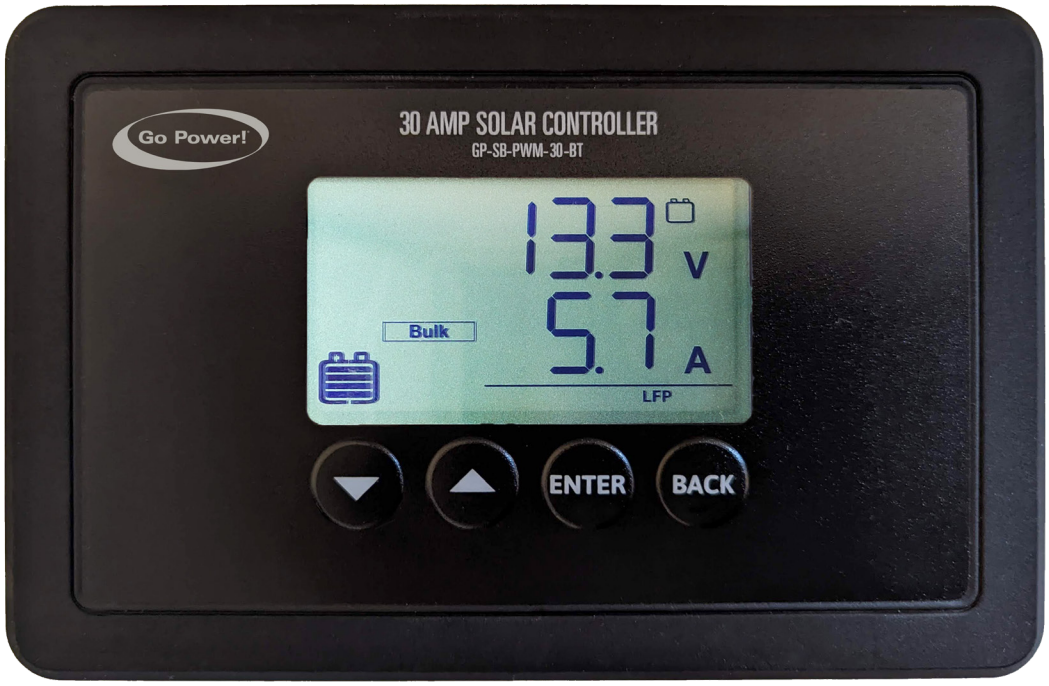
10 & 30AMP PWM SOLAR CONTROLLER

User Manual

GP-SB-PWM-10
GP-SB-PWM-30BT



GP-SB-PWM-30BT MODEL SHOWN

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Manual_GP-SB-PWM - 10 30BT

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ABOUT THIS MANUAL

Thank you for choosing Go Power! Solar Controller. This manual will provide you with all the information you need to properly install and use your solar controller. This manual contains important information about the safe installation and operation of the solar controller. Please keep this manual for future reference.

GENERAL SAFETY INFORMATION

Read this manual carefully and look at the Solar Controller equipment to become familiar with the device before trying to install, operate, or maintain it. The following special sign may appear throughout this documentation or on the equipment to warn of potential hazards or call to attention to information that clarifies or simplifies procedure. Make sure that you thoroughly understand the meaning of each signal word and comply with the manual instruction. Always refer to the manual.

	DANGER	"DANGER" indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
	WARNING	"WARNING" indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
	CAUTION	"CAUTION" indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury or damage to the equipment.

Examples of safety alert symbols

	This warning symbol indicates a caution or warning you must observe. A specific caution or warning is indicated by this symbol. Always follow the instructions.
	This symbol indicates a prohibited action. The specific prohibited action is often indicated by this symbol. Never attempt the prohibited action.
	This symbol indicates a mandatory action. The specific instruction is indicated by this symbol. Always follow the instruction.

SAFETY PRECAUTION

	Warning: **Disconnect all power sources**	Electricity can be very dangerous. Installation must be performed only by licensed electrician or qualified personnel.

SAFETY PRECAUTION

	Warning: Battery and wiring safety	Observe all safety precautions of the battery manufacturer when handling or working around batteries. When charging, some batteries may produce hydrogen gas, which is highly explosive.
	Warning: Wiring Connection	Ensure all connections are tight and secure to the specifications listed in section 6. Loose connections may generate sparks and heat. Be sure to check connections one week after installation to ensure they are still tight.
	Mandatory Action: Work Safely	Wear protective eye wear and appropriate clothing during installation. Use extreme caution when working with electricity and when handling and working around batteries. Use properly insulated tools only.
	Warning: Observe correct polarity at all times	Reverse polarity of the battery terminals will cause the controller to give a warning tone. Reverse connection of the panel(s) will not cause an alarm but the controller will not function. Failure to correct this fault could damage the controller.
	Warning: Do not exceed the GP-SB-PWM Amp current and max voltage ratings	The maximum current of the solar system is the sum of parallel-connected PV module–rated short circuit Currents (Isc) multiplied by 1.25. The resulting system current is not to exceed 12.5 / 37.5 amps. If your solar system exceeds this value, contact your dealer for a suitable controller alternative. The maximum voltage of the panel(s) is the sum of the PV module–rated open-circuit voltage of the series connected modules multiplied by 1.25 (or by a value from NEC 690.7 provided in Table 690.7 A). The resulting voltage is not to exceed 35V. If your solar system exceeds this value, contact your dealer for a suitable controller alternative. Always refer to the manual.
	Warning: Always use a fuse or breaker	There must be overcurrent protection installed between the controller and battery on the positive wire. An overcurrent protection device is not provided with this equipment and must be purchased separately.
	Mandatory Action: Mounted Indoor	Ensure that the controller is mounted indoors and protected from exposure to the elements and water.
	Mandatory Action: Well Ventilated	This warning symbol indicates a caution or warning you must observe. A specific caution or warning is indicated by this symbol. Always follow the instructions.

	Mandatory Action: Connections are Tightened	This symbol indicates a prohibited action. The specific prohibited action is often indicated by this symbol. Never attempt the prohibited action.
	Mandatory Action: Remove Connection	Prior to installing the controller, remove all connections between the controller and the battery or PV array, or disconnect the appropriate fuses/breakers.
	Warning: Do Not Disassemble	Do not attempt to disassemble or repair the controller as it contains no user-serviceable parts.
	Always Refer to the Manual	

1.1 GENERAL DESCRIPTION

A solar controller, also known as a charge controller or regulator, is a device that regulates the flow of electrical current from a solar panel to a battery or other load. Solar Controller is an essential component of your photovoltaic solar system. The Controller maintains the life of the battery by protecting it from overcharging. When your battery has reached a 100% state of charge, the Controller prevents overcharging by limiting the current flowing into the batteries from your solar panels.

The GP-SB-PWM solar charge controller uses PWM technology and comes in two models: 10A and 30A for 12V systems. Each model features an LCD user interface that displays various data and enables settings adjustment. This second version of the product comes with major changes such as a new mechanical and LCD design. The 30A version also comes with an integrated Bluetooth Low Energy module that allows all the data and settings to be accessible and managed via a mobile app.

The GP-SB-PWM solar controller is intended for use at 12 VDC nominal system voltage and is rated for a maximum continuous DC input current of 10A and 30A respectively. The voltage and current ratings of all equipment connected to PV panels must be capable of accepting the voltage and current levels available from PV panels installed in the field.

The GP-SB-PWM is suitable for use with lead acid batteries (flooded, GEL, or AGM type) as well as some lithium iron phosphate (LiFePO4) batteries that are supplied with a Battery Management System (BMS).

1.2 WHAT'S INCLUDED

ITEM	INCLUDED
GP-SB-PWM-10/ GP-SB-PWM-30BT	Yes
UV resistant wire	Yes*
User Manual	Yes
Quick Star Guide	Yes
4 Screws	Yes
Cardboard Mounting Template	Yes
GFCI Device	No
Overcurrent Protection	No
Cable Entry Plate	No

*If the GP-SB-PWM Controller was purchased with a Go Power! RV Solar Power Kit

1.3 COMPLIANCE INFORMATION

COMPLIANCE CATEGORY	COMPLIANCE LOGO	COMPLIANCE REQUIREMENT
RoHS	RoHS	EU RoHS Directive 2011/65/EU
CE	CE	EU safety, health and environmental requirements
UL 1471	c UL us LISTED	UL 1741 Standard for Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources CU 72181157 Photovoltaic charge controller Certified to UL1741, C22.2 No. 107.1-16
TUV	TÜVRheinland c us	

1.4 SPECIFICATIONS

DESCRIPTION	GP-SB-PWM-10	GP-SB-PWM-30-BT
Nominal System Voltage	12V	12V
Nominal Charge Current	10A	30A
Range of Battery Input Voltage	6 – 16 V	
Max Battery Charge Current	12.5A	37.5A
Max Solar Power	200W	600W
Input Voltage	35VDC	
Max Solar Voltage	28Voc	
Operating Consumption (Display backlight on)	≤15 mA	
Battery Types Supported	AGM, Sealed, Flooded, LFP (LiFePO4), Custom	
Temperature Compensation	- 25mV/ºC	
Operating Temperature	- 40 to 60°C / - 40 to 140°F	
Storage Temperature	- 40 to + 75°C / -40 to 167°F	
Humidity	99% N.C	
Ingress Protection	IP32	
Bluetooth® Connectivity	NO	YES
Protection	• Reverse Polarity on Battery and Solar terminals • Short-Circuit on Battery and Solar terminals • Reverse Current from Battery to Solar Terminals • Over Voltage on Battery and Solar terminals up to 50V • Over Current, Over Temperature	

Dimensions (H x W x D):
125.2 x 73.5 x 27 mm | 4.93 x 2.89 x 1.09 in

Weight: 260 g / 9.2 oz

Maximum Wire Gauge: #8 AWG / 10mm^2

Warranty: 5 years

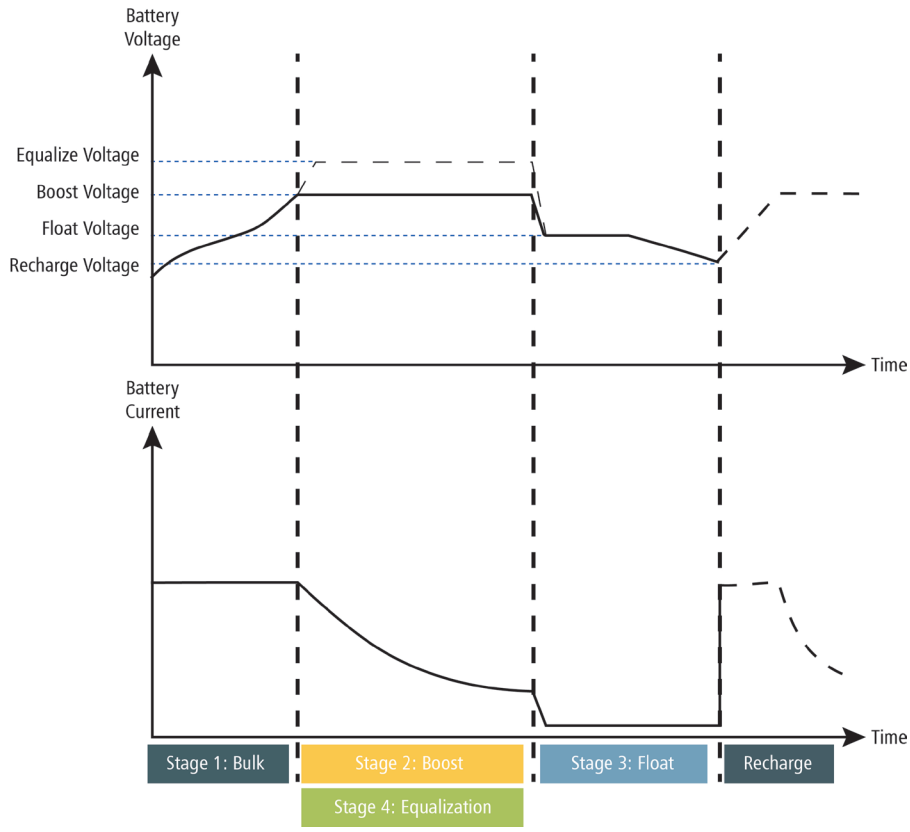
Features:

- PWM Charging
- 4 Battery Charging Standard Profiles and 1 Custom Profile
- 4-Stage Charging
- Monthly Equalize Option
- Custom Profile
- Lithium Wake-up
- Displays Charging Current, Battery Voltage, Battery State of Charge, and Amp Hours Charged Since Last Reset

*Max Charge Current

1.5 BATTERY CHARGING STAGES

The charge controller has a 4-stage battery charging algorithm for a rapid, efficient, and safe battery charging. These stages include: Bulk, Absorption, Float, and Equalization. Visit gopowersolar.com/controllers to learn more about charging algorithms.



1.5.1 FIRST STAGE: BULK

This algorithm uses 100% of available solar power to recharge the battery and provides the maximum current available based on maximum input current setting. In this stage the battery voltage has not yet reached constant voltage and the controller is delivering the maximum available current to the batteries.

1.5.2 SECOND STAGE: ABSORPTION

When the battery reaches the constant voltage setpoint as indicated in the chart above, the controller will start to operate in constant voltage charging mode, where it is no longer providing the maximum available current to the battery. The current will drop gradually to maintain the setpoint.

1.5.3 THIRD STAGE: FLOAT

After the Absorption stage, the controller reduces the current even further so that the battery voltage can reach and be maintained at a lower float voltage set point.

1.5.4 FORTH STAGE: EQUALIZATION

Equalization is carried out every 30 days by default for flooded batteries or custom batteries if it is enabled. It is intentional overcharging of the battery for a controlled time. Certain types of batteries benefit from periodic equalizing charge, which can stir the electrolyte, balance battery voltage and complete chemical reaction. Equalizing charge increases the battery voltage, higher than the standard complement voltage, which gasifies the battery electrolyte.

Check with your battery manufacturer to confirm your batteries require equalization.

2.1 CHOOSING AN INSTALLATION LOCATION

The GP-SB-PWM is designed to be mounted flush against a wall, out of the way but easily visible.

The GP-SB-PWM should be:

- Indoors, protected from the weather
- Mounted as close to the battery as possible
- Mounted on a vertical surface to optimize cooling of the unit

In an RV, the most common controller location is above the refrigerator. The wire from the solar panel(s) most commonly enters the RV through the fridge vent on the roof or by using the Go Power! Cable Entry Plate (sold separately) that allows installers to run wires through any part of the roof. PV connections should connect directly to the controller. Positive and negative battery connections must connect directly from the controller to the batteries. Use of a positive or negative distribution bus is allowed between the controller and battery as long as it is properly sized, electrically safe and an adequate wire size is maintained.

2.2 CHOOSING A BATTERY

The GP-SB-PWM is suitable for use with lead acid batteries (Sealed, GEL, or AGM type) as well as some lithium iron phosphate (LiFePO4) batteries that are supplied with a Battery Management System (BMS). If using lithium ion, it must be lithium iron phosphate (LiFePO4) chemistry with a BMS. Other chemistries with a BMS are compatible if a custom profile is chosen to program specific charging parameters.

Lithium batteries typically have maximum allowed charge currents. These maximums typically decrease in cold temperatures. GP-SB-PWM does not limit current for these restrictions, and system design of the solar panel(s) must account for this.

Be sure to follow all battery manufacturer safety instructions.

2.3 TOOLS AND MATERIALS NEEDED

- Flathead Screwdriver (for wire terminals)
- Philips Screwdriver (for mounting screws)
- UV resistant wire (see Note below)

Note If the GP-SB-PWM Controller was purchased with a Go Power! RV Solar Power Kit, then UV resistant wire is included. For instructions regarding the Go Power! RV Solar Panel installation, please refer to the Installation Guide provided with the Kit.

3. INSTALLATION INSTRUCTIONS - (NO PRE-WIRING)

1. **Prepare for mounting**. Use the template provided in the cardboard box or in the Appendix at the end of this document to mark the four mounting holes and the cutting line for flush mounting your controller.

2. **Complete the installation of the solar modules**. If this GP-SB-PWM was purchased as part of a Go Power! Solar Power Kit, follow the Installation Guide provided. Otherwise, follow manufacturer's instructions for solar module mounting and wiring.

3. **Select wire type and gauge**. If this GP-SB-PWM was purchased as part of a Go Power! Solar Power Kit, appropriate wire type, gauge, and length is provided. Please continue to Section 7, "Operating Instructions." If the GP-SB-PWM was purchased separately, follow the instructions included here.

Wire type is recommended to be a stranded copper UV-resistant wire. Wire fatigue and the likelihood of a loose connection are greatly reduced in stranded wire compared to solid wire. Wire gauge should be able to sustain rated current and minimize voltage drop. We recommend #8 for a 10A controller, and either #10 or #8 for a 30A controller.

Wire Strip Length
Strip wires to a length of approximately 3/8in or 10mm, as per strip gauge.

IMPORTANT: Identify the polarity (positive and negative) on the cable used for the battery and solar module. Use colored wires or mark the wire ends with tags indicating "Solar Positive and Negative (+ / -)". Although the GP-SB-PWM is protected, reverse polarity contact may damage the unit.

1. **Wiring the GP-SB-PWM.** Wire the GP-SB-PWM according to the wiring schematic in Section 7. Run wires from the solar panel(s) and the batteries to the location of the GP-SB-PWM. Keep the solar panel(s) covered with an opaque material until all wiring is completed.

IMPORTANT: All wiring must be in accordance to National Electrical Code, ANSI/NFPA 70. Always use appropriate circuit protection on any conductor attached to a battery.

2. Connect the battery wiring to the controller first and then connect the battery wiring to the battery. Install a fuse or breaker no more than 18 inches from the battery connection.

3. Torque all terminal screws per the following:

Stranded Copper 90°C Wire	
Wire Size AWG	Rated Torque (in-lbs)
12	20
10	20
8	25

With battery power attached, the controller should power up and display information. Connect the solar wiring to the controller and remove the opaque material from the solar panel(s). The negative solar connection and battery wiring must be connected directly to the controller for proper operation.

Mounting the GP-SB-PWM. Mount the GP-SB-PWM to the wall using the included four mounting screws.

IMPORTANT: You must set the battery type on the GP-SB-PWM before you begin to use the controller (follow steps in Section 8). The default battery setting is for AGM batteries.

Your GP-SB-PWM should now be operational. If the battery power is low and solar panel(s) are producing power, your battery should begin to charge.

4. **Re-torque**: After 30 days of operation, re-torque all terminal screws to ensure the wires are properly secured to the controller. Re-torque controller connections every six (6) months of use to maintain optimal performance.

WARNING: This unit is not provided with a GFCI device. This charge controller must be used with an external GFCI device as required by Article 690 of the National Electric Code for the installation location if required.

WARNING: When a ground fault is indicated, battery terminals and connected circuits might be ungrounded and hazardous.

BATTERY CHARGING PROFILE	SEALED/ GEL	AGM	FLOODED	LIFEPO4	CUSTOM
Bulk Charge Voltage Set Point	14.1V	14.4V	14.4V	14.4V	
Absorption Charge Voltage (30 min / day)	14.1V	14.4V	8.16V	14.4V	
Float Charge Voltage	13.7V	14.1V	8.16V	14.0V	
Equalize Charge Voltage (2h / 28 days or after V < 12.1V)	Disabled	Disabled	14.9V	Disabled	8.16V

3.1 WIRING DIAGRAM

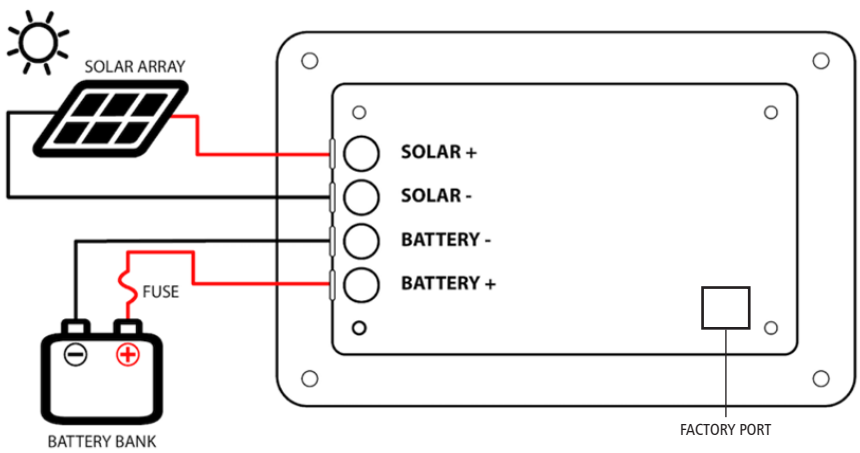
The GP-SB-PWM Maximum 37.5A rating is based on a 30-amp total maximum short circuit current rating (Isc) from the parallel solar panels nameplate ratings. The National Electric Code specifies the PV equipment/system rating to be 125% of the maximum Isc from the solar panels nameplate ratings (1.25 times 30 = 37.5A).

Use the wiring diagram (below) to connect your battery to the battery terminals on the solar controller. First, connect the battery to the controller, and then connect the solar panel connection to the controller.

The fuse or breaker used should be no larger than the amperage of the solar controller. (10A fuse for a 10A controller / 30A fuse for a 30A controller)

WARNING: When a ground fault is indicated, battery terminals and connected circuits might be ungrounded and hazardous.

CAUTION: Risk of Electric Shock: When the photovoltaic array is exposed to light, it supplies a DC voltage to this equipment

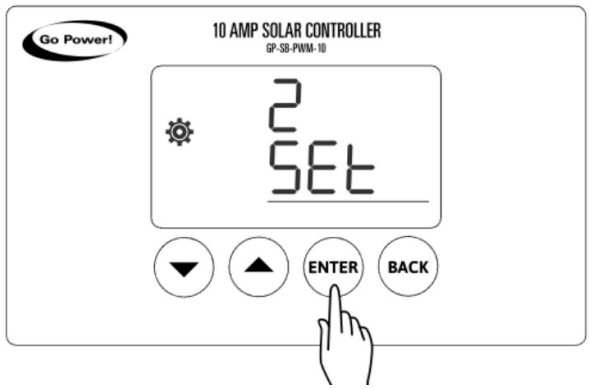


CAUTION: Internal Temperature Compensation: RISK OF FIRE, USE WITHIN 3 meters of BATTERIES.

The fuse or breaker should be installed no more than 18 inches from the battery connection.

3.2 BATTERY SET-UP

3.2.1 LEAD ACID BATTERY



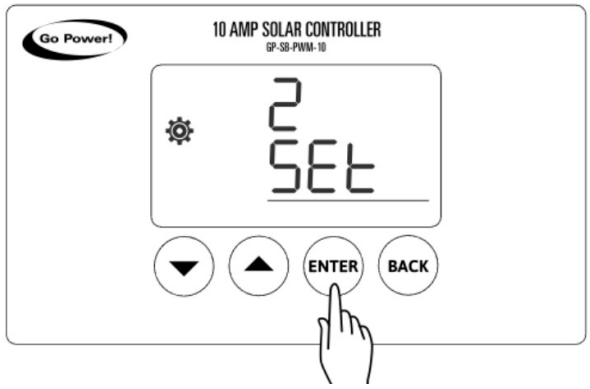
To setup a lead acid battery, hold the ENTER key and use the up ▲ and down ▼ keys to get to the setting's options (cog icon ⚙)

Press ENTER. Battery type will be displayed.

Press ENTER again and use the up ▲ and down ▼ keys to select the correct battery type (Wet or Flooded) and press ENTER.

After completing these steps, you may now press the BACK button to return to the main screen.

3.2.2 LITHIUM BATTERY



To setup a lead acid battery, hold the ENTER key and use the up ▲ and down ▼ keys to get to the setting's options (cog icon ⚙)

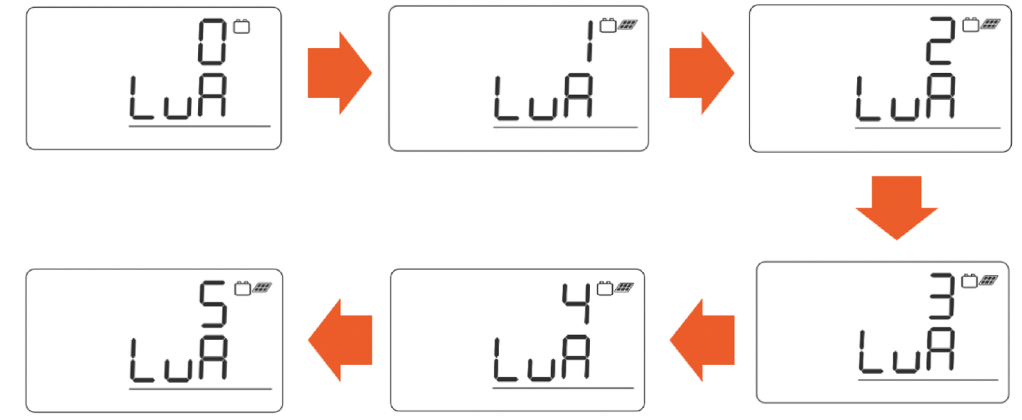
Press ENTER. Battery type will be displayed.

Press ENTER again and use the up ▲ and down ▼ keys to select the correct battery type (LFP) and press ENTER.

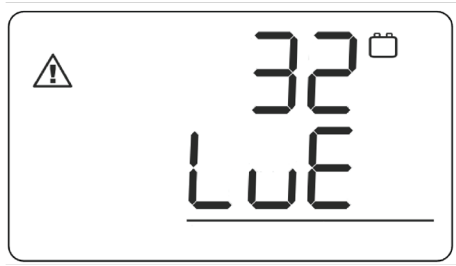
After completing these steps, you may now press the BACK button to return to the main screen.

3.3 LITHIUM WAKE-UP

When the GP-SB-PWM is powered by a solar panel but a battery is not detected, it sends 5 pulses to restore a Lithium battery that has been protected from over discharge by its BMS. The LCD indicates this process by showing the displays below.



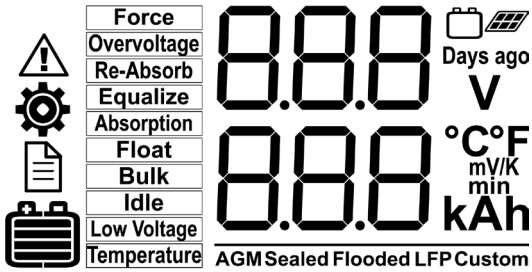
If a battery is still not detected after the fifth trial, the controller shows error number 32 to indicate this failure. The controller gives up until it is either manually reset by disconnecting and reconnecting solar power. The solar controller will not engage in this process if a new day is detected through the solar panel(s). Pressing the back button will also stop the process.



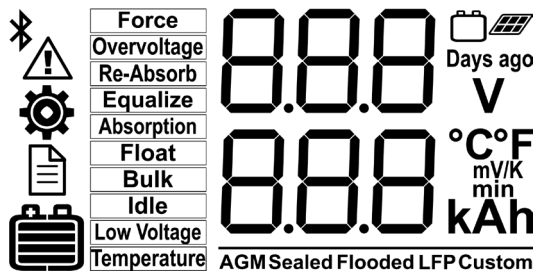
4. OPERATION

4.1 USER INTERFACE

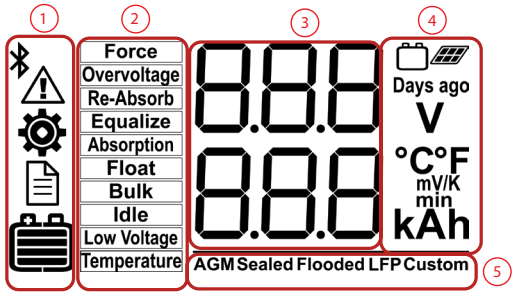
Note The GP-SB-PWM includes an LCD screen with 4 mechanical buttons that act as navigation keys to control the display.



GP-SB-PWM-10



GP-SB-PWM-30-BT

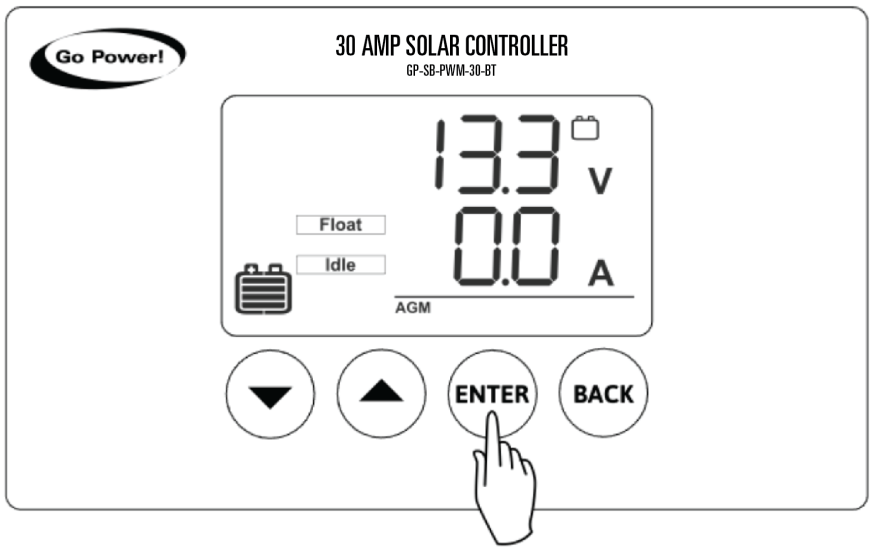


GP-SB-PWM-30-BT

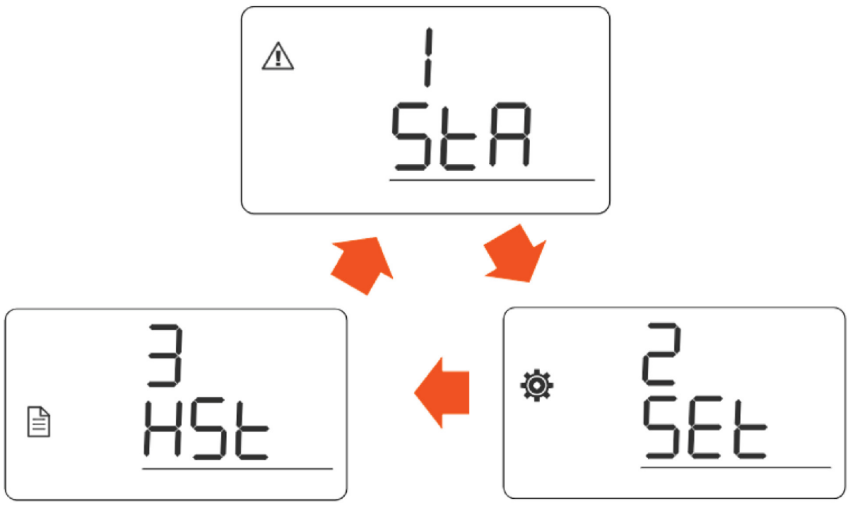
1	Icons Indicators
2	Parameters Identifiers
3	Value Indicators
4	Value Units
5	Battery Type Indicator

4.2 MENU OPERATION

Three menus are implemented in the display: status, settings, and history. At power up, the controller turns on within the status menu. The different menus can then be accessed by pressing the Enter key as shown below.



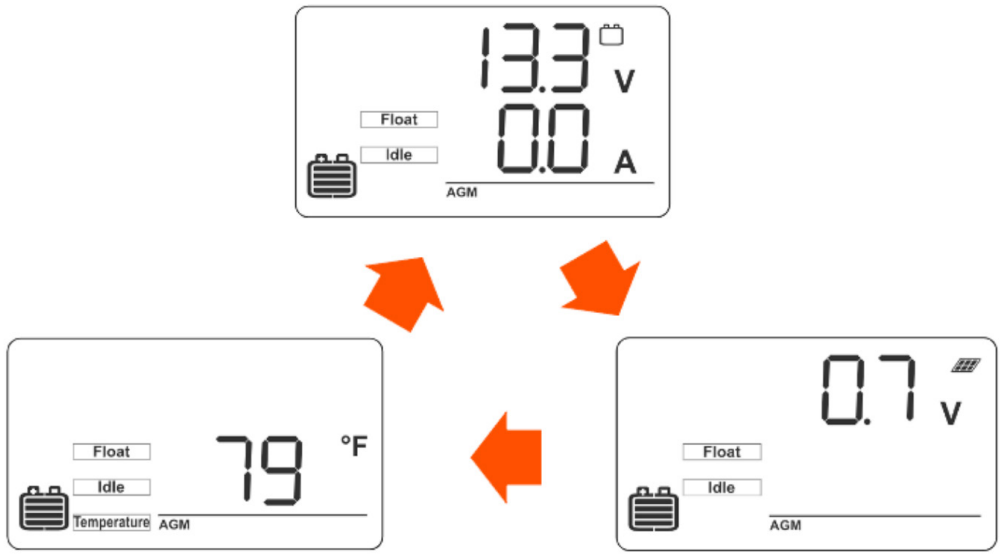
This leads to the status menu number one. Pressing the up and down keys allows navigation to the other menus as shown below. Menu 1 is for status, Menu 2 for settings and 3 for history.



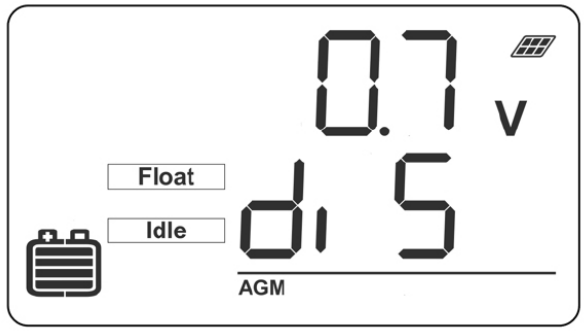
4.3 STATUS PARAMETERS

The status menu is entered by the controller at power-up. It is used to display key parameters as well as warnings and faults. Three displays are automatically scrolled through as shown below. The up ▲ and down ▼ keys can also be used to manually scroll through these. This auto scroll can be disabled using option #5 in the settings menu.

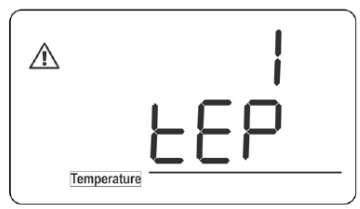
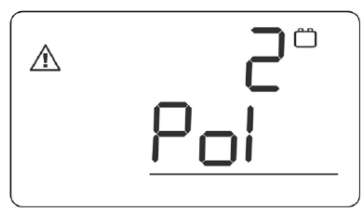
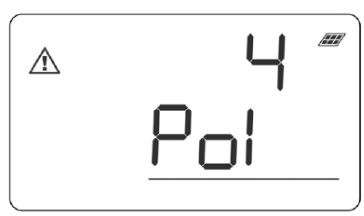
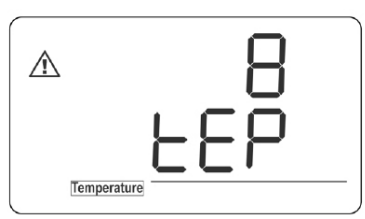
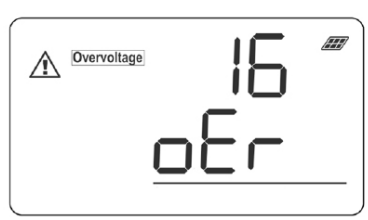
The first display shows battery voltage and current. The second shows solar open circuit voltage. The third shows the controller temperature.

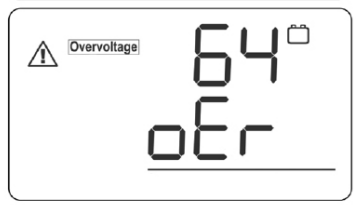
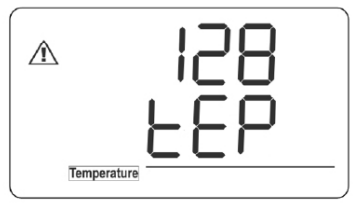


When the charging is disabled through the settings, the solar voltage display will show the following menu display to indicate this was set intentionally by the user.

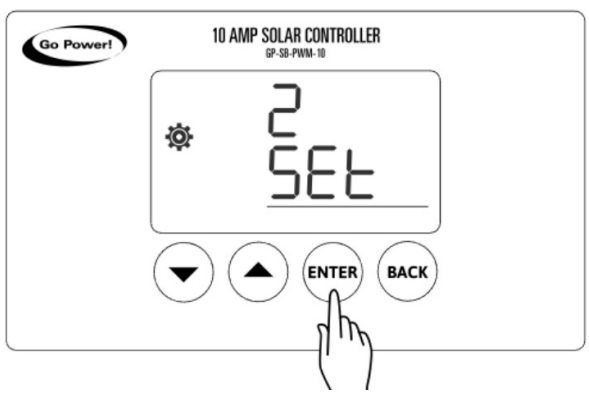


When a fault or warning is present in the system, auto-scroll is disabled and the display freezes on the fault shown. These are displayed below:

FAILURE TYPE	DISPLAY
Internal Temperature Circuit *The internal temperature of the control unit (MCU) is too high. User should make sure the ambient temperature is within acceptable range and/or power off the controller to let it cool.*	
Battery Voltage Reverse Polarity *The battery is installed in REVERSE polarity. User should disconnect PV and battery connections and correctly reinstall the connections.*	
Solar Voltage Reverse Polarity *The solar array is installed in REVERSE polarity. User should disconnect PV and battery connections and correctly reinstall the connections.*	
Circuit Board Over Temperature *The temperature of the controller PCBA/housing is too high. User should make sure the ambient temperature is within acceptable range and/or power off the controller to let it cool.*	
Solar Over Voltage *The solar array voltage is too high. User should disconnect PV and make sure the panels are properly rated for the controller considering the local expected temperatures.*	
LFP (LiFePO4) Wake Up *(If LFP battery type selected) The controller has failed 5 attempts to wakeup a lithium battery which has been protected by the BMS from overdischarge. User should check the Lithium battery and restart the BMS manually.*	

Battery Over Voltage *The battery voltage is too high (if using a custom battery type, the setting in menu 9 sets this point). User should disconnect the battery and make sure it is rated for a 12V nominal system. If yes, contact the battery manufacturer for recommended next steps.*	
Charge Temperature Limits Violation *The battery temperature is outside of the acceptable range of operating temperatures at the current charging rate. User should make sure the ambient temperature is within acceptable range and/or disable charging to let the battery cool.*	

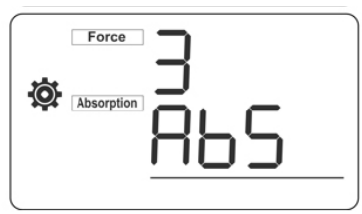
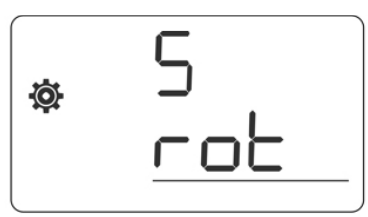
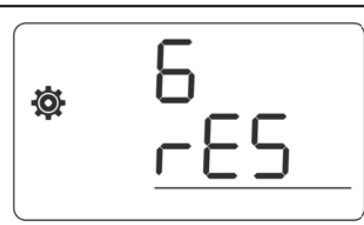
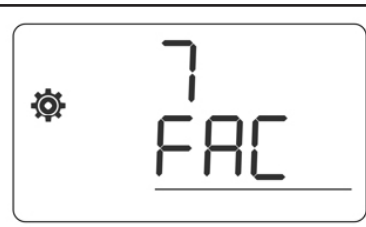
The GP-SB-PWM settings can be accessed by pressing and holding the ENTER button. Use the up ▲ and down ▼ keys to reach the Settings menu. Enter the menu by pressing the ENTER button again.

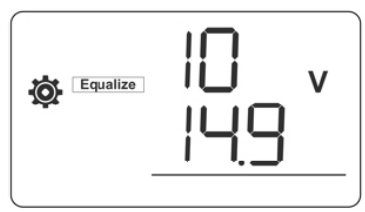
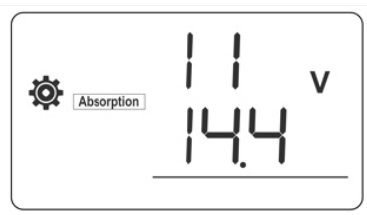
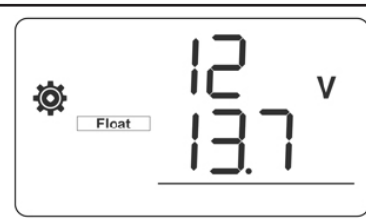
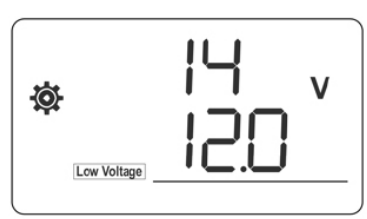


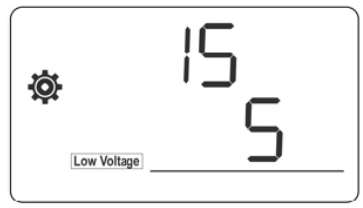
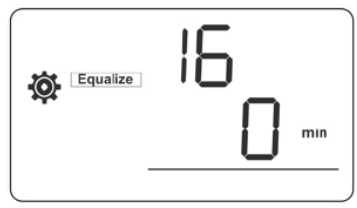
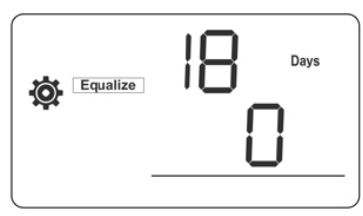
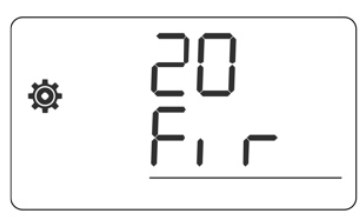
4.3 SETTING PARAMETERS

The settings listed with values of 9 through 19 on pages 16 to 18 are relevant only to setting a custom battery type. They will only be visible if the battery type setting number 1 is set to Custom.

Note The Custom Profile settings should ONLY be used by professional installers and advanced users.

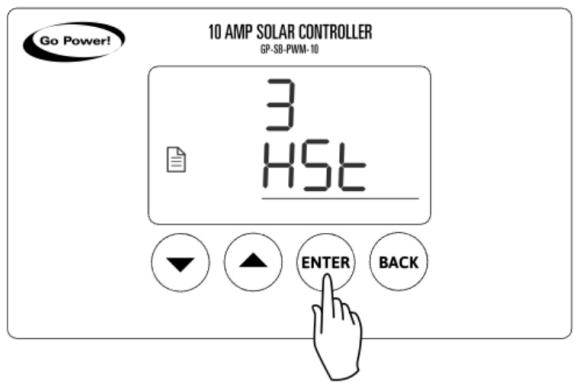
SETTING TYPE	DISPLAY
1. Battery Type (AGM / Sealed / Flooded / LFP (LiFePO4) / Custom) *This is the type of battery that is connected to the solar controller. Set this so the solar controller charges the battery according to the needs of that battery*	
2. Temperature Unit (°C / °F) *This is the temperature value. Default is °F for the United States and °C for Canada. Change this to suit your preference.*	
3. Force Absorption (YES / NO) *If the controller has already charged the battery and has transitioned to the float stage, setting this to YES will cause the solar controller to raise the voltage back up to absorption voltage again, hold it there for the absorption time and then go back to float. Use this if you want to top up the battery to 100% before nightfall or for any other reason.*	
4. Enable / Disable Charging (Ena / Dis) *Allows you to disable the solar controller so it will not charge anymore. Use this if you are performing maintenance on the controller for safety as it will not actively charge the battery.*	
5. Enable / Disable Status Rotation (Ena / Dis) *Allows you to disable the auto rotation between status parameters. Default is enabled so it will transition between displaying the voltage and current, solar voltage and temperature. If disabled it will stay on whatever screen you manually transition to. Use this if you want to see one screen all the time and not have it changing constantly.*	
6. Soft Reset (YES / NO) *Resets the solar controller. This feature is used for troubleshooting if the controller is not operating correctly. It may fix the problem without having to remove the controller from the wall and power cycle. If not, a hard reset would be next by completely removing power and applying it again.*	
7. Factory Reset (YES / NO) *Resets the controller to factory defaults for everything. Use this if selling the controller, or if unsure of what was changed to bring the controller back to a known state. This would likely be performed during troubleshooting over the phone to have a known baseline.*	

8. History Reset (YES / NO) *This resets the historical information in the solar controller. Use this if you want to start collecting data from a known point in time.*	
9. Battery Overvoltage Setpoint (8.0 to 16.0) *This setpoint will show a fault if the battery voltage is higher than the 8.0 to 16.0 value. Change this according to system requirements if you are using the **custom battery profile**.* *WARNING: DO NOT use it if you are unsure of how to properly set, or consult a professional.*	
10. Equalization Voltage Setpoint (8.0 to 16.0) *Sets the equalization voltage setpoint. Use this to set the value according to system requirements if using the **custom battery profile**.* *WARNING: DO NOT use it if you are unsure of how to properly set, or consult a professional.*	
11. Absorption Voltage Setpoint (8.0 to 16.0) *Sets the absorption voltage setpoint. Use this to set the value if using the **custom battery profile**.* *WARNING: DO NOT use it if you are unsure of how to properly set, or consult a professional.*	
12. Float Voltage Setpoint (8.0 to 16.0) *Sets the float voltage setpoint. Use this to set the value if using the **custom battery profile**.* *WARNING: DO NOT use it if you are unsure of how to properly set, or consult a professional.*	
13. Re-Absorb Voltage Setpoint (8.0 to 16.0) *Sets the re-absorb setpoint. If the battery voltage falls below this threshold, the controller will start a new charge cycle and perform an absorption. Use this to set the value according to system requirements if using the **custom battery profile**.* *WARNING: DO NOT use it if you are unsure of how to properly set, or consult a professional.*	
14. Low Voltage Setpoint (8.0 to 16.0) *This setpoint will indicate a low voltage fault. Someone would want to change this according to system requirements if they are using the custom battery profile. Use this to set the value according to system requirements if using the **custom battery profile**.* *WARNING: DO NOT use it if you are unsure of how to properly set, or consult a professional.*	

15. Low Voltage Delay in seconds (0 to 120) *The amount of time the controller will wait after the battery voltage falls below the low voltage setpoint before it indicates a fault. Use this to set the value according to system requirements if using the **custom battery profile**.* *WARNING: DO NOT use it if you are unsure of how to properly set, or consult a professional.*	
16. Equalization Time in minutes (0 to 600) *The amount of time the controller will hold the battery voltage at the equalization voltage setpoint before transitioning to float. Use this to set the value according to system requirements if using the **custom battery profile**.* *WARNING: DO NOT use it if you are unsure of how to properly set, or consult a professional.*	
17. Absorption Time in minutes (0 to 600) *The amount of time the controller will hold the battery voltage at the absorption voltage setpoint before transitioning to float. Use this to set the value according to system requirements if using the **custom battery profile**.* *WARNING: DO NOT use it if you are unsure of how to properly set, or consult a professional.*	
18. Equalization Interval in days (0 to 225) *The frequency at which the controller will perform an equalization. Use this to set the value according to system requirements if using the **custom battery profile**.* *WARNING: DO NOT use it if you are unsure of how to properly set, or consult a professional.*	
19. Temperature Compensation (0 to 30) *The temperature compensation setpoint used during temperature compensated charging. Use this to set the value according to system requirements if using the **custom battery profile**.* *WARNING: DO NOT use it if you are unsure of how to properly set, or consult a professional.*	
20. Firmware Version *The firmware version currently programmed onto the controller.*	

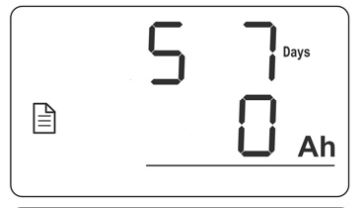
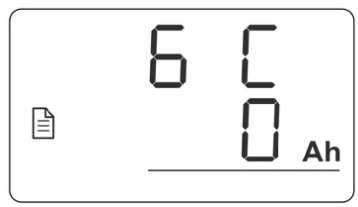
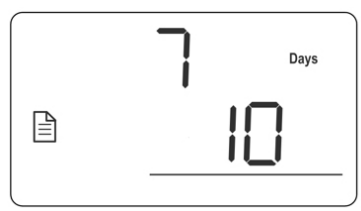
4.4 HISTORICAL PARAMETERS

The GP-SB-PWM historical amp-hour charging can be accessed by entering menu number 3. This section allows the user to review the previous usage for different settings based on the selected timeframes, as explained on the following pages.



Note These calculations do not reflect the entirety of the power generation of the solar panel(s), but the power put back into the battery to maintain the state of charge.

HISTORY TYPE	DISPLAY
1. Amp Hours from Today *Indicates how much power the controller has provided to the batteries from the solar panels throughout the day.*	1 0 Ah
2. Amp Hours Yesterday *Indicates how much power the controller has provided to the batteries from the solar panels throughout the previous day.*	2 1 Days ago 0 Ah
3. Amp Hours 2 days ago *Indicates how much power the controller has provided to the batteries from the solar panels 2 days previous.*	3 2 Days ago 0 Ah
4. Amp Hours 3 days ago *Indicates how much power the controller has provided to the batteries from the solar panels 3 days previous.*	4 3 Days ago 0 Ah

HISTORY TYPE	DISPLAY
5. Amp Hours in last 7 days *Indicates how much power the controller has provided to the batteries from the solar panels 7 days previous.*	
6. Total Cumulative Amp Hours *The total amount of power the controller has provided to the batteries since the last time the history was cleared using the clear history setting in the settings menu.*	
7. Operating Days *The number of days the controller has been in operation since the last time the history was cleared using the clear history setting in the settings menu.*	

4.5 CURRENT DERATING

The GP-SB-PWM constantly monitors the internal temperature to ensure it does not exceed UL limits. In applications that require full output current in high ambient temperatures, the solar controller starts limiting the current delivered to the battery to keep the PCB temperature within UL specifications.

4.6 BLUETOOTH® WIRELESS TECHNOLOGY

This section is for the GP-SB-PWM-30-BT Controller only!

Note The GP-SB-PWM-30BT comes with Bluetooth® Low Energy wireless technology for live status monitoring and settings configuration on mobile devices. It works together with the Go Power! Connect App, available for both Android and iOS devices.

Download and install the Go Power! Connect app, which is available on the Google Play store for Android devices and the App Store for iOS devices.

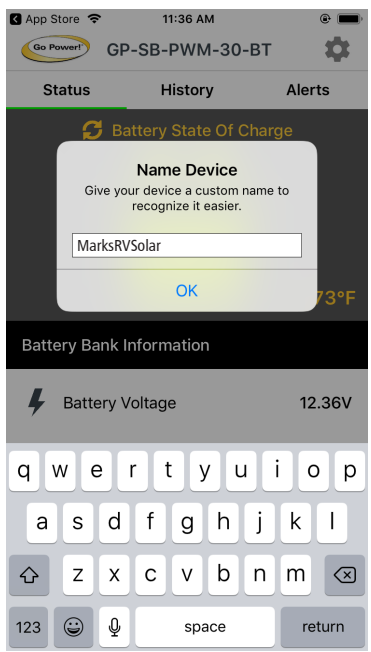
Scan the QR Codes below to be taken directly to the download page:

iOS **Google**

4.6.1 PAIRING

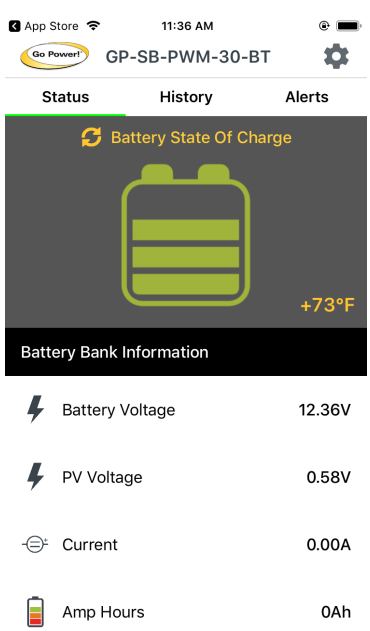
When connecting for the first time, pairing between the charge controller and the mobile device is required. Also ensure your mobile device's Bluetooth® communication function is enabled. You will see the Bluetooth® symbol present on your status bar if so. Open the app, and the Main page will prompt you to select devices.

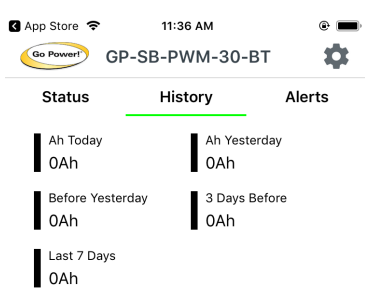
Once the solar controller is powered up, please select the charge controller in the Device Selection main page of the Go Power! Connect app. The App will prompt you to name the device for reconnection next time the app is used.

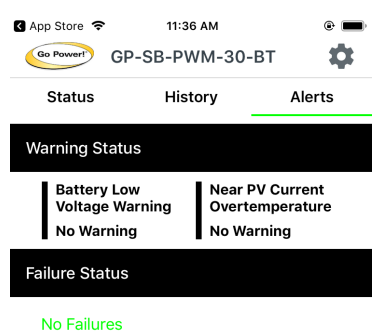


4.6.2 APP USAGE

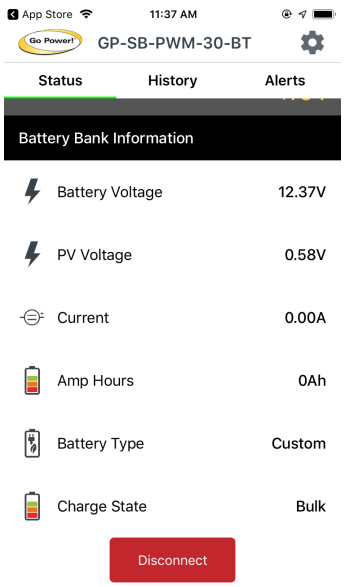
Upon initial connection you will load into the charge controller's main status screen. You will be able to see the SoC, Battery Type, Voltage, Current of the controller. In addition to the main screen, there are two additional tabs "History & Alerts" to track the Ah usage and any important faults/alerts that may occur.







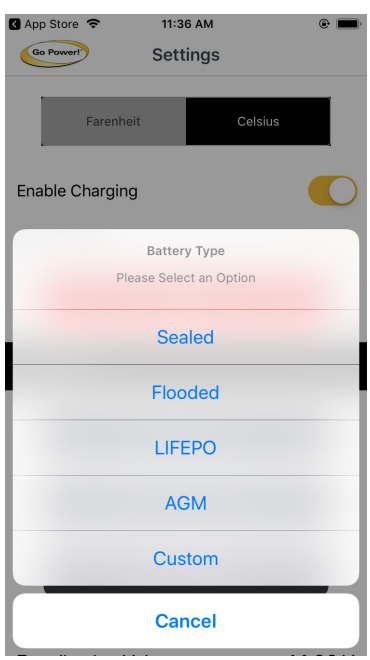
Please disconnect from the controller when you are done using the app. This helps mitigate any future connection issues. To disconnect the controller, press the "Go Power" Logo located at the top left of the app and click the red DISCONNECT button. The same button is found at the bottom of the Status page.

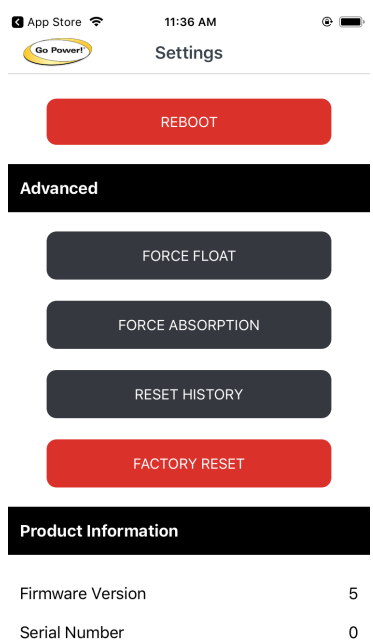


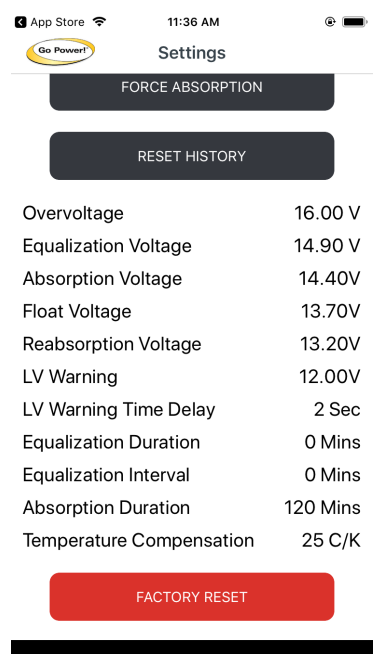
Note For a complete list of all functionalities and instructions in the Go Power! Connect app, visit https://gopowersolar.com/support/.

4.6.3 APP SETTINGS

In the App settings you will be able to set the battery type the solar controller is charging. The following batteries are supported below:







In addition to the charge controller settings, you will be able to set the temperature unit, reboot, force float & absorption and reset the "Ah" history. If you need to reset the controller to its factory settings it is located at the bottom of the APP settings page.

For custom batteries, you will be able to set custom parameters to ensure the proper custom battery profile and float, equalization and absorption voltages are optimal.

Note Please refer to the Settings Parameters section 4.3 on page 16, for more information.

Maintaining your solar charge controller is essential to ensure it operates efficiently and effectively. We recommend following these maintenance protocols **once every six (6) months**:

- Inspecting the controller: Check the charge controller regularly to see if it's in good condition. Inspect the wires, terminals, and other parts for damage or wear.
- Inspect the solar panels: Check the solar panels for damage or debris that can reduce their efficiency. Keep them clean and clear of obstructions.
- Check the wiring: Inspect the wiring and connections regularly to ensure they're in good condition and not loose or damaged.
- Keep the battery clean: Clean the battery terminals and connections regularly to prevent corrosion, which can affect the battery's performance.

6. TROUBLESHOOTING

How to Read this Section

Troubleshooting Problems is split into three sub-sections, grouped by symptoms involving key components. Components considered irrelevant in a diagnosis are denoted 'Not Applicable' (N/A). A multimeter or voltmeter may be required for some procedures listed.

It is imperative all electrical precautions stated in the Warning Section and outlined in the Installation Section are followed. Even if it appears the system is not functioning, it should be treated as a fully functioning system generating live power.

6.1 PROBLEMS WITH DISPLAY

Display Reading: Blank
Time of Day: Daytime/Nighttime

Possible Causes:
Battery or fuse connection and/or solar array connection
(Daytime only) or battery or fuse connection (Nighttime only).

How to tell:
1. Check the voltage at the controller battery terminals with a voltmeter and compare with a voltage reading at the battery terminals.
2. If there is no voltage reading at the controller battery terminals, the problem is in the wiring between the battery and the controller. If the battery voltage is lower than 6 volts the controller will not function.
3. For the solar array, repeat steps 1 and 2 substituting all battery terminals with solar array terminals.

Remedy:
Check all connections from the controller to the battery including checking for correct wire polarity. Check that all connections are clean, tight, and secure. Ensure the battery voltage is above 6 volts.

Display Reading: Nighttime
Time of Day: Daytime

Possible Causes:
Panel is covered by something; PV panel is too dirty to supply a high enough voltage to charge the battery; PV panel is not connected.

Remedy:
Check the panel and to ensure it is not obscured. Clean the panel if it is dirty. Check that PV cables are connected to the controller.

6.2 PROBLEMS WITH VOLTAGE

Voltage Reading: Inaccurate
Time of Day: Daytime/Nighttime

Possible Causes:
Excessive voltage drop from batteries to controller due to loose connections, small wire gauge or both.

How to tell:
1. Check the voltage at the controller battery terminals with a voltmeter and compare with the voltage reading at the battery terminals.
2. If there is a voltage discrepancy of more than 0.5 V, there is an excessive voltage drop.

Remedy:
Check all connections from the controller to the battery including checking for correct wire polarity. Check that all connections are clean, tight, and secure. Shorten the distance from the controller to battery or obtain larger gauge wire. It is also possible to double up the existing gauge wire (i.e. two wire runs) to simulate a larger gauge wire.

6.3 PROBLEMS WITH CURRENT

Current Reading: 0 A
Time of Day: Daytime, clear sunny skies

Possible Cause:
Current is being limited below 1 Amp as per normal operation or poor connection between solar array and controller.

How to tell:
1. The State of Charge (SOC) screen is close to 100% and the Sun and Battery icon are present with an arrow between.
2. With the solar array in sunlight, check the voltage at the controller solar array terminals with a voltmeter.
3. If there is no reading at the controller solar array terminals, the problem is somewhere in the wiring from the solar array to the controller.

Remedy:
Check all connections from the controller to the array including checking for correct wire polarity. Check that all connections are clean, tight, and secure. Continue with the solutions below for additional help on low current readings.

Current Reading: Less than expected
Time of Day: Daytime, clear sunny skies

Possible Causes:
1. Current is being limited below 1 Amp as per normal operation.
2. Incorrect series/parallel configuration and/or wiring connections and/or wire gauge.
3. Dirty or shaded module or lack of sun.
4. Blown diode in solar module when two or more modules are connected in parallel.
5. The battery is full

How to tell:
1. Battery State of Charge screen is close to 100% and the Sun and Battery icon are present with an arrow in between.
2. Check that the modules and batteries are configured correctly. Check all wiring connections.
3. Modules look dirty, overhead object is shading modules or it is an overcast day in which a shadow cannot be cast.

Avoid any shading no matter how small. An object as small as a broomstick held across the solar module may cause the power output to be reduced. Overcast days may also cut the power output of the module

4. Disconnect one or both array wires from the controller. Take a voltage reading between the positive and negative array wire. A single 12 volt module should have an open circuit voltage between 17 and 22 volts. If you have more than one solar module, you will need to conduct this test between the positive and negative terminals of each module junction box with either the positive or the negative wires disconnected from the terminal.

Remedy:

1. Reconnect in correct configuration. Tighten all connections. Check wire gauge and length of wire run. Refer to Suggested Minimum Wire Gauge in Section 5.
2. Clean modules, clear obstruction or wait for conditions to clear.
3. If the open circuit voltage of a non-connected 12 volt module is lower than the manufacturer's specifications, the module may be faulty. Check for blown diodes in the solar module junction box, which may be shorting the power output of module.

7. LIMITED WARRANTY

Go Power! warrants the GP-SB-PWM-30BT for a period of five (5) years from the date of shipment from its factory. This warranty is valid against defects in materials and workmanship for the five(5) year warranty period. It is not valid against defects resulting from, but not limited to:

- Misuse and/or abuse, neglect or accident
- Exceeding the unit's design limits
- Improper installation, including, but not limited to, improper environmental protection and improper hook-up
- Acts of God, including lightning, floods, earthquakes, fire, and high winds
- Damage in handling, including damage encountered during shipment

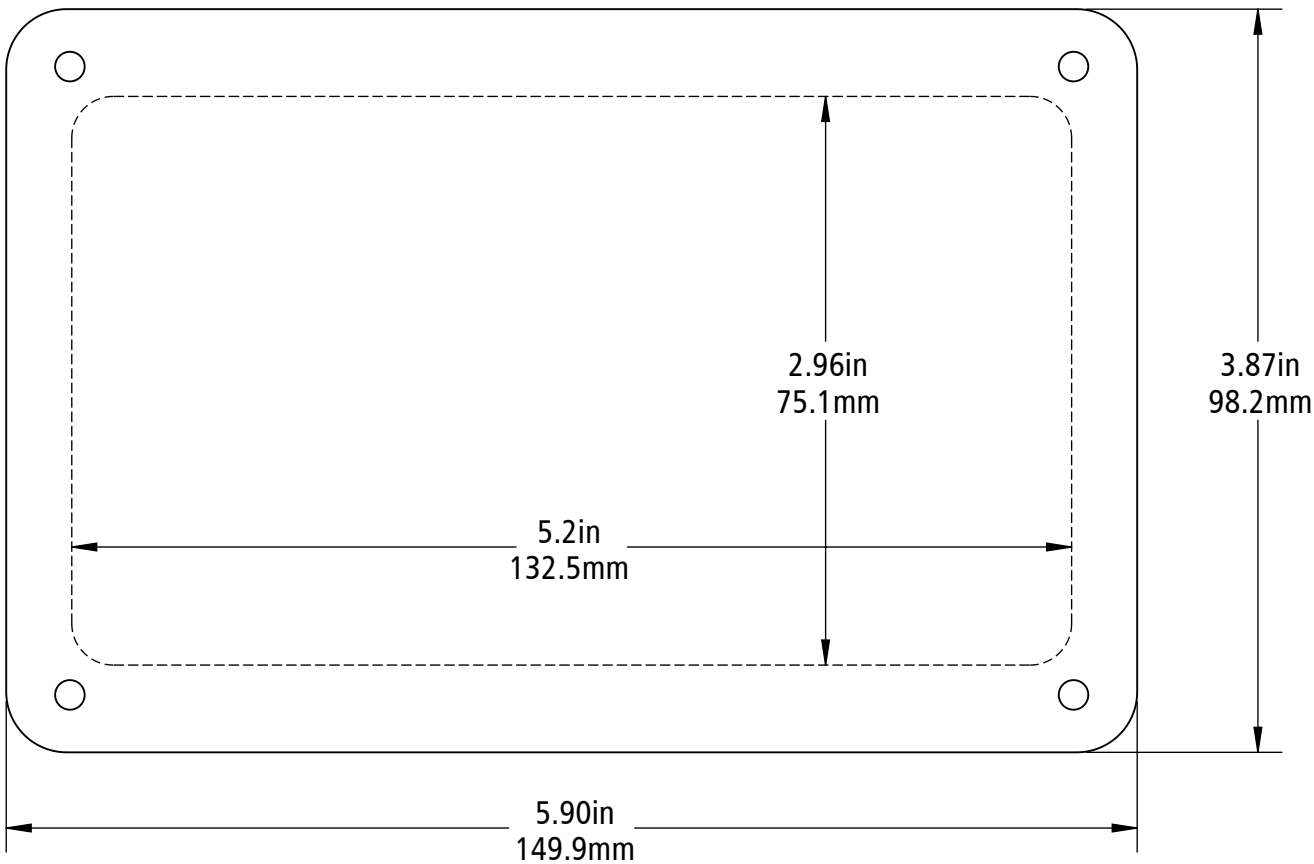
This warranty shall be considered void if the warranted product is in any way opened or altered. The warranty will be void if any eyelet, rivets, or other fasteners used to seal the unit are removed or altered, or if the unit's serial number is in any way removed, altered, replaced, defaced, or rendered illegible.

7.1 REPAIR AND RETURN INFORMATION

Visit www.gopowersolar.com to read the "frequently asked questions" section of our website to troubleshoot the problem. If trouble persists:

1. Fill out our online Contact Us form or Live Chat with us
2. Call our Tech Support team at 1-866-247-6527
3. Email techsupport@gopowersolar.com
4. Return defective product to place of purchase

8.1 MOUNTING TEMPLATE



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