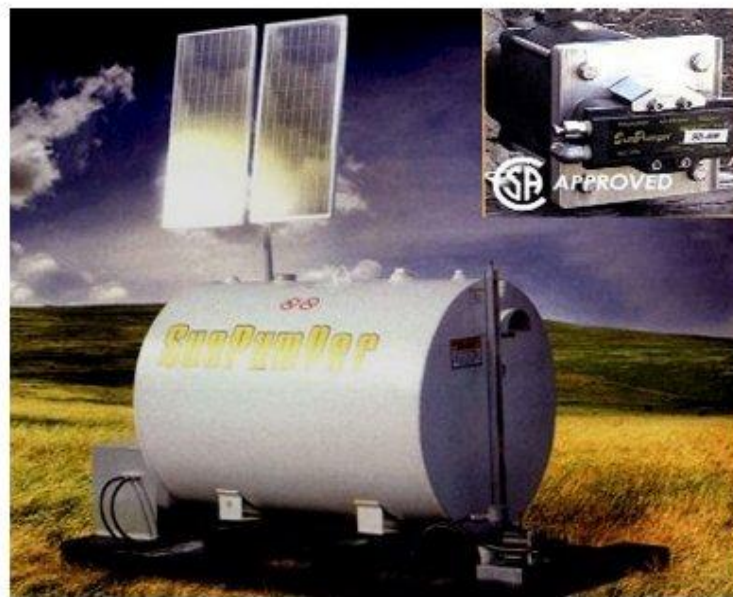




INSTALLATION INSTRUCTIONS

MODEL 113



**11207 Tahltan Rd
Fort St. John, BC V1J 6G8
Website: www.ace95.com**

TOLL FREE: 866.785.1206

**Solar Injection Systems, Inc.
1513 West Montgomery
Midland, TX 79701
O(432)570-8144/F(432)570-8153**

INSTALLING MODEL 113 PUMP

SITE SELECTION:

Select a location that will allow the solar modules to always be in full sun. No shadows should fall on the panels during daylight hours.

Panels are to face due south and be set at the angle specified for your particular location. Panel angle required can be located on the sticker at the back of the panel.

Mounting post needs to be anchored so the wind will not blow the panels out of the South alignment.

If this is a classified area location the solar panels, battery, and timer w/relay should be located out of the classified area as per local requirements.

PUMP INSTALLATION:

The standard Model 113 pump is not rated for classified area installation. If the requirement is for explosion proof pumps, this is an option that is available, contact Solar Injection Systems, Inc.

The Model 113 has a common manifold so that the suction and/or discharge piping can be installed from either end. The top openings left and right are always the discharge and the bottom openings left and right are always the suction. Be sure to block the spare opening with 1/4" plug that is provided.

All connections on the Model 113 are 1/4" FNPT.

The pump should be installed as close as possible to the chemical supply tank. This pump requires a flooded suction. The use of a strainer/filter in suction supply line is recommended. Use the shortest, most direct route from supply tank to pump suction. If elbows are needed, using 45° is recommended. Any restrictions in the inlet piping reduce pump efficiency. Do not install any 90° elbows in the pump inlet.

On discharge piping, use the shortest, most direct route to the injection point. Connect discharge to top 1/4" outlet on pump manifold. An inline check valve should be installed at the injection point. Select fittings and piping that meets the pressure requirements of the system. Support the piping and pump independently.

Caution: This is a positive displacement pump, a pressure relief valve may need to be installed between the pump discharge and injection point. Never install shutoff valves between the pump discharge and any pressure relief device.

TROUBLESHOOTING:

CAVITATION: Inadequate fluid supply caused by:

- Inlet line clogged or collapsed
- Clogged line strainer or filter
- Inlet line too small or too long
- Air leak in inlet line
- Too many valves and elbows in suction line

- **Air entrained in fluid piping system**
- **Aeration or turbulence in supply tank**

SYMPTOMS OF CAVITATION:

- **Excessive pump noise**
- **Volume or pressure drop**
- **Rough-running pump**

DROP IN VOLUME OR PRESSURE:

- **Air leak in suction line**
- **Clogged suction line or suction strainer/filter**
- **Inadequate fluid supply**
- **Worn pump valve parts**
- **Foreign material in inlet or outlet check valves**
- **O-rings forced out of their grooves from over pressurization**
- **Empty supply tank**
- **Excessive aeration and turbulence in supply tank**
- **Broken valve spring (possible cause – foreign object in pump)**

PUMP RUNS, BUT FLUID DOESN'T FLOW:

- **Unit air locked (Bleed off air)**
- **Trash in either of the internal suction or discharge check valves (Remove manifold and check or clean check valves)**

Please contact Solar Injection Systems if problem persists (432)570-8144

Some helpful tips for installing Seals in a Sunpump.

To remove the plastic adapter: Cut a short piece of 3/8" tubing to place inside of the adapter and use a pliers to pull the adapter out. The tubing stops the plastic from deforming.

To change out the offset bearing. Use a center punch and hammer on the dimple to spin the threaded bearing off the shaft. Threads on motor shaft are 5/16 " NF.

SETTING TIMER FOR DAILY INJECTION FOR MODEL 113 AND MODEL 375 PUMPS

To accurately set the injection rate requires the use of a “drum gage” or some other calibrated gage. For this example it is assumed that a Kenco type drum gage is being used to adjust and set the rate.

The Model 113 pump has no stroke adjustment so the only way to set the daily injection rate is with a timer. The timer module has 2 banks of DIP switches and each bank has 10 switches. Each and every one of the switches can be turned on or off depending on the requirements for your injection rate.

Each bank of switches is sized in seconds. The lowest setting is for .1 (1 tenth) of a second. The time value doubles as you go down the row of switches i.e. (.1, .2, .4, all the way to 51.2). The switches can be turned on or off to set any time from .1 second to 102.3 seconds. The left hand row is used to set the pump ON time and the right hand row is used to set the pump OFF time.

The following procedure will allow you to set the injection rate in an easy two-step process. With the pump switched off, first turn on some OFF time, using the 3.2 and 6.4 switches. These 2 switches combined will allow the pump to be off for 9.6 seconds of each run cycle. On the ON side we begin to set the switches to get the daily injection rate.

On the Kenco drum gage, the left inside marks are used to measure injection rate in quarts per day per a 1 (one) minute test. On the gage, mark where the fluid level is when the sight is nearly full. Count down from this mark the number of quarts required for daily injection rate, make a mark at this spot.

Five (5) gallons needs to be injected daily. From the top mark count down to a mark that equals 20 quarts (5 GPD = 20 QPD). Now the ON time can be set. Turn on the 1.6 and 3.2 switches; they have a combined time of 4.8 seconds. Now when the pump is turned on it will run for 4.8 seconds then be off 9.6 seconds that was set on the OFF side. The pump will continue to operate in this sequence till the pump is turned off. With the chemical at the top mark on the drum gage; see where the level is after running 4.8 seconds. Running for 4.8 seconds, the pump pulled down to the 15-quart mark, the pump needs more run time for 20 quarts. Now turn on the .8 and the .4 switches. Now run time will be for 6 seconds. Reset the drum gage to the top mark, turn the pump on and it pumps to the exact mark required. To inject 20 quarts per day the pump needs to run 6 seconds each minute. This is a 1 (one) minute test on the drum gage so now the OFF side is set so the injection rate is accurate according to the drum gage. Sixty seconds minus 6 seconds ON time leaves a remainder of 54 seconds OFF time. The closest switch on the OFF side is 51.2; turn this switch on. 54 minus 51.2 leave a remainder of 2.8. The closest switch to 2.8 is 1.6; turn this switch on. This leaves a remainder of 1.2 seconds; so now turn on the .8 and the .4 switches. Make sure that only these switches are on; turn off any others that may have been on when the pump was first being set. Now each minute the pump will run for 6 seconds and be off for 54 seconds which = 60 seconds. This is only an example, but by setting the ON and OFF times the daily injection rate can be set. Always remember that the total ON time and OFF time equal 60 seconds.

If you need any assistance call Solar Injection Systems, Inc. at 432-570-8144.

MODEL 113 PUMP SPECIFICATION

Type of Pump: Positive Displacement Piston: 3/8"

Piston Stroke: .075"

Piston Material: Tungsten Carbide

Pump Output: From 1 QPD to 10's of GPD (dependent on pump run time and injection pressure)

Seal: Main High Pressure Piston Seal is Teflon w/ graphite fiber impregnated.

Check Valve Seals: Viton O-ring (standard) or any compound customer requires. O-ring Size: -116

Secondary Seal on Seal Adapter: Same as above. O-ring Size: -016

Motor: 12VDC

Motor RPM: 1800 CCW

Bearing/Eccentric Cam Material: 440 SS

Check Valves: 304 SS (total of 4)

Overall pump footprint with mount: 7" H x 12" L x 14 1/2" W

Pump Body and Manifolds: Al (Alloy 6020) – heat-treated and hard anodized and Teflon Coated.





Sunpump Kit "A"



Sunpump Kit "B"



Sunpump Kit "C"

The check valves for a Model 113 and a Model 213 are exactly the same in size and assembly order. They also mount in the pump housing in the same manner, discharge at the top and suction at the bottom.

To replace seals in the pump, you must first remove the piston, you must first remove the seal adapter and the seal with a light oil or grease and push with a turning motion the seal adapter back into the seal cavity. Replace all of the seal retainer, making sure that one does not fall out when mounting the pump manifold and then when you mount the pump housing to the motor.

As a good practice when working with the check valves, place heads so that the discharge checks are at the top and the suction checks are at the bottom. Both suction and discharge checks are the same as far as parts and assembly order. How they are placed into the pump housing determines if it is a suction or discharge. Remember that a discharge check will have the retainer clips looking up and the suction check will have a smooth surface looking up. The discharge manifold will fit either way onto the check and pump housing.

CAUTION: MAKE SURE THAT PUMP DIS-CHARGE PORT IS AT THE TOP AND THE SUCTION PORT IS AT THE BOTTOM.

The bearing and cam offset arrangement are the same on both the Model 113 and Model 213. The stroke on the Model 113 is .075" and on the Model 213 it is .168". The motor shaft thread is RH. To remove the bearing cam/offset place the tip of an awl or similar object into the small round hole and strike with a mallet in a CCW. The piece should spin right off.

Tip for removing Plastic Adapter: Insert a short piece of 3/8" SST tubing inside the adapter, and then use a plier to grasp the outside of the adapter.

MODEL 113/213 CHECK VALVE REPLACEMENT

Replacement kit should contain 4 check valves, 4 – 116 O-rings, and 8 thin white washers.

Before Disassembly:

- **Make sure motor is disconnected from power source.**
- **Disconnect all suction and discharge tubing.**
- **If the chemical pumped requires bodily protection, this should be worn during repair, as a residual amount will be present in pump and parts.**

Disassembly:

- **Remove pump from motor.**
- **Remove bolts from back of pump.**
- **Lift manifold from pump halves.**
- **Maintain pump and manifold in proper orientation for suction and discharge.**
- **The check valves that are at the top of the pump halves. You can see an X or cross facing you, these are the discharge checks, and the ones facing in with smooth bottom up are suction checks. All check valves are exactly alike; they are suction or discharge by the way they face.**

Change out Check Valves:

- **Remove old checks and O-rings as required.**
- **Install one lightly greased white ring into each valve pocket in head.**
- **Place one O-ring around each valve and place each assembly into valve pockets. Be careful to install valves in their correct orientation.**
- **Install one lightly greased white ring into each valve pocket in manifold.**
- **Place manifold on top of head/plunger assembly, making sure of the suction/discharge orientation.**
- **Adjust position of heads to match valve pockets in manifold. It will click into place.**
- **Replace bolts with washers into back of pump and tighten finger tight.**
- **Add grease to cam bearing and assemble pump to motor.**
- **Tighten mounting bolts. Do not use excessive force because this may strip the bolt head or thread.**
- **Tighten bolts on back of pump.**
- **Reconnect suction and discharge tubing and reconnect to power. Prime and bleed air from pump and check for leaks.**

If you require assistance please call Solar Injection Systems, Inc. at 432-570-8144

SUNPUMPER MODEL 113 REPAIR PROCEDURE

1. Before disassembly:
 - a. If the chemical pumped requires body protection, this should be worn during repairs as a residual amount will be present in pump and parts.
 - b. Make sure motor is disconnected from power source.
 - c. Disconnect all plumbing.
2. The only tool required to disassemble pump is a 3/16" hex wrench.
3. Remove four (4) 1/4" socket head cap screws on front side of pump to separate from motor.
4. Remove all 1/4" (6) socket head cap screws from the back of pump.
5. Lift manifold from pump heads. **Take notice of the orientation of check valves.**
6. Pull heads apart.
7. Pull piston out from each head.
8. The seal retaining plates (4) normally fall out when heads are tipped.
9. Seal adapters can be removed with finger tips or a non-abrasive or non-galling tool.
10. The check valves can be pushed out from below with the short end of the 3/16" hex wrench.
11. Discard all worn parts and replace with new parts. Before replacing parts clean head and manifold with a soft rag and soap to remove residual chemicals and grease.
12. Lightly grease seal adapter assembly, slide assembly onto the piston and push into head by applying force with a twisting motion, being careful to not cut O-ring. Repeat procedure on the other head.
13. Install piston into one head then press the other head onto piston, install the seal retaining plates in slot above and below the seal adapter.
14. Install one lightly greased white washer into each valve pocket in each head.
15. Place one lightly greased O-ring around each check valve and place assembly into valve pockets. **Be CAREFUL to install valves in the correct orientation.**
16. Install one lightly greased white washer into each valve pocket in manifold.
17. Place manifold on top of head/piston assembly, adjust position of heads to match valve pockets in manifold. It will click into place.
18. Apply Lock Tight to all 1/4" bolts and place into the back of pump heads and tighten.
19. Apply a liberal amount of a good quality Teflon based or Moly EP grease to cam bearing and piston slot.
20. Rock and turn pump on end bell of motor to align pump to motor.
21. Apply Lock Tight to all 1/4" mounting bolts to join pump and motor. Do not use excessive force because this may strip the bolt head or thread.

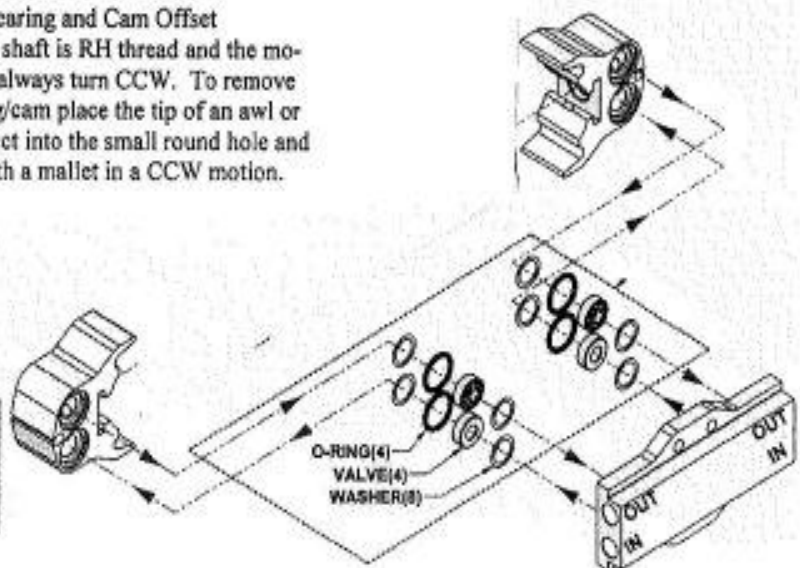


Bearing and Cam Offset

The motor shaft is RH thread and the motor has to always turn CCW. To remove the bearing/cam place the tip of an awl or similar object into the small round hole and strike with a mallet in a CCW motion.



Piston assembly



Sun Pumper #113 (Standard)

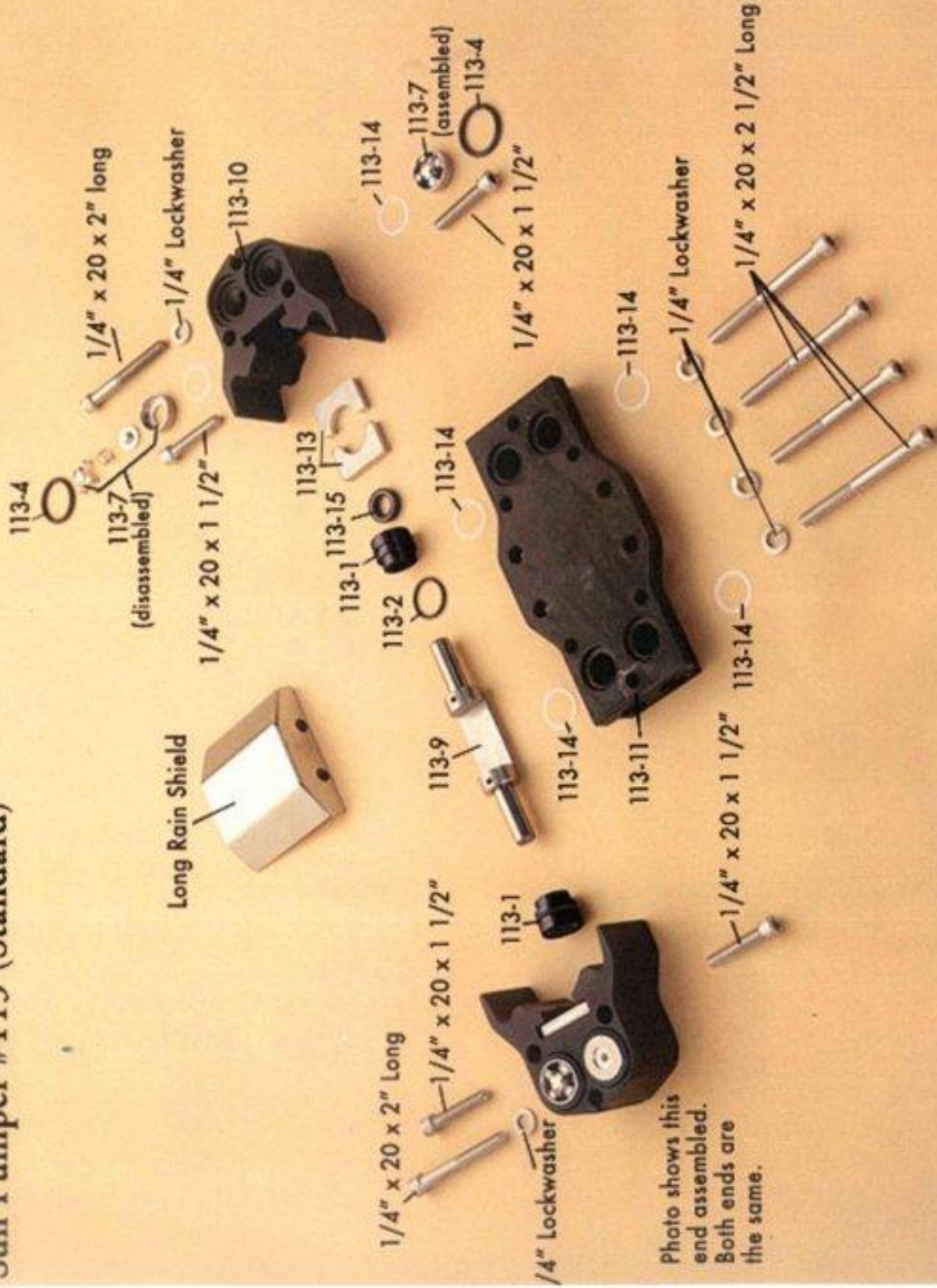
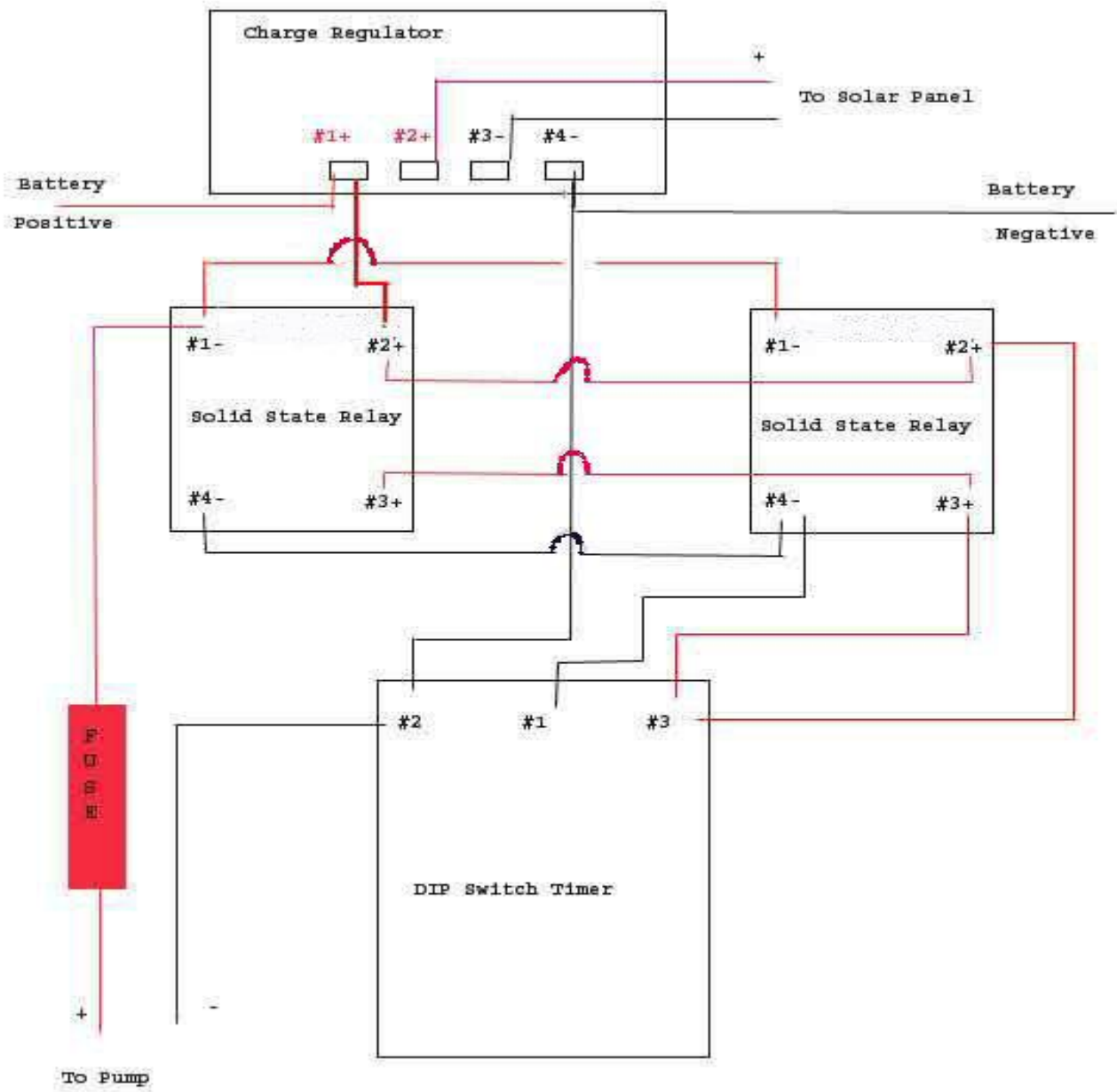
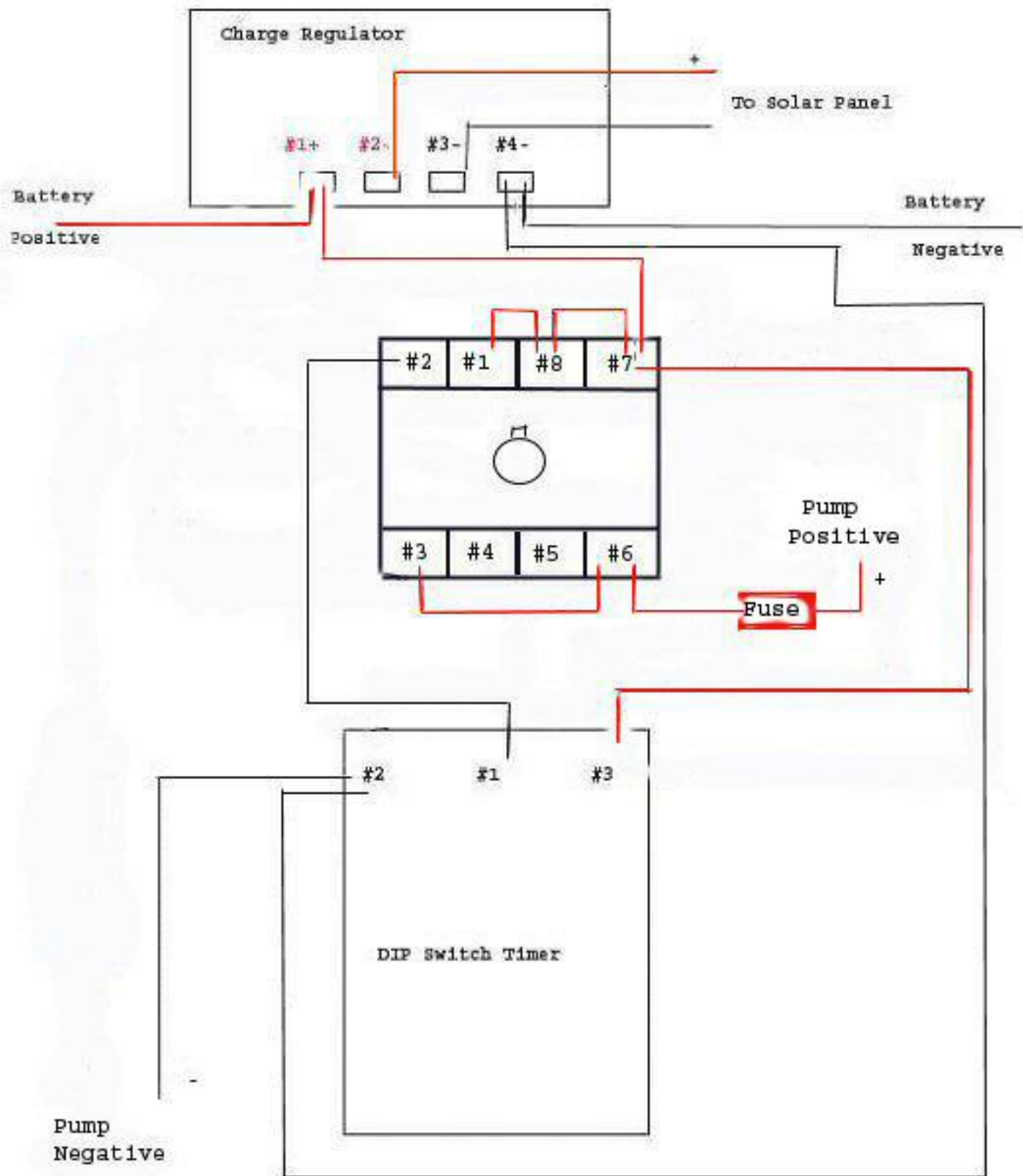


Photo shows this end assembled. Both ends are the same.

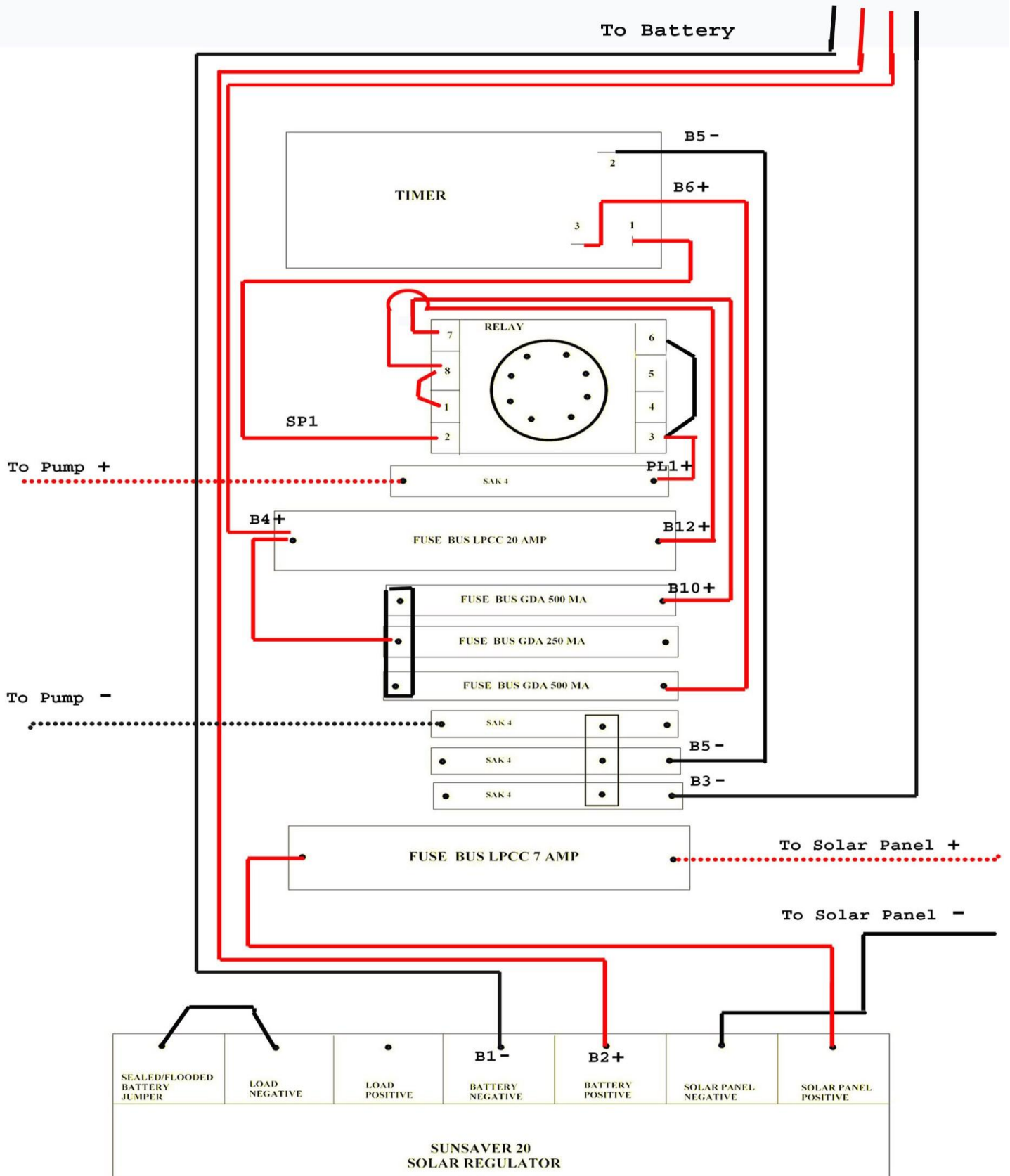
SunPump Wiring Diagram with Dual Solid State Relays



Sunpump Wiring Diagram with Magnecraft Relay



Sunpump CSA Electrical Panel



SUNPUMPER MODEL 113 REPAIR PROCEDURE

1. Before disassembly:
 - a. If the chemical pumped requires body protection, this should be worn during repairs as a residual amount will be present in pump and parts.
 - b. Make sure motor is disconnected from power source.
 - c. Disconnect all plumbing.
2. The only tool required to disassemble pump is a 3/16" hex wrench.
3. Remove four (4) 1/4" socket head cap screws on front side of pump to separate from motor.
4. Remove all 1/4" (6) socket head cap screws from the back of pump.
5. Lift manifold from pump heads. **Take notice of the orientation of check valves.**
6. Pull heads apart.
7. Pull piston out from each head.
8. The seal retaining plates (4) normally fall out when heads are tipped.
9. Seal adapters can be removed with finger tips or a non-abrasive or non-galling tool.
10. The check valves can be pushed out from below with the short end of the 3/16" hex wrench.
11. Discard all worn parts and replace with new parts. Before replacing parts clean head and manifold with a soft rag and soap to remove residual chemicals and grease.
12. Lightly grease seal adapter assembly, slide assembly onto the piston and push into head by applying force with a twisting motion, being careful to not cut O-ring. Repeat procedure on the other head.
13. Install piston into one head then press the other head onto piston, install the seal retaining plates in slot above and below the seal adapter.
14. Install one lightly greased white washer into each valve pocket in each head.
15. Place one lightly greased O-ring around each check valve and place assembly into valve pockets. **Be CAREFUL to install valves in the correct orientation.**
16. Install one lightly greased white washer into each valve pocket in manifold.
17. Place manifold on top of head/piston assembly, adjust position of heads to match valve pockets in manifold. It will click into place.
18. Apply Lock Tight to all 1/4" bolts and place into the back of pump heads and tighten.
19. Apply a liberal amount of a good quality Teflon based or Moly EP grease to cam bearing and piston slot.
20. Rock and turn pump on end bell of motor to align pump to motor.
21. Apply Lock Tight to all 1/4" mounting bolts to join pump and motor. Do not use excessive force because this may strip the bolt head or thread.

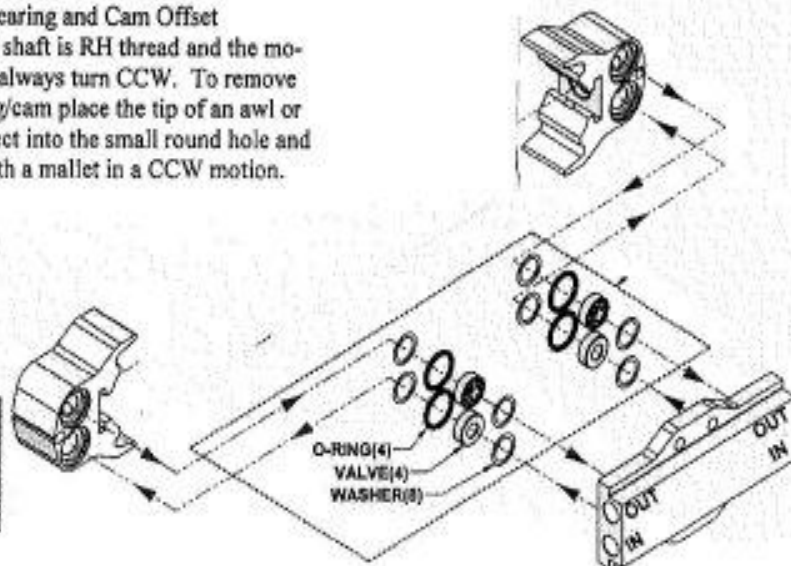


Bearing and Cam Offset

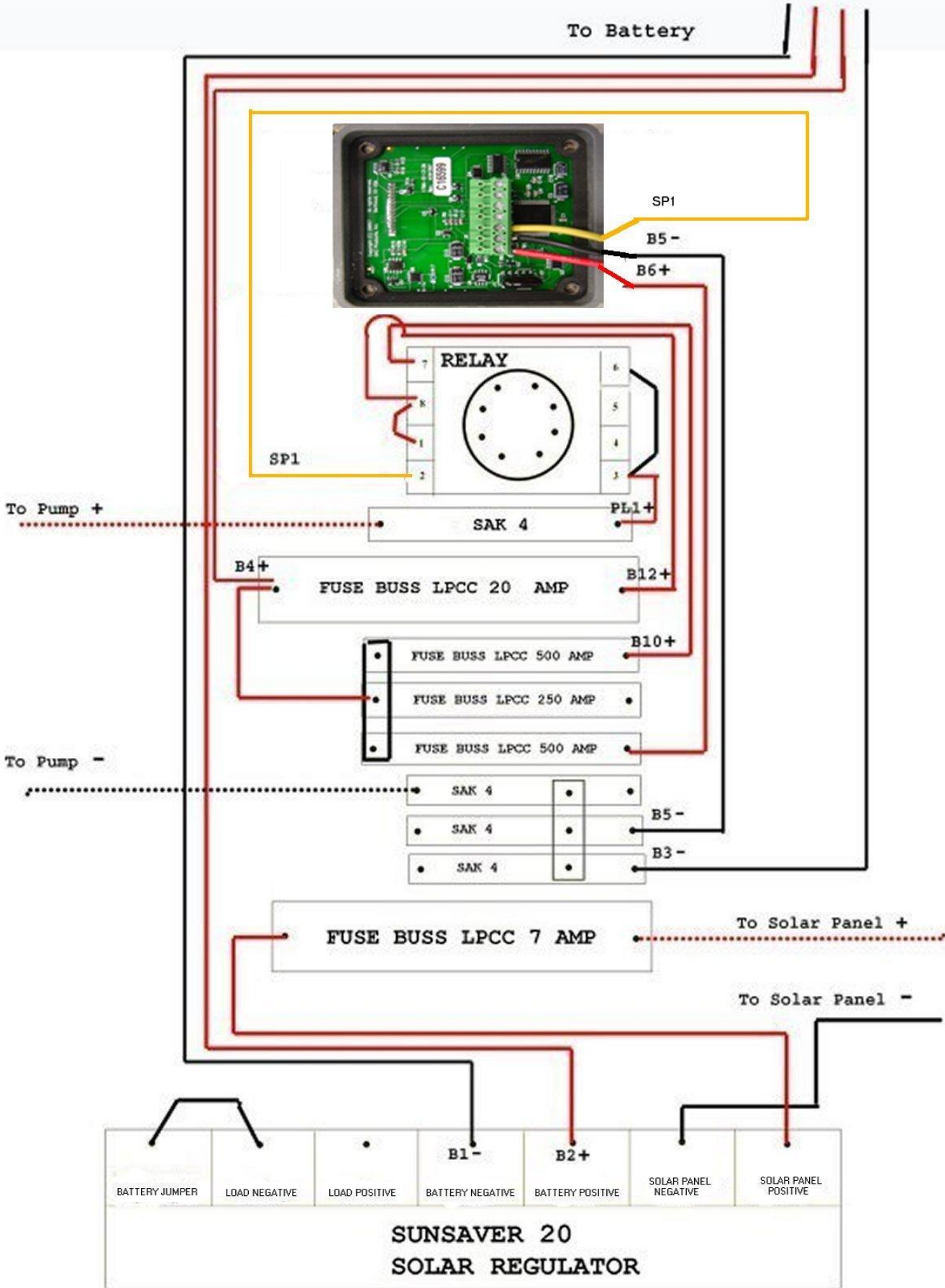
The motor shaft is RH thread and the motor has to always turn CCW. To remove the bearing/cam place the tip of an awl or similar object into the small round hole and strike with a mallet in a CCW motion.



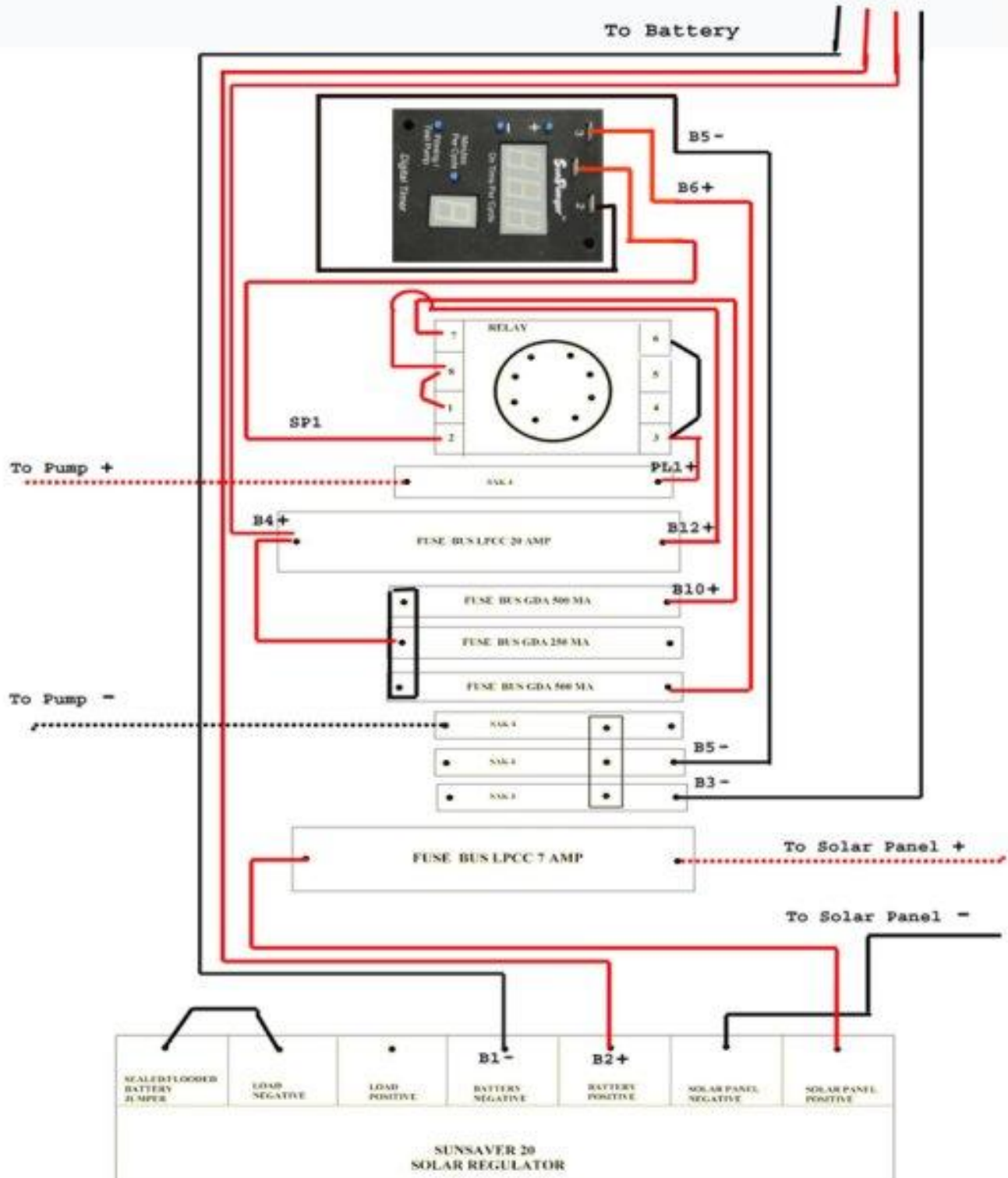
Piston assembly



Sunpump CSA Digital Panel



Sunpump CSA Electrical Panel



PANEL MATERIAL LIST					
ITEM	QTY	DISCRIPTION	MANUFACTURER	CATALOG NO.	SIZE
1	1	INSULATED ALUMINUM ENCLOSURE	CODE ELECTRIC	-	
2	1	HINGED PANEL	OPEN	-	445x445
3	AS REQ'D	BRACKET	OPEN	-	51X51
4					
5	1	SOLAR CONTROLLER	MORNINGSTAR	SS-20C-12V	20A
6	0	OPERATOR INTERFACE	SUNPUMPER	VISION 10	-
7	0	PUMP CONTROLLER	SUNPUMPER	SCADAPACK 100	-
8	1	SOLID STATE TIMER	ABB	RS1A11	-
9		Digital Timer	ABB	RSD12D-4815	
10	AS REQ'D	WIREWAY AND COVER	PANDUIT	WHITE	1" X 2"
11	AS REQ'D	TERMINAL MOUNTING RAIL	WEIDMULLER	23850	
12	1	TERMINAL END BRACKET (EW35)	WEIDMULLER	38356	-
13	4	TERMINAL (SAK 4/EN)	WEIDMULLER	46746	-
14	2	TERMINAL END PLATE (SAK 4/EN)	WEIDMULLER	11796	-
15	3	FUSED TERMINAL (ASK 1)	WEIDMULLER	47456	-
16	1	TERMINAL END PLATE (ASK 1)	WEIDMULLER	38036	-
17	1	FUSED TERMINAL	BUSS	CHM1	30A
18	1	RELAY (CLASS 1 DIV 2)	MAGNECRAFT	750X8XH~12D	DPDT
19	1	RELAY BASE (SOCKET)	MAGNECRAFT	70~464~1	15A, 300V, 8 PIN
20	1	CERAMIC TUBE FUSE	BUSSMAN	GDA~250mA	250mA
21	2	CERAMIC TUBE FUSE	BUSSMAN	GDA~500mA	500mA
22	1	CERAMIC TUBE FUSE	BUSSMAN	LP-CC 20A	20A
23	1	CERAMIC TUBE FUSE	BUSSMAN	LP-CC 15A	15
24	2	SEALED, RECHARGABLE BATTERY	POWER SONIC	PS-121000-U	12VDC/100A HOUR
25	1	CHASE NIPPLE	THOMAS BETTS	TAB843TB	3/4"
26	1	VENT KIT (CL1, DIV1)	REDAPT	DPE4004S3	1/2"











STAND UNIT



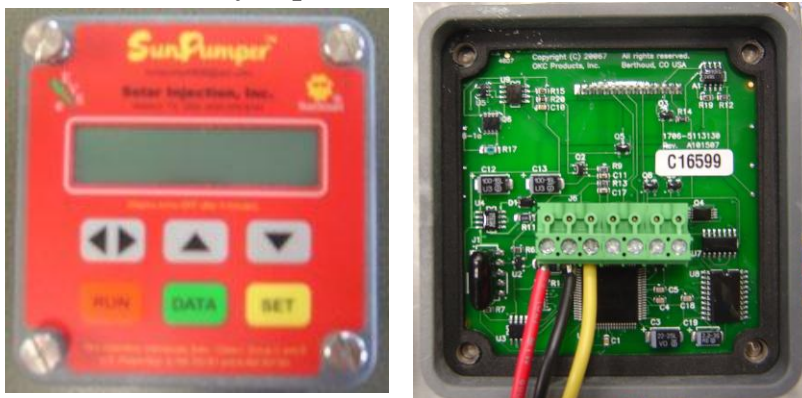
SKID UNIT

SETTING THE TIMEMATE DIGITAL TIMER

1. To set the timer, you need to have it in the *IDLE mode. If the pump is running, press RUN to return to *IDLE mode.
2. Press the SET key set the *PUMP ON time.
3. Press the  key to select between minutes, seconds, and tenths of a second.
4. Press the  key to increase or  key to decrease the time.
5. Press the SET key to change the *PUMP OFF time
6. Press the  key to select between minutes, seconds, and tenths of a second.
7. Press the  key to increase or  key to decrease the time.
8. Press the SET key to select the screen *HEATER. Press the  key or  key to turn it on and off.
9. Press the RUN key at any time to return to the *IDLE screen.
10. When in the *IDLE mode, press the RUN key to start the pump.
11. Press the RUN key to stop the pump and return to the *IDLE screen.

The timer will then continue to count down and change between the *PUMP ON and *PUMP OFF screens. The two timers (the on & off) should add up to 60 seconds. The sight glass uses a one minute cycle to determine the rate of litres being pumped per day. By changing the on and off time, you can set the flow rate as measured in litres per day.

Pump time data is available if you press the DATA button. To return to the *IDLE mode, press the RUN



button.

