

SUNHOPPER[®]-D

User Manual



SunHopper-D(US) User Manual
Version 1.6
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2 This Document

This document reviews the usage of the SunHopper®-D. User interface and troubleshooting are included in various sections of this document.

All material for installing the product is available in the installation manual.

Find the most up to date document at greenpwr.com.

3 Cautionary Marks

Several warning notes are shown in this document.

⚠ WARNING

A section under this mark must be followed or risk personal injury, shock, or death.

⚠ ADVISORY

A section under this mark must be followed or risk minor personal injury.

① NOTE

A section under this mark notes information important to the installation, but does not entail a safety risk.

4 IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS – This manual contains important instructions for Model SunHopper-D that shall be followed during installation and maintenance of the inverter.

⚠ WARNING

RISK OF ELECTRIC SHOCK. Warning – These servicing instructions are for use by qualified personnel only. To reduce the risk of electric shock, do not perform any servicing other than that specified in the operating instructions unless you are qualified to do so.

⚠ WARNING

THE INVERTER IS NON-ISOLATED. DO NOT connect a grounded PV array to the input of the device.

⚠ WARNING

RISK OF ELECTRIC SHOCK AND FIRE. USE ONLY WITH PV MODULES WITH A MAXIMUM SYSTEM VOLTAGE RATING OF 400V OR HIGHER.

⚠ WARNING

ELECTRIC SHOCK HAZARD. The DC conductors of this photovoltaic system are normally ungrounded but will become intermittently grounded without indication when the inverter measures the PV array isolation. Ensure the inverter is disabled with all voltage sources disabled before servicing.

⚠ WARNING

ELECTRIC SHOCK HAZARD. Both AC and DC sources are terminated inside this equipment. Each circuit must be individually disconnected before servicing. Only open the cover after all energy sources are disabled.

⚠ WARNING

ELECTRIC SHOCK HAZARD. When the photovoltaic array is exposed to light, it supplies a DC voltage to the equipment.

⚠ WARNING

ELECTRIC SHOCK HAZARD. An external DC disconnect switch is required with this product. After disabling the device, wait at least 30 seconds before removing the cover for servicing to reduce the risk of shock.

⚠ WARNING

ELECTRIC SHOCK HAZARD. Before operating the inverter, ensure grounding is connected properly. This product must have an earth connection. The inverter AC output is grounded to the chassis of the product internally.

⚠ WARNING

ELECTRIC SHOCK HAZARD. The inverter AC input, if used, must be connected to a dedicated AC branch with an overcurrent protection device. Follow the installation instructions to determine the rating of the AC input overcurrent protection device.

⚠ WARNING

FIRE HAZARD. The arc fault detection circuitry can be disabled if the installation location and type allow by local code. By disabling this system, faulty or damaged connections may result in a fire risk.

⚠ ADVISORY

RISK OF BURNS. The metal chassis of the product can become hot. Ensure the installation prevents unintentional touching of the unit. Before servicing the unit, ensure the device has been shut down for at least 30 minutes.

⚠ ADVISORY

RISK OF BURNS. The installation requires the addition of a mixing valve to the outlet of the water heater. The water temperature is set to the maximum on the thermostat to ensure adequate hot water is provided to the user. The mixing valve is not provided with the SunHopper-D.

① NOTE

INDOOR USE ONLY. Only install the product indoors to ensure there is no possible ingress of moisture and environmental contaminants. The space can be conditioned or unconditioned.

① NOTE

ELECTRICAL INSTALLATION REQUIREMENTS. The unit is not provided with an installation transformer and is intended to be installed in accordance to 690.35 of the National Electric Code, ANSI/NFPA 70, with an ungrounded PV array.

4.1 Intended Installation and Operation

The SunHopper-D is a specialised solar inverter for domestic hot water production. The inverter is transformerless. No galvanic isolation is provided between the PV input and output of the device. The device is designed for indoor use only in conditioned or unconditioned spaces which are within the operating temperature range (see Section 9).

⚠ WARNING

ELECTRIC SHOCK HAZARD. Before operating the inverter, ensure grounding is connected properly. This product must have an earth connection. The inverter AC output is grounded to the chassis of the product internally.

- The neutral conductor (L2) of the heater output is grounded to the chassis during PV operation. **THE DEVICE CHASSIS MUST BE BONDED TO EARTH.**

① NOTE

ELECTRICAL INSTALLATION REQUIREMENTS. The unit is not provided with an installation transformer and is intended to be installed in accordance to 690.35 of the National Electric Code, ANSI/NFPA 70, with an ungrounded PV array.

1. The PV panel frames must be bonded to earth. **DO NOT EARTH THE PV CIRCUIT.**

The array capacitance to earth should not exceed 1 μ F in all operating conditions. Higher capacitances will result in higher leakage current and nuisance tripping of the RCD system.

The output of the SunHopper-D is intended to drive resistive loads only. **DO NOT CONNECT TO A HEAT PUMP WATER HEATER OR ANY OTHER NON-RESISTIVE LOAD.**

Immersion type water heaters must not have any “smart” features for the device to work properly. Under PV operation, the output of the inverter will vary in voltage.

An external over-current protection device must be installed to the PV input as indicated by the National Electric Code NFPA 70.

An external over-current protection device must be installed to the AC grid input. No internal protection is provided for the grid backup path. Ensure the fuse or circuit breaker is within the SunHopper-D's maximum AC current specification (see Section 9) and is reasonably sized for the hot water immersion heater.

4.1.1 Arc Fault Circuit Interrupter (AFCI)

The SunHopper-D has a built-in DC arc fault circuit interrupter which meets the requirements of UL1699b. A detected arc event will cause the SunHopper-D to enter a fault state and resume operation automatically. Additional information is available in the User Manual.

The AFCI system can be disabled if the installation allows. See Section 7.3.

4.1.2 Rapid Shutdown

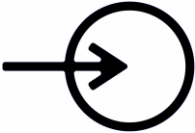
The SunHopper-D is a PVRSE (PV rapid shutdown equipment) and will decrease the voltage of the DC line to under 30V within 30 seconds. This discharge occurs when the input is disconnected from the PV array.

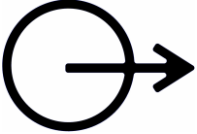
The SunHopper-D **DOES NOT** contain a rapid shutdown transmitter internally. Module level rapid shutdown equipment and a rapid shutdown transmitter are required externally if mandated by local code.

5 Symbols and Markings

Several symbols and markings are present on the product label and product itself.

Table 1

	Caution, hot surface. The product may become hot during operation.
	Caution, risk of danger.
	Caution, risk of electric shock.
	Alternating current (AC). The input or output is an AC circuit. DO NOT wire a DC circuit to these terminals.
	Direct current (DC). The input or output is a DC circuit. DO NOT wire an AC circuit to these terminals.
	Protective conductor terminal. Wire an earthing connection to this terminal for each circuit.
	Input terminal. Power inputs are marked with this symbol.

	Output terminal. Power outputs are marked with this symbol
	Refer to the operating instructions.
	Intertek listed symbol.

6 User Interface and Operation

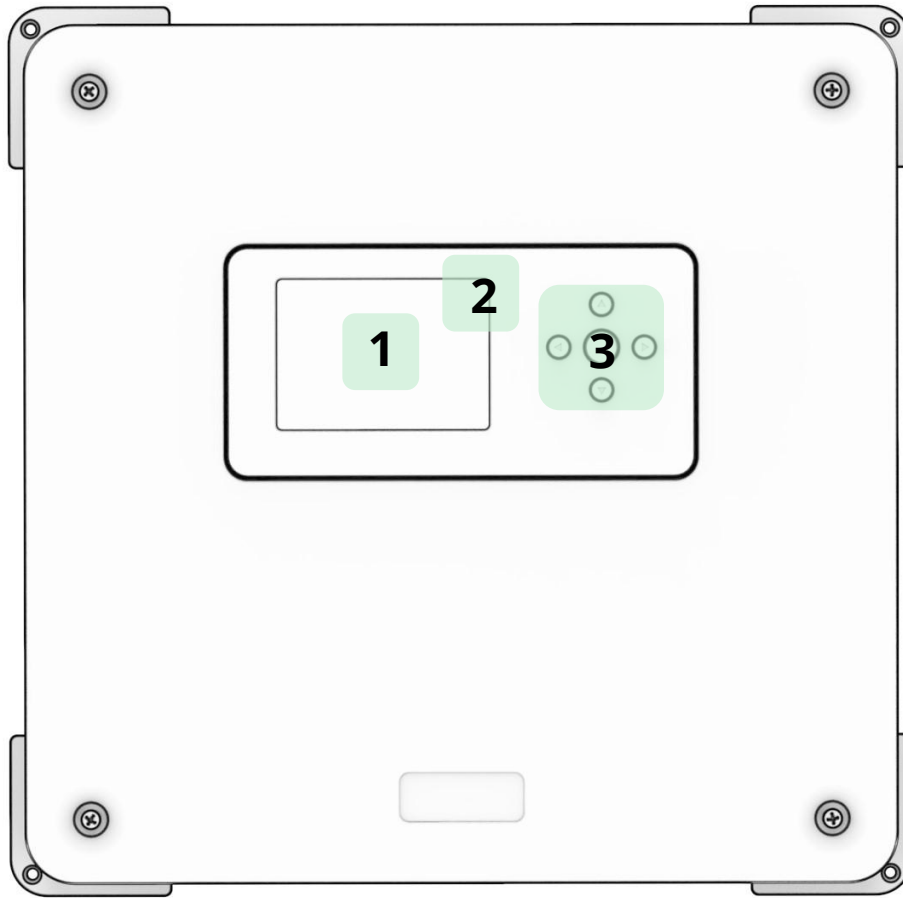


Figure 1

Note	Description
1	Display
2	Red Fault LED
3	5 Button User Interface

6.1 Display

The SunHopper-D uses a graphical LCD display to show several portions of data to the installer and user. A 5-button user interface is provided alongside of the display. These ensure the system is easy to use and diagnose if a fault were to occur.

6.1.1 Home Screen

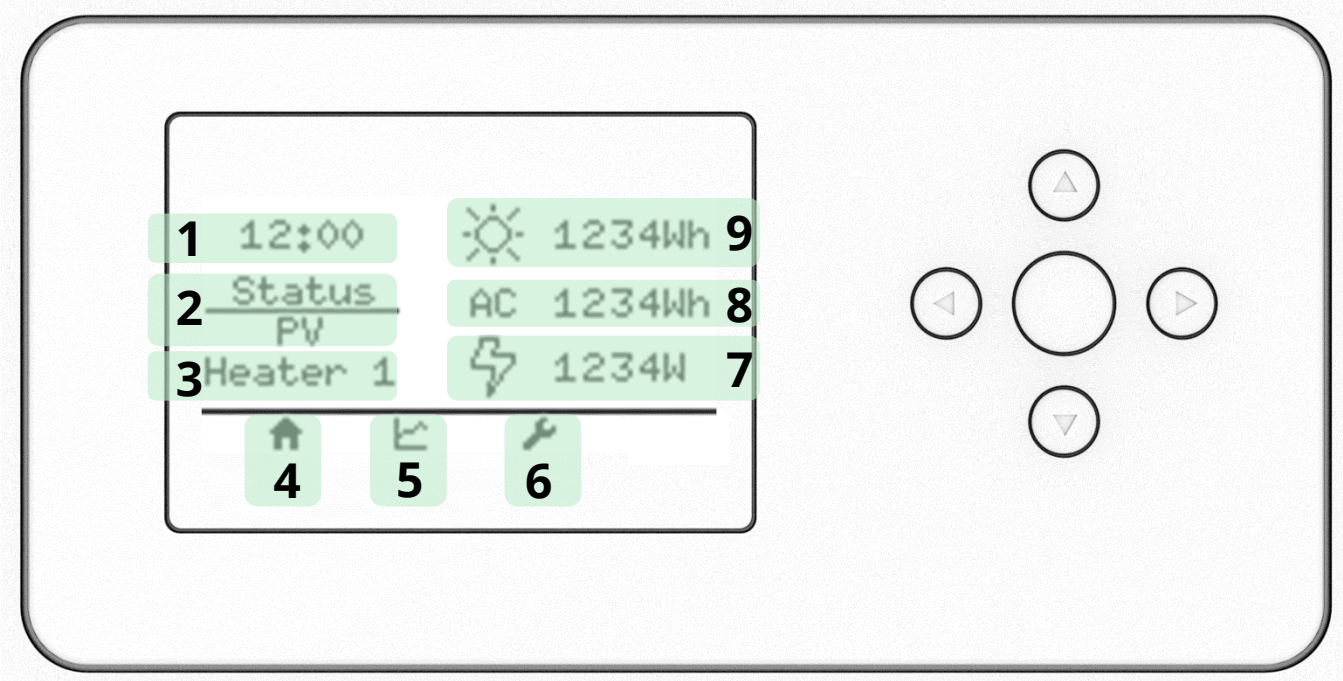


Figure 2

Note	Description
1	Current Time
2	Current Status
3	Active Heater (If Active)
4	Home Screen Icon
5	Chart Screen Icon
6	Settings Icon
7	Output Power (If Active)
8	Daily Energy from the AC grid
9	Daily Energy from PV

The home screen shows the performance of the device in a simple to use interface. A backlight on the display will illuminate when a button is pressed and remains on for a few seconds for installations where the display may be difficult to read. A navigation panel is provided at the bottom of the home screen.

Daily energy storage and current power are shown on the home screen. These are updated once per minute.

The current status of the unit will be one of the following:

Status	Description
Idle	The system is currently off but will begin operation once the internal schedule system calls for either PV or AC energy
AC	The heater is currently powered from the AC grid
PV	The heater is currently powered from the PV array
PV Weak	The inverter has detected a weak PV event where the panels cannot generate enough power to provide a stable voltage supply. After 15 minutes have passed, the device will attempt to try powering from the PV system again if voltage is still present from the PV panels. This occurs at dawn, dusk, during severe weather conditions, and is also indicated at device startup.
Starting...	The inverter is starting. During this time the UI will be unresponsive as timing critical events are completed. This typically lasts about 1 minute.
At Temp	The water heater system is at temperature and is not accepting any more power.
Disabled	The system has been disabled and will not provide output power. The SunHopper must be enabled via the enable screen. See Section 6.1.3.7.

6.1.2 Chart Screen

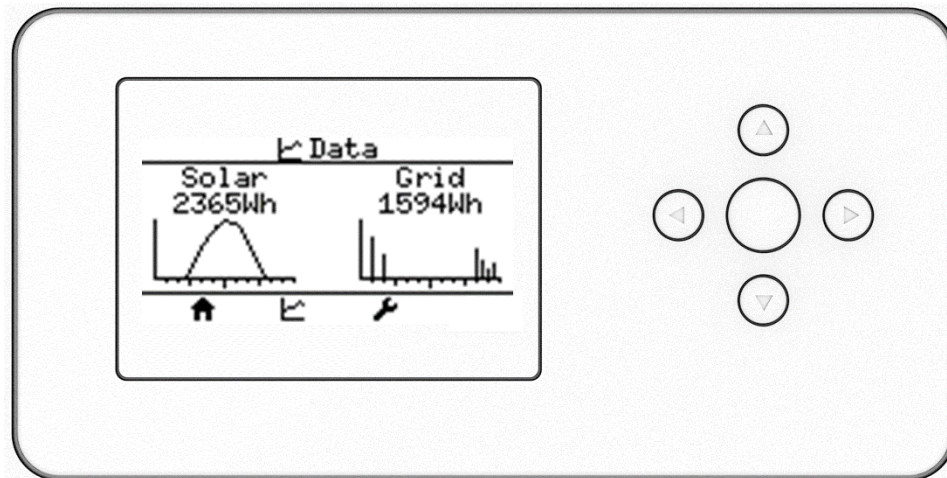


Figure 3

The chart screen shows the current day energy for both solar (PV) and grid (AC) backup energy use. The current day energy counter is displayed at the top of the display.

Additional data is available via the mobile app. The device UI provides minimal usage history data.

6.1.3 Settings Screen

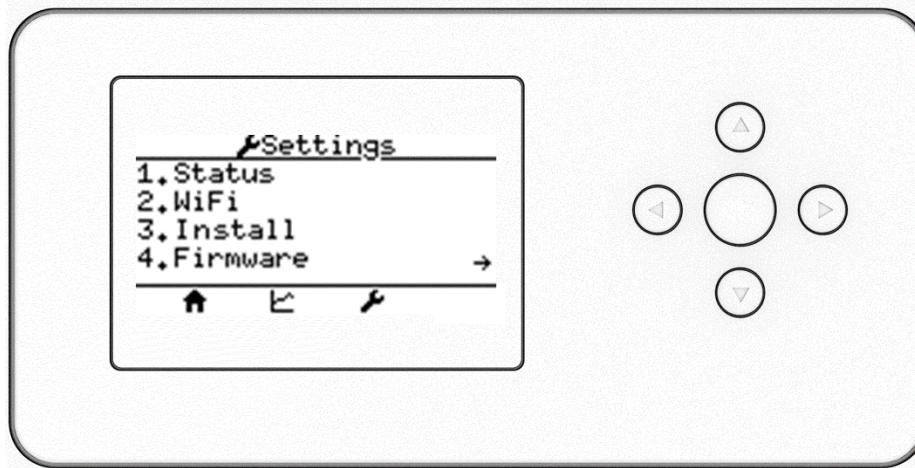


Figure 4

The first settings screen shows information on the unit and allows for new installations to be configured. Pressing the right arrow allows the user to find additional settings.

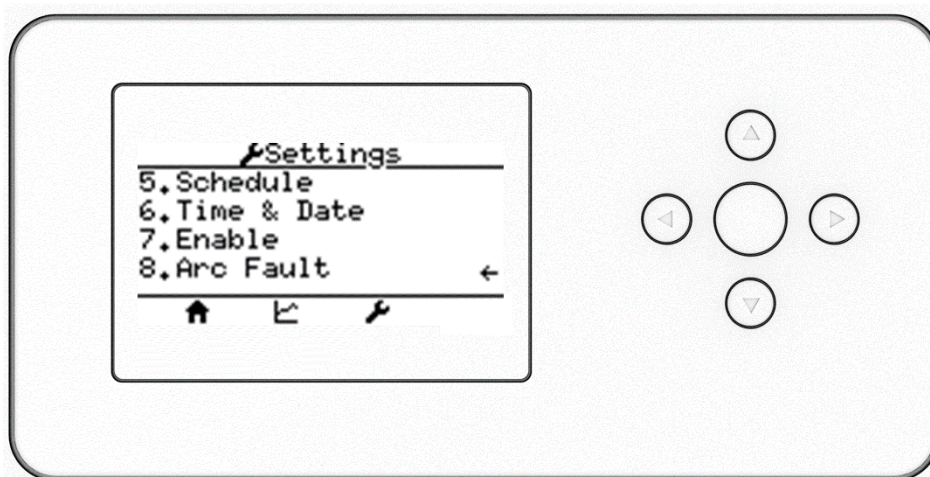


Figure 5

The second settings screen shows additional settings for the device, including schedule adjustments for basic scheduler operation, setting the clock, enabling/disabling the device and enabling/disabling the arc fault detector.

6.1.3.1 Setting: Status

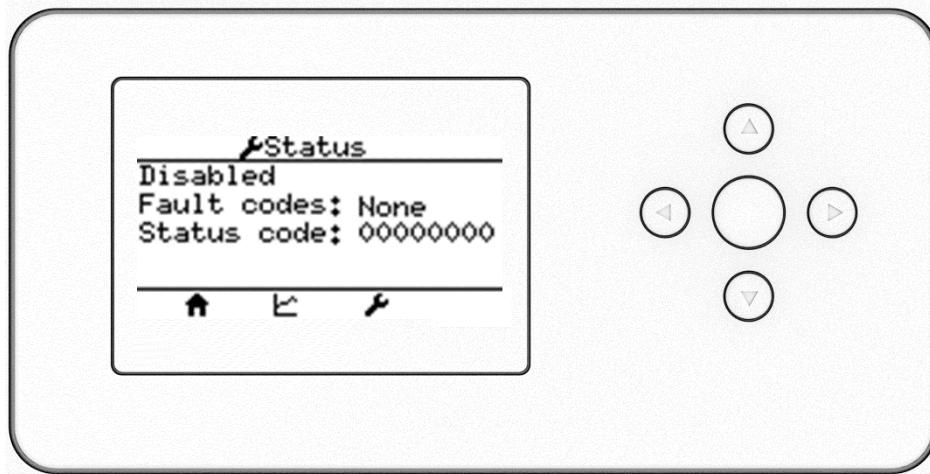


Figure 6

The status screen shows if the device is running, fault codes (if the code is not over the entire screen), and the current system status code.

6.1.3.2 Setting: WiFi

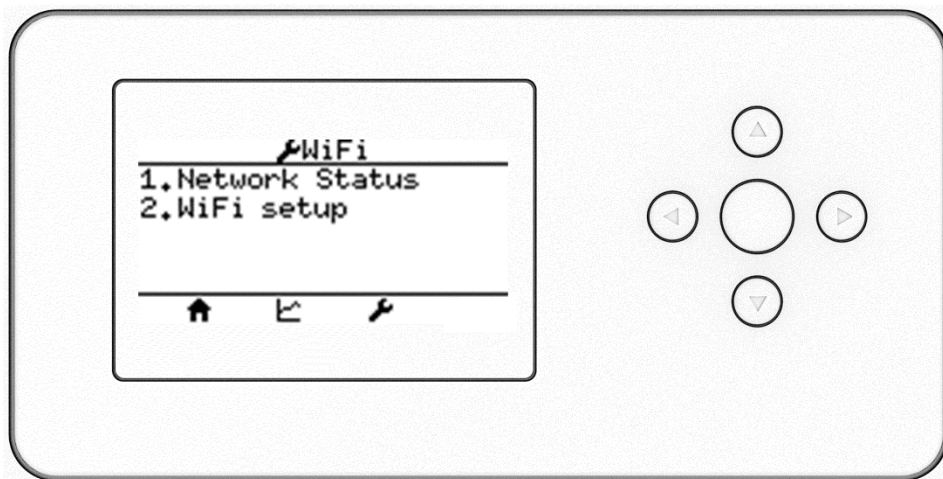


Figure 7

The WiFi settings screen has two additional options. Network status and WiFi setup can be selected.

6.1.3.2.1 WiFi Network Status

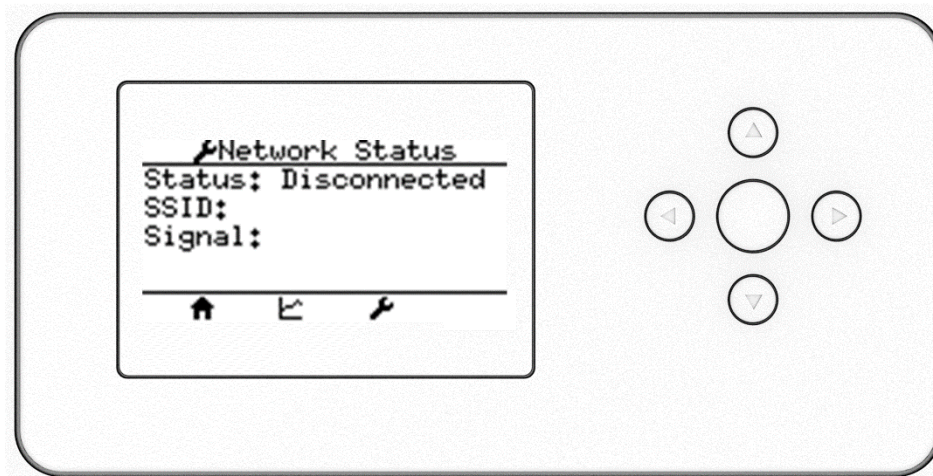


Figure 8

Network status shows the connection status of the WiFi system (either Connected or Disconnected). The SSID of the connected network and signal strength are shown. If WiFi is not connected, no SSID or signal strength will be shown.

6.1.3.2.2 WiFi Setup

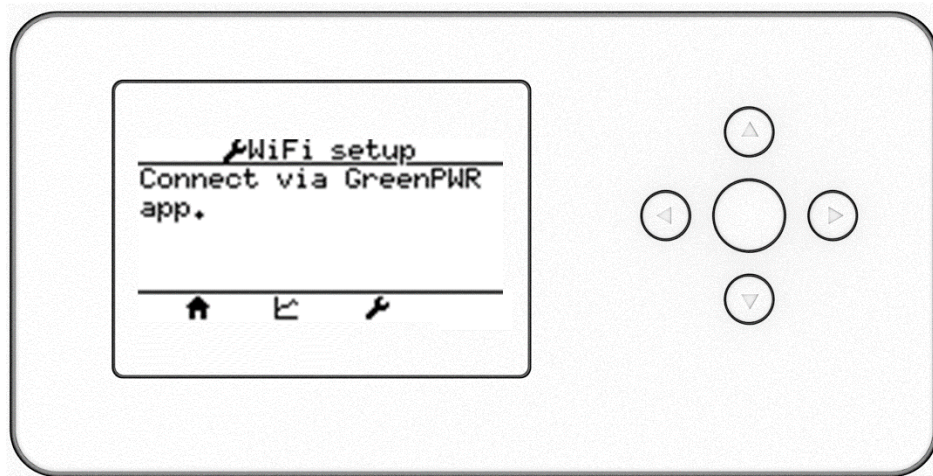


Figure 9

The WiFi Setup screen shows the GreenPWR app must be used to set the WiFi parameters of the device.

6.1.3.3 Setting: Install

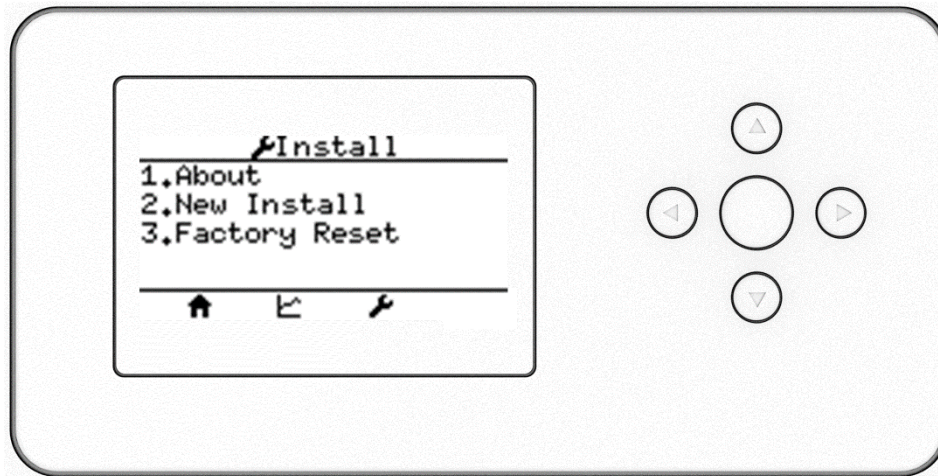


Figure 10

The installation screen shows additional items for installations, including information about the current installation, complete a new installation, and factory reset which clears all user data from the device.

6.1.3.3.1 About Installation

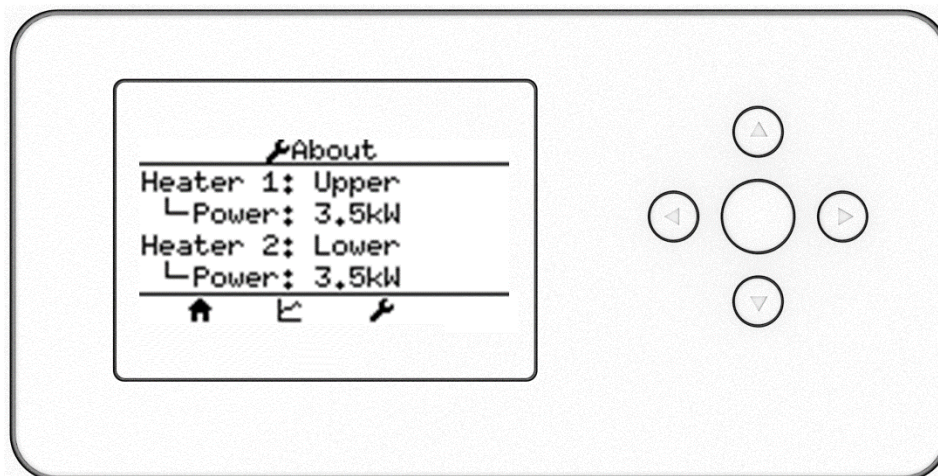


Figure 11

The about installation shows the heater configuration set on the device.

6.1.3.3.2 New Installation



Figure 12

A new installation will begin the installation process. **ALL USER DATA IS ERASED.**

6.1.3.3.3 Factory Reset

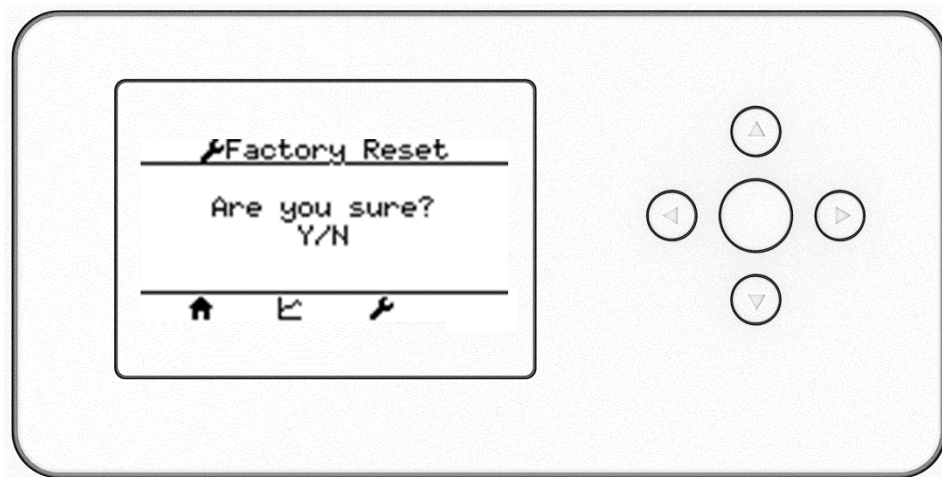


Figure 13

The factory reset screen jumps to a verification screen to ensure this action is desired. **ALL USER DATA IS ERASED.** The unit then proceeds to the new installation screen.

This option completes the same tasks as the New Installation selection, but is intended for those who are moving to erase all data from the device.

6.1.3.4 Setting: Firmware

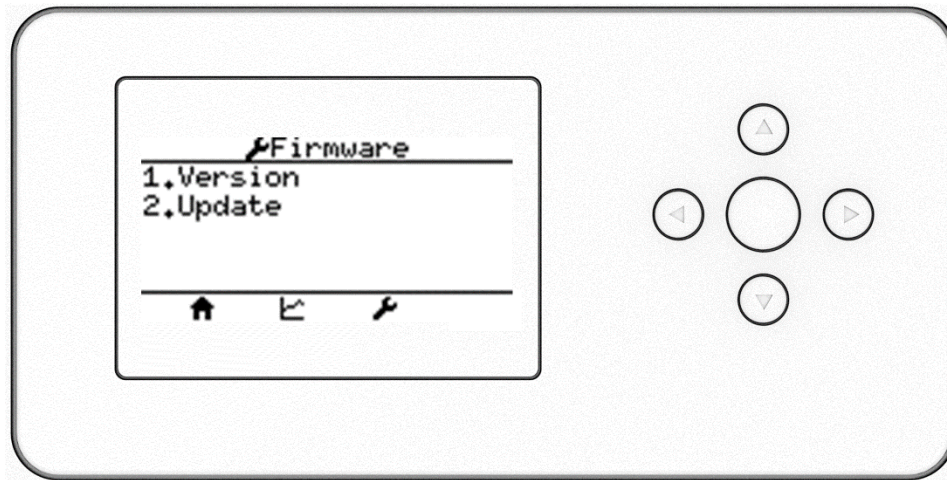


Figure 14

The firmware settings screen allows the user to check the current version and force an update check.

6.1.3.4.1 Firmware Version

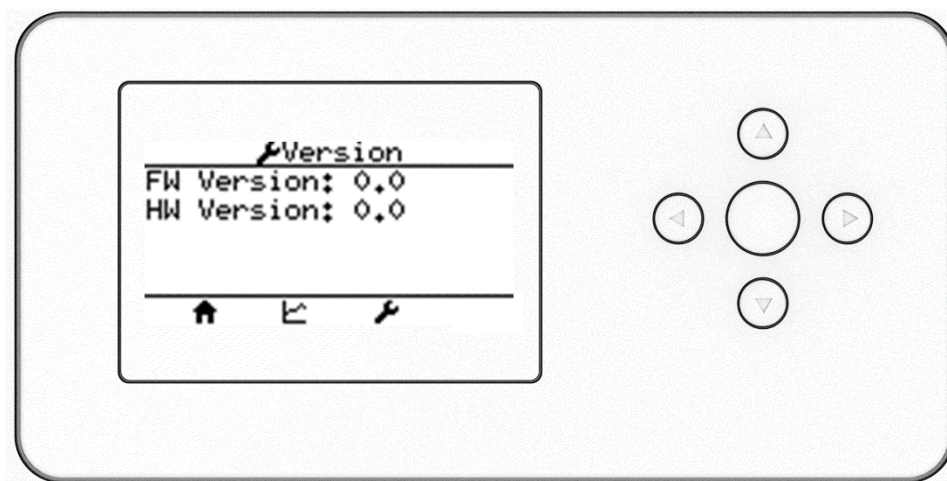


Figure 15

The firmware version and hardware version are found on this screen.

6.1.3.4.2 Firmware Update

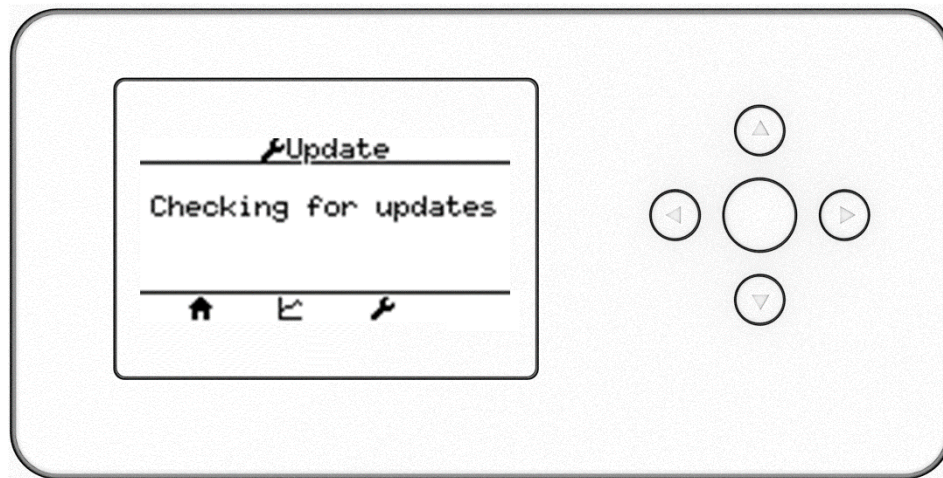


Figure 16

The device firmware can be updated when WiFi is connected to the unit. The user can force to check for firmware updates via this screen.

6.1.3.4.2.1 Firmware Update Available

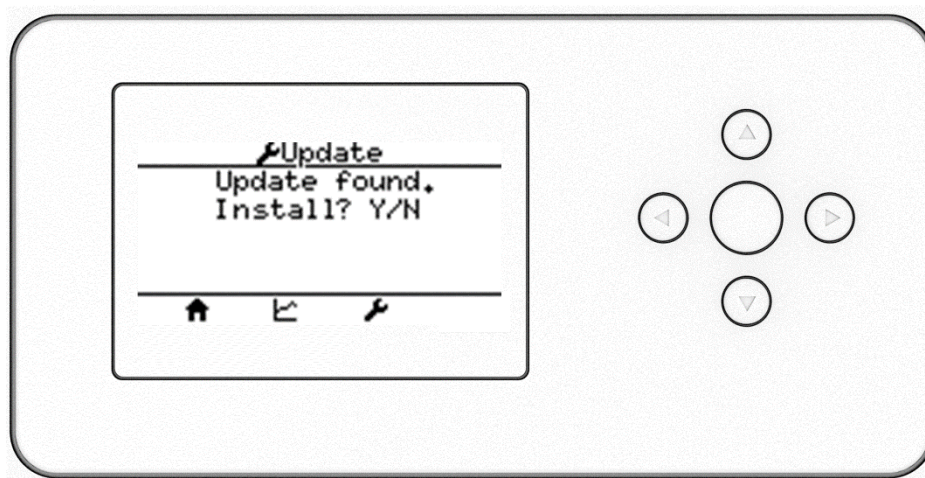


Figure 17

When a firmware update is available, this screen will be shown. By selecting “Y”, the device will download, install, and reset itself with the new firmware.

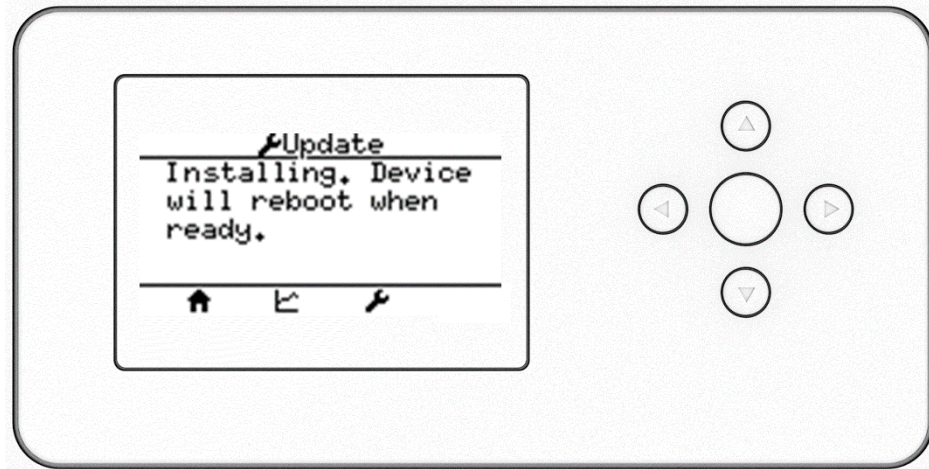


Figure 18

After selecting "Y" and pressing the centre key, the unit will download the update and show the device is updating.

6.1.3.4.2.2 No Update Available

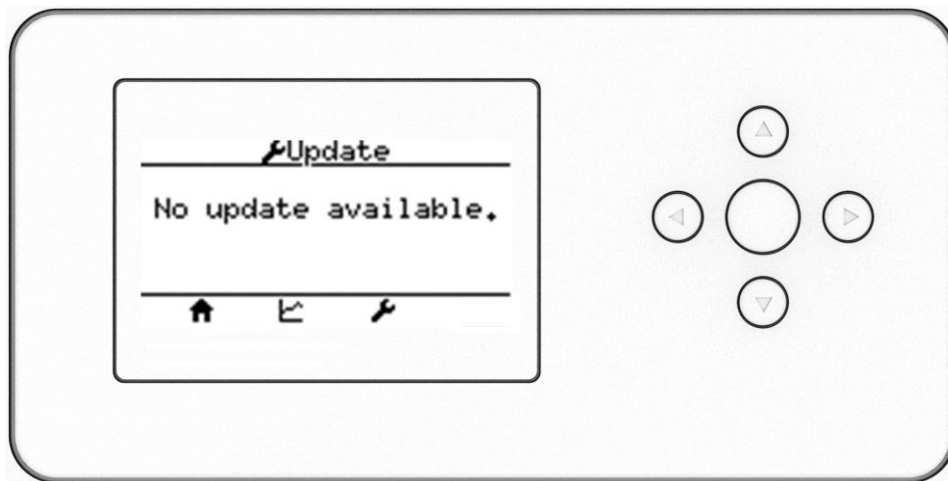


Figure 19

If no update is available, the display will indicate as such. The home screen can be reached by moving the cursor to the home icon and pressing the centre button.

6.1.3.4.2.3 No Network Available

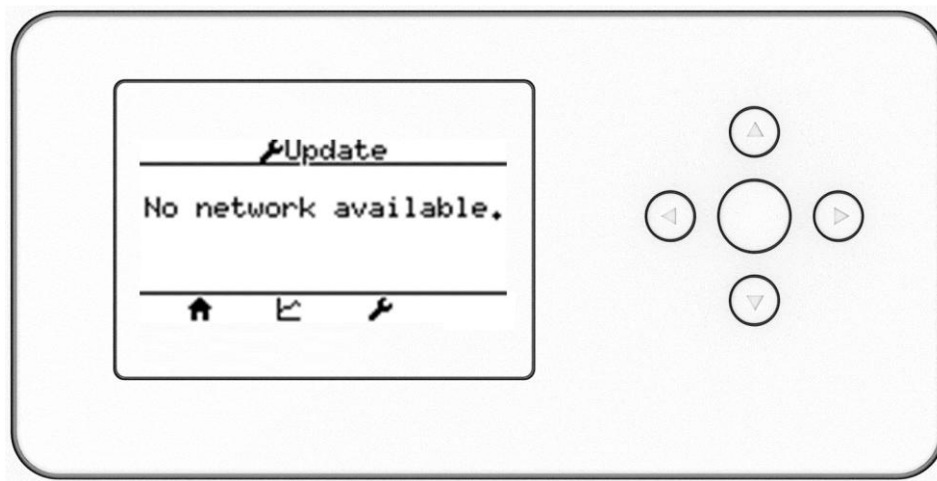


Figure 20

In the event the WiFi network is unavailable, the display will indicate this. The home screen can be reached by moving the cursor to the home icon and pressing the centre button.

6.1.3.5 Settings: Schedule

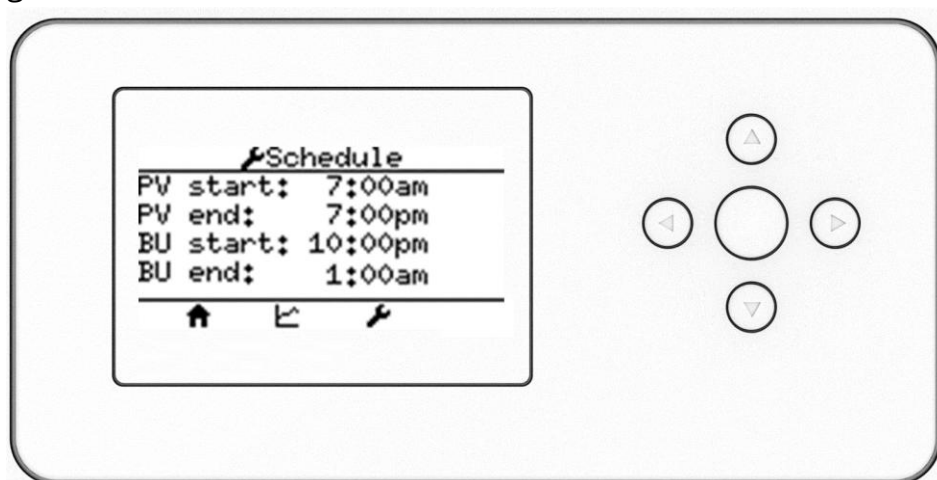


Figure 21

Installations using the basic scheduler can be modified locally via the onboard user interface. The PV start and ending times can be changed in addition to the backup (AC grid) start and end times.

6.1.3.5.1 Advanced Schedule

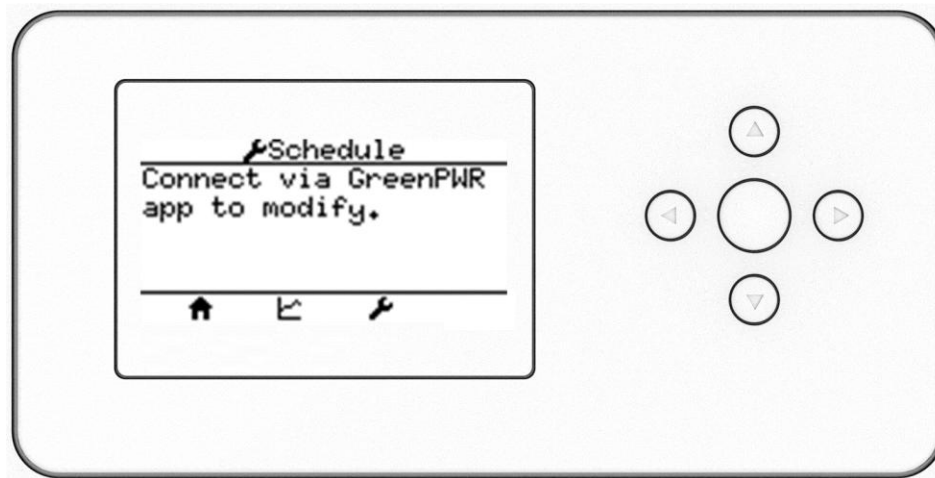


Figure 22

Installations using the full featured method cannot be updated via the UI. In these cases, the display will indicate the phone app must be used to change water usage parameters. The home screen can be reached by moving the cursor to the home icon and pressing the centre button.

6.1.3.6 Settings: Time and Date

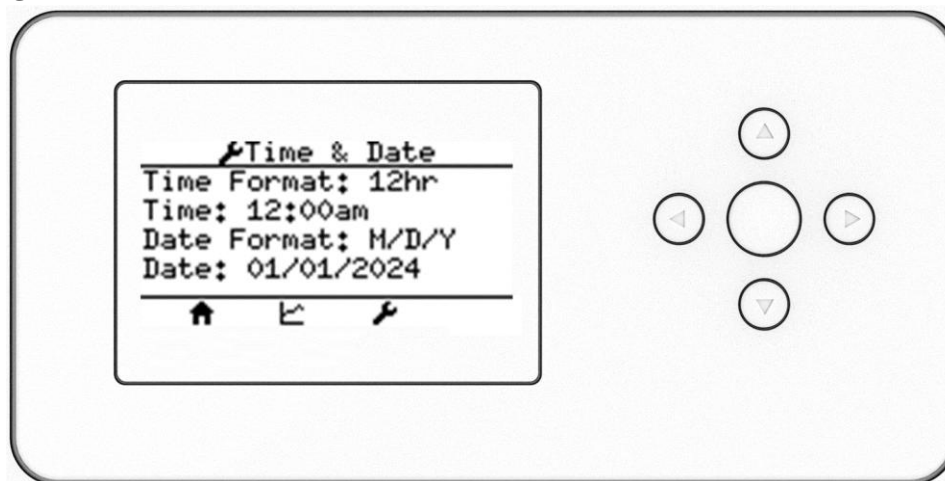


Figure 23

The time and date can be modified; however, the daylight savings selection is only set during the installation process. Several parameters can be modified on this screen:

1. The time format can be changed from 12-hour to 24-hour format. This is done by using the left and right keys on the keypad. Pressing the down key moves the cursor to the next line.

2. The time can be changed. The hour will first be selected. This can be incremented and decremented by using the right and left keys, respectively. Pressing the centre key moves the cursor to the minute setting. The minute is changed using the left and right keys. Pressing the centre key moves the cursor to the 'am'/'pm' portion of the date if in 12-hour mode. Again, using the right and left keys change the entry. Pressing the down key moves the cursor to the Date Format entry.
3. The date format can be changed from Month/Day/Year to Day/Month/Year if desired.
4. The date can then be changed. Similar to the time setting, the highlighted entry is changed using the left and right key. Pressing the centre button moves the cursor to the next date parameter.
5. Navigate to the home screen and press the centre key to save the clock settings.

6.1.3.7 Settings: Enable

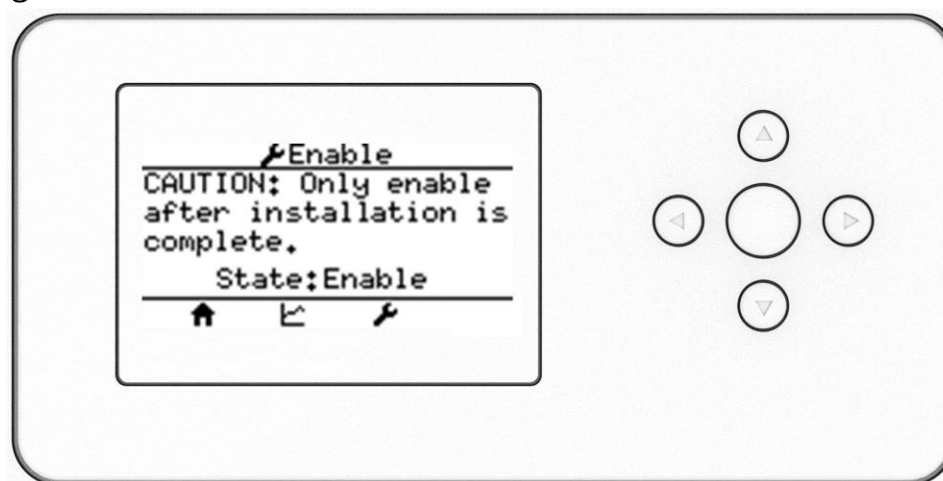


Figure 24

The system can be enabled or disabled which will isolate the heater outputs from the inverter as well as the AC backup source (if installed and configured). The SunHopper-D should only be enabled after installation is complete and all wiring to the unit and heating element is complete. Navigate to the home screen to allow the SunHopper-D to begin operation once enabled.

6.1.3.8 Setting: Arc Fault

⚠ WARNING

FIRE HAZARD. The arc fault detection circuitry can be disabled if the installation location and type allow by local code. By disabling this system, faulty or damaged connections may result in a fire risk.

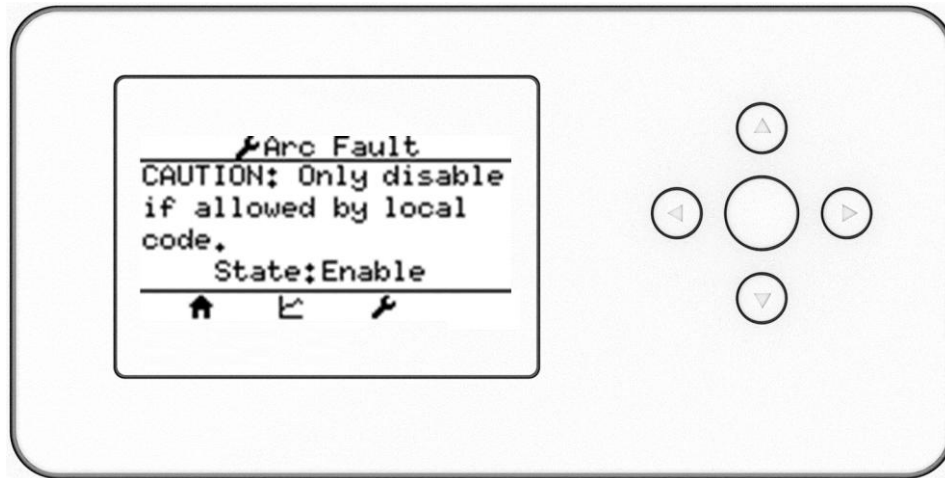


Figure 25

The arc fault system should only be disabled if allowed by local code. Some installations may have risk of false tripping due to noise sources near the SunHopper-D or wiring of the SunHopper-D.

7 Troubleshooting and Error Codes

Troubleshooting steps and fault/error codes are described in this section. Some error messages can be resolved by the user, others may need the intervention of your installer or GreenPWR.

This section describes all fault codes and basic system troubleshooting.

Messages with the text **⚠Qualified Personnel/ Installer Required** indicate that the installation must be checked and/or corrected. Only complete the debugging steps if qualified to do so.

7.1 Fault Codes and Messages

7.1.1 Arc Fault

⚠ WARNING

RISK OF ELECTRIC SHOCK. Warning – These servicing instructions are for use by qualified personnel only. To reduce the risk of electric shock, do not perform any servicing other than that specified in the operating instructions unless you are qualified to do so.

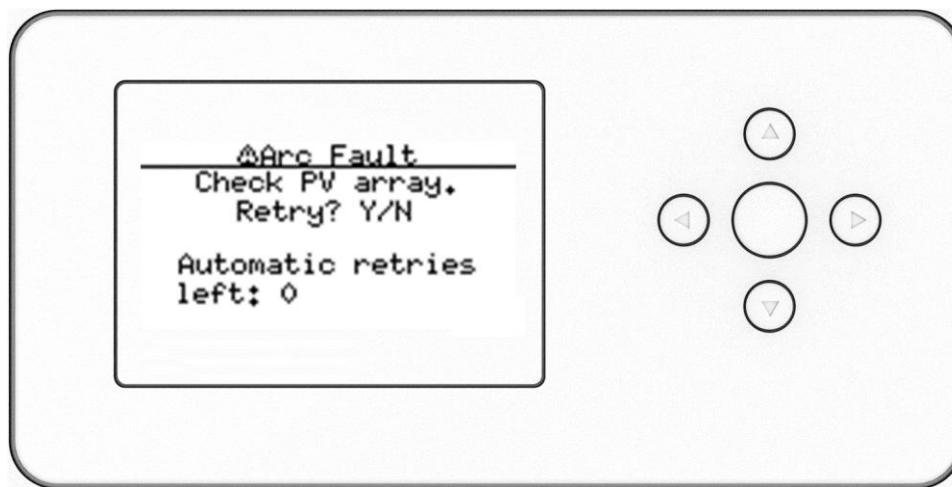


Figure 26

The arc fault message is shown when an arc event has been detected by the SunHopper-D. Automatic retries are available where the unit will automatically restart the SunHopper-D after a 10-minute wait from the prior arc event. Up to 4 retries are allowed within a 24-hour period. Only attempt repairs after the PV disconnect has been shut down and the AC input voltage has been shut off.

The arc fault may arise due to one of the following:

- a) There is a loose connector between the PV panels, wiring, or any rapid-shutdown equipment if installed
- b) There is a damaged or frayed DC cable
- c) The cables connecting to the PV input jack are not making good connection or loose. Verify the connection.
- d) If no fault is found, there may be an external noise source interfering with the detection scheme of the SunHopper-D. This could be a noisy appliance or other PV inverter which is creating noise patterns similar to an arc event. To remedy this condition, the DC cables may need to be run in a separate conduit to the SunHopper-D, or additional spacing may be required between PV panels connected to different inverters.

If the automatic retry counter has expired and reads 0, the SunHopper-D requires a manual retry selection. This can only be completed on the SunHopper-D user interface.

7.1.2 Ground Impedance Fault

⚠ WARNING

RISK OF ELECTRIC SHOCK. Warning – These servicing instructions are for use by qualified personnel only. To reduce the risk of electric shock, do not perform any servicing other than that specified in the operating instructions unless you are qualified to do so.

📘 NOTE

RISK OF INVERTER DAMAGE. Ground faults at the input of the inverter may cause irreparable damage. The inverter contains circuitry to verify no ground fault exists before starting the inverter, however no protection is present to measure ground impedance when the inverter is active. Ensure the PV wiring has no loose strands coming out of the wiring connector which could short to the metal chassis or other lines. The warranty does not cover damage to the inverter caused by ground faults.

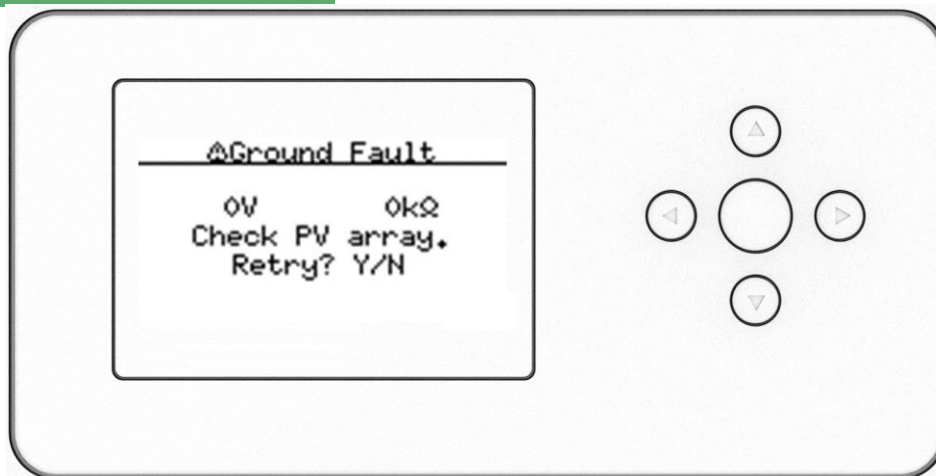


Figure 27

The ground impedance fault signifies the array impedance to earth is below a set threshold. A voltage and impedance are shown on the display to assist in diagnosing the location of the fault.

If this fault is indicated, the solar array must be investigated. **DO NOT ATTEMPT TO RESTART THE INVERTER WITHOUT CORRECTING THIS FAULT.** Shut down the PV system using the PV disconnect switch. Check the connection points and wiring to ensure no frayed wires are touching earthed metal. Verify the PV array is not earthed.

7.1.3 Loose Ground Connection

⚠ WARNING

RISK OF ELECTRIC SHOCK. Warning – These servicing instructions are for use by qualified personnel only. To reduce the risk of electric shock, do not perform any servicing other than that specified in the operating instructions unless you are qualified to do so.

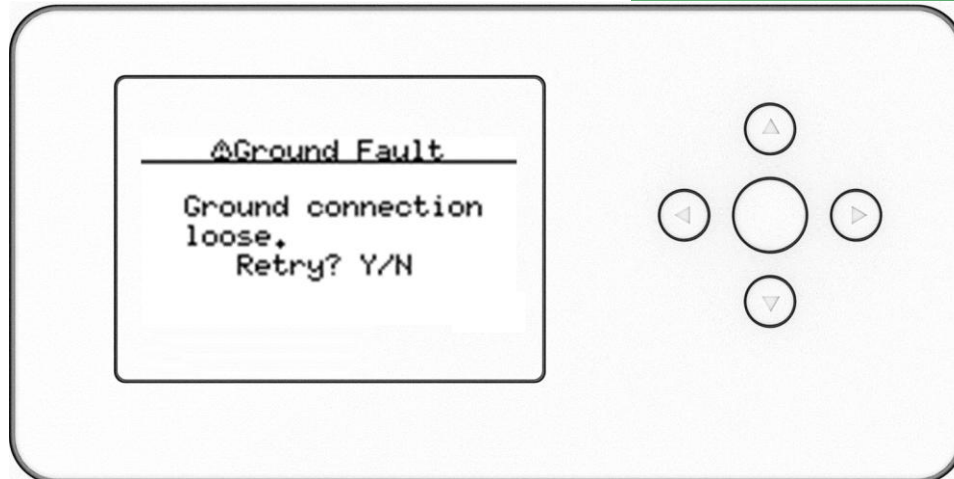


Figure 28

A loose ground connection is indicated when the internal test impedance fails to create a known impedance to earth. Shut down the PV disconnect switch and AC power (if installed). Verify the earth connection is tight and bonded correctly.

7.1.4 RCD Fault

⚠ WARNING

RISK OF ELECTRIC SHOCK. Warning – These servicing instructions are for use by qualified personnel only. To reduce the risk of electric shock, do not perform any servicing other than that specified in the operating instructions unless you are qualified to do so.



Figure 29

Residual Current Detection faults indicate that an excessive leakage current was detected from the PV input terminals to earth. This is indicative of an electrical shock event where someone may touch the DC cables at the input of the inverter.

This fault may also arise if a sudden rain event occurs and the system indicates a change in leakage current.

The RCD system will attempt to retry up to 3 times within a 24-hour period. The SunHopper-D will wait for 30 minutes before attempting an automatic restart. After 3 retry attempts have been exhausted, the unit error must be cleared manually via the device UI.

Excessive continuous leakage current will not print “Auto retries left” as this must be cleared manually.

Check the following:

- a) Was the PV input wire touched?
- b) Check the array grounding. Ensure the frames of the PV panels are earthed.

7.1.5 Temperature Fault

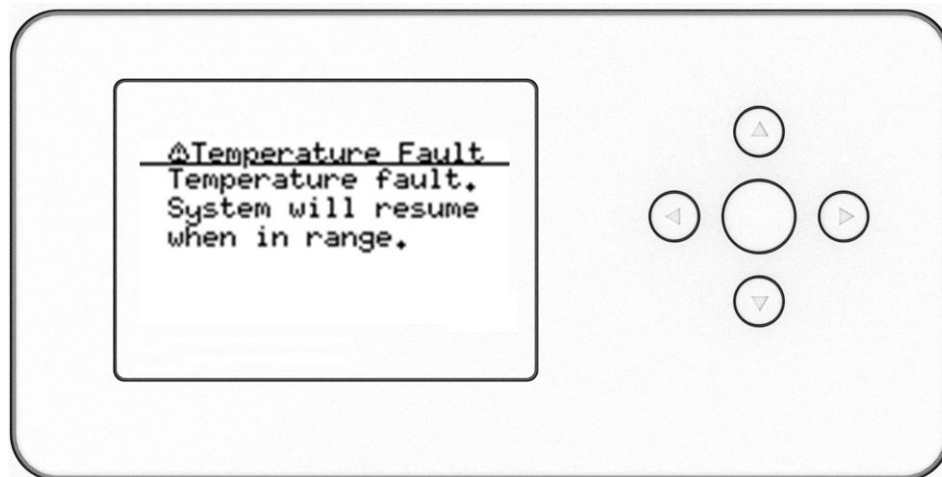


Figure 30

The device temperature is monitored via several sensors internally to verify the device is working within a safe temperature range. Excessive heat or cold will disable the device, or a problematic temperature sensor will also cause a fault to be indicated.

The temperature fault is automatically recovered.

Check the following:

- a) Was the unit just installed and is very cold or hot from transit? Allow the SunHopper-D to get to room temperature and monitor to ensure this error message clears.
- b) Verify that the unit is mounted correctly following the guidelines in the installation manual.
- c) Verify that the unit is not located directly near a heat source.
- d) Verify nothing is blocking airflow to the heatsink
- e) If the unit is installed in an attic or garage, verify the ambient temperature does not exceed the maximum temperature allowed by the SunHopper-D (See Section 9).
- f) If another electronic device is mounted near the SunHopper-D, verify the spacing requirements are met per the installation manual

7.1.6 PV Input Voltage Too High

⚠ WARNING

RISK OF ELECTRIC SHOCK. Warning – These servicing instructions are for use by qualified personnel only. To reduce the risk of electric shock, do not perform any servicing other than that specified in the operating instructions unless you are qualified to do so.

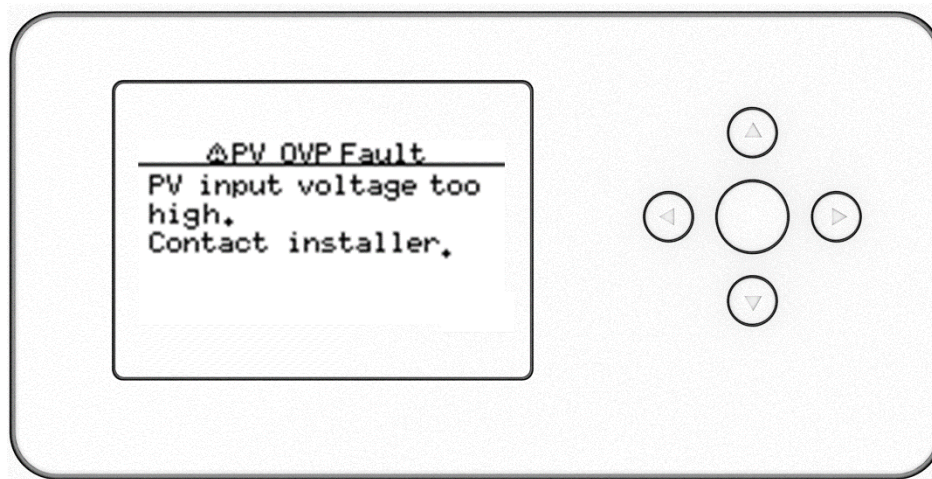


Figure 31

The device will indicate the PV voltage is too high if this is out of range. Doing so prevents the inverter from starting which may cause damage to the unit. Excessive voltage on the input will stress the input circuitry and cause possible damage to the unit.

This warning may start appearing after the system has been otherwise operational.

Check the following:

1. The input voltage exceeds the device maximum input voltage. The PV array needs to be resized correctly. Shut down the PV input until corrected to prevent damage.
2. Press and hold the centre button for 8 seconds to restart the unit and clear the fault.

7.1.7 Heater Fault

⚠ WARNING

RISK OF ELECTRIC SHOCK. Warning – These servicing instructions are for use by qualified personnel only. To reduce the risk of electric shock, do not perform any servicing other than that specified in the operating instructions unless you are qualified to do so.

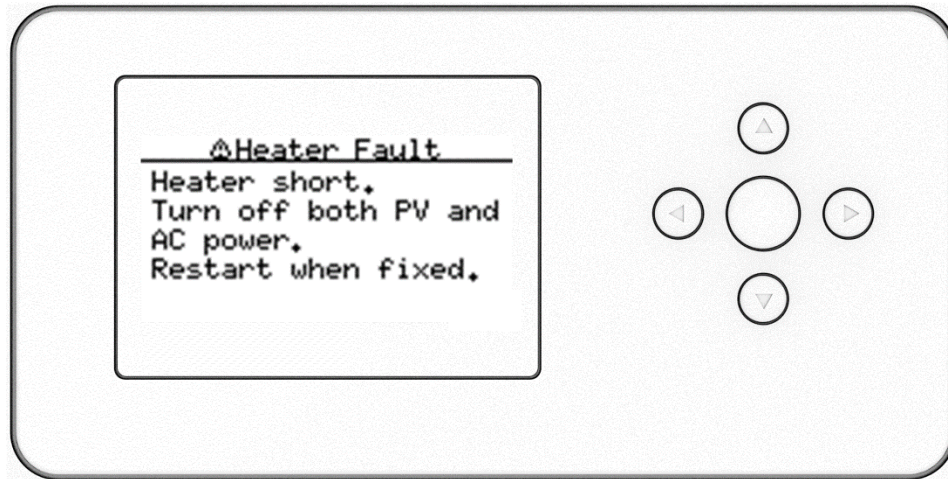


Figure 32

A heater fault is indicated if a short or very low impedance is detected on the output of the heater. This may be from a stray wire or a failure with the heater itself. This is constantly monitored, however a short happening at full power may damage the SunHopper-D and is not covered under warranty.

1. Shut off the PV input supply and if fitted the AC supply
2. Correct the fault with the heater or wire going to the heater.
3. Turn on the AC supply (if fitted) and the PV supply

7.1.8 System Fault

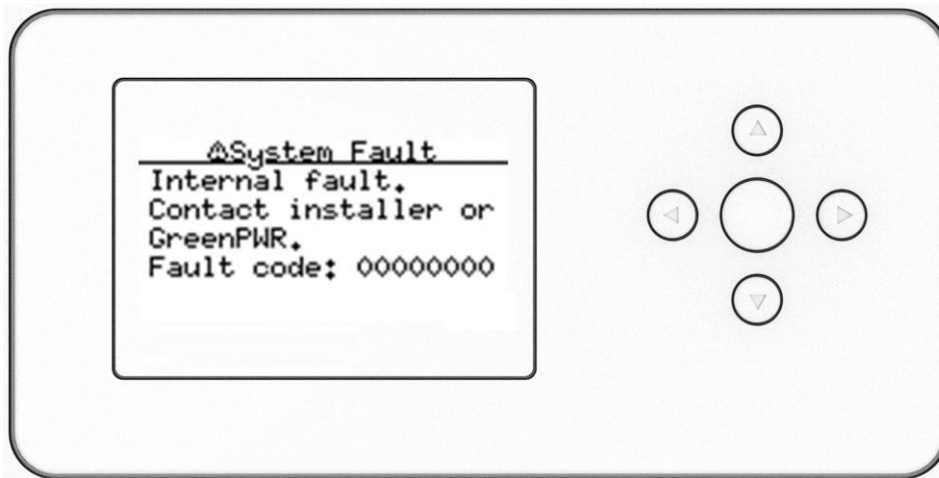


Figure 33

The general system fault code indicates all other faults present within the system which are indicative of an internal malfunction. Contact the installer or GreenPWR with the error code for assistance.

If assistance is required, provide the following to help us better assist you:

1. Error code from the unit
2. PV array parameters including the number of panels, model number, and arrangement
3. Rapid shutdown equipment model numbers, if installed
4. Heater and tank configuration including how many tanks are used, the tank capacity, heater element power rating(s) and heater element voltage rating(s)
5. How long the system was operational and any other indicators around the time of failure (e.g. any noises heard, other prior error codes, installation difficulties).

Additional details about the fault code are found in Section 7.2.3.

7.2 Troubleshooting

7.2.1 Unresponsive Display

The display may be blank and not turn on when power is applied to the unit. Check the following:

1. Press the centre button on the unit. This may wake the unit from a sleep state. If the power to the unit is removed and applied within 1 minute, the device will enter a sleep state for roughly 10 minutes before attempting to start again.
2. Attempt to reboot the unit. Press and hold the centre button for 8 seconds. Wait to see if any sign of life is shown on the display. If an error code is present, note this code and follow this manual to diagnose. Otherwise, monitor the device to ensure the system works properly.
3. **⚠Qualified Personnel/ Installer Required.** Check power connections. Ensure the PV connection is correct and within the operating voltage. If fitted, ensure the AC connection is correct with no loose wiring.

7.2.2 Inverter does not start

At times, the inverter may not be active. Several issues may be present to cause this issue.

1. Ensure the SunHopper is enabled. See Section 6.1.3.7.
2. Verify the PV voltage is within the operating range of the SunHopper-D. **⚠Qualified Personnel/ Installer Required**
3. A fault may be present on the device. Check the system messages and any fault codes as described in Section 7.1 and Section 7.2.3.
4. If none of these apply, contact GreenPWR for assistance.

7.2.3 System Fault Codes

Some of the system fault codes can be diagnosed further from the common faults listed in Section 7.1.

Some fault codes are not shown as they indicate multiple faults have occurred. In these cases, contact GreenPWR for additional clarity on corrective action.

Fault Code	Details and Corrective Action
00000008	Inverter Overcurrent Fault ⚠Qualified Personnel/ Installer Required The inverter has detected an excessively high current being supplied to the load. This may indicate that either the heater has a fault, or the heater rated power is too high. 1. Ensure the wiring from the SunHopper-D to the water heater has no loose strands or damage to the insulation causing possible shorts 2. Verify that the heaters connected are within range of the SunHopper-D capability (see Section 9). Verify the system is either connected to a single heater on each output, or that a non-simultaneous thermostat is used for multiple heater tanks. 3. The SunHopper-D may be damaged if 1 and 2 do not solve the issue. Contact GreenPWR for further support.
00000010	Internal Power Supply Fault The internal power supply is out of range. This will only occur when an internal fault has occurred and must be repaired by GreenPWR.
00000020	Internal Communication Fault The internal communication between the main controller and power system has had a fault occur. 1. Attempt to restart the SunHopper-D by pressing the centre button for 8 seconds. Monitor the device as it powers up to ensure the fault is no longer present. This may be a rare glitch. 2. One or more components internally is damaged if step 1 does not work. Contact GreenPWR for next steps.

00000040	Internal Power Supply Over Voltage The internal MPPT tracking supply has exceeded a safety voltage limit. This is very unlikely to occur in the field without unit damage and is self-tested before inverter operation begins. 1. Attempt to reset the unit by holding the centre button for 8 seconds. Monitor the device as the unit powers up and begins operation. 2. If this error code or error code 08000000 is shown, contact GreenPWR for assistance.
00000400	Arc Fault System Self-Test The arc fault system has failed an internal self-test. This indicates a component failure in the arc-fault system. 1. Attempt to reset the unit by holding the centre button for 8 seconds. Monitor the device as the unit powers up and begins operation. 2. If this error code returns, contact GreenPWR for assistance.
00000800	RCD System Self-Test The residual current detector (RCD) failed the internal self-test procedure. 1. Attempt to reset the unit by holding the centre button for 8 seconds. Monitor the device as the unit powers up and begins operation. 2. If this error code returns, contact GreenPWR for assistance.
00001000	Ground Impedance Self-Test The ground impedance monitor failed the internal self-test procedure. 1. Attempt to reset the unit by holding the centre button for 8 seconds. Monitor the device as the unit powers up and begins operation. 2. If this error code returns, contact GreenPWR for assistance.

00004000	Current Sensor Fault The internal current sensor output is out of range. 3. Attempt to reset the unit by holding the centre button for 8 seconds. Monitor the device as the unit powers up and begins operation. 4. If this error code returns, contact GreenPWR for assistance.
00008000	Internal Controller Fault The internal CPU has indicated one of several internal faults, making the system unreliable. A very rare bit flip event may have occurred and was caught by the system, or the internal system may have a fault. 1. Attempt to reset the unit by holding the centre button for 8 seconds. Monitor the device as the unit powers up and begins operation. 2. If this error code returns, contact GreenPWR for assistance.
00020000	Low Frequency Clock Failure The system low frequency clock has failed during operation. This typically indicates a component failure. 1. Attempt to reset the unit by holding the centre button for 8 seconds. Monitor the device as the unit powers up and begins operation. 2. If this error code returns, contact GreenPWR for assistance.
00040000	High Frequency Clock Failure The system high frequency clock has failed during operation. This typically indicates a component failure. 1. Attempt to reset the unit by holding the centre button for 8 seconds. Monitor the device as the unit powers up and begins operation. 2. If this error code returns, contact GreenPWR for assistance.

00080000	ADC Timeout The internal analogue to digital converter (ADC) did not complete a conversion within time limits. 1. Attempt to reset the unit by holding the centre button for 8 seconds. Monitor the device as the unit powers up and begins operation. 2. If this error code returns, contact GreenPWR for assistance.
00100000	ADC Pin Failure One or more of the analogue lines is detected to be out of normal bounds. This nearly always is a component failure but may be a very rare glitch. 1. Attempt to reset the unit by holding the centre button for 8 seconds. Monitor the device as the unit powers up and begins operation. 2. If this error code returns, contact GreenPWR for assistance.
00200000	Temperatures Out of Range The internal temperature sensors have too large of a deviation between each other, indicating a stuck/ damaged sensor. 1. If the unit was just installed, remove power and allow the unit to equalise to room temperature for an hour. Reset the unit by holding the centre button for 8 seconds. Monitor the device as the unit powers up and begins operation. 2. Ensure the unit does not have a heat source blowing on the case (e.g. a heater vent, another inverter mounted too close, etc). Correct the installation. 3. If this error code returns, contact GreenPWR for assistance.
00400000	Memory Error An internal error has failed to allocate memory during operation. 1. Attempt to reset the unit by holding the centre button for 8 seconds. Monitor the device as the unit powers up and begins operation. 2. If this error code returns, contact GreenPWR for assistance.

00800000	RAM Stack Error An internal error has occurred with the CPU stack. This indicates an error within system RAM. A very rare bit flip event can also cause this condition. 1. Attempt to reset the unit by holding the centre button for 8 seconds. Monitor the device as the unit powers up and begins operation. 2. If this error code returns, contact GreenPWR for assistance.
01000000	Division Error An internal mathematic error has occurred. 1. Attempt to reset the unit by holding the centre button for 8 seconds. Monitor the device as the unit powers up and begins operation. 2. If this error code returns, contact GreenPWR for assistance.
02000000	Critical Data Failure RAM space of critical variables has failed. A very rare bit flip event can also cause this condition. 1. Attempt to reset the unit by holding the centre button for 8 seconds. Monitor the device as the unit powers up and begins operation. 2. If this error code returns, contact GreenPWR for assistance.
04000000	CRC Failure CRC checksum error of program memory. A very rare bit flip event can also cause this condition. 1. Attempt to reset the unit by holding the centre button for 8 seconds. Monitor the device as the unit powers up and begins operation. 2. If this error code returns, contact GreenPWR for assistance.

08000000	OVP Self-test Failure An internal over-voltage protection (OVP) self-test circuit has indicated a failure. 1. Attempt to reset the unit by holding the centre button for 8 seconds. Monitor the device as the unit powers up and begins operation. 2. If this error code returns, contact GreenPWR for assistance.
10000000	Inverter OC Self-test Failure The inverter over-current (OC) circuit failed an internal self-test. 1. Attempt to reset the unit by holding the centre button for 8 seconds. Monitor the device as the unit powers up and begins operation. 2. If this error code returns, contact GreenPWR for assistance.
40000000	Waveform Timer Error A timeout has occurred on the waveform sampling timer for AC signal measurements. This failure condition indicates the system may have an internal clock failure. 1. Attempt to reset the unit by holding the centre button for 8 seconds. Monitor the device as the unit powers up and begins operation. 2. If this error code returns, contact GreenPWR for assistance.

7.3 Disable/Enable the AFCI

⚠ WARNING

FIRE HAZARD. The arc fault detection circuitry can be disabled if the installation location and type allow by local code. By disabling this system, faulty or damaged connections may result in a fire risk.

Some installations do not require the arc-fault circuitry to be enabled. The arc-fault detector can cause nuisance tripping in some limited installation scenarios. This section will review how to change the state of the AFCI system. This must be completed on the unit's user interface.

1. Navigate to the settings menu and press the right arrow key to get to additional settings
2. Select the Arc Fault settings and press the centre selection key.

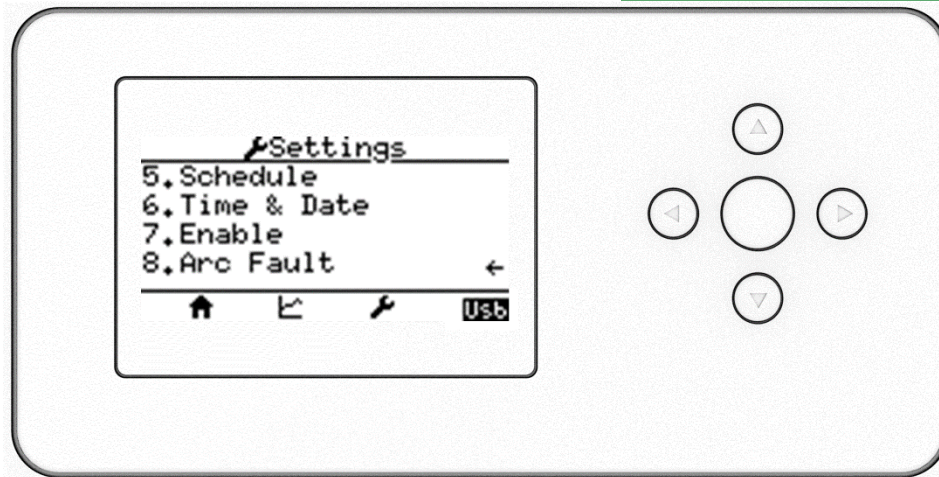


Figure 34

3. Use the left or right keys to enable/disable the AFCI detector. When complete, navigate to the home screen.

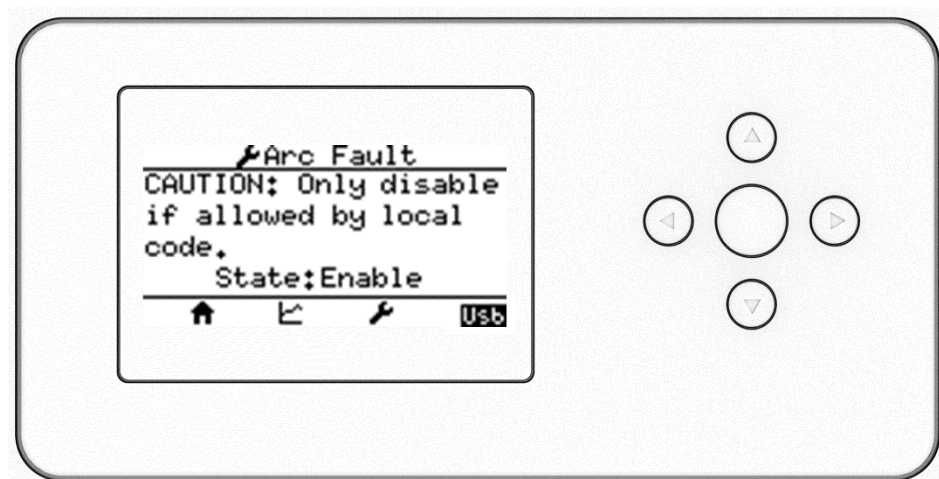


Figure 35

8 Maintenance

No maintenance is required for the SunHopper-D inverter itself. Do not use household cleaners on the SunHopper-D as these can discolour the housings and possibly damage device labels. Only wipe off with a clean, damp cloth if needed.

Maintain the water heater as recommended by the manufacturer and local plumber.

9 Specifications

PV Input	Maximum Input Voltage	350V
	PV Input Range	70V - 300V
	MPP Range	70V - 300V
	Starting Voltage	75V
	Maximum MPPT Input Current	10A
	Maximum Input Short Circuit Current	16A
	Conductor AWG Range	14AWG to 6AWG

AC Input	AC Input Range	100V - 240V
	AC Input Idle Power at 120V (night mode)	<1W
	AC Input Idle Power at 240V (night mode)	<1W
	Maximum AC Input Current	23A
	Operating Frequency	60Hz
	Conductor AWG Range	14AWG to 6AWG

Efficiency	Efficiency, 240V 1kW Heating element, 140V in	94.2%
	Efficiency, 240V 3.5kW Heating element, 200V in	95.9%
	Efficiency, 240V 5.5kW Heating element, 200V in	93.5%
	Efficiency, 120V 2kW Heating element, 140V in	93.5%

Heater Output	Supported 120VAC Heater Power Range	500W - 2kW
	Supported 240VAC Heater Power Range	500W - 5.5kW
	Supported Heater Impedance Range	7Ω - 120Ω
	AC Output Voltage	10V - 120V or 240V (limited to heater maximum current)
	Inverter Mode Output Waveform	Sinusoidal
	Inverter Mode Output THD	< 5%
	Output Frequency	60Hz
	Output Power Factor Rating	1
	Maximum Continuous Output Current from Inverter	12A
	Maximum Continuous Output Current from Grid Bypass	23A
	Maximum Continuous Output Power from Inverter	1.5kW
	Maximum Continuous Output Power from Grid Bypass	5.5kW

Specifications

Maximum Output Overcurrent Protection	25A
Maximum Output Fault Current	25A
Maximum Output Fault Current Duration	20ms
Conductor AWG Range	14AWG to 8 AWG

Multi-function Relay	Maximum DC Switching Voltage	30V
	Maximum AC Switching Voltage	250V
	Maximum Current	3A
	Minimum Load	100mW
	Conductor AWG Range	24AWG to 14 AWG

General	Length x Width x Height	15.25" x 15.43" x 4.72" (387mm x 392mm x 120mm)
	Weight	12.5lb (5.7kg)
	Operating Temperature Range	-5°F - 120°F (-20°C - 50°C)
	Maximum Operating Altitude	4000m
	Enclosure Rating	Type 1 Indoor Use Only
	Wireless Communication	BLE 2.4GHz WiFi

10 Compliance Information

10.1 FCC Compliance

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Additional safety compliance is located at the <https://greenpwr.com/> website.

11 Contact

For support or technical queries please contact GreenPWR support. Please provide the following details:

1. Unit serial number
2. Firmware version
3. Installation parameters including:
 - Heater connection and configuration
 - PV panel parameters including number of panels and type
 - Location of the installation in the country
 - Method and home location of the SunHopper-D
4. Any error message from the SunHopper-D or app

The GreenPWR support team can be contacted via email message and will respond as quickly as possible.

GreenPWR, Inc
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support@greenpwr.com