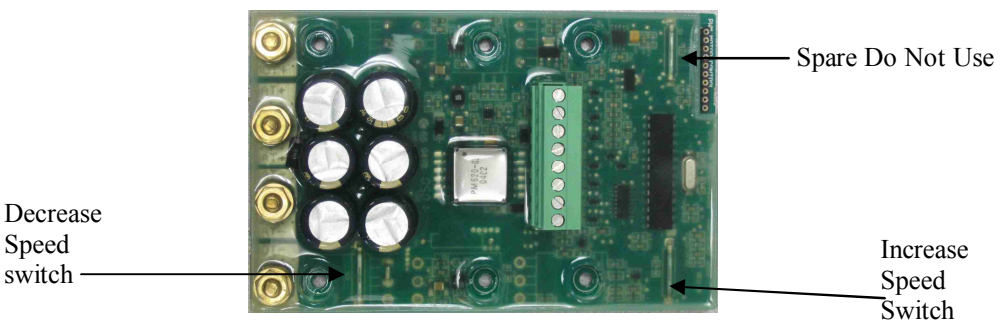
SPEED CONTROL ADJUSTMENTS

The motor speed controller will be installed in the feed pump module. On the board are two magnetic switches for adjusting the pump motor rpm. The switches are narrow silver colored bars about 1/2" (1.5cm) 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 speed setting, and the pump will speed up or slow down slightly.

Adjust the run speed as follows. Push the Auto Run button and wait 60 seconds for the system to start up and the pressures and flows to stabilize. Push the Alarm display button until the display reads FEED PRESSURE. **With a known good feed pump**, slowly increase (or decrease) the pump motor speed using the appropriate magnetic reed switch until the **FEED PRESSURE reads according to the nominal flows and pressures chart on the next page.** After adjusting the feed pump motor to the appropriate pressure reading, perform a flow test, as per the attached instructions. Adjust the pump motor speed until the nominal feed flow rate is achieved. **DO NOT EXCEED THE NOMINAL FEED FLOW RATE. Premature damage to the feed pump and membranes could occur.**

Press the 'Auto Store' button to adjust the fresh water flush cycle. The flush valve will open and fresh water will flow through the system. Measure the volume of water coming out the brine discharge, there should be a maximum of 1.5 gallons per minute (5.6Lpm). Adjust the feed pump motor speed accordingly. This will ensure that no seawater is drawn in during the flush, but fresh water is not being wasted overboard. At the end of the fresh water flush cycle, check the water quality of the brine discharge, it should be less than 1000ppm.

If the salinity of the brine discharge at the termination of the flush cycle is greater than 1000ppm, then either the pump is still drawing in seawater and needs to be slowed down, or the flush duration needs to be increased. Close the seawater intake thru-hull and push the 'Auto Store' button. If the pump cavitates or makes a grinding noise, slow down the pump motor speed. If the pump sounds normal, then the flush duration should be increased in increments of 1 minute, until the brine discharge water is below 1000ppm at the termination of the flush cycle.



MISC-4 NOMINAL FLOWS & PRESSURES

Reverse osmosis water maker system pressures are temperature related. There are two fundamentally different principles of watermaker operation: Spectra Watermakers operate on a Constant Flow Principle while less energy efficient water makers use a Constant Pressure System. In colder water a watermaker will make the same amount of product at a higher pressure (Spectra Constant Flow Principle), or less product at the regulated pressure (other "Constant Pressure" systems).
Product water salinity (ppm) is a function of pressure across the membrane and flow through the membrane. The higher the pressure and flow the more salt will be rejected, and the lower the salinity will be.

The Spectra Clark pump takes lower pressure from the feed pump and "intensifies" it to the higher pressures (approx 700psi) required at the membrane. Various models have different ratios of intensification. The pressures shown on the Spectra gauges and panels are the feed pressure not the membrane pressure. Because each model has a different feed pressure ratio, each model will have a different Nominal operating pressure. And, because sea temperatures vary widely and Spectra Watermaker membrane pressures vary with sea temperature, each model has a Nominal Operating Pressure Range, but system flow should vary only slightly.

VENTURA 150	55-70 PSI	1.5GPM
200C	70-80 PSI	1.5GPM
CATALINA 300	90-110 PSI	2.3GPM
380C	90-110 PSI	2.7GPM
NEWPORT 400	100-115 PSI	2.8GPM
NEWPORT 700	150-170 PSI	3.8GPM (15% Clark Pump)
NEWPORT 700	190-210 PSI	2.6GPM (20% Clark Pump)
NEWPORT 1000	190-210 PSI	3.5GPM

Normal pressures may fall outside of these nominal pressures in extreme arctic or tropical inland sea conditions.
If pressures are out of range, before proceeding, check product quality with a calibrated TDS meter, check product flow rate with a flow meter or timed quantity check, and check power consumption with an accurate meter.
Pressures below nominal can be due to worn Feed pumps, Low voltage, suction side flow restriction, poor membrane condition or a Clark pump problem. Pressures above normal can be caused by discharge side filters, Clark pump resistance, membrane fouling, and brine discharge system restriction.

HS LF-7 FLOW TEST VANE PUMP

The correct feed water flow rate and product flow ratio are essential to producing rated product flow and quality. Flows should be measured as follows. You will need a large container or small drum and a watch. Before starting the test clean all the filters and check for leaks. Check for and repair air leaks in the low pressure inlet side. Air leaks cause low production and erratic salinity. Listen carefully for a buzzing sound caused by cavitation or air in the feed pump. Cavitation will be caused by a restricted feed water suction.

Set up the unit so that the brine discharge and the product can be directed into the container. On automated units the system will have to be run for a minute or two as it times through the start cycle. You may have to direct the brine and product into the bilge until the test starts. Once the unit is running normally, direct the brine and product into the bucket. Time how long it takes to fill the container with a given amount of water. For example, if it takes 60 seconds to produce 4 gallons (15.2l) your feed rate (brine + product) is 4gpm (15.2lpm.) Note: If the system is rejecting the product the product will already be in the brine stream.

Empty the container. Direct the product into the container with the brine going overboard and time the product flow rate. If the Controls are delivering the product to the water tank you will have to break into the product line at the membrane or diversion valve with a separate hose.

Compare your readings with these nominal flow rates for the various models:

Model 300: feed 2.3gpm, product 12.5gph. Model 400: feed 2.8gpm, product 16.7gph. Model 700: feed 3.8gpm, product 29 gph. Model 1000: feed 3.5gpm, product 41.7 gph. If you are working in liters divide liters by 3.8 to convert to US Gallons.

If the feed flow is low there may be something wrong with the feed pump, the unit could be sucking air, or the suction lines may be restricted. The 700 and 1000 feed pumps are equipped with an internal pressure regulator. If the regulator is set to too low water will be by-passed inside the pump and feed flow will be too low. See theVP-4 “Adjust Relief Valve” bulletin. If the regulator is not the problem it may be a worn or damaged feed pump.

Models 700 and 1000 have variable speed feed pumps. If the speed control is not set properly feed flow will be too high or low. See bulletins VP-2 and VP-5 for instructions on adjusting the speed controls. Contact the factory before adjusting feed pump speed.

If the feed flow is up to spec but product flow rate is low the problem is leakage in the high pressure side, probably in the Clark pump. See CP-5 Clark Pump Checkout.