**※Thank you for selecting the LandStar E/EU series solar charge controller. Please read this manual carefully before using the product and pay attention to the safety information.**
**※Do not install this product in humid, salt spray, corrosion, greasy, flammable, explosive, dust accumulative, or other severe environments.**

# Solar Charge Controller

## 1. Safety Information

- Read all the instructions in the manual before installation.
- DO NOT disassemble or attempt to repair the controller.
- Install an external fast-acting fuse or breaker as required.
- Disconnect the solar module and fast-acting fuses/breakers near the battery before installing or moving the controller.
- Power connections must remain tight to avoid excessive heating from a loose connection.
- Only charge batteries that comply with the controller's parameters.
- The battery connection may be a single battery or a bank of batteries.
- Risk of electric shock! The PV and load can produce high voltages when the controller is working.

## 2. Overview

The LandStar E/EU series controller is a PWM charge controller that adopts the most advanced digital technique. It's an easy operation and cost-efficient controller featured as:

- 3-Stage intelligent PWM charging: Bulk, Boost/Equalize, and Float
- Support 3 charging options: Sealed, Gel, and Flooded
- Battery status LED indicator indicates battery situation
- Battery temperature compensation function
- With humanized settings, the operation is more comfortable and convenient
- The USB provides a power supply that can charge electronic equipment**(LS EU series only)**
- Battery type and load output can be set via the button
- Extensive Electronic protection

## 3. Product Features

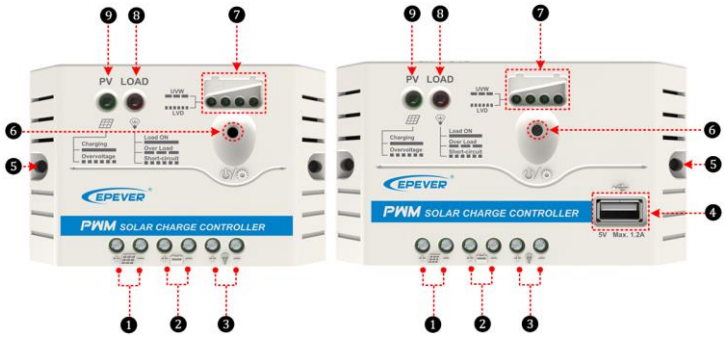



Figure 1 Product Feature

| | | | |
|---|---|---|---|
| ❶ | PV Terminals | ❻ | Load Switch Button |
| ❷ | Battery Terminals | ❼ | Battery status LED indicator |
| ❸ | Load Terminals | ❽ | Load status LED indicator |
| ❹ | USB output interface (LS EU series only) | ❾ | Charging status LED indicator |
| ❺ | Mounting Hole Φ4.5 | | |

## 4. Wiring

Connect the system in the order of ❶battery ➔❷ load➔ ❸PV array following Figure 2-2," Schematic Wiring Diagram," and disconnect the system in the reverse order❸❷❶.

**NOTE:** Do not connect the circuit breaker or fast-acting fuse while wiring the controller. Ensure that the leads of "+" and "-" poles are connected correctly.

**NOTE:** A fast-acting fuse whose current is 1.25 to 2 times the controller's rated current must be installed on the battery side with a distance from the battery not greater than 150 mm.

**WARNING:** The controller has no PV reverse connection protection; please connect it correctly.

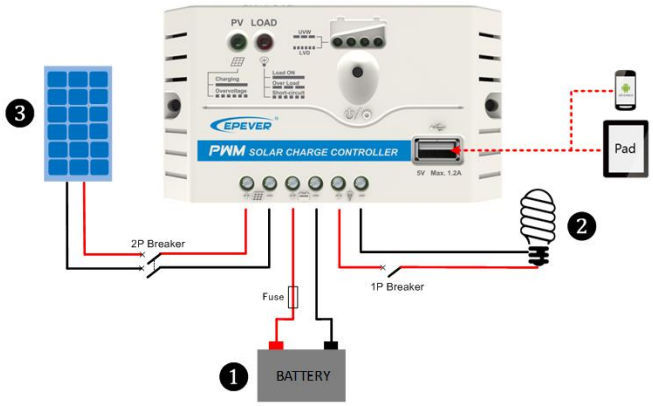


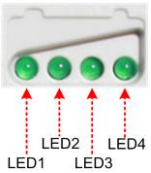

Figure 2 Connection diagram

## 5. LED Indicators

**1) Charging and load status indicator**

| Indicator | Color | Status | Instruction |
|---|---|---|---|
| Charging status LED indicator | Green | On Solid | In Charging |
| | | OFF | No Charging |
| | | Fast Flashing | Battery Over Voltage |
| Load status LED indicator | Green | On Solid | Load ON |
| | | OFF | Load OFF |
| | | Slowly Flashing | Overload |
| | | Fast Flashing | Load short circuit |

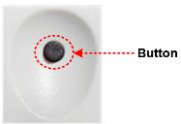
**2) Battery status indicator**




| LED1 | LED2 | LED3 | LED4 | Battery Status |
|---|---|---|---|---|
| Slowly Flashing | × | × | × | Under voltage |
| Fast Flashing | × | × | × | Over-discharge |
| Battery LED indicator status during voltage is up | | | | |
| ○ | ○ | × | × | 12.8V< $U_{bat}$<13.4V |
| ○ | ○ | ○ | × | 13.4V< $U_{bat}$<14.1V |
| ○ | ○ | ○ | ○ | 14.1V < $U_{bat}$ |
| Battery LED indicator status during voltage is down | | | | |
| ○ | ○ | ○ | × | 12.8V<$U_{bat}$<13.4V |
| ○ | ○ | × | × | 12.4V<$U_{bat}$<12.8V |
| ○ | × | × | × | $U_{bat}$<12.4V |

**NOTE:**
① The above voltage values are measured in the 12V system at 25℃; please double the values in the 24V system.
② "○" states LED indicator on; "×" states LED indicator off.

## 6. Operating




**1) Load ON/OFF Setting**

Press the button to control the load output when the controller is powered on.

**2) Battery Type Setting**

**Operation:**
**Step 1:** Enter the setting mode by pressing the button for 5s until the battery status LEDs are flashing.

**Step 2:** Select the desired mode by pressing the button.

**Step 3:** The mode is saved automatically without any operation for 5S, and the LED stops flashing. Battery Type Indicator shows as below:

| LED1 | LED2 | LED3 | Battery type |
|---|---|---|---|
| ○ | × | × | Sealed(Default) |
| ○ | ○ | × | Gel |
| ○ | ○ | ○ | Flooded |

**NOTE:** "○" states LED indicator on "×" states LED indicator off

**Battery Voltage Control Parameters**

Below parameters are measured in the 12V system at 25 ºC; please double the values in the 24V system

| Battery Type | Sealed | Gel | Flooded |
|---|---|---|---|
| Over Voltage Disconnect Voltage | 16.0V | 16.0V | 16.0V |
| Charging Limit Voltage | 15.0V | 15.0V | 15.0V |
| Over Voltage Reconnect Voltage | 15.0V | 15.0V | 15.0V |
| Equalize Charging Voltage | 14.6V | —— | 14.8V |
| Boost Charging Voltage | 14.4V | 14.2V | 14.6V |
| Float Charging Voltage | 13.8V | 13.8V | 13.8V |
| Boost Reconnect Charging Voltage | 13.2V | 13.2V | 13.2V |
| Low Voltage Reconnect Voltage | 12.6V | 12.6V | 12.6V |
| Under Voltage Warning Reconnect Voltage | 12.2V | 12.2V | 12.2V |
| Under Voltage Warning Voltage | 12.0V | 12.0V | 12.0V |
| Low Voltage Disconnect Voltage | 11.1V | 11.1V | 11.1V |
| Discharging Limit Voltage | 10.6V | 10.6V | 10.6V |
| Equalize Duration | 120 min. | —— | 120 min. |
| Boost Duration | 120 min. | 120 min. | 120 min. |

## 7. Protection

- **Battery Over Voltage Protection**
  When the battery voltage reaches the Over Voltage Disconnect Voltage(OVD), the controller stops charging the battery to protect the battery from being overcharged.
- **Battery Over Discharge Protection**
  When the battery voltage reaches the Low Voltage Disconnect Voltage(LVD), the controller stops discharging the battery to protect the battery from being over-discharged.
- **Overload Protection**
  The load is switched off after a delay when the load current exceeds 1.25 times the rated current. The user must reduce the load appliance, press the button, or restart the controller.
- **Load Short Circuit Protection**
  The load is switched off when the load short circuit (≥3 times the rated current) happens. The user must clear the short circuit faults, press the button, or restart the controller.
- **High Voltage Transients Protection**
  The controller is protected against small high voltage transients. In lightning-prone areas, an external lightning arrester is recommended.

## 8. Troubleshooting

| Faults | Possible reasons | Troubleshooting |
|---|---|---|
| The charging LED turns off during the daytime when sunshine falls on PV modules properly. | PV array disconnection | Confirm that PV and battery wire connections are correct and tight. |
| No LED indicator | Battery voltage may be less than 8V | Measure battery voltage with the multi-meter. Min.8V can start up the controller. |
| Charging LED fast flashes. | Battery over voltage | Check if the battery voltage is higher than the OVD, and disconnect the PV. |
| LED1 fast flashes. | Battery over-discharged | The load will recover when the battery voltage is restored to or above the LVR (low voltage reconnect voltage). |
| Load LED flashes slowly. | Overload★ | ① Please reduce the number of electric equipment.<br>② Press the button or restart the controller. |
| Load LED fast flashes. | Load short circuit | ① Check carefully loads connection, clear the fault.<br>② Press the button or restart the controller. |

★When the load current exceeds 1.25 times, 1.5 times, and 2 times the rated value, the controller can automatically turn off loads after 60s, 5s, and 1s, respectively.

## 10. Disclaimer

This warranty does not apply under the following conditions:

- Damage from improper use or use in an unsuitable environment.
- PV or load current, voltage, or power exceeds the controller's rated value.
- User disassembly or attempted to repair the controller without permission.
- The controller is damaged due to natural elements such as lighting.
- The controller is damaged during transportation and shipment.

## 9. Technical Specifications

| Item | LS0512E | LS1012E | LS1024E | LS2024E | LS0512EU | LS1012EU | LS1024EU | LS2024EU | LS3024EU |
|---|---|---|---|---|---|---|---|---|---|
| Nominal system voltage | 12VDC | | 12/24VDC Auto | | 12VDC | | 12/24VDC Auto | | |
| Rated charge current | 5A | 10A | | 20A | 5A | 10A | | 20A | 30A |
| Rated discharge current | 5A | 10A | | 20A | 5A | 10A | | 20A | 30A |
| Battery input voltage range | 8V～16V | | 8V～32V | | 8V～16V | | 8V～32V | | |
| Max. PV open circuit voltage | 30V | | 50V | | 30V | | 50V | | |
| Self-consumption | 12V≤5mA; 24V≤7mA | | | | | | | | |
| Charge Circuit Voltage Drop | ≤0.21V | | | | ≤0.13V | | | | |
| Discharge Circuit Voltage Drop | ≤0.12V | | | | ≤0.17V | | | | |
| USB input interface | — | | | | 5VDC/1.2A | | | | 5VDC/2A |
| Temperature compensation coefficient | -5mV/℃/2V | | | | | | | | |
| Environment temperature | -35℃ ～ +50℃ | | | | | | | | |
| Humidity | ≤95%,(N.C.) | | | | | | | | |
| Enclosure | IP30 | | | | IP20 | | | | |
| Grounding | Common Positive | | | | | | | | |
| Dimension(L x W x H) | 92.8x65 x20.2mm | 101.2x67 x21.8mm | 101.2x67 x21.8mm | 128x85.6 x34.8mm | 109.7x65.5 x20.8mm | 120.3x67 x21.8mm | 120.3x67 x21.8mm | 148x85.6 x34.8mm | 148x106.8 X43.7mm |
| Mounting size | 84.4mm | 92.7mm | 92.7mm | 118mm | 100.9mm | 111.5mm | | 138mm | |
| Mounting hole size | Φ4.5 | | | | | | | | |
| Terminals | 14AWG/2.5mm² | 12 AWG/4mm² | 12AWG/4mm² | 10AWG/6mm² | 14AWG/2.5mm² | 12AWG/4mm² | 12AWG/4mm² | 10AWG/6mm² | 8AWG/10mm² |
| Net weight | 0.07kg | 0.08kg | 0.08kg | 0.15kg | 0.09kg | 0.10kg | 0.10kg | 0.18kg | 0.29kg |

**Any changes without prior notice!** Version number: V4.2