

EPSOLAR

LS1024BP/ LS2024BP

—Solar Charge Controller

USER MANUAL

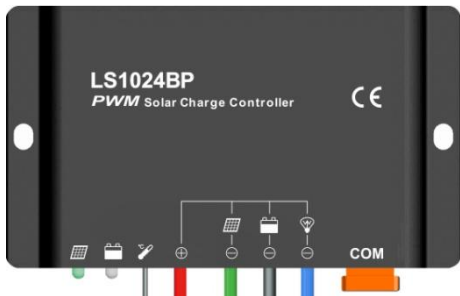
Thank you very much for selecting our product!

This manual offers important information and suggestions with respect to installation, use and troubleshooting, etc. Please read this manual carefully before using the product and pay attention to the safety recommendations in it.

LandStar

LS1024BP/ LS2024BP

—Solar Charge Controller



| | |
|------------------------------------|-----------|
| Nominal system voltage | 12/24VDC* |
| Maximum PV input voltage | 50V |
| Nominal charge / discharge current | |
| LS1024BP | 10A |
| LS2024BP | 20A |

*The solar charge controller has the system voltage 12/24VDC automatic recognition function and custom define function, and all charge, discharge and load control parameters can be modified.

Warranty: The charge controller is warranted to be free from defects for a period of two years from the date of shipment to the original end user.

Notice: Manufacture is not responsible for the damage of any part of controller due to operator's misuse, battery parameters mismatch, unreasonable system configuration, unauthorized repairment or exceeding the specified parameter.

Contents

| | |
|--------------------------------------|---|
| 1 Important Safety Information | 1 |
| 2 General Information | 1 |
| 3 Installation Instructions..... | 2 |
| 3.1 General Installation Notes..... | 2 |
| 3.2 Wiring..... | 3 |
| 4 Operation..... | 4 |
| 4.1 LED Indicators..... | 4 |
| 4.2 Setting Operation | 5 |
| 5 Protection, Troubleshooting..... | 6 |
| 5.1 Protection..... | 6 |
| 5.2 Troubleshooting..... | 7 |
| 6 Technical Specifications..... | 8 |

1 Important Safety Information

Please inspect the controller thoroughly after it is delivered. If any damage is seen, please notify the shipping company or our company immediately.

2 General Information

LandStar BP series solar charge controller adopts the most advanced digital technique and operates fully automatically. It's Ideal for extreme environments with corrosion, dust, water etc and has various unique functions:

- 12/24VDC automatic identify or user-defined working voltage
- High efficient Series PWM charging, increase the battery lifetime and improve the solar system performance
- Use MOSFET as electronic switch, without any mechanical switch
- Multiple load control modes, increase the flexibility of the load output
- Sealed, Gel, Flooded and user-defined battery type option
- Adopt temperature compensation, correct the charging and discharging parameters automatically and improve the battery lifetime
- New SOC method of calculating accurately displays the available battery capacity
- LandStar BP has no keys, the control function and the switch condition of the load can be modified by communication connection
- Electronic protection: Overheating, over charging, over discharging, overload, and short circuit
- Reverse protection: any combination of solar module and battery
- With functions of current power calculation and real-time energy statistics recording, it is convenient for users to view charging and discharging energy of each day, month, year and total value
- Use of standard Modbus communication protocol for TTL-232 bus connections, communication protocol compatibility much better
- Support firmware upgrade
- Fully encapsulated PCB, IP67 protection

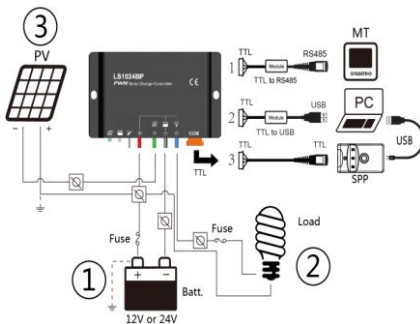
- Aluminumhousing

3 Installation Instructions

3.1 General Installation Notes

- Be very careful when working with batteries. Wear eye protection. Have fresh water available to wash and clean any contact with battery acid.
- Never short circuit the battery positive and negative terminals and wires which may cause explosion or fire.
- Install external fuses/breakers as required.
- Disconnect the solar module and fuse/breakers near to battery before installing or adjusting the controller.
- Confirm that power connections are tightened to avoid excessive heating from loose connection.
- Uses insulated tools and avoid placing metal objects near the batteries.
- Explosive gasses may be present during charging. Be certain there is sufficient ventilation to release the gasses.
- 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.
- Only charge the batteries that comply with the parameters of controller.
- Battery connection may be wired to one battery or a bank of batteries. The following instructions refer to a singular 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.

3.2 Wiring



1. Connect components to the charge controller in the sequence as shown above picture and pay much attention to the "+" and "-". Always power the battery First.

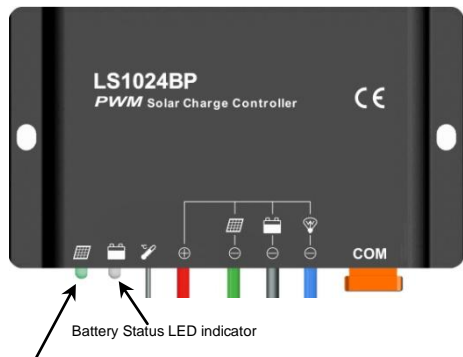
2. After power the battery, check the battery indicator on the controller, it will be green. If it's not green, please refer to chapter 5.

3. The battery fuse should be installed as close to battery as possible. The suggested distance is within 150mm.

Note: Please connect the inverter to the battery rather than to the controller, if the inverter is necessary.



4 Operation

4.1 LED Indicators

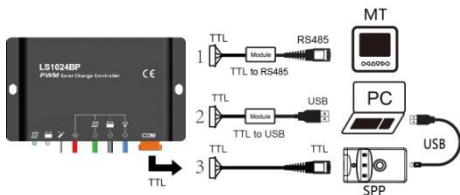


Charging Status LED indicator

Indicator Status Description

| | | | |
|---|--------|-----------------|--------------------------|
|  | Green | On Solid | Normal |
| | Green | Slowly Flashing | In charging |
| | Green | Fast Flashing | PV reversing |
| | Green | OFF | No charge |
|  | Green | On Solid | Normal |
| | Green | Slowly Flashing | Full |
| | Green | Fast Flashing | Over voltage |
| | Orange | On Solid | Under voltage |
| | Red | On Solid | Over discharged |
| | Red | Flashing | Battery over temperature |
| Charging and battery indicator (red)flashing simultaneously | | | System voltage error |
| Charging and battery indicator(orange)flashing simultaneously | | | Controller overheating |

4.2 Setting Operation



Three methods to program the controller:

1–Remote Meter, MT50/MT100 (Use dedicated TTL232 to RS485 communication cable with CC-TTL-RS485-200U) .

2–Super Parameter Programmer, SPP-01 (Use dedicated TTL232 to TTL232 communication cable with CC-TTL-TTL-150U) .

This method can realize one-key setting operation which is suitable for bulk quantity products setting or applied in the projects.

3–PC monitoring setting software “Solar Station Monitor” (Use dedicated TTL232 to USB communication cable with CC-USB-TTL-150U) .

Through the remote meter and PC software, it can realize real-time monitoring, modification of control parameter, charge mode, load work mode, inquiry of failure information etc.

Note: Please refer to the user manual of MT, SPP-01 and PC software for more details.



Note: After using, please be sure to plug the waterproof communication interface plug. Otherwise the controller will be damaged when water is into it.

•Load Set

1. Manual Control
2. Light ON/Off (default)
3. Light ON+ Timer
4. Time Control

Note: In the mode of Light ON/OFF and Light ON/Timer, the Load is turned on after 10Min. delay.

•Battery Type

1. Sealed(default)
2. Gel
3. Flooded
4. User

5 Protection, Troubleshooting

5.1 Protection

•PV Array Short Circuit

If PV array short circuit occurs, clear it to resume normal charge automatically.

•Load Overload

If the load current exceeds the rated discharge current of controller (≥ 1.05 times rated discharge current), the controller will disconnect the load. Once the overload occurs, the way to solve is to send a "remote load switch" command or reset the controller after reducing the load.

•Load Short Circuit

Fully protected against load wiring short-circuit (≥ 2 times rated discharge current). After one automatic load reconnect attempt, the fault must be cleared by restarting the controller or sending a "remote load switch" command.

•PV Reverse Polarity

Fully protection against PV reverse polarity, no damage to the controller will result. Correct the miswire to resume normal operation.

•Battery Reverse Polarity

Fully protection against battery reverse polarity, no damage to the controller will result. Correct the miswire to resume normal operation.

•Battery working voltage error

If battery voltage does not match controller working voltage, controller will stop working. After correcting the voltage, the fault must be cleared by restarting the controller or sending a "remote load switch" command.

•Damaged 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.

•Overheating Protection

If the temperature of the controller heat sink exceeds 85°C, the controller will automatically start the overheating protection and stop the charging and discharging. When the temperature is below 75°C, the controller will resume to work.

•High Voltage Transients

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

Note: The controller has daily automatic fault recovery function which will reduce the manual operation and can intelligently eliminate the fault caused by non-actual hardware failure.

5.2 Troubleshooting

| Faults | Possible reasons | Troubleshooting |
|---|--|--|
| Charging LED indicator off during daytime when sunshine falls on PV modules properly. | PV array disconnection | Check that PV and battery wire connections are correct and tight. |
| Green Battery LED indicator fast flashing | Battery voltage higher than over voltage disconnect voltage(OVD) | Check the battery voltage. If it over high, disconnect the solar module immediately and change a new controller. |
| Battery LED indicators orange | Battery under voltage | Load output is normal. Charging LED indicator will return to green automatically when fully charged. |
| Battery LED indicators RED color and loads not working. | Battery over discharged | The controller cut off the output automatically. LED indicator will return to green automatically when fully charged. |
| Load abnormal shutdown | Over load | Remove or cut out the additional load and sending a "remote load switch" command, the controller will resume to work after 3s or restart the controller. |

| | | |
|--|---|---|
| Load abnormal shutdown | Short circuit | Clear short circuit and sending a "remote load switch" command, the controller will resume to work after 3s or restart the controller. |
| All the led indicator flashing (battery orange indicator flashing) | Too high temperature of controller | When heat sink of the controller exceeds 85 °C, the controller will automatically cut input and output circuit. When the temperature below 75°C, the controller will resume to work. Please reduce the environment temperature, the power of solar module or the power of the load. |
| All the led indicator flashing (battery red indicator flashing) | System voltage error | Check whether the battery voltage match with the controller working voltage. Please change to a suitable battery or reset the working voltage. |
| SOC value incorrect | Choose the wrong battery type; Using the reconfigured profile of the user defined battery type. | Correct the right battery type; Using the configuration of the charging voltage compensation if choosing the user defined battery type and ignore the SOC |

6 Technical Specifications

Electrical Parameters

| Description | Parameter |
|--------------------------------------|------------------------------|
| Nominal System Voltage | 12/24VDC |
| Max. PV input voltage | 50V |
| Max. Battery Terminal Voltage | 34V |
| Rated Battery Current | LS1024BP 10A LS2024BP 20A |
| Charge Circuit Voltage Drop | ≤0.28V |
| Discharge Circuit Voltage Drop | ≤0.20V |
| Self-consumption | ≤8.4mA/12V;≤7.8mA/24V |
| Temperature compensation coefficient | -3mV/°C/2V (Default) |
| Grounding | Positive grounding |

Battery Voltage Parameters (parameters is in 12V system at 25°C, please use X 2 in 24V system)

| Battery charging setting | 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 | 10~180min |

Notes:

1. When the battery type is sealed, gel, flooded, the adjusting range of equalize duration is 0 to180min and boost duration is 10 to180min.

2. User type is the user defined battery type. The default value is the same as sealed type. When modify it, please follow the below logistic relation:

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

***Please carefully to select battery type. It will damage battery if the setting is incorrect.**

Environmental parameters

| Environmental parameters | Parameter |
|--------------------------|-------------|
| Working temperature | -30℃ ~ +55℃ |
| Storage temperature | -30℃ ~ +80℃ |
| Humidity | ≤95% N.C. |
| Enclosure | IP67 |

LS1024BP Mechanical parameters

| Mechanical Parameter | Parameter |
|----------------------|--------------------|
| Overall dimension | 108.5x64.5x25.6mm |
| Mounting dimension | 100.5 mm |
| Mounting hole size | Φ4.5 |
| Power cable | 2.5mm ² |
| Net weight | 0.4kg |

LS2024BP Mechanical parameters

| Mechanical Parameter | Parameter |
|----------------------|--------------------|
| Overall dimension | 139x76.5x28 mm |
| Mounting dimension | 131mm |
| Mounting hole size | Φ4.5 |
| Power cable | 4.0mm ² |
| Net weight | 0.6kg |

Final interpretation right of the manual belongs to our company.

Any changes without prior notice!

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