

# *SpectraPure*

## **PUMPED RO SYSTEMS (PSP)**



User's Manual for PSP-1500 Systems



## PSP-1500 SYSTEM DESCRIPTION

### Reverse Osmosis — RO

Reverse Osmosis utilizes the unique properties of a semi-permeable membrane to allow fluid to pass while restricting the flow of dissolved ionic material. While pressure is applied to impure water on one side of such membrane material, pure water will pass through, leaving most of the impurities behind. The rejection of the dissolved ionic material is a function of both molecular weight and ionic charge. Most metallic salts are rejected in excess of 98%

### PSP-1500 System — Components

- RO (Reverse Osmosis) System
- High/low level floats
- 10 ft. float control cable
- 10 ft. 3/8 inch blue product water tubing
- 10 ft. 3/8 inch black reject (waste water) tubing
- 8 ft. power cord

### PSP-1500 System Specifications (115 / 230 volts 60 Hz / 10.4 / 5.2 amps)

MODEL	Production Rate * (GPD / LPD)	Description	Element size (inches)	Maximum Recovery (%)	Motor HP (SinglePhase)	Inlet / Outlet Connections
PSP-1500-EF-115	1500/ 5677	Dual Electric Float Level Control	4.0" x 40"	33	3/4	3/4" pipe 3/8" tube
PSP-1500-BT-115	1500 / 5677	For use with Bladder Tank	4.0" x 40"	33	3/4	3/4" pipe 3/8" tube

## PSP-750 SYSTEM DESCRIPTION (continued)

### PSP-1500 Systems Technical Operating Data

1. Number of Modules	ONE (4.0' x 40')
2. Type of Membrane	Ultra high Rejection TFC Membrane
3. Operating Pressure	110 psig max
4. Operating Design Temperature	40°F to 86°F (4.5°C to 30°C)
5. Membrane Rejection	greater than 99% average
6. RO System Recovery	33%
7. Feed flow (GPM)	3.12 GPM at 150 psi, 77 °F
8. Reject flow (GPM)	2.08 GPM at 150 psi, 77 °F
9. Product flow (GPM)	1.04 GPM at 150 psi, 77 °F
10. System Inlet port	3/4" female pipe
11. Membrane Housing Material	PVC
12. High Pressure Lines	SS
13. Permeate (Product) port	3/8"
14. Retentate (Reject) port	3/8"
15. RO (Reverse Osmosis) pump	Rotary Vane
16. Pump MODEL No.	3306 PH
17. Motor Horsepower	0.75 hp (1725 RPM) at 60 Hz , 0.75 hp (1432 RPM) at 50 Hz
18. Power Requirements	Single phase, 60 Hz., 115 VAC, 10.4 Amps Single phase, 60 Hz., 230 VAC, 5.2 Amps. Single phase, 50 Hz., 230 VAC, 5.2 Amps.

## RO PRETREATMENT

### RO Feed Water Requirements

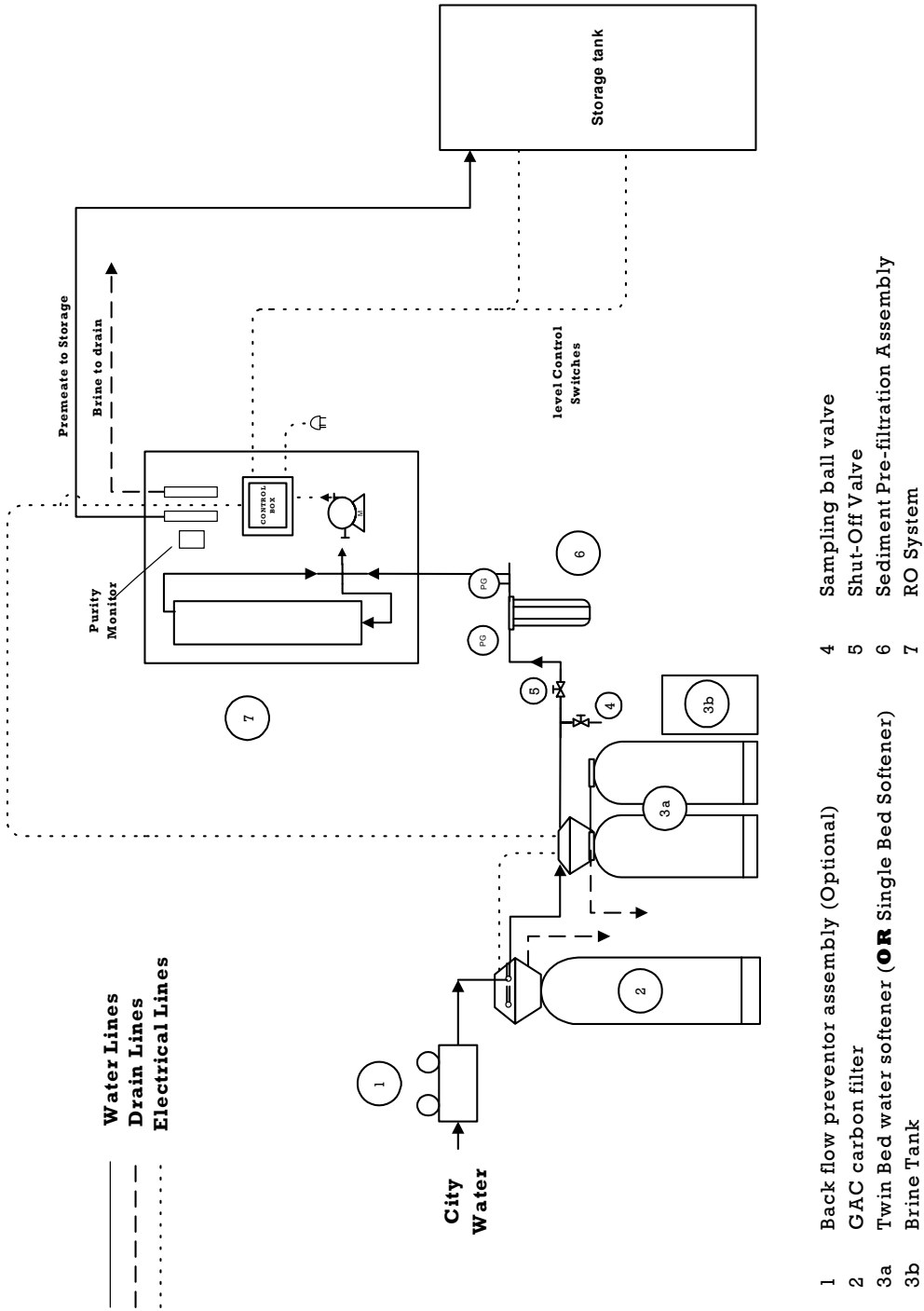
For a Pumped Reverse Osmosis System to function effectively & yield long membrane life, the feed water MUST meet the following requirements:

- pH Range: 3-11
- Max. Temperature: 110°F (43°C)
- Max. Feed Turbidity: 1.0 NTU
- Max. Silt Density Index: 5.0 (based on 15 min. test time)
- Maximum Chlorine: < 0.1 ppm
- Maximum TDS: 2000 ppm
- Maximum Hardness: < 1 grain per gallon (17 ppm as CaCO<sub>3</sub>)
- Maximum Iron: < 0.1 ppm
- Maximum Manganese: < 0.1 ppm
- Maximum Hydrogen Sulfide: 0 ppm
- Langelier Saturation Index (LSI): must be negative
- Minimum Water Pressure 30 PSI

### Pretreatment

RO pre-filtration should be a combination of sediment ,carbon filtration.and water softening The sediment filters bring the feed water NTU value to < 1 and the carbon filter further reduce the sediment & turbidity levels in your filters reducing chlorine, chloramines and VOC levels in the water down to acceptable levels. Because of the high recovery of the pumped RO systems we highly recommend the use of a water softener ahead of the reverse osmosis system. This will greatly increase membrane life and reduce maintenance costs of the RO system. (See **Figure 1**)

# RO PRETREATMENT (continued)



**Figure 1: Water Treatment System Components Sequence & Hook-UP**

## SYSTEM INSTALLATION & START-UP

**Securely mount RO system to wall.**

### Carbon Filter and Water Softener Installation

Follow **Figure 1** for sequence and hook-up of components of water purification system.

**Important Note: On carbon filter or water softener not equipped with system lock-out controls, never operate RO System during carbon filter backwash or water softener regeneration. System lock out control is not necessary when used with twin bed water softeners.**

### Plumbing Connections

1. Carbon Filter & Water Softener feed lines- 3/4"
2. Drain lines - 1/2" minimum
3. Install a sampling port and a shut-off valve ahead of the pre-filter (**See Figure 1, # 4, 5**).
4. Feed water line to prefilter - 3/4" minimum.
5. Prefilter outlet to RO System inlet - 3/4" pipe.
6. Reject water line to drain 3/8" black tubing.
7. Product water line to storage tank 3/8" blue tubing.

### Electrical Requirements

Single Phase, 115 VAC / 60 Hz / 10.4 Amps

Single Phase 220 VAC / 60 Hz / 5.2 Amps

### Float Switch Set-Up (PSP-1500-EF System)

1. Determine the position of the High and Low float switches in the storage tank, at the levels you want to RO system to turn off and then turn back on again.
2. Drill 5/8" holes at these positions using a 5/8" wood boring bit. Remove any burrs from the holes.
3. Mount the floats from the inside of the tank. Position the rubber gasket on the inside of the tank.

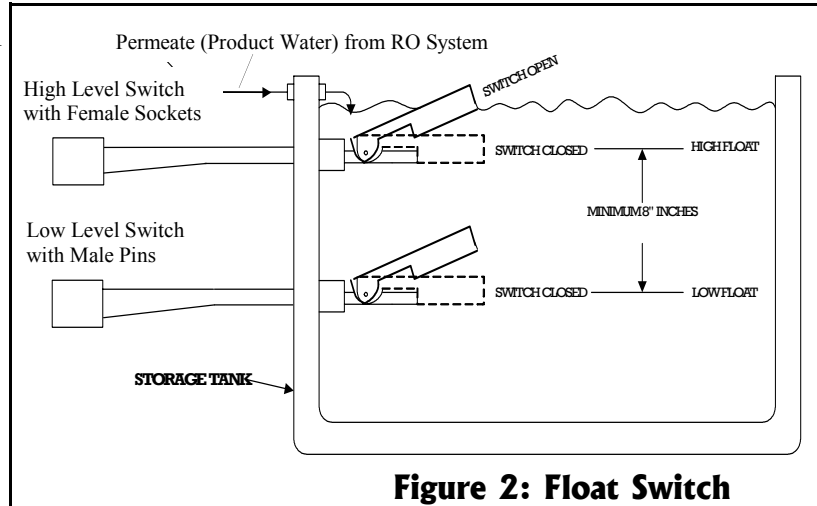
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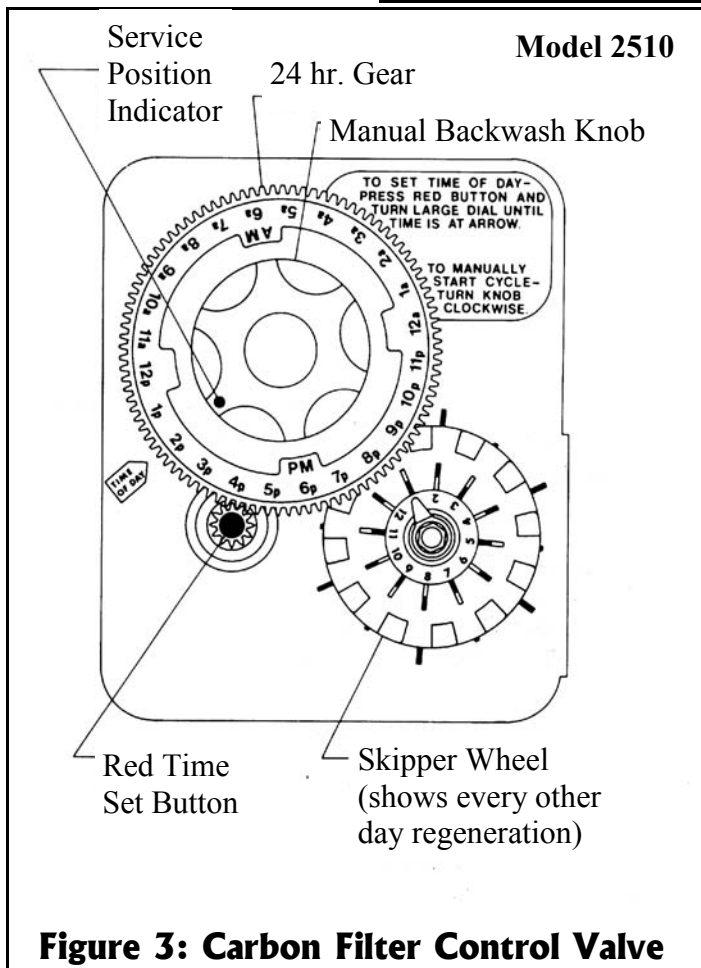
## SYSTEM INSTALLATION & START-UP (continued)

### Float Switch Set-Up (PSP-1500-EF System) cont.

4. Orient the floats as shown in **Figure 2**, and secure with the plastic nut on the outside of the tank. The float switches should be in the Horizontal (closed) position. . . (See **Figure 2**). When the water level rises above the high float switch the system shuts



**Figure 2: Float Switch**



**Figure 3: Carbon Filter Control Valve**

OFF and when water level falls below the low float switch the RO system turns back on.

5. Connect the float control cable to each float and plug the other end of the cable into the 3 terminal connector found on the control box.



**Figure 4: Solenoid Valve**



## SYSTEM INSTALLATION & START-UP (continued)

### Water Purification System Start-Up

1. Close shut-off valve ahead of pre-filter. (**# 5, Figure 1**).
2. Set the carbon filter by-pass valve to by-pass position.
3. Turn the manual regeneration knob (rotate clockwise on click from the service position) in the carbon filter control valve to backwash position. Make sure carbon filter is plugged into a 120 V outlet. Now slowly turn the red by-pass valve handle located at the back of the carbon filter to the service position to bleed air from tank. Do not rapidly open this valve. Leave valve partially open until the air has been bled from the tank. Then fully open the valve.
4. Backwash the carbon filter for at least 15 minutes after air has been bled from the tank.
5. Return the valve back to service position by rotating the manual backwash valve clockwise to the service position.(**Figure 3**)
6. Set time of day on the control valve on the carbon filter by depressing the red button and aligning the 24 hour gear to the correct time. (See **Figure 3**).
7. Open the shut-off valve ahead of the pre-filter.
8. With system in off position and all plumbing and electrical connections completed, open feed water valve and let pressure build up to set low pressure switch.
9. Check feed water connections for any leaks.
10. Rotate solenoid valve lever counter-clockwise as viewed from top to manually open the inlet solenoid valve. (See **Figure 4**). Leave the valve open for 5 minutes to purge any air from the system and then shut the valve by turning lever counter clockwise to close the inlet solenoid valve.
11. Turn the power switch on the control panel to the “ON” position (UP). This will immediately open the inlet solenoid valve. After 1 minute, the RO pump will turn on. This motor protection circuitry assures a flooded inlet to the pump prior to pump start-up; thus eliminating any dry starts which could damage the pump.
12. After a few minutes of operation, adjust the pressure relief valve, located beneath pressure gauge, to the pressure listed on system tag by loosening the nut on the threaded shaft and turning the brass handle. When adjusted to this pressure, lock the nut back in place.
13. Check the product water to waste water ratio. It should be at least 1:2. Note: If not, contact the factory (the flow restrictor may require adjustment).
14. Check for leaks and *carefully* tighten any compression fittings if necessary.

## SYSTEM OPERATION & MAINTENANCE

### Sediment pre-filter cartridge Replacement

Maintainence Regime: Pre-filter Output pressure < 30 PSI when system is operating.  
Materials Needed: 20" 1.0 micron gradient density cartridge, filter wrench

#### Procedure:

- a. Turn the power switch on the control panel to the "OFF" position (DOWN position).
- b. Close the shut-off valve, prior to the pre-filter. (**# 5, Figure 1**).
- c. Manually open inlet solenoid valve on RO System to relieve pressure in the filter housing and then shut solenoid valve.  
(See previous page: Water Purification System Start Up # 10.)
- d. Locate the filter wrench for removing the blue canister.
- e. Using filter wrench, unscrew blue housing from the housing head. Some water may leak out of the canister in the process.
- f. Throw out the used cartridge.
- g. Place the new micron cartridge in the canister.
- h. Screw the blue canister back on.
- i. Open the shut-off valve.
- j. Turn the power switch on the control panel to the "ON" position (UP position).
- k. Check for leaks.

### RO Membrane Replacement

Maintainence Regime: As Needed (Refer to troubleshooting chart.)  
Materials Needed: Replacement membrane, pliers.



**Figure 5:**  
**White Retaining Ring**



**Figure 6:**  
**Pulling End Plug**

## SYSTEM OPERATION & MAINTENANCE (continued)

### Membrane Replacement Procedure:

- a Turn the power switch on the control panel to the “OFF” position (DOWN position).
- b Close the shut-off valve. (# 5, Figure 1).
- c Remove white retaining ring by holding it with your left hand, grip the pull tab with thumb and forefinger, and pull ring towards center of membrane. Now pull ring straight out. (See **Figure 5**). Grasp the threaded port with pliers, and pull bottom end plug straight out. (See **Figure 6**).
- d Pull the membrane from the housing with pliers. (See **Figure 7**). Insert new membrane into the housing. Black rubber brine seal must remain at the open end. (See **Figure 8**) Push the membrane into the housing until it bottoms out.
- e Replace O-ring (See **Figure 9**) on end plug and firmly push plug into membrane housing to seat it.
- f Replace white retaining ring in groove.
- g Open the shut-off valve. (# 5, Figure 1).
- h Turn the power switch on the control panel to “ON” position (UP position).
- i Divert the product water to a drain and operate the RO system for 1/2 hour at 150 psi and check for leaks. Tighten fittings if necessary.
- j RO water can now be sent to storage tank for safe use.



**Figure 7:**  
**Pulling Membrane**



**Figure 8: Replacing Membrane**



**Figure 9: Replacing O-ring**

## TROUBLESHOOTING GUIDE

This troubleshooting guide is to assist you in identifying the most common operating problems you may experience with your water purification system.

<b>PROBLEM</b>	<b>PROBABLE CAUSE</b>	<b>CORRECTIVE ACTION</b>
Low system inlet pressure.	Insufficient feed water pressure or flow Clogged pre-filter Closed valve ahead of RO System	Check feed pressure, open feedwater valve, check for restrictions Replace pre-filter cartridge. Check for closed valves.
Low system operating pressure.	Pump not operating correctly Defective pressure regulator valve	Repair or Replace pump. Replace or repair valve.
Low permeate flow rate	Low operating pressure Dirty or fouled membrane Operating on cold water	See above possible causes for low operating pressure. Replace it. If possible operate with a feedwater temperature of 72-80 °F (22-27 °C).
Excessive Permeate flow rate.	Defective product water O-rings. Damaged membrane (possibly due to chlorine damage) Ruptured membrane	Check product water tube O-rings and replace if necessary. Replace membrane. Replace membrane.
Water flowing when system is turned off	Inlet solenoid valve not closing or seating properly	Clean valve or replace.
RO System cycles ON and OFF.	Insufficient system inlet pressure.	See above possible causes for low system inlet pressure.

## TROUBLESHOOTING GUIDE (continued)

<b>PROBLEM</b>	<b>PROBABLE CAUSE</b>	<b>CORRECTIVE ACTION</b>
High product water conductivity (declining rejection)	Dirty or fouled membranes	Replace membrane.
	Product water tube O-ring seal broken or damaged	Replace O-ring, check sealing surfaces on O-ring groove, interconnectors and end caps. Replace damaged parts.
	Membrane put in backwards	Install membrane correctly.
	Change in incoming water quality	
Power switch on, unit not operating	Float switch has cut power to machine	Check position of float in the storage tank.
	Defective Float	Replace Float
	Thermal overload in motor	Allow motor to cool and re-start system. Check amp draw of motor.
	No power to system	Check fuses or circuit breakers, measure voltage.
	Motor and/or pump not operating properly	Repair or Replace pump/ motor.
	Micro-switch on either carbon filter or water softener not functioning properly	Replace micro-switch.
	Carbon filter or water softener control valve not in service position	Set the control valves to the service position.
Low system inlet pressure	See previous page for possible causes for low system inlet pressure.	