

## Solar Regulator Instruction guide



### 1. Important safety instructions

1. Read all instructions and heed all safety warnings before beginning installation.
2. All installation, repair, and service work to this product must be done by a suitably qualified person.
3. There are no user serviceable parts inside the controller. Do not disassemble or attempt to repair it.
4. Install external fuses/breakers as required.
5. Do not in any way modify the components of the system.
6. Disconnect the solar module and fuse/breakers near to battery before installing or adjusting the controller.
7. Do not allow water to enter the controller.
8. Confirm that power connections are tightened to avoid excessive heating from loose connection.
9. Do not leave packing materials (plastic, polystyrene, etc.) within reach of children as such materials are potential sources of danger.

10. Dispose of all waste products like packaging materials, according to local regulations.
11. Centurion does not accept any liability caused by improper use of the product, or for use other than that for which the automated system was intended.
12. This product was designed and built strictly for the use indicated in this documentation. Any other use, not expressly indicated here, could compromise the service life/operation of the product and/or be a source of danger.
13. Anything not expressly specified in these instructions is not permitted.

## 2. General information

The ESOLRPG020V0 series of solar charge controllers has been designed to be economic, practical, simple and easy to use as well as aesthetically pleasing. The controller boasts various unique features:

- Battery voltage is measured intuitively thanks to the built-in battery indicator
- Highly efficient series PWM charging increases battery lifespan and makes for optimum performance of the system
- The system uses an electronic switch - no bulky mechanical switches which are easily damaged
- LED indicators display battery voltage state.
- Automatic correction of charging and discharging parameters extends battery life
- Reliable protection against overcharging, over discharging, overload and short-circuit
- Reverse protection for battery.
- Novel built-in USB port provides 5V DC for onsite charging of various electronic devices

### 3. Technical specifications

Electrical Parameters

Table 1

Description	Type	Parameter
Nominal system voltage	ESOLRPG020V0	12/24VDC
Maximum battery voltage to the controller	ESOLRPG020V0	32V
Rated battery current	ESOLRPG020V0	20A
Charge circuit voltage drop	ALL	$\leq 0.26V$
Discharge circuit voltage drop	ALL	$\leq 0.15V$
Self-consumption	ALL	$\leq 6mA$

\* Compensation of equalize, boost, float and low voltage disconnect

Temperature compensation coefficient

Table 2

Description	Parameter
Temperature compensation coefficient(TEMPCO)*	-5mV/°C/2V (ref)

Environmental parameters

Table 3

Environmental parameters	Parameter
Working temperature	-35°C~+55°C
Storage temperature	-35°C~+80°C
Humidity	$\leq 95\%$ N.C.
Enclosure	IP30

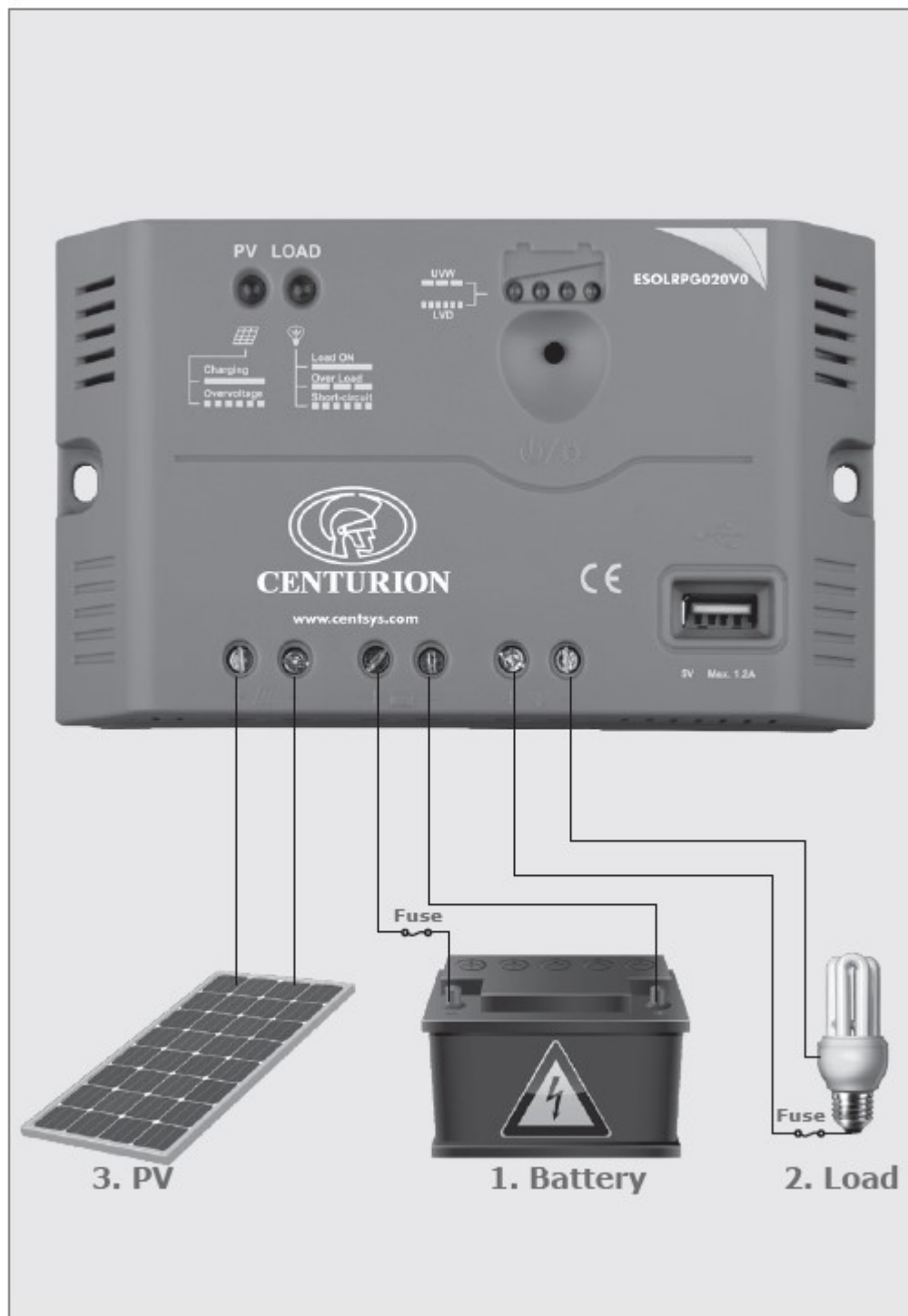
Type	ESOLRPG020V0
Overall dimension	148(5.83) × 85.6(3.37) × 34.8 (1.37)mm (inches)
Mounting dimension	138(5.43)mm(inches)
Mounting hole size	Ø4.5
Terminal	4mm <sup>2</sup>
Weight	103g

## 4. Installation instructions

### 4.1. Mounting

1. Read through the entire installation section before beginning installation.
2. Be very careful when working with batteries. Wear eye protection. Have fresh water available to wash and clean any contact with battery acid.
3. Use insulated tools and avoid placing metal objects near the batteries.
4. Explosive battery gasses may be present during charging. Ensure that there is sufficient ventilation to release the gasses.
5. Avoid direct sunlight and do not install in locations where water can enter the controller.
6. Loose power connections and/or corroded wires may result in resistive connections that melt wire insulation, burn surrounding materials, or even cause fire. Ensure tight connections and use cable clamps to secure cables and prevent them from swaying in mobile applications.
7. Use with Gel, Sealed or Flooded batteries only.
8. Battery connections may be wired to one battery or a bank of batteries. The following instructions refer to a single battery, but it is implied that the battery connection can be made to either one battery or a group of batteries in a battery bank.
9. Select the system cables according to 3.5A/mm<sup>2</sup> current density.

## 4.2. Wiring



**Figure 1.**

1. Connect components in the sequence shown in Figure 1 above, paying close attention to the "+" and "-" symbols. Always connect the battery first.
2. Once the battery has been connected, check the battery indicator LED on the controller. It should be green. If this is not the case, please refer to Section 5.
3. A DC load must be used, and the load must have the same rated voltage as that of the battery. The controller provides power to the load via the battery voltage.

# 5. Operation

## 5.1. LED indicators

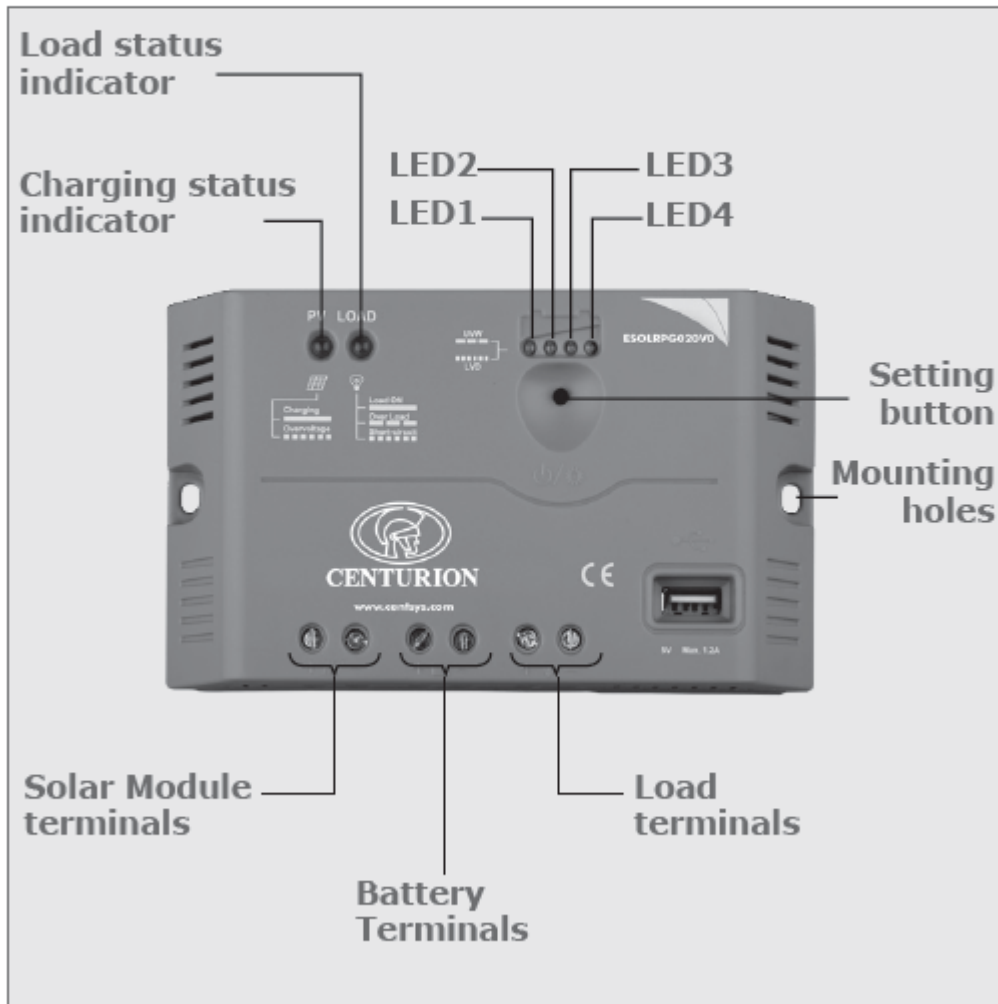


Figure 2.

### 5.1.1. Charging and load status indicator

Table 5

Indicator	Indicator Status	System Status	Note
Charging status indicator	On	Charging	Normal
	Fast flashing	Over voltage	Refer to Section 5
Load status indicator	On	On	Occurs when the load current is 1.25 times that of the rated current for a period of 60 seconds, or the load current is 1.5 times that of the rated current for a period of 5 seconds.
	Off	Off	
	Slowly flashing	Overload	
	Fast flashing	Short circuit	Refer to Section 5

### 5.1.2. Battery status indicator (LED1, LED2, LED3, LED4)

The parameters in Table 6 below pertain to a 12V DC system; for a 24V system, the values will be double those given.

Table 6

LED1	LED2	LED3	LED4	Battery Status
Slowly flashing	X	X	X	Under voltage
Fast flashing	X	X	X	Over discharged

Battery LED indicator status when voltage is high				
O	O	X	X	>12.8V
O	O	O	X	>13.4V
LED1	LED2	LED3	LED4	Battery status
O	O	O	O	>14.1V
Battery LED indicator status when voltage is down				
O	O	O	X	>13.4V
O	O	X	X	>12.8V
O	X	X	X	>12.4V

"O"LED indicates on

"X"LED indicates off

## 5.2. Setting operation

### 5.2.1. Load Work Mode Setting

With the controller powered up, press the setting button to control the load output. Press the button once, the ON/OFF status will be change accordingly. The USB Output is ON only when the Load Work Mode is ON, otherwise, it is OFF.

### 5.2.2. Battery type setting

Press the setting button for a period exceeding 5 seconds. The battery indicator LEDs will flash. Next, press the setting button to select the battery type (Sealed, Gel or Flooded), and release the button once the selection has been made.

**Table 7**

LED1	LED2	LED3	Battery status
O	X	X	Sealed lead acid battery
O	O	X	Gel battery
O	O	O	Flooded battery

"O"LED indicates on

"X"LED indicates off



## 6. Protection and Troubleshooting

### 6.1. Protection

#### 6.1.1. Load overload

If the load current exceeds the maximum load current rating(exceeds 1.25 times of rated current), the controller will disconnect the load with a short delay. The Overload condition can be cleared by reapplying power or pressing the setting button.

#### 6.1.2. Load short circuit

The unit is fully protected against short circuits caused by load wiring (current exceeding twice the rated current). The device will automatically attempt to reconnect the load but, after one reconnection attempt, the fault must be cleared by reapplying power or pressing the setting button.

The unit is protected against damage that would otherwise result from reversing the battery polarity. Correct the battery wiring to resume normal operation.

#### 6.1.3. Battery reverse polarity

In the event that the temperature sensor is short circuited or otherwise damaged, the controller will charge and discharge at the default temperature of 25°C to prevent the battery from being damaged in the process.

#### 6.1.4. Damaged local temperature sensor

If the temperature sensor short-circuited or damaged, the controller will be charging or discharging at the default temperature 25°C to prevent the battery damaged from overcharging or over discharged.

#### 6.1.5. High voltage transients

PV is protected against high voltage transients. In lightning prone areas, additional external suppression is recommended.

## 6.2. Troubleshooting

**Table 8**

LED1	LED2	LED3
Charging LED off during daytime with sunlight falling on PV modules.	PV array disconnected	Check that PV and battery wire connections are correct and securely tightened
Charging LED indicator fast flashing	Battery voltage higher than over voltage disconnect voltage(OVD)	Ensure that battery voltage is not too high. Disconnect the solar module
Battery LED1 indicator SLOWLY FLASHING	Battery under voltage	When load output is normal, LED status will return to ON automatically when fully charged.
Battery LED1 indicator FAST FLASHING	Battery over discharged	The controller will automatically disconnect the output, the LED will return to the on state once the battery has been fully charged
Load LED indicator SLOWLY FLASHING	Over load	Please reduce the load and press the button once, the controller will resume normal operation after 3s
No LED indicator	Battery voltage lower than 6V	Measure battery voltage with multimeter. Min.6V can start up the controller
No charging status LED indicator with normal connection	Input voltage of solar module lower than battery voltage	Measure the input voltage of solar module, the input voltage must be higher than battery voltage