Lithium Iron Phosphate Battery

Ecox 12100 SE

User Manual

Information Version: 1.0

Legal Information

Disclaimer

The Manual contains instructions for the use of the product. All the pictures and charts in this manual are for description and explanation only. Information in the manual may change without further notice.

Please read this manual carefully before using the product and keep this manual for further reference.

Failure to use the product in accordance with the manual may result in serious injuries, property damages and may void the warranty, with which the user acknowledges and accepts full responsibility for any risks associated.

No representations or warranties, either express or implied, are made with respect to the information contained in this manual.

In the event of any conflicts between this manual and the applicable law, the latter prevails.

The final interpretation of this manual rests with the issuing party.

Safety Instructions

Warning

- The device should be used in strict compliance with local laws, electrical safety regulations, and fire prevention regulations of the nation or the region.
- Do not place the device near open fire, heat sources and flammable materials.
- Do not leave the device in an extremely hot environment.
- Do not place the device in damp locations.
- Do not expose the device to high electromagnetic radiation.
- Do not strike, mechanically crush or cut the device.
- Do not puncture the device with sharp objects.
- Do not stack heavy objects on the device.
- Do not place metal objects or wires on the device.

Caution

General

- For safety purposes, please use only the accessory (cable, charger, and etc) supplied or recommended. Damage to the product that caused by using third-party accessories is not covered by warranty.
- Before first use, please check if the device is in good condition. If the device is deformed or has an odor, do not use the device and return it to the distributor.
- Keep the device out of reach of children and pets.
- If the device falls into water during use, please take it out immediately.
- If the battery leaks, avoid contact with the leaking liquid or gas. In case of contact with skin or eyes, flush immediately with plenty of clean water and seek medical advice.

Installation

- Do not install the device in an unstable place. Personal injury or property damage may be caused if the device falls.
- Do not place the device in dusty locations.

Operation

- Please ensure good ventilation while the device is in use.
- If the device has been stored for more than one year, please check it carefully to make sure there is no problem before using it.

Transportation

- Keep the device upright when moving it.
- Handle the device gently.

Safety Instructions

Maintenance

- Charge the device regularly. If you need to store the device for a long time, please charge it to 40% ~ 70% every time before storing it.
- Recharge the device in time after it has been fully discharged.
- If the device does not work properly, please contact your distributor. DO NOT disassemble the device for repair or maintenance by yourself. The user acknowledges and accepts full responsibility for any risks associated.
- Do not charge the device which is hot, deformed, or leaking.
- It is recommended to check the connection between power cords and screws regularly to ensure that there is no loosening, breakage or corrosion at the connection points.
- It is recommended to regularly check if the device storage environment is normal.

Cleaning

- Please use a soft and dry cloth to clean the exterior surfaces.

Disposal

- Dispose of used batteries according to the laws or the regulations of the nation or the region.

Contents

1 Introduction

Ecox 12100 SE is a lithium iron phosphate battery module. It is designed to replace deep-cycle lead-acid batteries. The battery is perfect for recreational vehicles (RV), caravans, marine (boats), trucks, cabins, and other off-grid deep-cycle applications.

The product has the following advantages.

- High Reliability

The built-in advanced BMS manages charging and discharging status, helps in balancing the individual cells, and ensures intelligent automatic protection against over-voltage, under-voltage, over-current, over-temperature, under-temperature and short circuit.

- Low Self-discharge Loss

The battery can be stored for more than 12 months if it has been disconnected from other devices.

- Energy Expansion

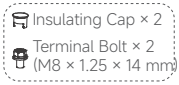
The battery supports up to 1 in series and 8 in parallel (Max. 1S8P) to build a 12 V 800 Ah battery system.

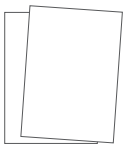
- Heating Film

With the heating film, the battery can work in an extremely-cold environment.

2 Packing List

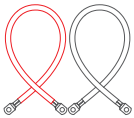
Battery





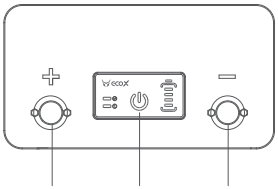
User Manual

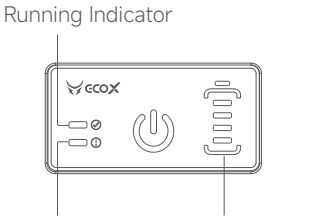
3 Optional Accessory



Battery Adapter Cables

4 Interface & Indicator

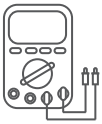




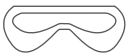
Running Indicator	▪ Solid blue: Charging mode / Idle mode. ▪ Quick flashing blue: Discharging mode. ▪ Slow flashing blue: Power-saving mode. *Quick flashing: Light up every 2 s. *Slow flashing: Light up every 4 s.
Alarm Indicator	▪ Flashing red: Protected mode. ▪ Solid red: System error. *When the alarm indicator is on, refer to 10 Troubleshooting to solve problems.
SoC Indicators	Each indicator represents 25% SoC. *When the device is being charged, one of the indicators will flash to show the state. *When SoC is less than 5% and the device is not being charged, all power indicators will remain off to save power. *When an exception occurs, all power indicators will remain off.

5 Battery Installation

5.1 Tools Preparation



Voltmeter

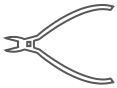


Safety Goggles

Insulating Gloves

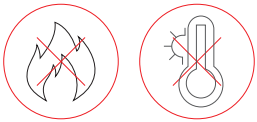
Torque Wrench

Screwdriver

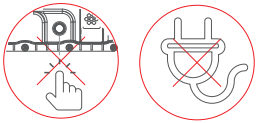


Wire Cutter

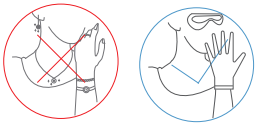
5.2 Pre-installation Check



- Ensure that the battery is away from open flames, heat sources and flammable materials.



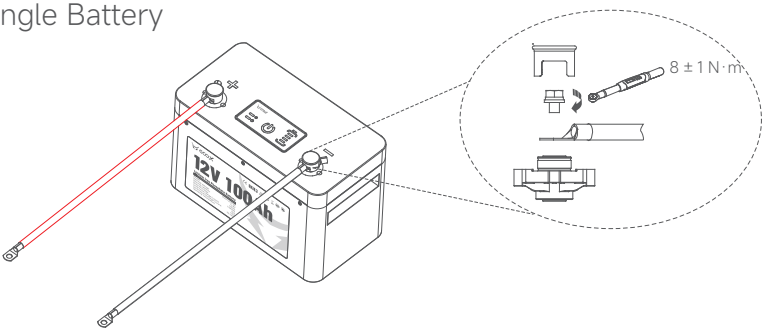
- Cut off the power before wiring, installing or removing the battery.



- To prevent electric shock, please remove watches, bracelets, rings and other conductive items (if any) and wear insulating gloves and safety goggles before installation.

5.3 Battery Connection

Single Battery



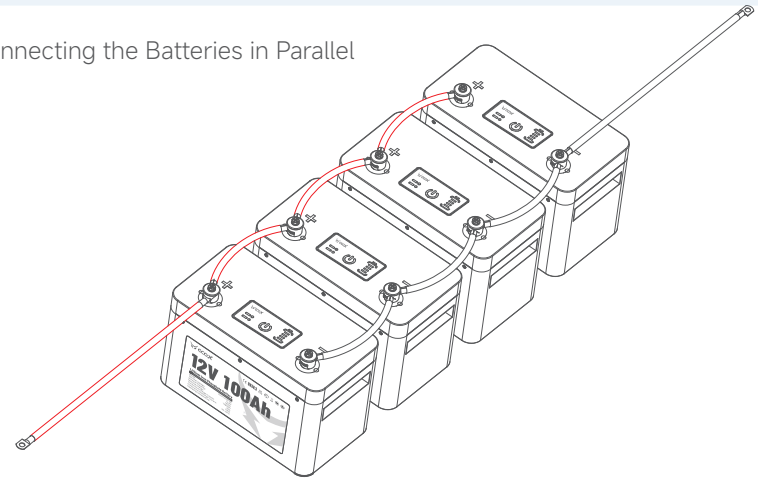
5 Battery Installation

Multiple Batteries

Caution

- Do not mix batteries of different brands, types, models or life spans.
- In order to prolong the life span of the batteries, please make sure the length, diameter and internal resistance of the power cables are the same when using multiple batteries.

Connecting the Batteries in Parallel



Steps

1. Connect the Positive Terminals of the batteries in sequence.
2. Connect the Negative Terminals of the batteries in sequence.
3. Finally, connect the Positive Terminal of the first battery and the Negative Terminal of the last battery to the corresponding terminals of external devices.

Note

Up to 8 batteries can be connected in one system.

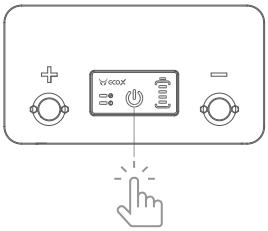
5.4 Post-installation Check

Please check if the positive and negative connections are correct.

6 Battery Use

- Turn on the battery: short press the button for about 1 s.

> Note
>
> - When the battery is turned on for the first time, it performs a power-up self-test. After that, all indicators light up for about 2 s and then resume displaying the device status.
> - The device will enter idle mode automatically If the battery is turned on but no operation is performed in 30 s, and it will enter power-saving mode automatically if no operation is performed after 30 s.
> - You can turn on all batteries in one battery system by turning on any battery in the system.



- Turn off the battery: long press the button for about 3 s.

> Note
>
> If you want to turn off any battery in one system, please turn off all the batteries in 1 min.

- Enable Power-saving Mode

Short press the button to enable/disable power-saving mode when the battery is turned on.

7 Battery Storage

Please follow the steps below to store the battery.

1. Make sure the battery level is between 40% and 70%.
2. Disconnect the battery from all loads and the charging device (if present).
3. Turn off the battery.
4. Store the battery in a well-ventilated, clean, dry area with temperatures between 50 °F (10 °C) and 104 °F (40 °C).

> Note
>
> - Charge the battery at least once every 6 months to prevent over-discharge.
> - In extreme conditions, the battery can be stored for up to 1 month at temperatures as low as -4 °F (-20 °C) or as high as 140 °F (60 °C).

8 Battery Management System

Protection and Warnings
Under-voltage
Over-voltage
Over-current
Over-temperature/Under-tempera-ture
Short Circuit
System Error

Management and Monitoring
Cell Balancing
Smart Charging Mode
Heater Control
SoC Calculation
SoC Display
Operation Log

9 Specifications

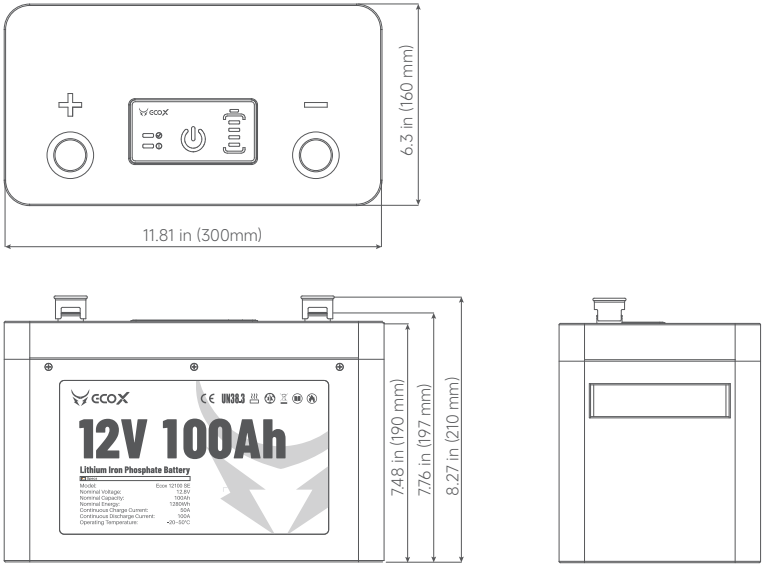
Electrical Specification	
Nominal Voltage	12.8 VDC
Nominal Capacity	100 Ah
Resistance	<10 mΩ
Self Discharge	≤ 3% per month
Max. Batteries in Parallel	8
Design Life	≥ 10 years
Short Circuit Current Duration	< 1 kA/100 us
Discharge Specification	
Max. Continuous Discharging Current	100 A
Peak Discharging Current	200 A @10 s
Charge Specification	
Recommended Charging Current	≤ 50 A
Max. Continuous Charging Current	100 A
Recommended Charging Voltage	14 V ~ 14.4 V
Environment Specification	
Recommended Storage Temperature	50 °F ~ 104 °F (10 °C ~ 40 °C)
Operating Temperature	-4 °F ~ 122 °F (-20 °C ~ 50 °C) *If charging is required when the temperature is below 32 °F (0 °C), please connect the charger to enable the heating film. The battery starts charging when the cell temperature is heated to above 32 °F (0 °C).
Relative Humidity	5% ~ 95%
Mechanical Specification	
Dimensions (L × W × H)	11.81 in × 6.3 in × 8.27 in (300 mm × 160 mm × 210 mm)
Weight	Approx. 26.46 lbs (12 kg)
Terminal Type	M8
Terminal Torque	8 ± 1 N·m
Case Material	Metal

9 Specifications

Enclosure Protection	IP20
Cell Type-chemistry	$LiFePO_4$
Cooling	Natural Cooling
Other	
Certifications	UN38.3, IEC 62619, CE
Max. Altitude	13123 ft (4000 m)

*Product performance is based on testing in a controlled environment. Your results may vary due to several external and environmental factors.

Dimension



Unit: inch (mm)

10 Troubleshooting

My battery won't turn on?

Charge the battery to see if it can be activated.
- Yes → The battery is restored.
- No → Contact your distributor.

My battery won't turn off?

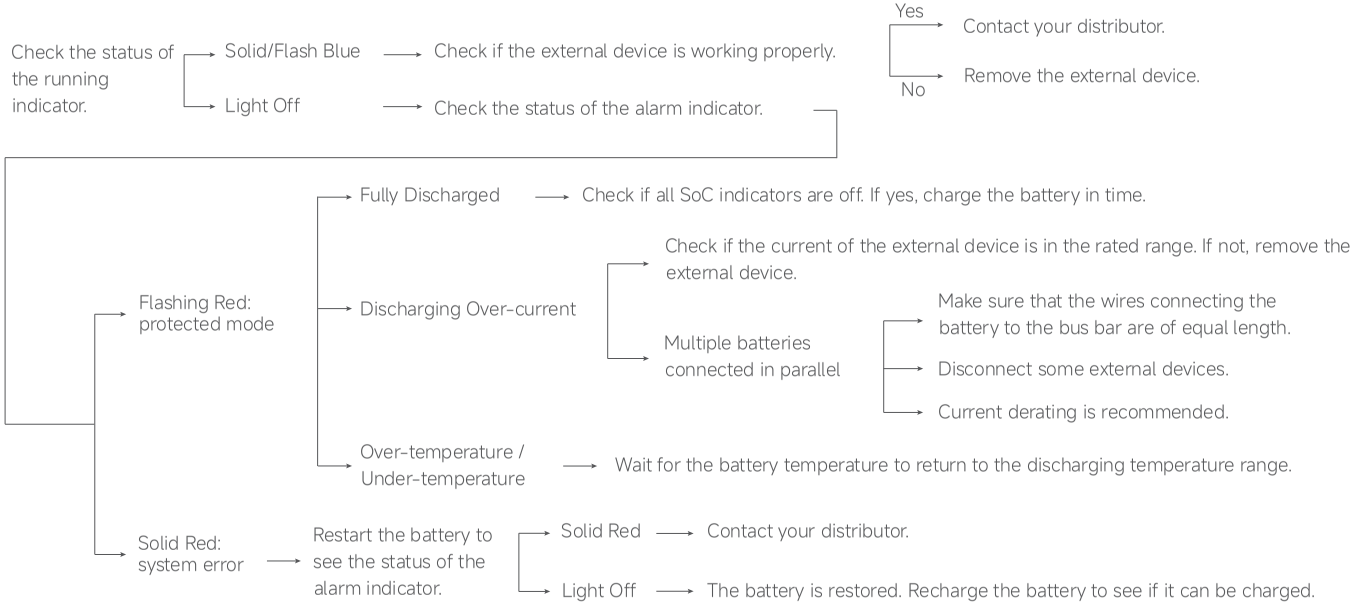
Disconnect all external devices and long press the power button to see if it can be turned off.
- Yes → The battery is normal.
- No → Contact your distributor.

My battery won't charge?

Check the status of the running indicator.
- Solid/Flash Blue → Check if the charger is working properly.
  - Yes → If the environment temperature is lower than 32 °F(0 °C)
    - No → Contact your distributor.
    - Yes → The battery cell is warming up, and the battery will start charging when the battery cell temperature rises above 32 °F(0 °C). DO NOT disconnect the charger.
  - No → Change a charger.
- Light Off → Check the status of the alarm indicator.
  - Flashing Red: protected mode
    - Fully Charged → Check if all SoC indicators are solid blue. If yes, disconnect the charging device.
    - Charging Over-current
      - Check if the charger current is in the rated range. If not, change a charger.
      - Multiple batteries connected in parallel
        - Make sure that the wires connecting the battery to the bus bar are of equal length.
        - Make sure that the voltage difference between batteries is less than 0.05 VDC.
    - Over-temperature / Under-temperature → Wait for the battery temperature to return to the charging temperature range.
  - Solid Red: system error → Restart the battery to see the status of the alarm indicator.
    - Solid Red → Contact your distributor.
    - Light Off → The battery is restored. Recharge the battery to see if it can be charged.

10 Troubleshooting

My battery won't discharge?



11 FAQ

1. Why won't my battery turn on sometimes when it is just turned off?

Please wait at least 3 s if you need to turn on a battery after it has just been turned off.

2. Why won't my batteries turn off when they are connected in parallel?

- Please turn off all the batteries in 1 min.
- Please make sure that there is no power supply on the power bus, and no energy storage device like large capacitors in the devices connected to the bus bar.

3. Why won't my battery system in parallel connection turn on with one-click?

If the voltage of some batteries is low, turning on the whole system by turning on one battery in the system may fail. In this case, please turn on all the batteries manually one by one.

4. Why is derating recommended when multiple batteries are used in parallel?

When multiple batteries are connected in parallel, the internal resistance from the bus bar to each battery may differ, and there may be a voltage difference between the batteries. Therefore, the current may be unevenly distributed. In order to avoid the battery triggering protection, derating is strongly recommended.

5. Why do some batteries charge at low temperatures and others don't?

Batteries can be charged when the cell temperature is within the charging temperature range, but the cell temperature of different batteries may vary even at the same environment temperature.

6. Does the heating film automatically heat the battery at low temperatures?

The battery can only be heated if external electricity is detected.

7. Why can a voltage be measured by a multimeter at the power terminals of a battery when it is turned off?

It is a normal phenomenon. After the battery is turned off/enters the sleep mode, there is a floating voltage (2 V~7 V) on both terminals of the battery, which is not sufficient for device operation.

8. Why does my battery sometimes over-discharge?

When the battery is discharged, please disconnect the load and charge the battery in time. If the bus bar is connected, the battery may be activated repeatedly by float currents or external devices, which may result in over-discharge.

9. With multiple batteries connected in parallel, why do some of them enter protected mode due to over-current at the moment of turning on?

If the voltage difference between the batteries is too large, the battery with a higher voltage will charge the battery with a lower voltage, which may result in charging/discharging over-current.

*If you're still unable to resolve your issue via the above instructions, please contact your local distributor or send an email to ess_support@pytesgroup.com

ess_support@pytesgroup.com