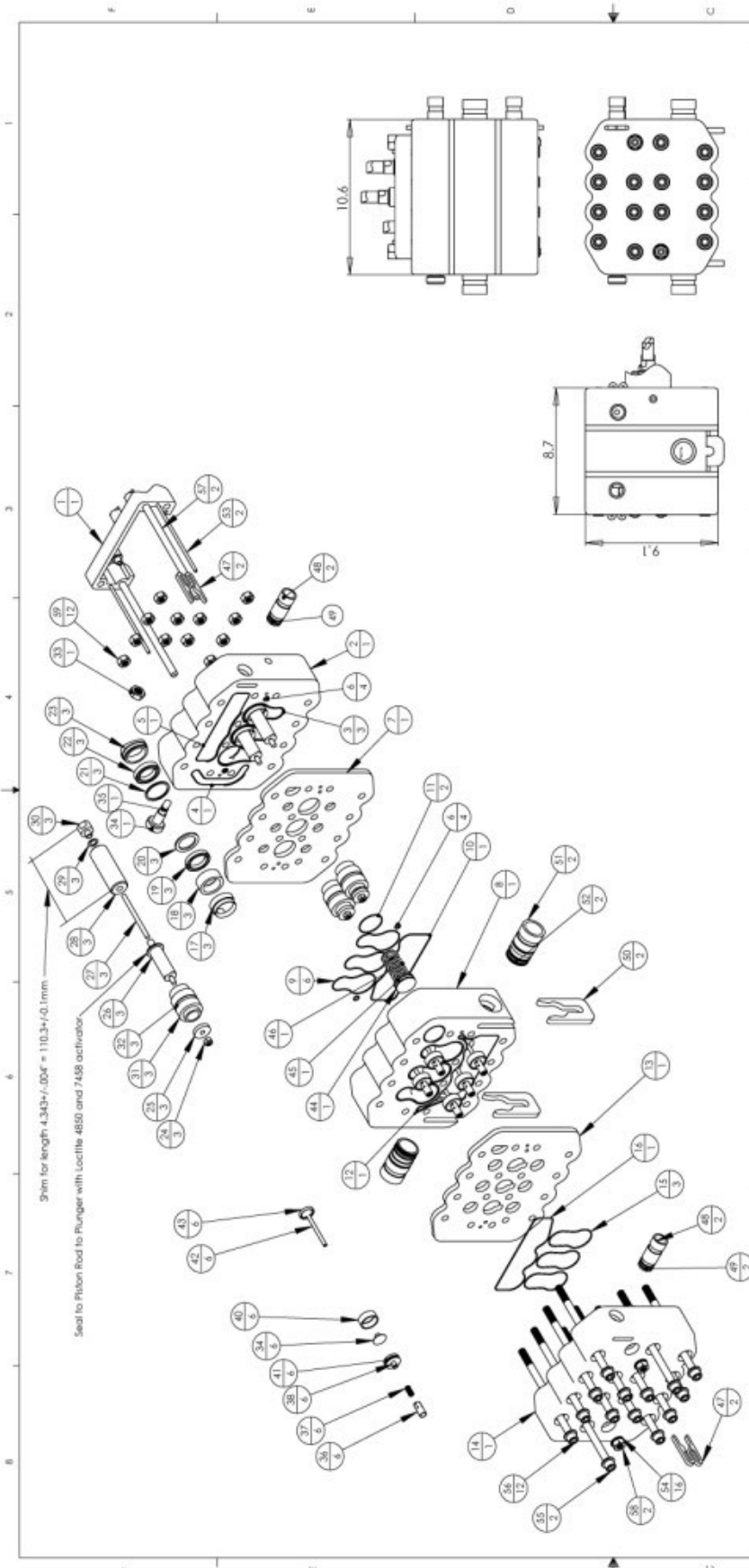
Rejection: 99.5%

Flow: 6.5—7.2 gpm, 24.5—27.25 lpm

Lubricant:

O-rings and seals: Dow Corning Silicon Lubricant

CAT Crankcase: 5W-30 or equivalent synthetic motor oil



Rev No.	Part No.	Title	Qty.	Change	Rev No.	Part No.	Title	Qty.	Change	Rev No.	Part No.	Title	Qty.	Change
1	PR-14-CC-CCA	SP20 Crankcase, Cat 2110 or 2801	1		21	PR-20-2AL-5DW	SP20-50 LP Seal Washer Rev A	3		41	SO-PP-14-VLV	O Ring Valve, 021 I88 75A	6	
2	PR-20-LV1	SP20 Lower 1 Rev A	1		22	SO-PP-20-LF-S	SP20-50 LP Seal I88 Cat 4803 Rev A	3		42	PR-20-VV-VLV	SP20 Valve Rev A	6	
3	SO-PP-14-VLV	O Ring Valve, 021 I88 75A	6		23	SO-PP-14-VLV	SP20 Valve Rev A	6		43	PR-20-VV-VLV	SP20 Valve Rev A	6	
4	SO-PP-14-VLV	O Ring Valve, 021 I88 75A	6		24	SO-PP-14-VLV	SP20 Valve Rev A	6		44	PR-20-2AL-5DW	SP20 Crankcase, Cat 2110 or 2801	1	
5	SO-PP-14-VLV	O Ring Valve, 021 I88 75A	6		25	PR-14-INK-484T	484-1.75 Hex Nut Hacc 31052	3		45	PR-14-INK-484T	484-1.75 Hex Nut Hacc 31052	3	
6	PR-20-LV1	SP20 Lower 1 Rev A	1		26	PR-20-PC-50VPS	SP20 Pumper Top Washer Rev A	3		46	PR-14-PC-314	SP20 Firing Valve 3.5in LP Rev A	2	
7	PR-20-LV1	SP20 Lower 1 Rev A	1		27	PR-14-PC-314	SP20 Firing Valve 3.5in LP Rev A	2		47	PR-14-PC-314	SP20 Firing Valve 3.5in LP Rev A	2	
8	PR-20-LV1	SP20 Lower 1 Rev A	1		28	PR-14-PC-314	SP20 Firing Valve 3.5in LP Rev A	2		48	PR-14-PC-314	SP20 Firing Valve 3.5in LP Rev A	2	
9	SO-PP-14-VLV	O Ring Valve, 021 I88 75A	6		29	PR-14-PC-314	SP20 Firing Valve 3.5in LP Rev A	2						
10	SO-PP-14-VLV	O Ring Valve, 021 I88 75A	6		30	PR-14-PC-314	SP20 Firing Valve 3.5in LP Rev A	2						
11	SO-PP-14-VLV	O Ring Valve, 021 I88 75A	6		31	PR-14-PC-314	SP20 Firing Valve 3.5in LP Rev A	2						
12	SO-PP-14-VLV	O Ring Valve, 021 I88 75A	6		32	PR-14-PC-314	SP20 Firing Valve 3.5in LP Rev A	2						
13	PR-20-LV1	SP20 Lower 1 Rev A	1		33	PR-14-PC-314	SP20 Firing Valve 3.5in LP Rev A	2						
14	SO-PP-14-VLV	O Ring Valve, 021 I88 75A	6		34	PR-14-PC-314	SP20 Firing Valve 3.5in LP Rev A	2						
15	SO-PP-14-VLV	O Ring Valve, 021 I88 75A	6		35	PR-14-PC-314	SP20 Firing Valve 3.5in LP Rev A	2						
16	SO-PP-14-VLV	O Ring Valve, 021 I88 75A	6		36	PR-14-PC-314	SP20 Firing Valve 3.5in LP Rev A	2						
17	PR-20-LV1	SP20 Lower 1 Rev A	1		37	PR-14-PC-314	SP20 Firing Valve 3.5in LP Rev A	2						
18	PR-20-LV1	SP20 Lower 1 Rev A	1		38	PR-14-PC-314	SP20 Firing Valve 3.5in LP Rev A	2						
19	SO-PP-14-VLV	O Ring Valve, 021 I88 75A	6		39	PR-14-PC-314	SP20 Firing Valve 3.5in LP Rev A	2						
20	PR-20-LV1	SP20 Lower 1 Rev A	1		40	PR-14-PC-314	SP20 Firing Valve 3.5in LP Rev A	2						

Remove all burrs and sharp edges, max radius 0.010"

Material: Cast Aluminum

Surface Finish: As Cast

Dimensions: Inches

Tolerances: Do not scale

Third Angle Proj. Rev Date

SCALE: 1:10

140314 SP18 50% Assembly Exploded Rev A, plus changes as BOM

Purpose & Changes

SP20-50 Assembly Exploded Rev A

Contact: Colin Pearson

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