## 5 SP 2.3 Operation

### 5.1 Touch Screen Controller Display





The SunPump 2.3 Solar-Assisted Heat Pump uses the following indicators to display system status.

	Heating Mode. The SunPump 2.3 does not include a cooling option and only operates in heating mode.	
©	Indicates when the compressor is running during normal heating.	
•	Indicates system is operational.	
*	Indicates that the Circuit Board cooling fan is running.	
₩	Indicates when the electric backup heater is running.	
Û	Indicates that the screen is locked. Press and hold power button for $()$ seconds to lock or unlock the screen.	
MON THE WED THU FRI SAT SUN 1 ON 2 OFF	Displays current time. Also used to set system timer (see below).	
	Indicates set point temperature (lower display) and actual water temperature (top display).	

# 

Before applying power to the SunPump ensure that all plumbing and sensor connections are hooked up, that the tank is full of water, and the refrigeration lines have been properly installed and tested.

### 5.2 Start up

When power is first applied to the SunPump the display will come on showing the current water temperature and the time display (to set the correct time see below).

To turn the SunPump on press and release the On button  $\bigcirc$ . The display will now show both the current water temperature and the set point temperature (default is 45°C). At this point the system will be operational and, assuming the water temperature is at least 5°C below the set point, will start the compressor to begin heating the water.

When the heating cycle begins, the controller fan will start first to cool the internal electronics. This will be indicated by the fan symbol on the display panel. The compressor will start shortly after, indicated by the compressor symbol on the display panel.

The arrow buttons  $\Delta V$  can be used to adjust the set point temperature up or down as desired. The recommended temperature is between 45°C and 50°C.

#### 5.3 System Setup

#### 5.3.1 Setting Correct Time

- Press and hold clock button (-) for 5 seconds until day starts to blink.
- Use arrow buttons  $\Delta V$  to select current day.
- Press clock button to switch to hour digits and use arrow keys to set correct hour (Note, SunPump uses a 24-hour format for time).
- Press clock button again to switch to minute digits and use arrow keys to set correct minute.
- Press On/Off button (I) to confirm time and exit setup.

#### 5.3.2 Setting Temperature Display Units

SunPump 2.3 can display temperatures in either Celsius or Fahrenheit. You can change between units using the function setup option using the following procedure.

- To enter the function setup press and hold the settings button **P** and the mode button **N** at the same time for 5 seconds.
- Press the settings button twice more to select F03 and use arrow buttons  $\Delta V$  to select either C or F to display Celsius or Fahrenheit respectively.
- Press the On/Off button () to confirm the selection and exit function setup.

#### 5.3.3 Setting Timer Option

SunPump 2.3 can be set to operate only during certain times on any day if desired. You can set up to two time periods per day that the heating system will operate, or you can turn the timer off to operate any time if preferred.

#### 5.3.3.1 Turn Timer Option On or Off

Use the following procedure to toggle the timer option between On and Off.

- Press and hold the clock button O and the On/Off button O at the same time for 5 seconds.
- When the time display changes to show only the days of the week release the buttons and wait a few seconds for the screen to refresh.
- When the timer option is Off the screen will appear like the image below:







• When the timer option is On the screen will appear like the image below, with the number of the corresponding period for the day shown (1 or 2), and whether the current time is within on operating period or not (ON or OFF).



#### 5.3.3.2 Setting Operating Times

The default settings for the timer option are as follows.

	1 <sup>st</sup> Operating Period		2 <sup>nd</sup> Operating Period	
Day of Week	Start Time	End Time	Start Time	End Time
Monday	8:00	11:30	13:30	17:30
Tuesday	8:00	11:30	13:30	17:30
Wednesday	8:00	11:30	13:30	17:30
Thursday	8:00	11:30	13:30	17:30
Friday	8:00	11:30	13:30	17:30
Saturday	8:00	11:30	13:30	17:30
Sunday	8:00	11:30	13:30	17:30

When the timer option is turned On the SunPump will only run heating during the times indicated by these settings. For example, in the default settings above, the SunPump would not operate before 8:00 on any morning, between 11:30 and 13:30, or after 17:30 in the evening, regardless of the water temperature in the tank.

To change the timer settings, use the following procedure.

- Press and release the clock button  $\bigcirc$  which will cause the time display to change to the first start time for Monday, with the day blinking.
- Use arrow buttons  $\Delta \nabla$  to select the day you want to adjust.
- Press clock button to switch to hour digits for the 1<sup>st</sup> starting time on that day and use arrow keys to set hour you want the system to start.
- Pressing the clock button cycles through all the times which can be adjusted as needed (1<sup>st</sup> stop, 2<sup>nd</sup> start, 2<sup>nd</sup> stop, 1<sup>st</sup> start next day....).
- Once you have the times set correctly press the On/Off button  ${f O}$  to confirm and exit.

# 

These parameters affect the operation and performance of the SunPump system and should only be adjusted by a qualified technician who fully understands their function.

#### 5.4 Adjusting Parameters

The table on the following page lists the 7 Parameters that can be adjusted on the SunPump 2.3 as well as the default values for each. To adjust Parameters use the following procedure.

- a. Long Press the power **ON** button **O** and HOLD for 5 seconds (until it beeps) to reveal 6 button icons stacked on the right side. This unlocks the hidden Settings meant for Installers only.
- b. Long Press the **SETTINGS** button **Press** and HOLD for 5 seconds to see **P01** and the associated numeric Value display in large digits. The upper digit is the Parameter number, and the lower is the set Value.
- c. Touch the **ARROW UP** button [] to scroll through the list from **P01** to **P07** while both digit sets are flashing.
- d. Touch the SETTINGS button To make the Value digit flash if you want to change the Value.
- e. Touch one of the ARROW buttons  $\Delta V$  to adjust the Value up or down.
- f. Touch the **SETTINGS** button **O** to accept the Value change.
- g. Press the **ON** button **()** to save all setting changes and exit.

#### 5.5 Viewing Sensor Live Data

- i. Long Press the **MODE** button M for
  - for 5 seconds until it beeps, to enter the live Data list
- ii. Touch the **ARROW UP** button  $[\Delta]$  to scroll from a1 to a10 (depending on model).

**Post** your Parameters and Data to **https://sunpump.freshdesk.com** in this this type of format: P1=131 F, P2= , P3= , P4= . P5= , P6= , P7= , P8= , P9= , P10= , P11= , P12= a1= , a2= , a3= , a4= , a5= , a6= , a7= ,

# SP2.3 Parameter Settings

Code	Setting	Setting Range	Your Data
P01	Water tank temperature set point – turns off	20 to 60°C, Default: <u>50°C</u>	
P02	Temperature below set point when heating is initiated with system in ON/OFF Mode. NOTE: When using Fahrenheit, the actual temperature difference will be the value set minus 32 degrees. (for example for a temperature difference of 9°F this	3 to 15°C, Default: <u>5°C</u>	
	parameter should be set to 41°F)		
P03	Heat Pump ON/off Mode or Constant Water Temperature (CWT) Mode for Winter recovery	0: ON/OFF; 1: CWT; Default: <u>0</u>	
P04	Temperature below set point when booster element heating turns on with system in CWT Mode. NOTE: When using Fahrenheit, the actual temperature difference will be the value set minus 32 degrees. (for example for a temperature difference of 9°F this parameter should be set to 41°F)	0 to 8°C, Default: <u>3°C</u>	
P05	Delay time before booster Electric Heating Element starts operating (from start of heating cycle)	3 to 180 min, Default: <u>90 min</u>	
P06	Auxiliary Electric Heating Element starting temperature	20 to 50°C, Default: <u>50°C</u>	
P07	Minimum Outdoor Ambient temperature for heat pump operation to not run until weather warms to higher temp.	30 to1°C, Default: <u>30°C</u>	
P08	Reserved parameter – no defrost		
P09	Reserved parameter – no defrost		
P10	Reserved parameter – no defrost		
P11	Reserved parameter – no defrost		
P12	Reserved parameter		

#### Trouble Shooting 8

#### System Data Codes 8.1

Certain sensor outputs can be accessed from the display to help evaluate performance issues and support trouble shooting.

To access this data press and hold the mode button  $\mathbf{M}$  until the temperature display changes to **a01** to show the first display code.

To cycle through display codes, press the settings button

To exit press the ON button  ${f U}$ 



The following table lists the data codes that are available on SunPump 2.3

Data Codes	Meaning
d01	Operating frequency of DC Inverter compressor (Hz)
d02	Operating current of compressor (amp)
d03	Water temperature (same as shown on normal display)
d04	Ambient air temperature
d05	Electronic expansion valve opening
d06	Panel defrost temperature
d07	Compressor gas discharge temperature
d08	Not used on SunPump 2.3 (will always read 25 C.)
d09	Not used on SunPump 2.3 (will always read 25 C.)

#### 8.2 Error Codes

The following table lists the error code warnings that protect your SunPump system. An error message often involves external component problems like a pump flow that is not part of SunPump

#### **8.3 ACTION STEPS**

- 1. Contact the Vendor or Installer to check for a common fix, like a loose sensor wire
- 2. Search the Support Knowledge Base by keyword or Category to find known solutions
- 3. If your issue is not in the Knowledge Base, then Open an online Support Ticket https://sunpump.freshdesk.com/support/login
- 4. Trouble-shooting other parts of a heating system may be an extra service fee at \$100 per hour.
- 5. Maintenance and performance issues are not covered by Warranty and may be an extra service fee.
- 6. Request Return Authorization to ship a defective part under Warranty to SunPump

Error code	Meaning
E 01	EEPROM error (IDU PCB/Wire Controller)
E 02	Water tank temperature sensor – not being read
E 05	Panel defrost sensor – not being read
E 06	Ambient temperature sensor – not being read
E 07	Gas discharge temperature sensor failure
E 08	Signal communication between controller and PCB failure
E 09	Signal communication disconnect between main PCB and inverter modular board
E 10	Boot failure, compressor protection disconnect; temperature protection
E 12	Inverter modular board or software failure
E 13	Discharge gas temperature or compressor temperature overheat protection
E 15	Over current or Brown Power low electrical current protection
E 16	Water tank temperature too low
E 19	Return gas temperature failure
E 20	Expansion valve outlet temperature sensor failure

## 8.3 Trouble Shooting Guide

Malfunction	Reason	Solution		
Unit does not turn on	<ol> <li>Power failure.</li> <li>Loose power wire connection.</li> <li>Fuse burnedout.</li> <li>E5 Sensor missing</li> </ol>	<ol> <li>Turn off power and inspect power supply.</li> <li>Identify the cause and rectify.</li> <li>Identify the cause and replace with new fuse.</li> <li>Connect Air and Panel sensors</li> </ol>		
Unit heating capacity is low or compressor working too long	<ol> <li>Shortage of refrigerant or leakage</li> <li>Poor thermal insulation of water system</li> <li>Sizing too small</li> <li>Winter operation needs to switch to Hybrid Mode.</li> </ol>	<ol> <li>Check the system for leakage, fix leak and recharge refrigerant gas</li> <li>Improve thermal insulation of the system. Check for thermal migration by feeling pipes, install heat traps.</li> <li>Calculate Heat Loss, add insulation, turn off HRV, reduce air leakage, use Auxiliary heat</li> <li>Change Parameter 3 Value to 1 for Hybrid or Combo Heat Pump/Electric booster mode.</li> </ol>		
Compressor discharge pressure too high	<ol> <li>Tank water level is too low</li> <li>Excessive refrigerant (from repair / regas)</li> </ol>	<ol> <li>Check / fix water supply to tank</li> <li>Call refrigeration mechanic to reduce refrigerant</li> </ol>		
Compressor suction pressure too low	<ol> <li>Shortage of refrigerant or leakage</li> <li>Filter or capillary blocked</li> </ol>	<ol> <li>Call refrigeration mechanic to check the system for leakage, fix the leak and regas the heat pump</li> <li>Replace capillary tube or filter</li> </ol>		
Compressor will not turn on	<ol> <li>Power failure</li> <li>Compressor contactor malfunction</li> <li>Loose connection</li> <li>Overload protection of compressor on</li> <li>Compressor capacitor is damaged</li> </ol>	<ol> <li>Check the power supply and restore</li> <li>Test, then replace the contactor</li> <li>Check for loose wires and re-connect</li> <li>Check that the current / Amp draw of compressor is within specification, may require replacement of the compressor</li> <li>Test, then replace the capacitor if failed</li> </ol>		
Loud compressor noise	<ol> <li>Liquid refrigerant getting into the compressor</li> <li>Compressor not working</li> </ol>	<ol> <li>Check the cause for flooding of the compressor and solve the problem</li> <li>Replace the compressor</li> </ol>		
The compressor is in operation	<ol> <li>Refrigerant has leaked out</li> <li>Compressor not working</li> </ol>	<ol> <li>Check the system for refrigerant leakage.</li> <li>Repair leak and regas</li> <li>Replace the compressor</li> </ol>		

### SUPPORT FRESHDESK – search issues, technical knowledge, and open Warranty Tickets

#### SUPPORT DESK: https://sunpump.freshdesk.com/support/login

#### 8.4 External Air and Panel Temperature Sensors

Your SunPump system comes with two NTC 10k Ohm temperature sensors that need to be installed outdoors and connected by AWG22 2 wire to the lead on the right side of the indoor heat pump unit shown in green as figure **S2** on page 6 parts list. Their purpose is to assist in Defrost and heating controls by measuring small changes in resistance that correspond to temperatures. In new construction, the wires can be roughed-in from Mechanical room to roof and soffit overhang areas. Make certain **S1** is installed in the lower tank thermistor well, as shown in red on the parts page 6. If it is in the upper Well, move it to the lower for best results.

The small black or white plastic connector is a **JST** SM type used in low voltage Electronics and Vehicles. It is like the Molex type that also uses miniature crimped pins, but is smaller. To undue a connection pair, you must depress a catch. Do not try to pull apart by tugging on the wires, the pins are not hard to damage and then the fix becomes time consuming. Be patient, do not use force.

The Ambient Air sensor should be installed on a shady exterior wall, or alternatively under the roof overhang shown in the picture below. Do not locate inside the Attic, on the roof, or in the Sun.

The Panel sensor (at right side), is fastened securely by a wire strand twisted tight with pliers on a Panel on the smaller ¼" liquid line that is the lower of the two on any Panel. The sensor needs to be as close to the panel as possible, right at the square cut-out is best. The goal is to measure the lower entry to the Panel, where Frost first appears. Do not install on a pipe that is inches away from the Panel because it is less accurate.

Extending the AWG22-26 gauge wire is simple, but needs to be done with care. Solder the twisted strands and use a shrink wrap to seal joined wires to avoid poor connection aging that will increase resistance and alter the sensor accuracy over time. Installers should consider





