

## CP-5 CLARK PUMP CHECKOUT

First open the pressure relief ½ turn and start the feed pump using the manual control. If it does not cycle, the fault may lie in the pilot valve spool pins. If these are bent or broken the pump won't cycle, and no water will flow when the pressure relief is closed. For 700 and 1000 models, see also "CP-10 Tight Pistons". If the pump does not cycle but water flows through it, the problem is likely a check valve that is stuck open. This can sometimes be solved by blocking the brine discharge and opening it suddenly to "shock" the system. Do not attempt this on systems with vane type (Catalina and Newport models) feed pumps. If this doesn't work, see the Repair Manual for instructions on check valve service.

If the Clark Pump cycles, remove the test plug on the center block just above the high pressure outlet. Close the pressure relief and if water runs, pulses, or squirts out of the test port, you have a bad piston rod seal. An occasional drip of water is not a problem. This can usually be repaired by replacing the rod seals. Note: Newport 700 and 1000 systems do not have a test port.

If the pump stops cycling when the pressure relief is closed but runs OK when it is open, the problem is probably a broken reversing valve spool. See "CP-7 Spool Valve Repair".

If the pump keeps cycling, check the feed pressure readings. On automated systems you can use the MPC display, or laptop to check feed pressures even though you are running the feed pump manually. If possible, install a suitable pressure gauge in the feed pump discharge line to take pressure readings. See chart below for nominal pressures and flow rates for your unit. Note that if the Feed Pump flow rate is lower than the minimum indicated the feed pump may be failing and will need to be addressed as well to insure proper production rates. Low flow rate can be voltage and/or speed related. If the pump is drawing the correct current and the flow is below spec the pump head is failing and should be replaced.

### NOMINAL PARAMETERS FOR SPECTRA SYSTEMS

System	AMPS				Feed Pressure		Static * Pressure	Feed Flow				Product Flow				Product Quality	Watts/Gallon	
	12V	MAX	24V	MAX	psi	bar		Flow	MIN	MIN	Flow	Flow	MIN	MIN	Nom		Max	
Ventura	≈ 9.0	9.5	≈ 4.5	5	60-70	4.2-5	10-15	1.7	6.4	1.65	6.2	6.5	24.6	5.7	21.5	< 300	17	19.55
Catalina	≈ 15	16	≈ 7	8	80-90	5.6-6.3	25-30	2.3	8.7	2.2	8.3	12.5	47.3	12.3	46.5	< 300	15	16.5
NP 400 HI	≈ 24	26	≈ 12	13	90-110	6.3-7.7	25-35	2.8	10.6	2.7	10.2	17	64.3	16	60.5	< 300	18	20.7
NP 400 LO	≈ 16.5	18	≈ 8.5	9	80-90	5.6-6.3	25-35	2.3	8.7	2.2	8.3	12.3	46.5	11.5	43.5	< 300	18	20
NP 700 HI	N/A	N/A	≈ 22	25	≈ 180	≈ 12.6	≤ 80	2.6	9.8	2.5	9.5	29	109.6	26	98.3	< 300	18	20.7
NP 700 LO	N/A	N/A	≈ 15	18	≈ 165	≈ 11.6	≤ 80	1.75	6.6	1.65	6.2	21	79.4	19	71.8	< 300	18	20.7
NP 1000	N/A	N/A	≈ 26	28	≈ 200	≈ 14	≤ 80	3.6	13.6	3.5	13.2	41	155.0	39	147.4	< 300	18	20.7
NP 1000 LO	N/A	N/A	19	21	≈ 165	≈ 11.6	≤ 80	2.5	9.5			30	113.4			< 300	17	20
Cape Horn HI	≈ 19	20	≈ 10	11	90-100	6.3-7	30-35	2.8	10.6	2.7	10.2	15	56.7	14.5	54.8	< 300	16	18.4
Cape Horn LO	≈ 9	10	≈ 4.5	5	60-80	4.2-5.6	20-25	1.7	6.4	1.6	6.0	8.7	32.9	8	30.2	< 300	13	16.5
VT 200	≈ 10	10.5	≈ 5	5.5	80-90	5.6-6.3	20-25	1.7	6.4	1.6	6.0	8.3	31.4	7.7	29.1	< 300	17	19.5
NP 700**	N/A	N/A	~24	~25	150-160	10.5-11.2	~50	3.9	14.7	3.8	14.4	29	109.6	26	98.3	< 300	19	21

\* Pressure relief valve open one turn  
 |\*\* Newport 700 with a 15% Clark Pump

The feed pressures should be within 5% of each other on each stroke, and the pressure spikes about the same. If the pressures are far different (asymmetrical) on each stroke look for one of these problems:

1. Listen for a hissing noise on the low pressure stroke. This is an indication of a broken annular ring in the upper valve body. See “CP-1 Reversing Valve Problems”.
2. If the pressures are asymmetrical without a hissing noise, the most likely cause is a bad check valve in the lower center block.

If the pressures are symmetrical but low, you may have an internal leak. Check the pressure relief valve for damage or foreign material. Inspect the check valves in the center block for dirt or damage. While the cylinders are off, check the bores for scoring. Some light scoring is normal but deep damage will cause leakage around the pistons.

Perform a flow test to confirm the Clark pump is functioning by confirming the ratio of product water to brine discharge is correct; first measure total system flow (combined brine discharge and product water) then measure just the product flow. Accuracy is important as we are interested in any deviation over 1% from the standard recovery rates (see chart). The recovery rate is the percentage of seawater pumped through the system converted to potable water.

Nominal Recovery Rate	Actual Recovery Rate	Acceptable Recovery Rate
7%	6.5%	5.5%
10%	9%	8%
15%	12.5%	11.5%
20%	18.5%	17.5%

The Clark pump used in your system will have a serial number stamped into the center block just under the pressure relief valve where the last two numbers are the recovery rate XXXX-07 (or -10, -15, 20). If your Clark pump has a serial number that is all numbers or ends in letters it is a 10% pump.

If the measured recovery rate is lower than the “Acceptable Recovery Rate” from the chart above then it’s time to send your pump in for an Upgrade as it is worn out.

Full instructions for Clark Pump repair can be downloaded from our website at [www.spectrawatermakers.com](http://www.spectrawatermakers.com) click “Repair Manual”.