UT-SERIES

User Manual

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1 - General Information

This manual includes instructions for installing, operating, and maintaining Ultra-Thin LiFePO4 batteries.

1.1 - Precautions

- Keep batteries away from water, heat, sparks, and hazardous chemicals.
- Do not place the battery in a high-temperature environment, near a fire, or in direct sunlight.
- Avoid puncturing, dropping, crushing, burning, penetrating, shaking, or hitting the battery.
- Do not open, disassemble, or modify the battery.
- Do not use the battery if it emits an unusual smell, generates heat, is deformed, discolored, or shows any other abnormality.
- If the battery leaks or emits an unusual smell, move it away from any open flames immediately.
- If leaking electrolytes or powders come into contact with skin or eyes, flush immediately with plenty of clean water and seek medical attention.
- Before storing the battery, ensure all chargers or charge controllers are disconnected.
- Do not connect or disconnect the battery terminals without first disconnecting the load.
- Do not place tools on top of the battery.
- Keep the battery out of reach of children.
- Wear suitable protective equipment when handling batteries.

- Use insulated tools when working with batteries.
- Avoid wearing jewellery or other metal objects while working near the battery.
- Ensure the battery is fully installed and securely fastened.
- Use appropriate handling equipment to transport batteries safely.
- Do not dispose of batteries as household waste; use recycling channels that comply with local, state, and federal regulations.
- If the device will not be used for an extended period, store the battery in a cool, dry place. Charge and discharge it every 3 to 6 months to maintain
- performance and extend its service life.

2 - Product Introduction

2.1 - Key Features

Ultra-thin LifePO4 batteries offer high energy density and power delivery with excellent safety performance.

- **Lightweight and portable**
- **Environmentally friendly**
- **Long cycle life**
- **Wide temperature range**
  - Working temperature: -10 ～65℃.
  - Storage temperature: -10 ～45 (75% RH).

These batteries include a Battery Management System (BMS) with multiple functionalities:

- Voltage Monitoring and Control
- Temperature Monitoring and Control
- Current Monitoring and Control
- Short Circuit Protection
- Cell Balancing
- Bluetooth connectivity
  - State of Charge monitoring
  - Temperature monitoring
  - Input/output monitoring
  - Cycle life tracking
  - Protection history

2.2 - Bluetooth Installation

How to Download the Bluetooth App

1. For iOS Users:
   - Open the Apple App Store on your device.
   - In the search bar, type " Marvel Tech ".
   - Locate the app in the search results and tap "Download" or "Get".

2. For Android Users:
   - Open the Google Play Store on your device.
   - In the search bar, type " Marvel Tech ".
   - Locate the app in the search results and tap "Install".

Once the app is installed, open it and follow the on-screen instructions to connect to your battery via Bluetooth.

3 - Installation

Safe and secure installation requires trained and certified technicians.

Please check the polarity before connecting the wiring. Reversing polarity may damage the battery.

batteries can be installed in various orientations, however, please do not install the battery upside down.

Please note, we recommend against using our LiFePO4 batteries for under bonnet use. LiFePO4 batteries have a lower thermal tolerance compared to other types of batteries, such as lead-acid or AGM batteries. The engine compartment can reach high temperatures, especially in demanding conditions or during extended use. These high temperatures can degrade the battery's performance, lifespan, and safety.

4 - Operating Instructions

Avoid overcharging or over-discharging the battery. The charging and discharging temperature range is -10 to 65℃ . Do not charge the battery outside of this temperature range.

4.1 - Optimising Your Battery’s Lifespan

A battery's lifespan is measured by the number of cycles it can complete before its original capacity is reduced by a certain amount. A cycle is defined as discharging the battery from fully charged to a specific Depth of Discharge (DOD) and then recharging it to full. The DOD indicates the percentage of the battery's capacity that is used during each cycle.

The lower the Depth of Discharge (DOD) used in each cycle, the longer the battery will last. This should be considered when selecting the battery's amp-hour capacity. Investing in a battery with sufficient capacity ensures that you are not heavily discharging it in every cycle. Extra capacity results in a lower DOD, extended battery life, and a higher financial return on your investment.

4.2 - Operating your battery

Initial Setup

- Ensure the battery is fully charged before first use.
- Use only compatible chargers and charge controllers designed for LiFePO4 batteries.
- Check that all connections are secure and free of corrosion.
- Verify that the battery is installed in a well-ventilated area to prevent overheating.
- Ensure the battery is placed on a stable surface to avoid physical damage.

Charging

- Do not exceed the battery's maximum continuous charging current.
- Charge the battery in an environment with temperatures between -10°C and 65°C.
- Monitor the battery temperature during charging to prevent overheating.

Discharging

- Do not exceed the battery's maximum continuous discharge current.
- Discharge the battery in temperatures ranging from -10°C to 65°C.
- Monitor the battery voltage regularly during discharge.

5 - Battery Maintenance

5.1 - Regular Inspections

- Examine the battery to ensure it is clean, dry, and that the terminals have no corrosion.
- Examine cables and connections, replace any damaged parts and tighten loose connections.
- Check the battery voltage regularly to monitor health.
- Look for any signs of swelling or deformation in the battery case.
- Check for any unusual smells or sounds coming from the battery.
- Regularly clean the battery using a damp cloth or a non-metallic brush.

5.2 - Storage

- Ensure the battery and surrounding area are kept clean and dry.
- Store the battery in a cool, dry place between -10°C and 45°C when not in use.
- Recharge the battery every 3 to 6 months to prevent over-discharge.
- Ensure the battery is disconnected from any loads during storage.
- Label stored batteries with the last charge date.
- Do not expose batteries to direct sunlight.

6 - Battery Management System

6.1 - Protection

The battery is equipped with a Battery Management System (BMS) that alerts the user and safeguards the battery from overvoltage, overcurrent, short circuits, and abnormal temperatures. Refer to the table on the following page for the specific triggering and recovery conditions of each protection feature.

6.2 - Cell Balancing

The Battery Management System (BMS) uses the resistance bypass method for cell balancing.

During charging, the balancing function activates when the voltage of the highest single cell in the battery pack reaches the predefined equilibrium starting voltage and the voltage difference between the minimum and maximum cells exceeds the set threshold.

The balancing process stops when the cell voltage difference falls below the set threshold or when the cell voltage drops below the equalization turn-on voltage.

7 - Troubleshooting

If you encounter any issues while using the battery, please refer to the instructions below or contact us for assistance:

- Activation Issues: If the battery fails to activate at a charge or discharge current greater than 1A, or if it activates when the resting voltage is below 9.6V, it may be severely over-discharged due to self-discharge or a parasitic load. Use a battery charger or charge controller with a lithium battery activation or rejuvenation function to restore the battery. If the battery voltage is 0V, the internal fuse may have blown due to severe overcurrent.

- Under-Voltage Protection: If the battery shuts down due to under-voltage protection, disconnect it from the load immediately and charge the battery with a current greater than 1A.

- Overvoltage Protection: If the battery cuts off the charging current due to overvoltage protection, disconnect it from the charging source immediately and discharge the battery with a current greater than 1A.

If the problem persists, please contact us for assistance.