# GS-PWM-165W series Solar Intelligent Charging Controller

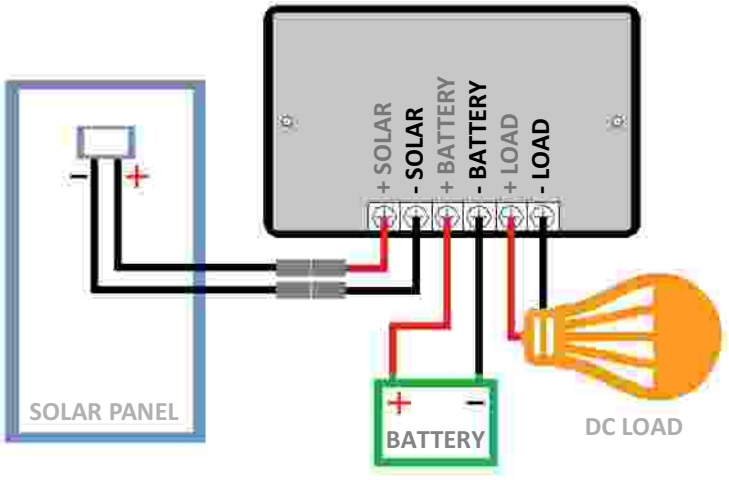
Operation Manual

## I. Main features

- Automatically Identifies 12V or 24V battery banks
- LED indicates the working status of the battery and load
- Dual USB outputs with a maximum load current of up to 1.2A
- LCD screen shows charging current, discharge current and battery bank capacity
- Advanced ternary form charging algorithm equalizes the charge to the battery once per week to prevent imbalance and vulcanization, which extends the battery lifespan
- Manual load control button
- Various protective features cover: Over charging, over discharging, overload, short circuit, reverse polarity, & TVS lightning

## II. Installation and wiring

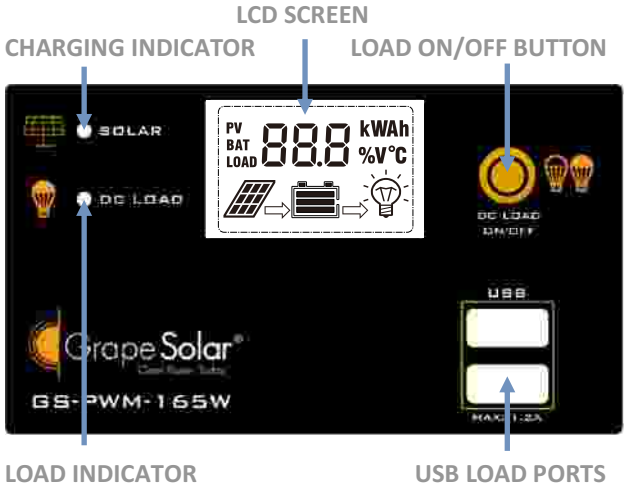
1. Connect the battery bank first. When the battery is connected the charge controller will automatically recognize the battery bank voltage. If used on a 12V system, “12” will be shown on LCD screen. If used on a 24V system, “24” will be shown.
2. Connect the solar panel array second. If the connection is correct, the solar indicator LED will illuminate. If the LED does not turn on check the connection.
3. Connecting the load (optional) last. Connect the DC load wires to the controller’s load output terminals. This feature is for DC loads only and is not meant for inverters. Wiring diagram is as follows:

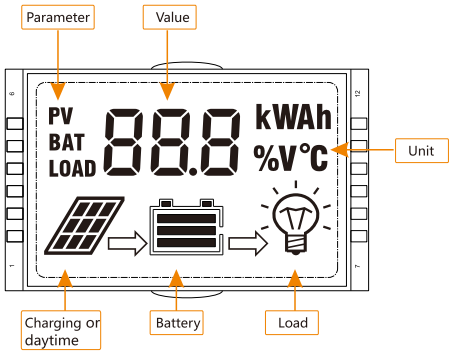



## III. Suggestions for use

1. When the battery is overly discharged, disconnect any USB load. Otherwise, the USB load will discharge the battery bank even further which can lead to damaged batteries.
2. Install the controller in a ventilated environment where there can be airflow to allow for proper cooling.
3. The temperature compensation function uses the ambient temperature and performs best when the battery bank is nearby.
4. 10AWG cable is recommend on runs under 25 feet. For longer runs, contact Grape Solar Technical Support for guidance.
5. Grounding is not necessary but can be accomplished through any of the three negative outputs.

## IV. Status indications




**Error Screen:**

Displays E0~E6 in the center of the display, this indicates normal operation.

| Code on LCD screen | Corresponding error |
|---|---|
| E0 | No error |
| E1 | Battery over-discharge |
| E2 | Battery over-voltage |
| E4 | Load short circuit |
| E5 | Load overloaded |
| E6 | Temperature too high inside controller |

**Battery Voltage:**

Displays the battery voltage at center of the display, "V" at middle right, and "BAT" at middle left.

**Battery Percentage:**

Displays the battery percentage at center of the display, "%" at middle right, and "BAT" at middle left.

**PV Current:**

Displays PV current at the center of the display, "Amps" at middle left, and "PV" at middle left.

**Load Amperage:**

Displays the load amperage at the center of the display, "A" at middle right, and "LOAD" at middle left.

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**Ambient Temperature (C):**
Displays temperature at the center of the display, "C" at middle right, and "TEMP" at middle left.
**Load Control Setting:**
Indicates type of load control chosen. Hold the button down to enter the menu, push the button to change the setting.

**V. Five Load Working Modes** (similar with controller GS-PWM-40BT)

**1.Pure light control (0):**
When sunlight disappears and the light intensity drops to the starting point (light control off), the controller initiates a 10-minute delay (settable) to confirm the starting signal, and then switches on the load for operation. When sunlight emerges and the light intensity reaches the starting point, the controller initiates a 1-minute (fixed) delay to confirm the shutting-down signal, and then shuts down the output to stop the load's operation.
**2.Light control + time control (1 to 14):**
The starting process is the same as pure light control. After operating for a preset period of time (settable from 1 to 14 hours), the load stops operation automatically.
**3.Manual mode (15):**
In this mode, the user can switch the load on or off by the keys,no matter whether it's day or night.
**4.Debugging mode (16):**
When the solar panel voltage is higher than the "light control off" voltage, switch off the load immediately; when the solar panel voltage is lower than the "light control on" voltage, switch on the load immediately.
**5.Normal on (17):**
The energized load remains in the output state.

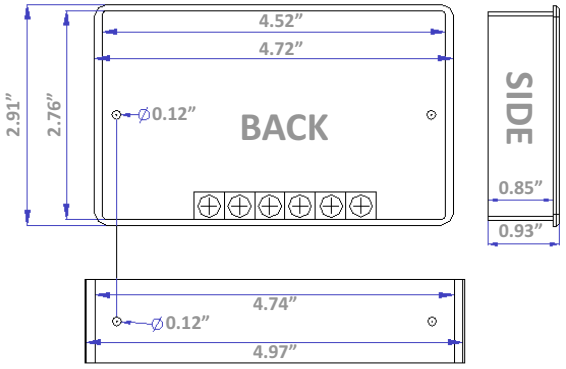
| Display | Mode |
|---|---|
| 00 | Sole light control mode |
| 01-14 | Light control + time control (1 to 14 hours) |
| 15 | Manual mode (factory default) |
| 16 | Debugging mode |
| 17 | Normal on mode |

**VI. Electrical Specifications**

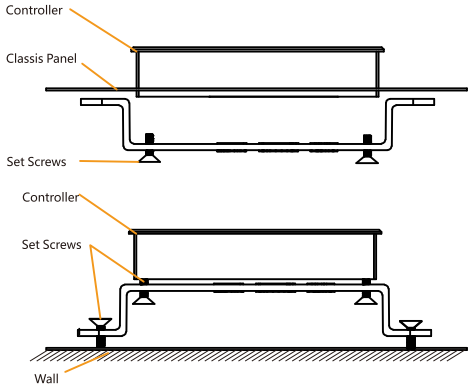
| | 12V | 24V |
|---|---|---|
| System voltage | 12V/24V Auto Detection | |
| System current | 10A | |
| No-load loss | < 12mA | |
| Solar energy input voltage | < 27V | < 55V |
| Overvoltage protection | 17.0V | 34.0V |
| Equal charging voltage | 14.6V, 1h | 29.2V, 1h |
| Ascending charging voltage | 14.4V (25℃), 2h | 28.8V (25℃), 2h |
| Float charging voltage | 13.8V (25℃) | 27.6V (25℃) |
| Charging recovery voltage | 13.2V (25℃) | 26.4V (25℃) |
| over-discharging recovery voltage | 12.5V | 25.0V |
| Under voltage | 12.0V | 24.0V |
| Over-discharging voltage | 11.1V | 22.2V |
| USB load cut-off voltage | 10.6V | 21.2V |
| Total USB load rated current | 1.2A | |
| Temperature compensation | -4.0mv/℃/2V ; | |
| Overload protection | 1.25 times of rated current: 30s; | |
| Short Circuit protection | ≥1.5 times of rated current | |
| Working temperature | -20℃ to +50℃ | |
| Protection level | IP30 | |
| Weight | 140g(10A) | |
| Dimensions | 120×74×23.6(mm); (L×W×H) | |

**VII. Installation and setting**
1. Use the back of the charge controller to trace a pattern on the mounting surface.
2. Cut a hole in the mounting surface to match the trace pattern.
3. Insert the back of the charge controller through the front of the hole in the mounting surface.
4. Lock the charge controller to the mounting surface from behind using the mounting bracket, screws, washers and rubber mats.
5. After installation, press the button to turn on or turn off the load.
6. If the controller overloads or short circuits, turn off the load and check that is not malfunctioning before turning it on again. Press and hold for the LOAD ON/OFF button for 2 seconds to reset the load protection.
7. If there is an over voltage or over discharge, the load will be turned off. It will be activated after the system voltage returns to normal.

**VI. Mechanic al Specifications**




Overall dimension: 4.72×2.91×0.93(inches), 120×74×23.6(mm)
Installation dimension: 4.53×2.76(inches), 115×70(mm)
Installation hole diameter: 0.11(inches), 3.0(mm)




**VIII. Warranty**
One year limited warranty on workmanship and materials

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