

# User' s Manual



## 1.General Safety Instructions

Danger of explosion due to improper handling of batteries! Corrosive hazard by leaking battery acid! Keep children away from batteries and acid! Smoking, fire and naked lights are prohibited when handling batteries. Prevent sparking and wear eye protection gear during installation.

Solar modules generate power from light incidence. Even by low light incidence solar modules carry the full voltage. Therefore, work cautiously and avoid sparking during all work.

Use only well-isolated tools!

If the regulator is operated in a manner not specified by the manufacturer, the regulator' s constructive protective measures can deteriorate.The factory signs and marking may not be modified, removed or made unrecognizable. All work must be performed in conformity with the national electrical specifications and related local regulations!

When installing the regulator in foreign countries, information concerning regulations and protective measures must be obtained from the relevant institutions / authorities.

Do not begin the installation until you are sure that you have technically understood the manual and perform the work only in the order provided in this manual!

The manual must be available during all work performed on the system, third parties included.

This manual is a component of the system regulator and must be included with the regulator when given to a third person.

The Controller is equipped with a low power surge protection. The installer had to care for a efficient lightning protection.

## 2.Scope of Application

The charge regulator is only suitable for regulating photovoltaic solar modules. Never connect another charging source to the charge regulator. This can destroy the regulator and / or source.

The regulator is only suitable for the following chargeable 12V or 24V battery types:

- Lead storage batteries with liquid electrolytes
- Sealed lead storage batteries; AGM, GEL

Important!The regulator is not suited for nickel Cadmium, nickel metal hydride, lithium ions or other rechargeable or non-rechargeable batteries.

The regulator may only be used for the particular solar applications provided.Also,observe that the permitted, model-specific, nominal currents and voltages are not exceeded.

### 3. Installation

Install the regulator near the battery on a suitable surface. The battery cable should be as short as possible and have a suitable cable diameter size to minimize loss, e.g. 4 mm<sup>2</sup> at 20 A and 2m length. A temperature compensated final charge voltage will extend the batteries lifetime and uses the optimum charge capacity.

Do not install the controller to direct sunlight.

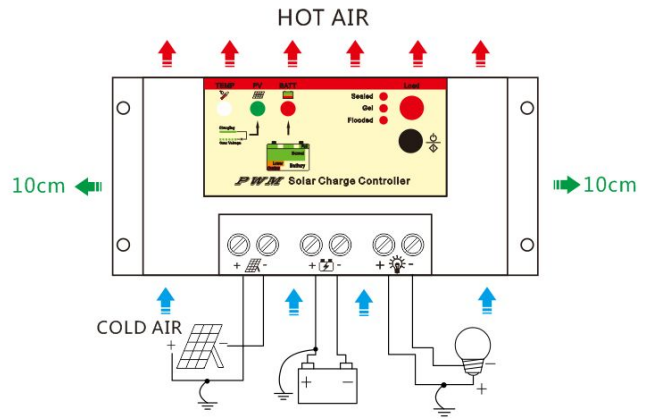
To ensure the air convection on each side keep a distance of 10 cm to the regulator.

#### Connecting the Regulator

1. Connect the battery to the charge regulator - plus and minus
2. Connect the photovoltaic module to the charge regulator - plus and minus
3. Connect the consumer to the charge regulator - plus and minus

The reverse order applies when deinstalling!

An improper sequence order can damage the controller!

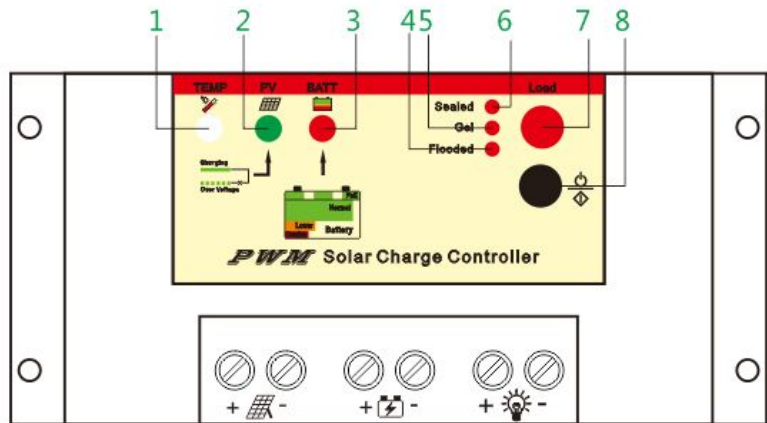


Attn : In a stand-alone solar system, grounding is not necessary. This controller is a positive ground controller, therefore, if you need to do the grounding, please connect all positive wires to the ground!

### 4. System indicator

The interface of the controller

1. Temperature compensation
2. Charge indicator
3. Battery capacity indicator
4. Flooded battery indicator
5. Gel battery indicator
6. Sealed battery indicator
7. Load output indicator
8. Manual on/off switch



The indicators of the controller shows the running states of the controller, therefore, you can judge the running condition of the controller according to the different color of the indicators.

|               | 2 charge                    | 3 battery capacity  | 7 load        |
|---------------|-----------------------------|---|---------------|
| on            | PWM constant voltage charge | green : battery capacity high<br>orange : battery capacity medium<br>red : battery capacity low | open          |
| Fast flashing | Buck charge                 | Green flash , battery over voltage  | Short-circuit |
| Slow flashing | Float charge                | Battery capacity very low   | Over-current  |
| off           | At night                    | Unable to power on  | closed        |

## 5. Setting the controller

### Manual ON/OFF load

All indicators will be flashing once you connect battery to the controller.the controller will be running after the flashing of the indicators.press the bottom once to close the load output,and press it again to open the load output.you can see the load status by the load indicator no.7.

### Setting battery type

Different battery type needs different charging volage.therefore,you can extend the battery running life by setting the correct battery type.press the bottom for more than 5 seconds,the battery type indicator will be slow flashing,then you can press the bottom each time to select the battery type which matches your battery.nothing is intercessory to do after selecting,the setting will be finishing once you see the indicators stops flashing.

## 6. PWM technology

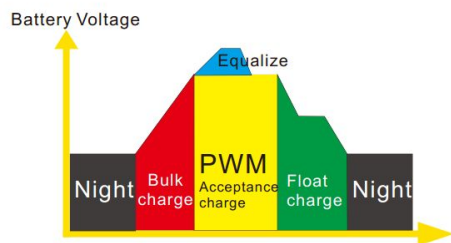
In the “old days,” simple on-off regulators were used to limit battery outgassing when a solar panel produced excess energy. However, as solar systems matured it became clear how much these simple devices interfered with the charging process.

Charging a battery with a solar system is a unique and difficult challenge.The history for on-off regulators has been early battery failures, increasing load disconnects, and growing user dissatisfaction. PWM has recently surfaced as the first significant advance in solar battery charging. PWM solar chargers use technology similar to other modern high quality battery chargers. When a battery voltage reaches the regulation setpoint, the PWM algorithm slowly reduces the charging current to avoid heating and gassing of the battery, yet the charging continues to return the maximum amount of energy to the battery in the shortest time. The result is a higher charging efficiency, rapid recharging, and a healthy battery at full capacity.

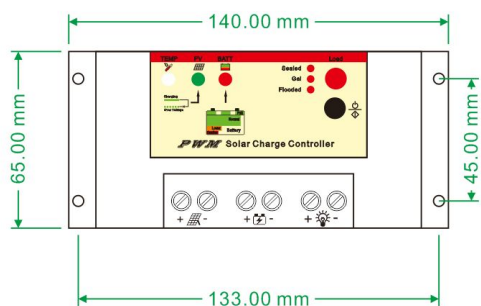
## 7. Protective functions of the controller

- Protection against reverse polarity of solar modules
- Protection against reverse polarity of connected battery
- Short-circuiting at the module input
- Short-circuiting at the load output
- Protection against over charging
- Reverse current protection at night
- Overvoltage and under voltage protection
- Over load protection at load output
- Deep discharging protection/low voltage disconnect

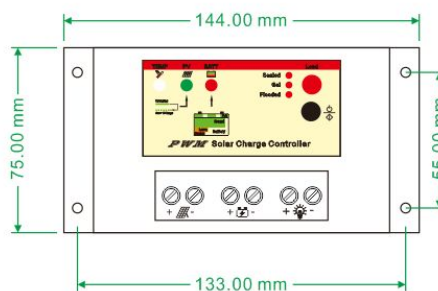
## 8.Charging Program



## 9.Mechanical drawing



LS10A



LS20A

## 10.Technical parameter

| Model                       | LS10A   | LS20A          |         |
|-----------------------------|---|----------------|---------|
| Rated charging current      | 10A   | 20A            |         |
| Rated discharging current   | 10A   | 20A            |         |
| Short-current protection    | 40A   | 40A            |         |
| System voltage              | 12V/24V automatic adapt   |                |         |
| Over current protection     | <1.3 maintain for 60s<br><1.6 maintain for 5s<br>>1.6 shut down immediately |                |         |
| Stand-by lost               | <7mA  |                |         |
| Charge voltage drop         | ≤0.26V  |                |         |
| Discharge voltage drop      | ≤0.15V  |                |         |
| Max solar panel voltage     | 42V   |                |         |
| Operating temperature       | -35°C to +55°C  |                |         |
| voltage                     | Gel   | Sealed         | Flooded |
| Equalize charging voltage   | 14.8V   | 14.6V          | 14.8V   |
| Bulk charging voltage       | 14.5V   | 14.5V          | 14.5V   |
| Acceptance charging voltage | 14.2V   | 14.4V          | 14.6V   |
| Float charging              | 13.8V   | 13.8V          | 13.8V   |
| Charge return voltage       | 13.2V   | 13.2V          | 13.2V   |
| Discharge stop voltage      | 11.2V   | 11.2V          | 11.2V   |
| Discharge return voltage    | 12.6V   | 12.6V          | 12.6V   |
| Temperature compensation    | -4mV/2V/°C  |                |         |
| Control mode                | PWM( Pulse Width Modulation )   |                |         |
| Maximum wire size           | 11AWG   | 7AWG           |         |
| Size/weight                 | 140×65×34mm/150g  | 143×79×45/300g |         |