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Trouble shooting and repair tips for the model FCO chemical pump.

System sizing.

Solar powered pumps are a closed system that are sized for a fairly specific set of parameters for each individual requirement. Because the pumps run off of the power that is stored in the battery or batteries, It is essential that there is enough electricity stored while the sun shines, to last throughout the night and also to power the pump when the sunlight hours are short or the weather is keeping the sun from shining on the solar panels.

There are 3 very important factors that need to be considered. 1) What pressure is the pump going to inject into. 2) How much chemical will be pumped in a 24 hour period and 3) Where is the pump located (different parts of the continent have more or less sun hours). These 3 factors will determine how much power the pump will use. Because batteries are rated for warm weather and store much less when they are cold, the calculations are done using a temperature of -30 C. Available sunshine hours are calculated using the shortest day of the year. With these parameters we try to make sure that there is enough battery power to run the pump for 4 days with no sun to charge the batteries. If the customer wants to increase this backup supply, we do a calculation using those requirements and increase the amount of panels and batteries to suit the requirements. The amount of solar panels and batteries are what will determine cost.

System setup

For a complete system with the solar panel, pump, and batteries. The set up consists of securing the solar panel to the mast. Standing the mast upright into the mast support, turning the panel to point South and tightening the ubolt to hold it secure. Install the battery in the box by attaching the red wire to the positive terminal and the black to the negative terminal. Attach the discharge tubing to the top of the pump, and run it to the injection point with an inline check valve and a shutoff valve in place. **Note:** It is very important to ensure that the seal material in this check valve is compatible with the chemical that you are pumping. If it is not, the check valve will fail.

For a system that is not attached to a skid. A qualified electrician must do all of the electrical connections and then the tubing can be done the same as in a complete skid unit to the injection point. On the suction side, the pump can be mounted up to 1 meter above the tank. A particulate filter **MUST** be installed between the chemical supply tank and the pump.

FAQ

What happens if we are sized for 75 Psi. and the pressure goes up to the pump maximum pressure of 173 Psi.?

A: The pump will continue up to the maximum pressure that it is capable of and will pump at the fluid volume that it was set for. What will happen is that the electrical supply will be used up much faster and the pump will stop pumping when the voltage drops below 12VDC. When the solar panels recharge the batteries the pump will start up once again.

How do I set the pump rate?

Using the speed control knob mounted on the face of the pump. The rate is set just like any other pump by using the calibrated site glass. Trap the fluid in the glass and time it for 1 minute. Count the number of graduations that the fluid has moved in the minute and that is your liters per day.

Can I set the rate while the pump is running?

No. Because the pump is not explosion proof you must open the electrical box and shut the power off before opening the enclosure that the pump is mounted inside of. Make your adjustment with the rate control knob, completely screw the cover back on to the pump enclosure and then it is safe to turn the power back on and recheck the flow rate.

Can the pump be used to pump different chemicals?

Yes. The pump can be used for most chemicals **BUT!!** Because all chemicals are not the same they may react to the materials in the pump, especially the seals. When the pump is ordered, it arrives with the seals installed for a specific chemical. If a different chemical is going to be used then you must call me, or find out from the chemical supplier what kind of material is compatible with the chemical to be pumped. It is usually a matter of changing out a few orings and the pump will be ready to use. The main diaphragm is Teflon and the steel in the head is stainless so this is good for most, but not all requirements.

REPAIR

There are 2 external check valves on the pump. 1, suction and 1, discharge. On the wrench flats of the check valve there is a "V" which indicates the direction of flow. There is (1) 012 oring that seals the check valve to the pump injection head, (1) 008 oring that seals the internal ball against the check valve and (2) 011 orings that seals the ball guide against the wall of the check valve. There is (1) stainless steel ball in each check valve that seals the fluid as the pump is actuated. Be careful not to lose this ball when you take it apart. These check valves are basically the same as the check valves used on pumps such as the Texsteam models.

To repair the check valve, unscrew it from the pump head in a counterclockwise direction. Using an allen wrench, unscrew the ball guide from the check valve and pull it out being careful not to lose the steel ball. Remove all of the orings and replace with new ones. Put the steel ball back into the check valve. Gently push the ball guide back in place and tighten down with the allen wrench. (tighten snugly but do not over tighten which can cut the oring) Screw the check valve back into the injection head paying attention to the "V" directional flow marking.

Start pump back up and let it pump for a few minutes. Turn the pump off as indicated above in the "Can I set the rate while the pump is running" section and check for leaks.

The main diaphragm is located between the injection head and the pump body. Unscrew the 4 screws that secure the head to the body and take the head off. Replace the #120 oring that seals the pump head to the body of the pump. Grasp the diaphragm and unscrew it in a counter clockwise direction and remove it from the shaft of the electromagnet drive. Install a new diaphragm by screwing it back, in a clock wise direction until it is snug. Do not use anything other than your fingers to tighten the diaphragm back into place. Replace the injection head to the pump with the new #120 oring and the 4 screws. Tighten down snugly but do not over tighten to the point that the oring seal is going to be extruded.

Troubleshooting

If there is no sound coming from the pump and all indications are that the pump is not running at all.

Check the battery voltage to see if it is above 12VDC. If it is. Check the fuses to ensure that they are OK. If the battery is not above 12VDC then check the voltage coming from the panel to the charge regulator. If the voltage coming from the panel is above 12VDC then the charge regulator is probably not working properly and should be replaced. Any replacements or electrical repairs must be done by a certified electrician.

The pump is making a very quiet clicking sound but there is no indication the fluid is being pumped.

Check that the pump is not dead headed. **Check the pressure that the pump is discharging into. Make sure that it is not attempting to inject into a pressure greater than 173 Psi. If that is OK, close the valve between the pump and the injection point then loosen the connection between the discharge of the pump and the inlet side of the check valve at the wellhead to see if the pump is injecting to that point. If it is then retighten the fitting on the inlet side of the check valve and loosen the fitting on the outlet side of the check valve, if no fluid is coming through the check valve then the check valve needs to be repaired or replaced, this will determine if the check valve and the shut off valve between the pump and the well head is working properly.**

The pump sounds normal and is stroking but is not injecting any chemical.

The fluid is trapped in the sight glass, but when the pump strokes the fluid does not move at all. **Replace the orings.**

If the fluid bounces up and down in the sight glass when it is trapped and the pump is stroking. **There may be some air trapped in the pump. Loosen a fitting on the downstream side of the discharge check valve and let the pump stroke until fluid comes out then retighten the fitting.**

All warranty is void if the fluid supply to the pump is not filtered to remove particulate matter.

