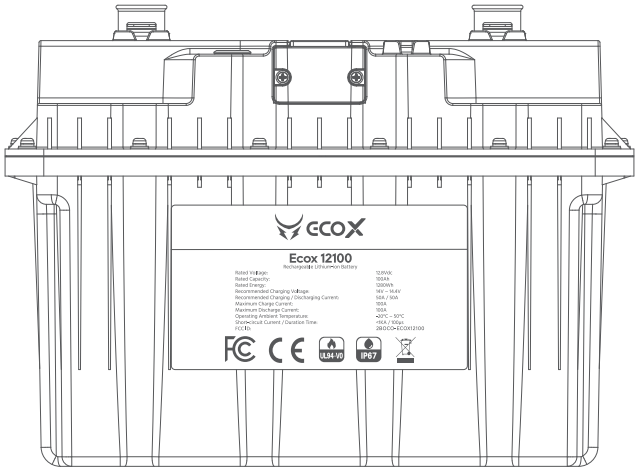


Smart Lithium Iron Phosphate Battery
Ecox 12100

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.

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.
- IIf 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 is a lithium iron phosphate battery module. With a standard BCI G31 size, it is perfect for recreational vehicles (RV), marine (boats), trucks, cabins, and other off-grid deep-cycle applications. Moreover, it can replace deep-cycle lead-acid batteries.

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.

- High Energy Density

With the high energy density lithium cells, our battery is half the weight of the lead acid battery of equivalent energy, and 70% the size of the regular lithium battery of equivalent energy. It's easier to carry, faster to charge, and more convenient to use.

- Real-time Monitoring via App

The built-in Bluetooth module allows real-time monitoring via mobile devices.

- Low Self-discharge Loss

The battery can be stored for up to 6 months if it is turned off after being fully discharged, and can be stored for up to 12 months if it is turned off when its level is between 40% and 70%.

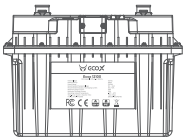
- Flexible Connection in Parallel and Series

The battery supports up to 16 identical batteries in 4S4P/1S16P connection, building a battery system with a max. energy output of 20.48 kWh.

- Communication Expansion

With a KIT-C1 communication box, you can form a battery network to extend external communication and control functions of these batteries, such as CAN communication, RS485 communication, and dry contacts.

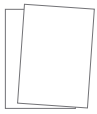
2 Packing List



Insulating Cap × 2

Terminal Bolt × 2
(M8 × 1.25 × 14 mm)

Battery



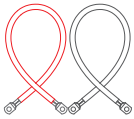
User Manual

3 Optional Accessories

KIT-C1

Extended Antenna
(3 m, 2.4 G, 3 dBi)

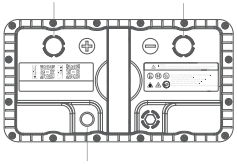
Rubber Duck Antenna
(2.4 G, 3 dBi)



Battery Adapter Cables
(Orange/Black, 0.4/1/3/5 m,
4 AWG, GT25-8 Terminal)

4 Interface

Positive Pole Negative Pole



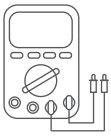
Power Button
(with Dust-proof Cap)

Status	Meaning
Light up for 0.5 s every other 1.5 s	Working Mode
Light up for 1 s every other 1 s	Networking Mode
Light up for 1.5 s every other 0.5 s	Protected Mode
Light Off	Sleep Mode/Power Off/System Error

*Positive Pole: Connect the positive pole of battery adapter cables.
*Negative Pole: Connect the negative pole of battery adapter cables.
*Power Button: Turn on/off the battery.

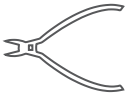
5 Battery Installation

5.1 Tools and Accessories Preparation



Voltmeter

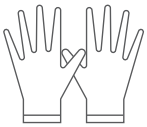
Torque Wrench



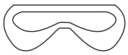
Wire Cutter

Screwdriver

5 Battery Installation



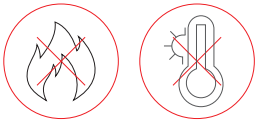
Insulating Gloves



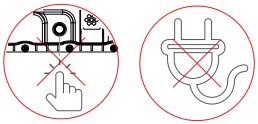
Safety Goggles

Bus Bar

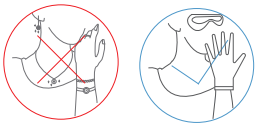
5.2 Pre-installation Check



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



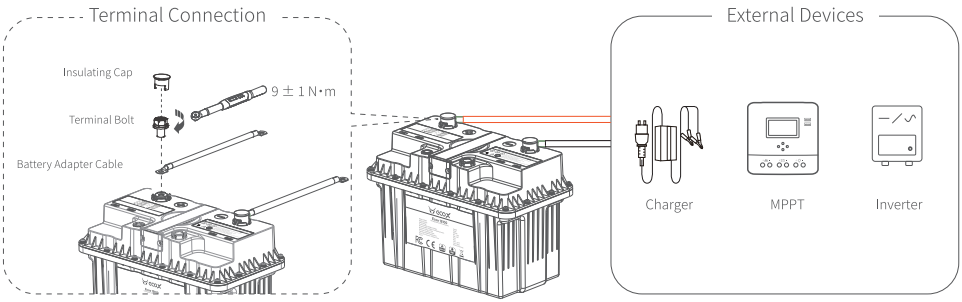
Cut off the power before wiring, installing or removing the battery.



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

5.3.1 Single Battery



5.3.2 Multiple Batteries

Connect batteries in series and parallel via power adapter cables to increases voltage and capacity.

Caution

Check if the voltage difference between the batteries is less than 0.1 VDC before using them in series connection, or 0.5 VDC in parallel connection. If not, please balance the voltage first. Otherwise, over-current protection may be triggered due to the large voltage difference.

Do not mix batteries of different brands, types, models or life spans.

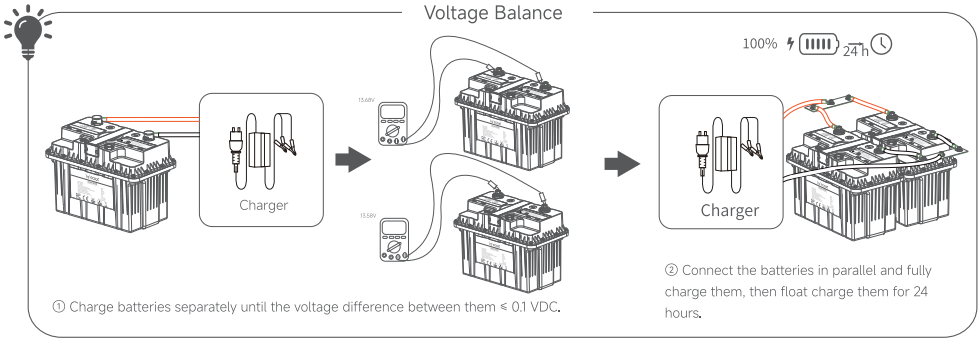
In order to prolong the life span of the batteries, please make sure the length, diameter and internal resistance of the power cables are the same when using multiple batteries.

Note

Please refer to Section 5.3.1 for terminal connection and external devices connection.

When batteries are used in series and parallel connection, it is recommended to use with a busbar to distribute power effectively.

The power cable connection methods provided in the manual are for reference only. The actual optimal connection method varies depending on the cable size, equipment devices connected and environmental conditions.



① Charge batteries separately until the voltage difference between them ≤ 0.1 VDC.

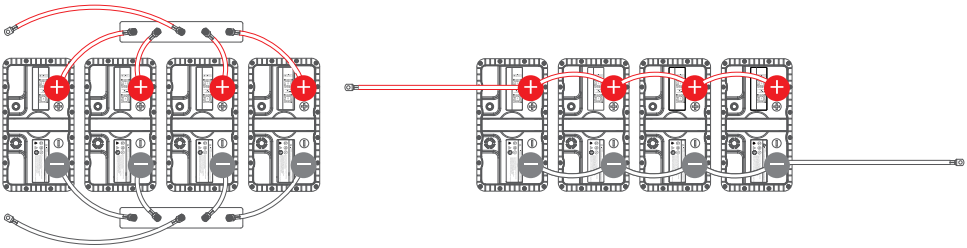
② Connect the batteries in parallel and fully charge them, then float charge them for 24 hours.

5 Battery Installation

① Connecting the Batteries in Parallel

⊕ to ⊕

⊖ to ⊖



Method 1 (Optimal)　　Method 2

Voltage of Battery Pack (VDC)	Current of Battery Pack (A)
12.8	Total Current of All Batteries

Note

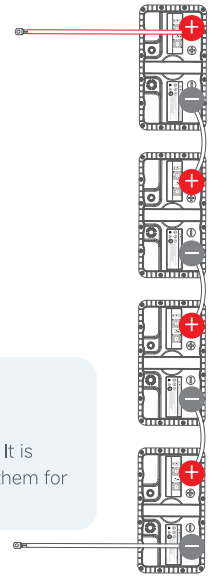
Up to 16 batteries can be connected in parallel. The pictures above shows 4 batteries in parallel as an example.

② Connecting the Batteries in Series

⊕ to ⊖

Series Configuration	Recommended Charge Voltage Value (VDC)
1S	14 ~ 14.4
2S	28 ~ 28.8
3S	42 ~ 43.2
4S	56 ~ 57.6

Voltage of Battery Pack (VDC)	Current of Battery Pack (A)
12.8 ~ 51.2	Current of Single Battery



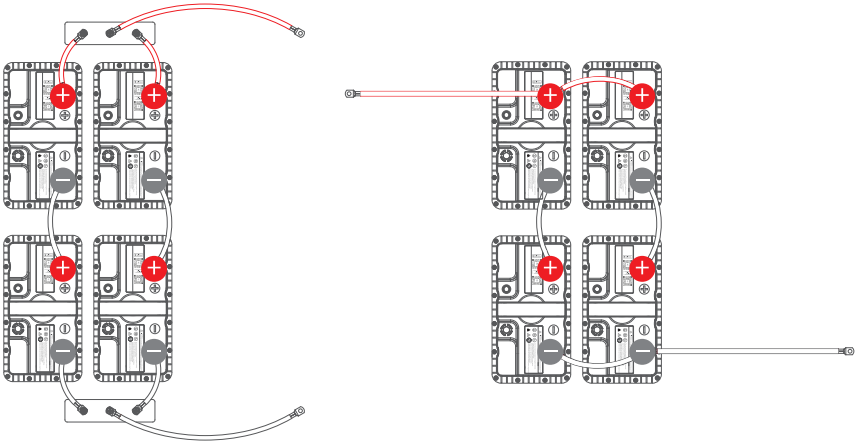
Note

Up to 4 batteries can be connected in series.

Using batteries in a series connection for a long time may lead to imbalances. It is recommended to regularly connect the batteries in parallel, and float charge them for 24 hours after a full charge.

5 Battery Installation

③ Connecting the Batteries in Series & Parallel



Method 1 (Optimal)

Method 2

Note

To avoid triggering battery protection due to the large voltage difference, it is recommended to connect the batteries in parallel, float charge them for 24 hours after a full charge, and then use them in series and parallel connection.

When connecting the batteries in series and parallel, please connect them in series first and then in parallel.

Up to 16 identical batteries are supported in series and parallel connection (Max 4S4P or 1S16P). The pictures above shows 4 batteries in 2S2P connection as an example.

5.4 Post-Installation Check

Please check if the positive and negative connections are correct.

6 Turn On/Off Battery

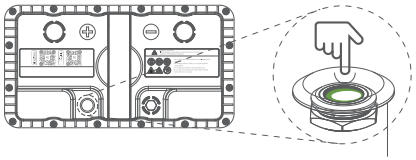
Turn On Battery

Via power button: press the power button and the button indicator flashes green.

Via charger: charge the battery to turn on it if the battery is in sleep mode and the power button is pressed down.

Turn Off Battery

Via power button: press the power button, the button pops up and the button indicator goes out.



Note

If batteries are networked and no external charger is connected, turning off the host battery can make all the slave batteries enter sleep mode.

Press the power button to turn off the battery if it is not used for a long time.

Do not turn on/off the battery frequently.

Do not remove the dust-proof cap, or the dust ingress may affect battery usage.

7 Battery Networking

You can check battery information by organizing them in one network.

For ways of battery networking, please scan the QR codes below to download RE+ App, and view the App Quick Guide.

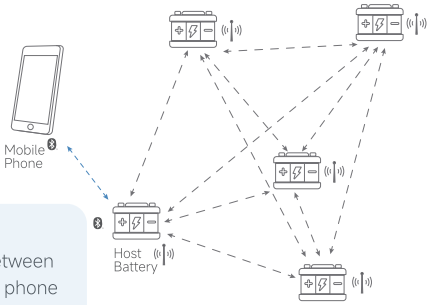
ios

Google play

7 Battery Networking

7.1 Basic Mode

Search for batteries via App, and connect them for networking.



Note

In this mode, make sure that there is no obstruction between the devices, and that the distance between the mobile phone and the host battery is less than 10 m, and the distance between the batteries is less than 5 m.

7.2 Extension Mode

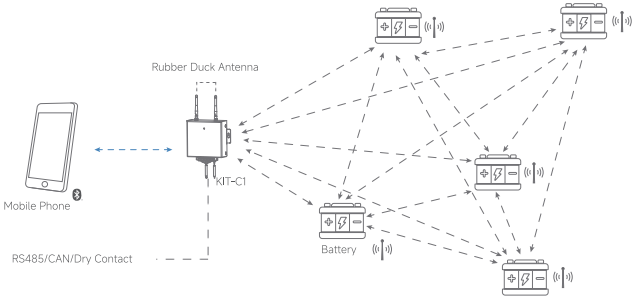
With a KIT-C1 communication box, you can form a battery network to extend external communication and control functions of these batteries, such as CAN communication, RS485 communication, and dry contacts.

Note

KIT-C1 power supply: DC10 V ~ 60 V.
When KIT-C1 is far away from the mobile phone or battery, or when there is an obstruction between KIT-C1 and the mobile phone or battery, you are recommended to use an extended antenna for smooth signal transmission.
For more information about KIT-C1, refer to KIT-C1 User Manual.

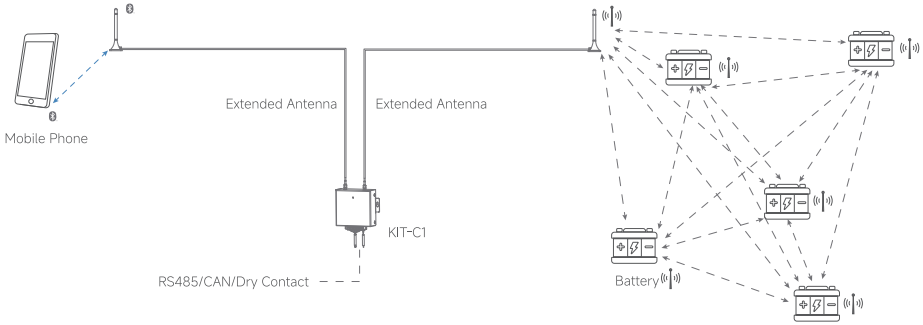
KIT-C1 Connection Scenario

① When KIT-C1 is close to both the mobile phone and the batteries, and there is no obstruction between the devices, rubber duck antennas are recommended for both ports.

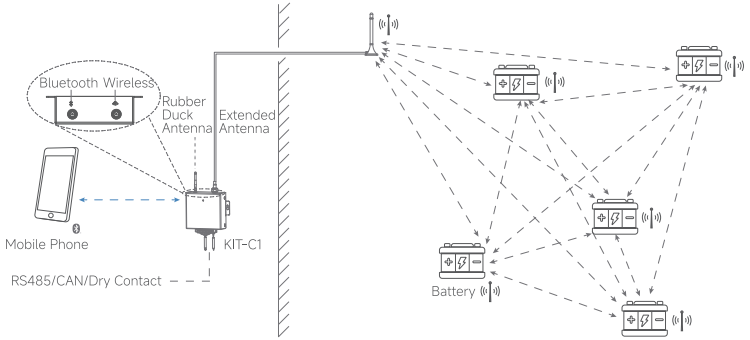


7 Battery Networking

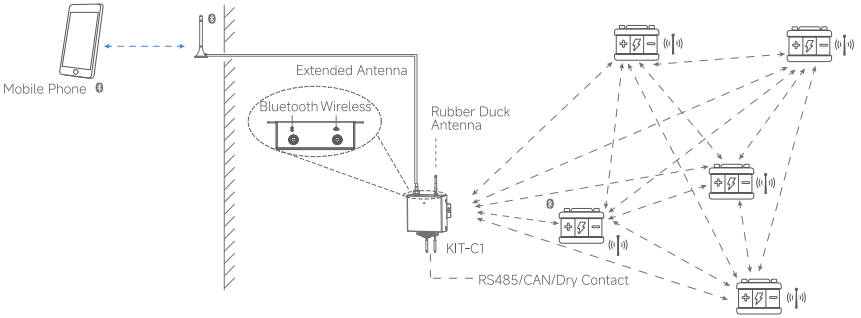
② When KIT-C1 is far from both the mobile phone and the batteries, extended antennas are recommended for both ports.



③ When KIT-C1 is close to the mobile phone and there is no obstruction between them, while there is an obstruction between KIT-C1 and the batteries, a rubber duck antenna is recommended for the Bluetooth port and an extended antenna for the wireless port.

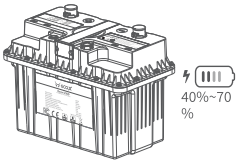


④ When there is an obstruction between KIT-C1 and the mobile phone, and KIT-C1 is close to the batteries and there is no obstruction between them, an extended antenna is recommended for the Bluetooth port and a rubber duck antenna for the wireless port.

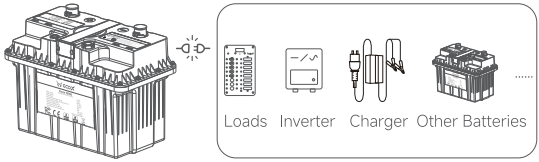


8 Battery Storage

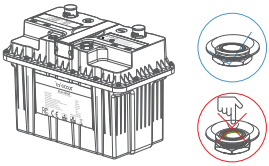
1.Make sure the battery level is above 40% (Optimal 70%).



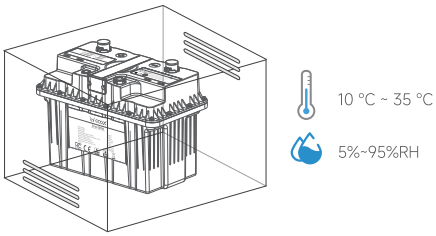
2.Disconnect the battery from all external devices (if present).



3.Turn off the battery.



4.Store the battery in a well-ventilated, clean, dry area.



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).

9 Battery Management System

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

Management and Monitoring
Cell Balancing
Smart Charging Mode
SoC Calculation
Wireless Internal Communication
Wired Extended Communication
Operation Log

10 Specifications

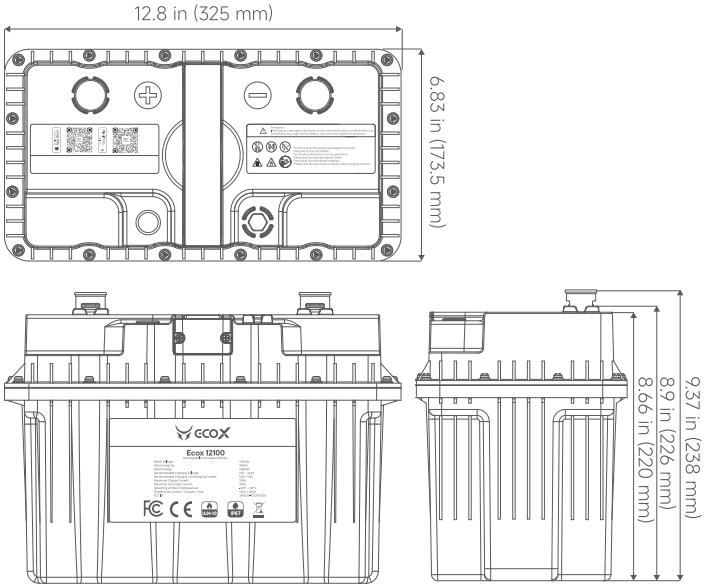
Electrical Specification	
Nominal Voltage	12.8 VDC
Nominal Capacity	100 Ah
Resistance	< 10 mΩ
Self Discharge	⩽ 3% per month
Max. Batteries in Parallel or Series	4S4P/1S16P
Cycle Life (25°C)	> 4500 (80% DOD, 0.5 C, 25 °C)
Design Life	⩾ 10 years
Short Circuit Current Duration	< 1 kA/100 us
Discharge of Depth (DoD)	100%
Discharge Specification	
Max. Continuous Discharging Current	100 A
Peak Discharging Current	200 A @30 s
Charge Specification	
Recommended Charging Current	50 A
Max. Continuous Charging Current	100 A
Recommended Charging Voltage	14 V ~ 14.8 V
Environment Specification	
Storage Temperature	-4 °F ~ 140 °F (-20 °C ~ 60 °C)
Operating Temperature	-4 °F ~ 122 °F (-20 °C ~ 50 °C) *The battery does not support charging when the temperature is below 32 °F (0 °C).
Max. Altitude	13123 ft (4000 m)
Relative Humidity	5% ~ 95% (non-condensing)
Mechanical Specification	
Dimensions (L × W × H)	12.8 in × 6.83 in × 9.37 in (325 mm × 173.5 mm × 238 mm)
Weight	Approx. 26.46 lbs (12 kg)
Terminal Type	M8
Terminal Torque	9 ± 1 N·m

10 Specifications

Case Material	PC
IP Rating	IP67
Cell Type-chemistry	$LiFePO_4$
Other	
Certifications	UN38.3, FCC, IEC 62619, CE
Communication	BLE 5.0
App	Supported

*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)

11 Troubleshooting

My battery won't turn on?

- The power button cannot be pressed down. → Contact your distributor.
- With the button pressed down, the button indicator doesn't light up. → Check if the battery is running down.
  - Yes → Charge the battery in time.
  - No → Contact your distributor.

My battery won't turn off?

Disconnect all external devices, and press the power button to confirm whether it can be turned off.

- Yes → The battery is normal.
- No → Contact your distributor.

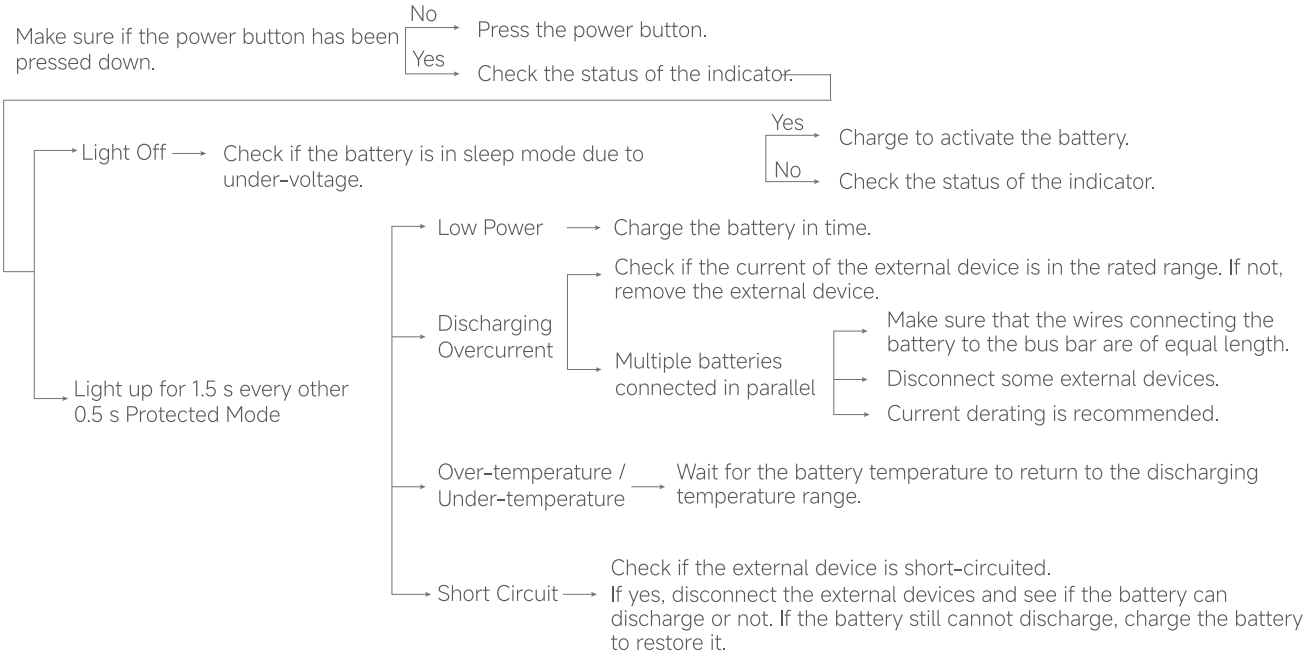
My battery won't charge?

Make sure if the power button has been pressed down.

- No → Press the power button.
- Yes → Check the status of the indicator.
  - Light Off → Contact your distributor.
  - Light up for 1.5 s every other 0.5 s Protected Mode
    - Fully Charged → The battery is normal. It stops charging when it is full.
    - Charging Overcurrent
      - 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 0.5 VDC.
        - Current derating is recommended.
    - Over-temperature / Under-temperature → Wait for the battery temperature to return to the charging temperature range.

11 Troubleshooting

My battery won't discharge?



12 FAQ

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

When the battery is turned off, it enters lock state for 5 s. Please wait for 5 s before turning on the battery.

2. Why can a voltage still 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 (10 V~13 V/0 V~2 V) on both terminals of the battery, which is not sufficient for device operation.

3. Why won't my batteries connected in parallel charge/discharge sometimes?

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 this case, it is recommended to ensure that the charging and discharging currents are less than the rated values when using the batteries in parallel connection.

4. Can my battery communicate with wired RS485 or CAN devices?

With a KIT-C1 communication box, the battery can be extended with RS485 communication, CAN communication and dry contact function. For more information, see KIT-C1 User Manual.

5. 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.

6. Why won’t my cascaded battery system turn off with one-click?

In extension mode, turning off the whole system by turning off one battery in the system is not supported.
In basic mode, only the host battery supports the one-click switching.
If the batteries are used in cascade, please remove the charger before turning off the battery. Otherwise, you may fail to do so.

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7. Why does networking fail sometimes?

The channel you selected is duplicated with the surrounding network, please change the channel.
Long distance between devices results in unstable signals.
The environment interference is serious.
You can re-organize the batteries in one network after solving the above problems.

8. Why does the network drop sometimes?

The network is interfered.
The distance between the antenna and the device is long, resulting in an unstable network.
The battery is turned off abnormally, resulting in a loss of signal source.

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