

※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.

LandStar E/EU series —Solar Charge Controller

1. Safety Information

- Read all of the instructions in the manual before installation.
- DO NOT disassemble or attempt to repair the controller.
- Install external fuse or breaker as required.
- Do disconnect the solar module and fuse/ breakers near to 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 parameters of controller.
- Battery connection may be wired to one 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 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, Float
- Support 3 charging options: Sealed, Gel, and Flooded
- Battery status LED indicator can indicates battery situation
- Battery temperature compensation function
- With humanized settings, operation will be more comfortable and convenient
- The USB will provide power supply that can charge for electronic equipment (LS EU series only)
- Battery type and load output can be set via button
- Extensive Electronic protection

3. Product Features

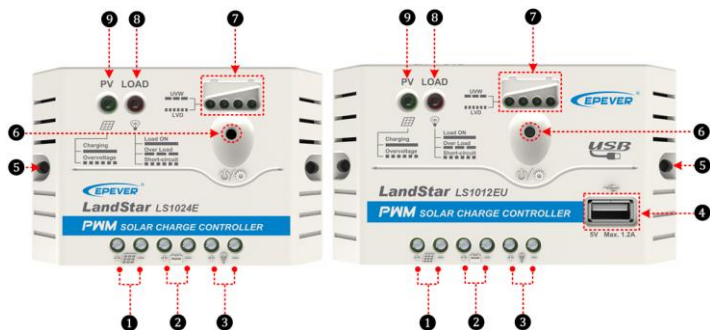


Figure 1 Product Feature

| | | | |
|---|---|---|-------------------------------|
| ① | PV Terminals | ⑥ | Load Switch Button |
| ② | Battery Terminals | ⑦ | Battery status LED indicator |
| ③ | Load Terminals | ⑧ | Load status LED indicator |
| ④ | USB output interface (LS E series only) | ⑨ | Charging status LED indicator |
| ⑤ | Mounting Hole Φ4.5 | | |

4. Wiring

Step 2: Connect the system in the order of ① battery → ② load → ③ PV array in accordance with Figure 2-2, "Schematic Wiring Diagram" and disconnect the system in the reverse order ③ ② ①.



NOTE: While wiring the controller do not close the circuit breaker or fuse and make sure that the leads of "+" and "-" poles are connected correctly.



NOTE: A fuse which current is 1.25 to 2 times the rated current of the controller must be installed on the battery side with a distance from the battery not greater than 150 mm.



NOTE: If an inverter is to be connected to the system, connect the inverter directly to the battery, not to the load side of the controller.

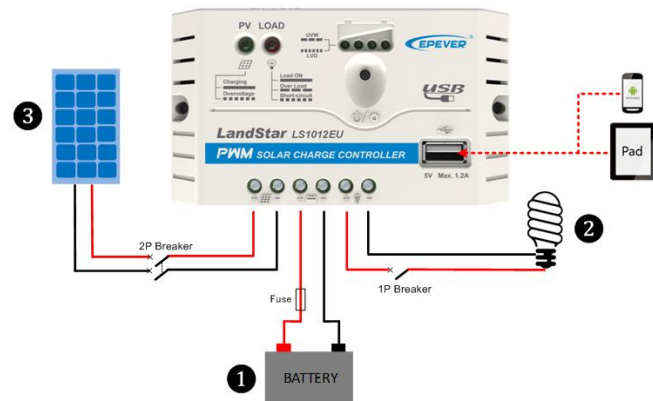


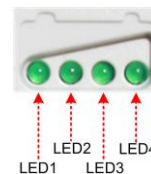
Figure 2 Connection diagram

5. LED Indicators

1) Charging and load status indicator

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

2) Battery status indicator

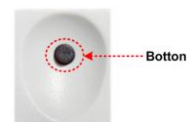


| LED1 | LED2 | LED3 | LED4 | Battery Status |
|---|------|------|------|----------------------------------|
| Slowly Flashing | X | X | X | Under voltage |
| Fast Flashing | X | X | X | Over discharge |
| Battery LED indicator status during voltage is up | | | | |
| ○ | ○ | X | X | 12.8V < U _{bat}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

NOTE:

- ① Voltage value for 12V system at 25°C, please use 2x in 24V system ;
② "○" LED indicator on; "X" LED indicator off.

6. Setting Operation



1) Load ON/OFF Setting

When the controller is powered on, press the button to control the load output.

2) Battery Type Setting

Operation:

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

Step 2: Select the desired mode by pressing button.

Step 3: The mode will be saved automatically without any operation for 5S and LED will stop flashing.

Battery Type Indicator

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

NOTE: "○" LED indicator on "X" LED indicator off

Battery Voltage Control Parameters

Below parameters are in 12V system at 25 °C, please double the values in 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 to the set point of Over Voltage Disconnect Voltage(OVD), the controller will stop charging the battery to protect the battery from being over charged to break down.
- Battery Over Discharge Protection**
 When the battery voltage reaches to the set point of Low Voltage Disconnect Voltage(LVD), the controller will stop discharging the battery to protect the battery from being over discharged.
- Load Overload Protection**
 Load will be switched off when 1.25 times rated current overload happens. User has to reduce load appliance, then press the button or repower the controller.
- Load Short Circuit Protection**
 Load will be switched off when load short circuit (≥ 3 times rated current) happens. User has to clear short circuit, then press the button or repower the controller.
- High Voltage Transients Protection**
 The controller is protected against small high voltage transients. In lightning prone areas, additional external suppression is recommended.

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 \leq 5mA; 24V \leq 7mA | | | | | | | | |
| Charge Circuit Voltage Drop | $\leq 0.21V$ | | | | $\leq 0.13V$ | | | | |
| Discharge Circuit Voltage Drop | $\leq 0.12V$ | | | | $\leq 0.17V$ | | | | |
| USB input interface | — | | | | 5VDC/1.2A | | | | 5VDC/2A |
| Temperature compensation coefficient | -5mV/°C/2V | | | | | | | | |
| Working environment temperature | -35°C ~ +55°C | | | | | | | | |
| Humidity | $\leq 95\%$, (N.C.) | | | | | | | | |
| Enclosure | IP30 | | | | IP20 | | | | |
| Grounding | Common Positive | | | | | | | | |
| Overall dimension | 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 dimension | 84.4mm | 92.7mm | 92.7mm | 118mm | 100.9mm | 111.5mm | | 138mm | |
| Mounting hole size | Φ4.5 | | | | | | | | |
| Terminals | 14AWG/2.5mm ² | 12 AWG/4mm ² | 12AWG/4mm ² | 10AWG/6mm ² | 14AWG/2.5mm ² | 12AWG/4mm ² | 12AWG/4mm ² | 10AWG/6mm ² | 8AWG/10mm ² |
| Net weight | 0.07kg | 0.08kg | 0.08kg | 0.15kg | 0.09kg | 0.10kg | 0.10kg | 0.18kg | 0.29kg |

8. Troubleshooting

| Faults | Possible reasons | Troubleshooting |
|---|------------------------------------|---|
| LED Charging indicator turn off during 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 maybe less than 8V | Measure battery voltage with the multi-meter. Min.8V can start up the controller |
| Charging status LED indicator Fast flashing | Battery Over Voltage | Check if battery voltage is higher than OVD, and disconnect the PV |
| LED1 Fast flashing | Battery over discharged | When the battery voltage is restored to or above LVR point (low voltage reconnect voltage), the load will recover |
| Load status LED indicator slowly flashing | Load over load ^① | ①Please reduce the number of electric equipments. ②Press the button or repower the controller. |
| Load status LED indicator fast flashing | Load short circuit | ①Check carefully loads connection, clear the fault. ②Press the button or repower the controller. |

①When load current reaches 1.25 times 1.5 times and 2 times more than nominal value, the controller will automatically turn off loads in 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 exceeding the rated value of controller.
- User disassembly or attempted repair the controller without permission.
- The controller is damaged due to natural elements such as lightning.
- The controller is damaged during transportation and shipment.

Any changes without prior notice! Version number: V2.0