

※Thank you for selecting the LS-B series solar charge controller. Please read this manual carefully before using the product and pay attention to the safety information.

## Solar Charge Controller

### 1 Overview

LS-B series is a PWM common positive solar charge controller that adopts the advanced digital technique. The multiple load control modes make it suitable for a solar home system, traffic signal, solar street light, solar garden lamp, etc.

#### Features:

- Adopt high-quality components of ST, and IR, ensure product lifespan
- UL and VDE certification for terminals, make the product safer and more reliable
- Full load running in the environment temperature range
- 3-stage intelligent PWM charging: Bulk, Boost/Equalize, Float
- Optional four battery types: Sealed, Gel, Flooded and User
- Battery temperature compensation function
- Real-energy statistics function
- Standard Modbus protocol based on RS485 bus, longer communication distance
- Multiple load control modes
- Extensive electronic protection

### 2 Identification of parts

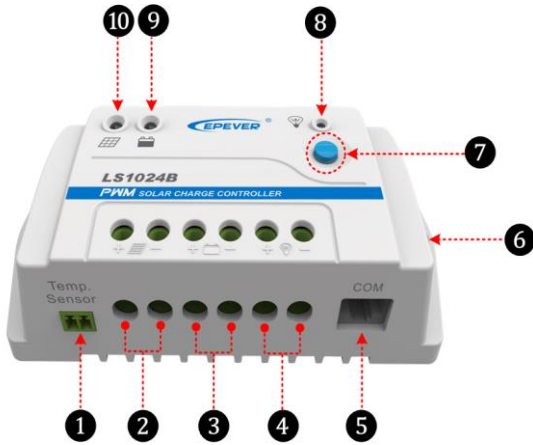


Figure 1 Characteristic

①	Remote temperature(RTS)port*	⑥	Mounting hole
②	PV terminals	⑦	Load ON/OFF button
③	Battery terminals	⑧	Load status indicator
④	Load terminals	⑨	Battery status indicator
⑤	RS485 communication port	⑩	Charge status indicator

★ If the temperature sensor is short-circuited or damaged, the controller will charge or discharge at the default temperature setting of 25 °C (no temperature compensation).

### 3 Wiring

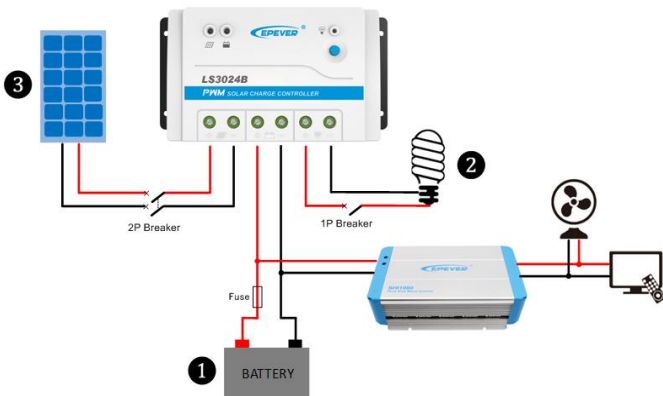


Figure 2 Connection diagram

#### Installation Procedure:

Connect the system in the order of ① battery → ② load → ③ PV array as shown in figure 2 and disconnect the system in reverse order ③ ② ①.



**NOTE:** While wiring the controller, please do not switch off 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:** The LS-B series is a positive ground controller. Any positive connection of solar, load, or battery shall be earth grounded as required.



**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.

### 4 Indicator and button

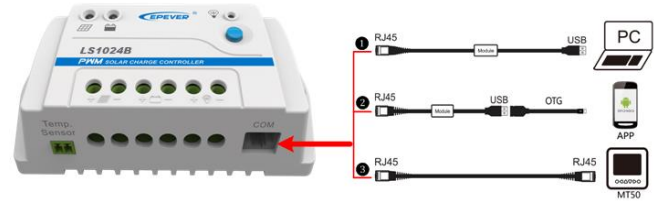
#### (1) Indicator

Indicator	Color	Status	Information
	Green	On solid	PV connection normal ,but low voltage(low irradiance) from PV, no charging
	Green	OFF	No PV voltage(night time) or PV connection problem
	Green	Slowly flashing(1Hz)	In charging
	Green	Fast flashing(4Hz)	PV over voltage
	Green	On solid	Battery normal
	Green	Slowly flashing(1Hz)	Battery full
	Green	Fast flashing(4Hz)	Battery over voltage
	Orange	On solid	Battery under voltage
	Red	On solid	Battery over discharged
	Red	Slowly flashing(1Hz)	Battery over temperature
	Red	On solid	Load ON
	Red	OFF	Load OFF
	Red	Slowly flashing(1Hz)	Overload
	Red	Fast flashing(4Hz)	Load short circuit
Charge, Load and Battery(orange)indicator flashing			Controller over temperature
Charge, Load and Battery(red)indicator flashing			System voltage error

#### (2) Button

- ① The load is turned ON/OFF via the button when the operating mode is Manual Control.
- ② Clear the faults for the overload and load short circuit.

### 5 Setting



- ① USB to RS485 converter cable: CC- RS485-RS485-150U

Download PC software: [www.epever.com](http://www.epever.com)(PC Software for the Solar Charge Controller)

- ② USB to RS485 converter cable: CC- RS485-RS485-150U

OTG cable: OTG-12CM

Download phone APP (support Andriod system only)

[www.epever.com](http://www.epever.com)(Andriod APP for the Solar Charge Controller)

- ③ RS485 to RS485 converter cable: CC-RS485-RS485-200U-MT)

#### (1) Battery type

Battery voltage control parameters (Below values are measured in the 12V/25 °C system; please double the values in the 24V system.)

Battery type	Sealed	Gel	Flooded	User
Over Voltage Disconnect Voltage	16.0V	16.0V	16.0V	9~17V
Charging Limit Voltage	15.0V	15.0V	15.0V	9~17V
Over Voltage Reconnect Voltage	15.0V	15.0V	15.0V	9~17V
Equalize Charging Voltage	14.6V	—	14.8V	9~17V
Boost Charging Voltage	14.4V	14.2V	14.6V	9~17V
Float Charging Voltage	13.8V	13.8V	13.8V	9~17V
Boost Reconnect Charging Voltage	13.2V	13.2V	13.2V	9~17V
Low Voltage Reconnect Voltage	12.6V	12.6V	12.6V	9~17V
Under Voltage Warning Reconnect Voltage	12.2V	12.2V	12.2V	9~17V
Under Voltage Warning Voltage	12.0V	12.0V	12.0V	9~17V
Low Voltage Disconnect Voltage	11.1V	11.1V	11.1V	9~17V
Discharging Limit Voltage	10.6V	10.6V	10.6V	9~17V
Equalize Duration	120 min	—	120 min	0~180 min
Boost Duration	120 min	120 min	120 min	10~180 min

#### NOTE:

1) When the battery type is sealed, gel, flooded, the adjusting range of equalizing duration is 0 to 180 minutes, and boost duration is 10 to 180 minutes.

2) The following rules must be observed when modifying the value of the parameter in the user battery type (factory default value is the same as the sealed type):

- A. Over Voltage Disconnect Voltage > Charging Limit Voltage ≥ Equalize Charging Voltage ≥ Boost Charging Voltage ≥ Float Charging Voltage > Boost Reconnect Charging Voltage.
- B. Over Voltage Disconnect Voltage > Over Voltage Reconnect Voltage.
- C. Low Voltage Reconnect Voltage > Low Voltage Disconnect Voltage ≥ Discharging Limit Voltage.
- D. Under Voltage Warning Reconnect Voltage > Under Voltage Warning Voltage ≥ Discharging Limit Voltage.
- E. Boost Reconnect Charging voltage > Low Voltage Disconnect Voltage.



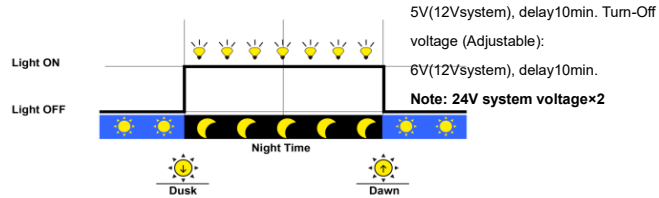
**CAUTION: Please refer to the user manual or contact the sales for the details of the setting operation.**

## (2) Load Set Mode

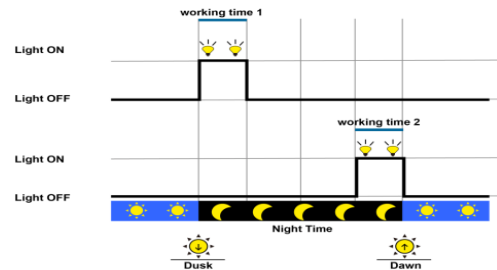
### 1) Manual Control(default ON)

The load is turned ON/OFF via the button or remote command.

### 2) Light ON/OFF



### 3) Light ON/OFF + Timer



### 4) Time Control

Control the load on/off time by setting a real-time clock.

## 6 Protections

### • PV over current

When the charging power of the PV array exceeds its rated charging power, it will be charged at the rated charging power.

### • PV short circuit

The controller will stop charging when the input terminal of the PV array is short-circuited. After clearing the faults, the charging will resume automatically.

### • PV reverse polarity

When the polarity of the PV array is reversed, the controller may not be damaged and can continue to operate normally after the polarity is corrected.

### • Battery reverse polarity

When the polarity of the battery is reversed, the controller may not be damaged and can continue to operate normally after the polarity is corrected.

### • Battery over voltage

When the battery voltage reaches the over voltage disconnect voltage, the controller will automatically stop charging the battery to prevent battery damage caused by over-charging.

### • Battery over discharge

When the battery voltage reaches the low voltage disconnect voltage, the controller will automatically stop discharging the battery to prevent battery damage caused by over-discharging. (Any controller connected loads will be disconnected. Loads directly connected to the battery will not be affected and may continue to discharge the battery.)

### • Battery over temperature

The controller detects the battery temperature through an external temperature sensor. The battery will stop working when its temperature exceeds 65 °C and resume when its temperature is below 55 °C.

### • Overload

When the load current is higher than 1.05 times the rated discharge current, the controller will automatically cut off the output. After the load reconnects automatically five times (delay of 5s, 10s, 15s, 20s, 25s), please reduce the electrical equipment. And then press the load ON/OFF button or restart the controller, or wait for one night-day cycle (night time > 3 hours) to eliminate the overload fault.

### • Load short circuit

When the load is short-circuited (The short circuit current is higher than or equal to 2 times the rated discharge current), the controller will automatically cut off the output. After the load reconnects automatically five times (delay of 5s, 10s, 15s, 20s, 25s), please press the load ON/OFF button, or restart the controller, or wait for one night-day cycle (night time > 3 hours). Then the load reconnection automatically will resume.

### • Controller over temperature

An internal temperature sensor can detect the internal temperature of the controller. The controller stops working when its internal temperature exceeds 85 °C and resumes when the internal temperature is below 75 °C.

### • TVS high voltage transients

The internal circuitry of the controller is designed with Transient Voltage Suppressors (TVS), which can only protect against the high-voltage surge pulses with less energy. If the controller is to be used in an area with frequent lightning strikes, it is recommended to install an external surge arrester.

## 7 Troubleshooting

Faults	Possible reasons	Troubleshooting
When there is sufficient direct sunlight on the PV array, the charging indicator does not light up.	PV array disconnection	Confirm that PV and battery wire connections are correct and tight
The wire connection is correct, but the controller is not working.	Battery voltage is lower than 8V	Please check the voltage of the battery. At least 8V voltage to activate the controller.
Battery green indicator fast flashing	Battery over voltage	Check whether the battery voltage is higher than OVD (over voltage disconnect voltage), and disconnect the PV.
Battery red indicator on solid	Battery over discharged	Waiting for the battery voltage restore to or above LVR (low voltage reconnect voltage) or changing the power supply in other ways.
Battery red indicator slowly flashing	Battery over temperature	When the battery temperature declines to be below 55 °C, the controller will resume.
Charge, Load and Battery (orange) indicator flashing	Controller over temperature	When the heat sink of the controller exceeds 85 °C, the controller will automatically cut off the input and output circuit. When the temperature bellows to 75°C, the controller will resume work.
Load red indicator slowly flashing	Overload	① Please reduce the number of electric equipment. ② Restart the controller or press the load ON/OFF button. ③ Wait for one night-day cycle (night time>3 hours).
Load red indicator fast flashing	Load short circuit	① Check carefully loads connection, clear the fault. ② Restart the controller or press the load ON/OFF button. ③ Wait for one night-day cycle (night time>3 hours).

## 8 Technical Specifications

Item	LS1024B	LS2024B	LS3024B
System nominal voltage	12/24VDC Auto		
Battery type	Sealed/Gel/Flooded/User		
Rated charge current	10A	20A	30A
Rated discharge current	10A	20A	30A
Working voltage range of controller	8~32V		
Max. PV open circuit voltage	50V		
Self-consumption	≤8.4mA/12V; ≤7.8mA/24V		
Charge circuit voltage drop	≤0.28V		
Discharge circuit voltage drop	≤0.20V		
Temperature compensate coefficient	-3mV/°C/2V (default)		
Working environment temperature	-35°C~+50°C		
Relative humidity	≤95% (N.C.)		
Enclosure	IP30		
Grounding	Common positive		
Dimension(mm)	138.6x69.3x37	159.6x81.4x47.8	200.6x101.3x57
Mounting size	126mm	147x50mm	190x70mm
Mounting hole size	Φ4.3	Φ4.3	Φ4.5
Terminal	4mm <sup>2</sup>	10mm <sup>2</sup>	10mm <sup>2</sup>
Weight	0.13kg	0.3kg	0.5kg

## 9 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 rated value of the controller.
- The controller's working temperature exceeds the limit working environment temperature.
- User disassembly or attempted to 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: V3.2**