

## PWM30LCD

RENOGY 30A Pulse Width Modulation Solar Charge Controller with LCD Manual



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# 1. Product Information

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The **PWM30LCD** is an intelligent and multifunctional solar charge controller. The customized LCD display makes it easy to operate. All the controlling parameters can be adjusted to the user's needs. This controller has the following features:

- Visual LCD with graphic symbols
- Brief key operation
- Auto detection voltage (12V/24V)
- Intelligent PWM Charging Mode
- Temperature compensation
- Adjustable charging and discharging parameters
- Settable working modes of loads
- Accumulative function of charging and discharging Amp-hours
- Battery discharging protection
- Low Voltage Disconnect
- Overloading and short-circuit protection
- Battery reversed protection
- Delayed auto restart after overloading protection

The controller adopts the advanced Pulse Width Modulation (PWM) charging technology. With range of 0-100%, it can charge the battery quickly and safely under any condition of solar photovoltaic system.

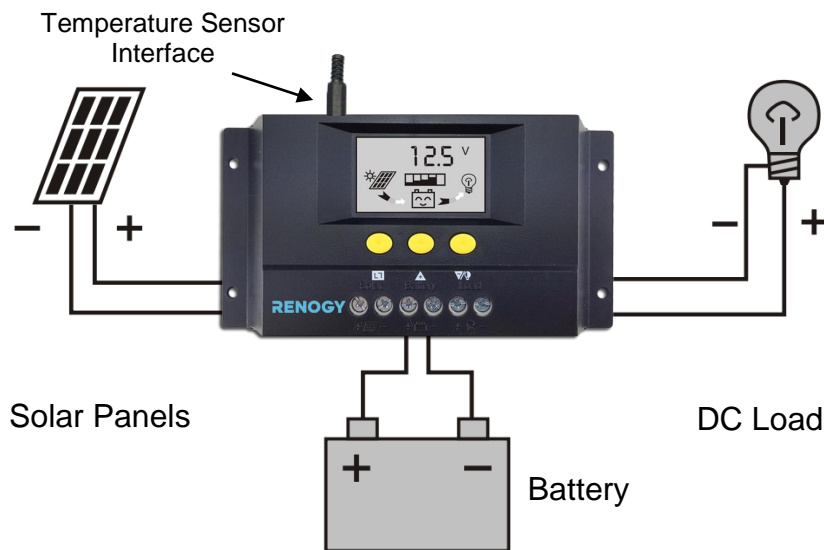
When charging, it uses automatic duty cycle conversion, creating pulses of current to charge the battery. Intermissions make the oxygen and hydrogen generated by chemical reactions combine again and absorbed. It can naturally eliminate concentration polarization and ohm polarization and reduce the internal pressure of the battery, thus making the battery absorb more power. Pulse current charging mode makes the battery have more time to react, which reduces the gassing volume and makes the battery improve the acceptance rate of the charging current.

## 2. Installation

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We suggest you choose the appropriate cables to ensure the current density  $< 4 \text{ A/mm}^2$ . This is good for reducing voltage drop between the solar array and the charge controller. Recommendation: For 30 Amps, use a  $10\text{mm}^2$  cable.

1. Please avoid installing and using the controller under the following conditions: wet or dusty locations, and in places with flammable and explosive gases.
2. Install the controller on a vertical surface. In order to make the controller have good thermal dissipation, please allow 10 cm (4 in) of free space above and below the controller.
3. As shown in **Fig. 1.1**, do the connections in the following order:
  - 1<sup>st</sup> Connect the DC loads
  - 2<sup>nd</sup> Connect the battery or battery bank
  - 3<sup>rd</sup> Connect the solar panel(s)
4. Plug the external thermal sensor into the interface as shown in **Fig. 1.1**. **Do not lose this sensor; it is required for the proper operation of the controller.**



**Figure 1.1** Charge Controller Diagram

**Caution:** To avoid the accident, please disconnect the system in reverse order as the installation. That is, first remove the panels, then the battery, and finally your loads.

**Attention:** Accidentally connecting the battery with reverse polarity will not damage the controller, but will cause safety risk on your loads.

## 3. Operation

### 3.1. Explanation of LCD Graphic Symbols














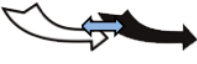
Icon	Description	Icon	Description
	Load output is OFF		Battery is not receiving charge
	Load output is ON		Charging battery at full speed
	Supplying current to loads		Controller is at normal operation
	Load connected		Controller is at abnormal operation
	Solar array connected		Battery Level
	Load light control		Battery Connected
	Timing control for loads		Float Charging

Table 3-1 LCD graphic symbols description

### 3.2. Explanation of Buttons



**Circular toggle button.** This button is used to navigate all interface screens in a circular order as shown as **Fig. 3.1**.



**Parameter adjusting (+) button.** This button is used to increase the value of a parameter (if adjustable).



**Parameter adjusting (-) button.** This button is used to decrease the value of a parameter (if adjustable). Also, at the main interface, this button can turn on or turn off the output load.

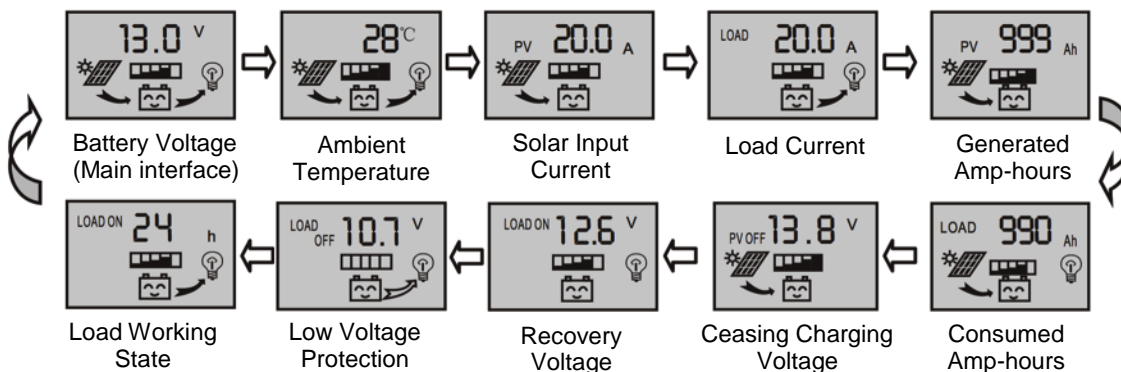




Figure 3.1 Order of the all the parameter screens

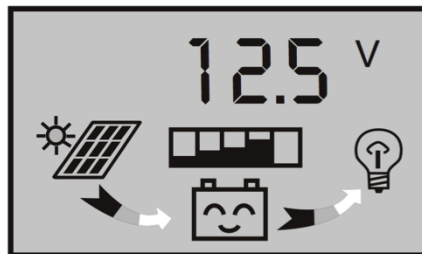
### 3.3. Parameter Review and Setting

Once the charge controller is powered up, it will display the battery voltage. This screen is the main interface of the controller. Press  to go through the all of the charge controller's screens. Screens with parameters that are adjustable e.g. "Low Voltage Protection" can be adjusted by pressing  for more than 5 seconds. Once the number

on the screen starts to flicker, it can now be adjusted using  $\blacktriangle$  and  $\blacktriangledown$  buttons. After the adjustment is complete, press  $\square$  again for more than 5 seconds to save the new parameter.

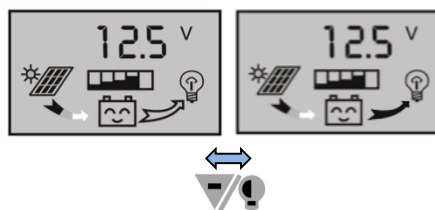
### 3.3.1 Battery Voltage

The main screen shows the battery voltage and the battery level. It also, shows the charging and discharging state. After using the navigation button, and changing to a different screen, the controller will jump back automatically to the main screen after **15 seconds**.



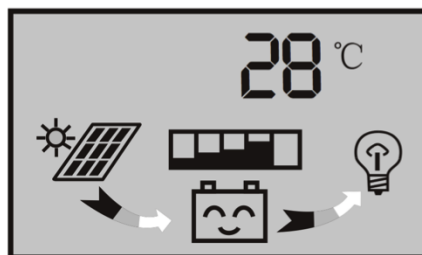
### 3.3.2 Turning the Load ON/OFF

At the main screen, press  $\blacktriangledown$  to turn on or off the load output. Please note that this button does not have this functionality at any other screens.



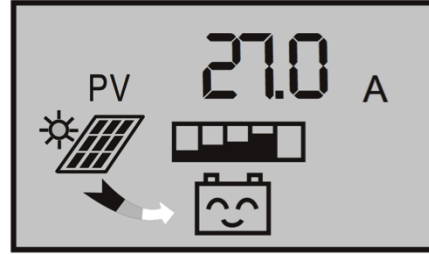
### 3.3.3 Ambient Temperature

The temperature sensor is required for temperature compensation when the battery ceases charging. This screen displays the surrounding ambient temperature of the charge controller.



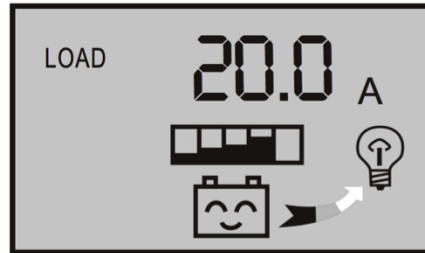
### 3.3.4 Solar Input Current

This screen will display the total amperage being produced by the solar panel(s). This number will decrease when approaching float-charging mode.




### 3.3.5 Load Current

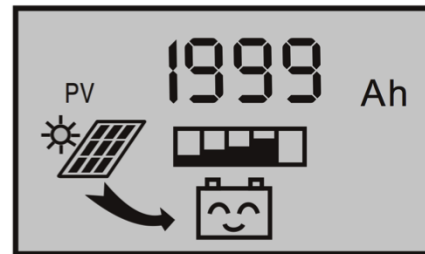
When the load is ON and a device is connected to its terminals, the screen will show the amount of current is drawing from the battery.




### 3.3.6 Generated Amp-hours

In this screen, the controller will display the generated Amp-hours from the solar panels since start up. Pressing  for more than 5 seconds will clear the generated A-h.

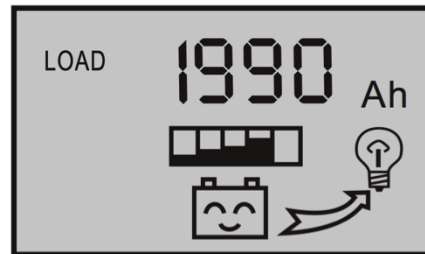
**Note:** This number will also reset if you turn the charge controller off.







### 3.3.7 Consumed Amp-hours

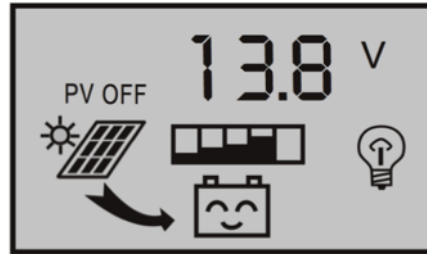
In this screen, the controller will display the total Amp-hours consumed from the battery since start up. Pressing  for more than 5 seconds will clear the consumed A-h.

**Note:** This number will also reset if you turn the charge controller off.







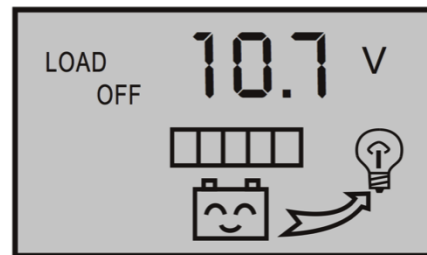
### 3.3.8 Ceasing Charging Voltage

The picture on the right shows the screen with the maximum allowed battery voltage. When the battery voltage reaches up to this voltage, the controller will disconnect the charging state to prevent the battery from overcharging. After the battery voltage drops, the controller will reconnect the charging state. This parameter can be adjusted by pressing  for more than 5 seconds. Once the number on the screen starts to flicker, it can now be adjusted using  and  buttons. After the adjustment is complete, press  again for more than 5 seconds to save the new parameter.







### 3.3.9 Low Voltage Protection Function

The low voltage protection function disconnects any power to the load output if the voltage falls below a specific voltage. This function helps prevent the battery from over-discharging. This parameter can be adjusted by pressing  for more than 5 seconds. Once the number on the screen starts to flicker, it can now be adjusted using  and  buttons. After the adjustment is complete, press  again for more than 5 seconds to save the new parameter.



### 3.3.10 Recovering Voltage

After the controller enters into low voltage protection state, it will remain on this state until the battery voltage is greater than the recovering voltage specified on this screen. Once this happens, the controller will reconnect the load output power automatically. This parameter can be adjusted by pressing  for more than 5 seconds. Once the number on the screen starts to flicker, it can now be adjusted using  and  buttons. After the adjustment is complete, press  again for more than 5 seconds to save the new parameter.

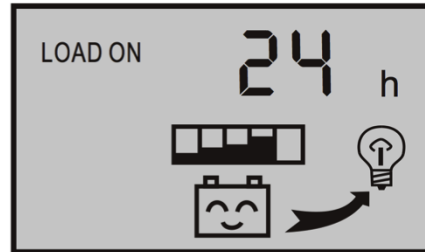






### 3.3.11 Load Work Mode



In this screen, the load output behavior is as follows:

- **24h** – Indicates normal mode. Loads are under the condition of supplying power without interruption.
- **1h-23h** – Indicates timed light control. Load terminals start to supply power after sundown for the amount of hours indicated on the screen (1 to 23 hours).
- **0h** – Indicates Dusk-to-Dawn. Load is on all night long.

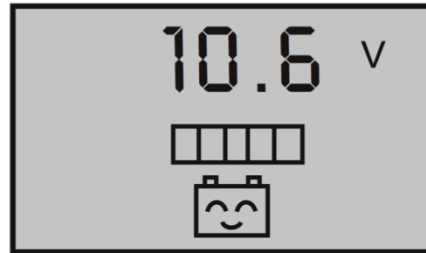


This parameter can be adjusted by pressing  for more than 5 seconds. Once the number on the screen starts to flicker, it can now be adjusted using  and  buttons. After the adjustment is complete, press  again for more than 5 seconds to save the new parameter.


# 4. Protection Features and Troubleshooting

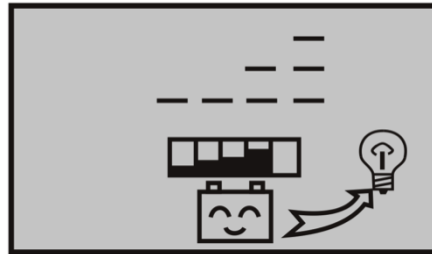
## 4.1 Low Voltage Protection

When the battery voltage is below than the protection voltage, the controller will enter in low voltage protection state, which disconnects the load output. Use the solar panels or alternate charger to charge the battery. When battery voltage recovers above the specified voltage on the “Recovering Voltage” screen, the controller will recover to supply power for load terminals and operate normal once again.




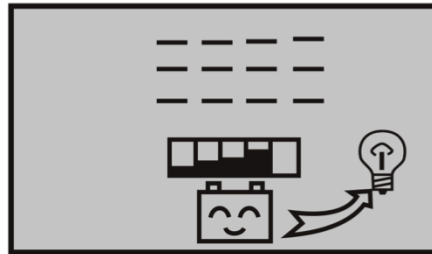
## 4.2 Overloading Protection

When the light bulb on the screen flickers with partial lines (as shown on the picture on the right), it means that the current load overloaded to 1.2 times of the rated current for 3 seconds. The controller is now in overloading state with no output load. Removing some of loads will reduce the current draw, and the controller will continue supply power to the loads automatically within seconds. If power still not recovered, press  to recover the power manually.




## 4.3 Short-circuit Protection


When the light bulb on the screen flickers with full lines (as shown on the picture on the right), it means that there is a short-circuit at the load terminals. The controller is now in short-circuit protection state with no output load. Check for damaged loads and make sure cables are not shorting out. After checking all connections, press  to recover the power output.



#### 4.4 Solar Panels Not Detected

When  is flickering, means that the controller does not detect the input PV array. Check for loose connections and also check that the cables are in good condition. If the panel still not detected, make sure that the polarity is not reversed. Bad blocking diodes from the solar panels can cause low voltage input, check that the panel's open voltage and short-circuit current is within specification.

#### 4.5 Starting Current Greater than the Rated Current

If  flickers when you turn on the load, it means the starting current is more than twice of the charge controller's rated current. Restart the controller four times. **Other exceptional conditions:** Please contact the distributor or manufacturer.

# 6. Technical Specifications

## 6.1. Electrical Characteristics

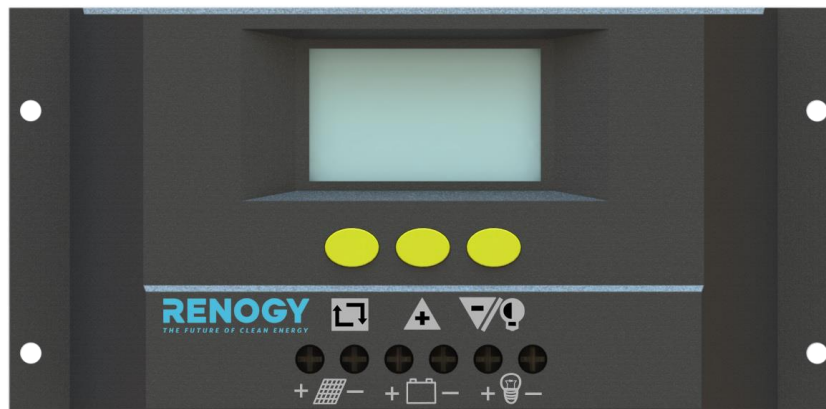
Description	Parameter
Rated Working Voltage	12V/24V
Rated Charge Current	30A
Rated Load Current	30A
Maximum Input Power	400W (12V), 800W (24V)
Solar Input Voltage	≤48V
Battery Type	Sealed AGM (Lead Acid) and Flooded
Float Charging Voltage (adjustable)	13.8V/27.6V
Low Voltage Protection (adjustable)	10.7V/21.4V
Low Voltage Recovery (adjustable)	12.5V/25.0V
No Load Loss	≤30mA
Loop Voltage Drop	≤170mV
Temperature Compensation	-4mV/Cell/°C

**Table 6.1.** Electrical Characteristics

## 6.2. Mechanical Specifications

Description	Parameter
Max. Wire Size	AWG #7 (16mm <sup>2</sup> )
Working Temperature	-10°C to 60°C (14°F to 140°F)
Storage Temperature	-30°C to 70°C (-22°F to 158°F)
Temperature Requirement	≤90%, No Condensation
Dimensions	90x188x48 mm (3.54x7.40x1.89 in)
Mounting Hole Size and Distance	Φ 5 mm, 60x178 mm (2.36x7.01 in)
Weight	360g (12.7 oz.)

**Table 6.2.** Mechanical and Thermal Characteristics



**Figure 6.1** Charge Controller (Top view)