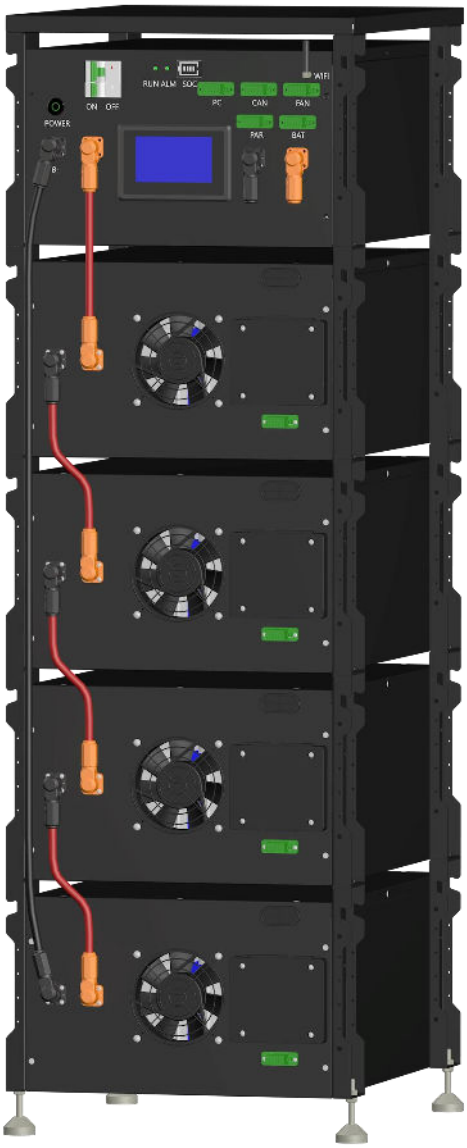
# User Manual

## Model: 51.2V200Ah-HV



# Content

# 1 General Information

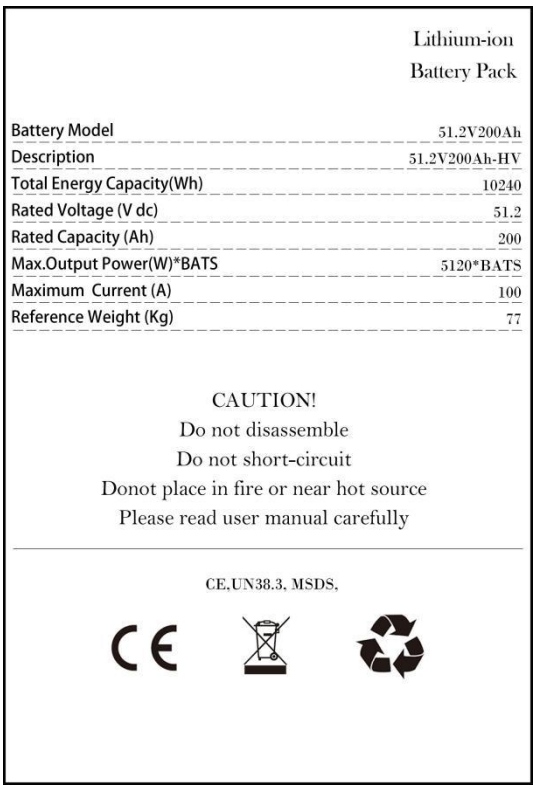
This manual introduces the 51.2V200Ah-HV battery products. Which includes: battery information, using way, guide, safety information, installation guide, common issues and maintenance. Please read this manual carefully before using the battery. For any questions, please contact the authorized dealer immediately for advice and clarification.

51.2V200Ah-HV is an energy storage unit,that is designed for residential application scenarios with the capability of short-term backup, not suitable for supporting life-sustaining medical devices. This product is intended for used only in accordance with the information provided in the enclosed documents and applicable local standards and regulations. Any other use may result in personal injury or property damage. The illustrations in this manual are only intended to help explain the concept of the system configuration, including use guidelines, safety precautions, common operating problems, and subsequent battery maintenance.

Alterations to the product, e.g. changes or modifications, are only permitted with the express written permission of the authorized dealer. Unauthorized changes will not be allowed by warranty claims. the authorized dealer shall not be liable for any damage resulting from such changes. Any use of the product other than described in the intended use section does not qualify as appropriate. The enclosed documentation is an integral part of this product. Please keep the documentation in a safe and convenient place for future reference.

The type labels were attached on the product, which contain the product identification information. For safe usage, the user must be well-informed of the contents in the type labels.

Labels:



Lithium-ion
Battery Pack

| | |
|---|---|
| Battery Model | 51.2V200Ah |
| Description | 51.2V200Ah-HV |
| Total Energy Capacity(Wh) | 10240 |
| Rated Voltage (V dc) | 51.2 |
| Rated Capacity (Ah) | 200 |
| Max.Output Power(W)*BATS | 5120*BATS |
| Maximum Current (A) | 100 |
| Reference Weight (Kg) | 77 |

CAUTION!
Do not disassemble
Do not short-circuit
Donot place in fire or near hot source
Please read user manual carefully

CE,UN38.3, MSDS,

| | |
|---|---|
| Model | BCU |
| Description | Match 51.2V200Ah-HV |
| Operating Voltage Range (V dc) | 185.6~980 |
| Max.Output Power(W)*BATS | 5120*BATS |
| Maximum Current (A) | 100 |
| Reference Weight (Kg) | 15 |

CAUTION!
Do not disassemble
Do not short-circuit
Donot place in fire or near hot source
Please read user manual carefully

# 2 Safety Measures

This section contains safety information that must always be observed when using or installing batteries. To prevent personal injury or property damage and ensure long-term operation of the batteries, please read this section carefully, always watch for warnings from all safety messages.

**Environmental requirements:**

1. Do not expose the battery to temperature above 50 °C;
2. Do not place the battery near any heat source;
3. Do not expose the battery to moisture or liquid;
4. Do not expose the battery to a corrosive gas or liquid;
5. Do not expose the battery to a combustible gas or liquid;
6. Place the battery in safe place that away from children and animals.

**Operation Precautions:**

1. Do not disassemble the battery;
2. Do not touch the battery pack with wet hands;
3. Do not smash, fall, or puncture the battery;
4. Do not short-circuit the terminal, and remove all metal jewelry items that may produce a short-circuit before installation and repair;
5. Always handle the products in accordance with the local safety regulations;
6. Store and use the battery in the user's manual, 8.Ensure reliable grounding;
7. Disconnecting all batteries to the wires before installation and repair;
8. The stacking of packaging batteries shall not exceed the quantity specified on the packaging.

# 3 Technical Parameters

| 51.2V200Ah-HV | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Model** | RHV-41 | RHV-51.2 | RHV-61.4 | RHV-71.7 | RHV-81.9 | RHV-92.2 | RHV-102.4 |
| Number of Battery Modules | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| **Electrical parameters** | | | | | | | |
| Nominal voltage | 204.8V | 256V | 307.2V | 358.4V | 409.6V | 460.8V | 512V |
| Nominal capacity | 40.96KW.h | 51.2KW.h | 61.44KW.h | 71.68KW.h | 81.92KW.h | 92.16KW.h | 102.4KW.h |
| Total energy (90% DOD) | 36.86KW.h | 46.08KW.h | 55.30KW.h | 64.51KW.h | 73.73KW.h | 82.94KW.h | 92.16KW.h |
| Maximum current | 100A | 100A | 100A | 100A | 100A | 100A | 100A |
| Maximum power | 20480W | 25600W | 30720W | 35840W | 40960W | 46080W | 51200W |
| **General parameters** | | | | | | | |
| Battery type | LiFePO4 | | | | | | |
| Working humidity | ≤85%rh | | | | | | |
| Store humidity | ≤85%rh | | | | | | |
| Working altitude | ≤2000m | | | | | | |
| Maximum number of parallel | 4 sets | | | | | | |
| Protection level | IP20 | | | | | | |
| Net weight | 323Kg | 440kg | 477kg | 554kg | 631kg | 708kg | 785kg |
| Cabinet size (W*D*H) | 436*575*1820 (mm) | | 872*575*1820 (mm) | | | | |
| Cabinet weight | 64Kg | | | 64Kg*2 | | | |
| Certificate | CE, MSDS, UN38.3 | | | | | | |

| | |
|---|---|
| Circle life | ≥6000 times |
| Communication port | CAN, RS485, WIFI |
| Discharging working temperature | -20℃ ~ 60℃ |
| Charging working temperature | 0℃ ~ 60℃ |
| Storage temperature | 12 months, ≤25℃ |
| | 6 months, ≤35℃ |
| | 3 months, ≤45℃ |
| Warranty | 5 years |

| Battery Module Parameters | |
|---|---|
| Rated Voltage | 51.2V |
| Rated Storage Capacity | 200Ah |
| Weight | 77Kg |
| Dimensions (W*D*H) | 396*575*248（mm） |
| Protection Level | IP20 |

# 4 Product Overview

## 4.1 Brief Introduction


The high voltage lithium battery energy storage system consisting of multi battery modules (51.2V200Ah) and a BCU (Battery Control Unit) in series. Single set battery max. supports 17units, with an max. operating voltage range of 185.6V-980V, is used for household / commercial energy storage applications, working with a high voltage inverter for energy storage purposes.

It has a built-in BMS (battery management system, including the main BMS in BCU and the slave BMS in battery module), which can manage and monitor battery information, including voltage, current and temperature. In addition, BMS can balance battery charging to prolong service life. BMS has over discharge, over charge, over-current, high / low temperature and other protection functions. The system can automatically manage the charge state, discharge state and balance state. It has built-in wireless WIFI module, support mobile phone remote monitoring and

debugging. The exterior is equipped with touch color screen, status indicator and power indicator, which can also observe the status of the energy storage system clearly. Each battery is equipped with a cooling fan, which will run when the high temperature.

It has soft-start circuit inside so it can support inverters without soft-start function.

## 4.2 HV BCU

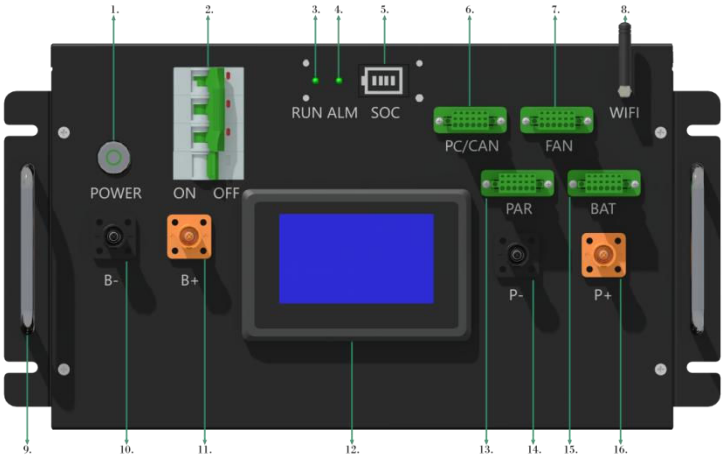
The BCU includes the master BMS, DC fuse, soft starting circuit, charging circuit, discharge circuit, 24VDC/DC power supply module, cut off the protection switch, touch color screen, wireless WIFI module, status indicator.

The BMS in the battery module collects the battery voltage and temperature data uploaded to the master BMS via the internal CAN. BMS's BCU controls the charging voltage / current and discharge voltage / current.

### 4.2.1 BCU Technical Data

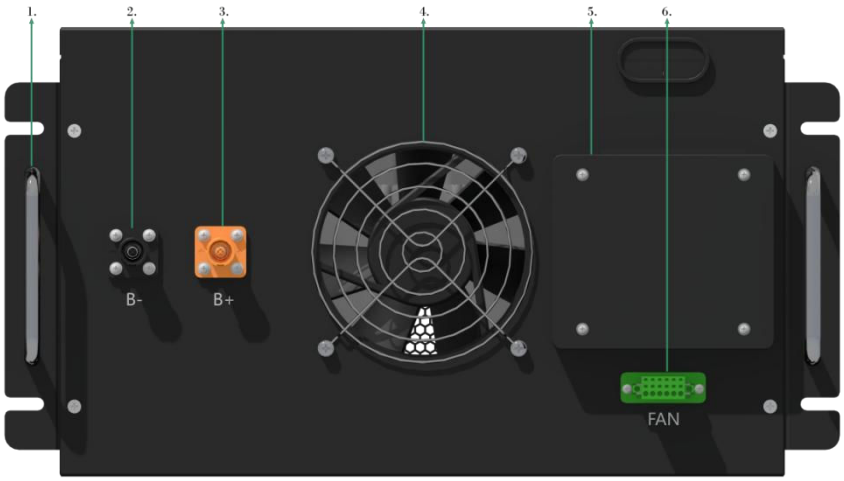
| | |
|---|---|
| Adaptable battery model | 51.2V200Ah-HV |
| Rated voltage | 185.6V-980V |
| Max. power | 5120W* battery module number |
| Max. current | 100A |
| Refer dimension (W*D*H) | 396*575*248(mm) |
| Refer weight | 15Kg |

### 4.2.2 BCU Port



| NO. | Name | Description | NO. | Name | Description |
|---|---|---|---|---|---|
| 1. | POWER | System start switch | 2. | ON/OFF | Cut-off switch |
| 3. | RUN | Work normal | 4. | ALM | Alarm |
| 5. | SOC | Power light | 6. | PC/CAN | Communication with computer/ upper computer port |
| 7. | FAN | Cooling fan power port | 8. | Wifi | Wifi wire |
| 9. | | Removable handle | 10. | B- | Connection position of battery negative pole |
| 11. | B+ | Connection position of battery positive pole | 12. | | Touch screen |
| 13. | PAR | Parallel communication port | 14. | P- | Connection position of PCS negative pole |
| 15. | BAT | Communication with battery module | 16. | P+ | Connection position of PCS positive pole |

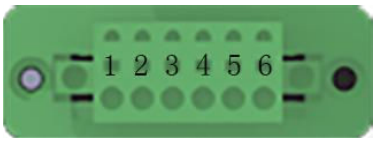
## 4.3 HV Battery Module




| NO. | Name | Description | NO. | Name | Description |
|---|---|---|---|---|---|
| 1. | | Removable handle | 2. | B- | Battery module negative pole (black) |
| 3. | B+ | Battery module positive pole (orange) | 4. | | Cooling fan |
| 5. | | Slave BMS kit | 6. | FAN | Fan power supply |

The battery module includes battery cell and the salve BMS. The slave BMS collects and transfers the battery voltage and temperature of the battery cell in real time and the BCU to the main BMS via internal communication. When the energy storage system reaches the set temperature, the main BMS controls the cooling fan to adjust the temperature.

## 4.4 Communication Port-PIN




| PORT | PIN1 | PIN2 | PIN3 | PIN4 | PIN5 | PIN6 |
|---|---|---|---|---|---|---|
| PC/CAN | CAN0H | CAN0L | CAN1H | CAN1L | CAN1H | CAN1L |
| PAR | CAN0H | CAN0L | NC | NC | DO | DI |
| BAT | SPI-H | SPI-L | NC | NC | NC | NC |
| FAN | 24V+ | 24V- | NC | NC | NC | NC |

# 5 Installation Guide

## 5.1 Inspection Before the Installation

### 5.1.1 Check the Outer Packaging

Packaging materials and components may be damaged during transportation. Check the outer packaging material before installing the battery. Check the packaging material surface for damage, such as holes and cracks. If any damage is found, do not unpacking the battery and contact the dealer as soon as possible. It is recommended that you remove the packaging material within 24 hours before installing the battery.

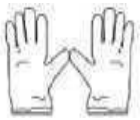
### 5.1.2 Check Deliverables

After unpacking the package, check that the deliverables are intact and complete. If any damage or missing parts is found, please contact the authorized dealer.

Accessories list in the package.

| 51.2V200Ah-HV | | | | | |
|---|---|---|---|---|---|
| NO. | Name | Model | Unit | Qty | Mark |
| 1 | Battery module | 51.2V200Ah-HV | PCS | 1 | |
| 2 | Communication cable | | PCS | 1 | For battery connection |
| 3 | Power cable | Red/black 4AWG | SET | 1 | For battery connection |
| 4 | Battery rack | Steel | SET | 1 | |
| **NO. 1~4 are accessories for slave control;<br>NO. 5~11 are accessories for BCU.** | | | | | |
| 5 | Battery control unit | BCU | PCS | 1 | |
| 6 | Battery rack | Steel | SET | 1 | |
| 7 | Power cable | Red/black 4AWG | PCS | 2 | For inverter connection |
| 8 | Communication cable | | PCS | 1 | For battery connection |
| 9 | User manual | 51.2V200Ah-HV user manual | PCS | 1 | |
| 10 | User manual | Wifi user manual | PCS | 1 | |
| 11 | Upper computer cable | USB-CAN | PCS | 1 | For computer connection |
| 12 | Battery cabinet | Steel | SET | 1 | Optional |
| 13 | Battery rack | Steel | SET | 1 | Optional |

## 5.2 Tools

| Type | Tools | | | |
|---|---|---|---|---|
| Installation | Measuring tape  | Hammer drill  | Socket wrench  | Cross Screwdriver  |
| Protection | ESD gloves  | Safety goggles  | Dust mask  | Safety shoes  |

## 5.3 Installation Requirements

1. Install the battery in an indoor environment.
2. Place the battery in a safe position away from children and animals.

3. Do not place the battery near any heat source, and avoid generating sparks.
4. Do not expose the battery to moist air or liquid.
5. Do not expose the battery to direct sunlight.
6. Do not expose the battery to a combustible gas or liquid.
7. The mounting carrier shall be fire resistant. Do not install batteries on flammable buildings.
8. Ensure ground connection.

## 5.4 Fix the Battery

Insufficient or no grounding may cause an electric shock. Device malfunctions, and insufficient or no grounding may cause device damage and life-threatening electric shocks.

1.Assembly stack sheet metal installation:

Install stacked sheet metal at the four corners of each battery, each sheet metal is fixed by four screws. The limit bolt is above the sheet metal.

Align with the limiting latch, and stack battery modules one by one (if there is a serial number attached to the battery module, the No.1 battery module is placed next to the main control module, and the other serial numbers are placed downward). The main control module is installed on the top.

2.Battery cabinet installation:

Install the mounting ear sheet metal in turn, and then install the battery rack.

## 5.5 Connect the Power Cable, Communication Cable

Before connecting the power cable of the battery string, check that the installed battery module and the main control module are delivered together in set. Do not mix them with other systems to avoid system exceptions.

1. Stack and assemble the battery system.
2. Connect the battery power cable, as the figure shows.
3. Connect the communication cables in turn( red and black twisted pair cables), connect the battery module to the main control BAT communication port according to the cable tube identifier, connect the red plug on the battery module to the main control BAT communication port.




4. Connect fan power cable.

Find out the cable parts as the picture, insert the FAN port into the main control FAN port according to the cable identifier, and then insert other plugs into the battery module.



5. BCU CAN port connects to inverter's communication.

# 6 Touch Screen External

## 6.1 User Mode

First boot, enter user mode.


Click anywhere on the screen to pop up the following button, with specific instructions as follows:

Click "left&right" different user mode styles (including day/night mode) can be switched.; slide the "sun icon" left and right to adjust screen brightness; Click "settings" to enter engineering mode to view more information; click "back" to return to the interface

## 6.2 Engineering Mode

Enter engineering mode, with the date displayed on the top left, faults displayed between date and time, and time displayed on the right.

Central display of total voltage, SOC, total Current, highest voltage, lowest voltage, highest

temperature, lowest temperature.

The navigation menu is displayed at the bottom, allowing you to switch to viewing interface details.


‘Cell Vol’: single cell voltage;

‘Cell Temp’: single cell temperature;

‘Heating Temp’: MOS temperature, environment temperature;

‘Relay Status’: relay detail information, includes: relay- name, On/ Off status and Alarm. Slide left and right to check more information.

‘Chg_Inf’: enter the charging detail page, to check charging time, BMS request and charger information.

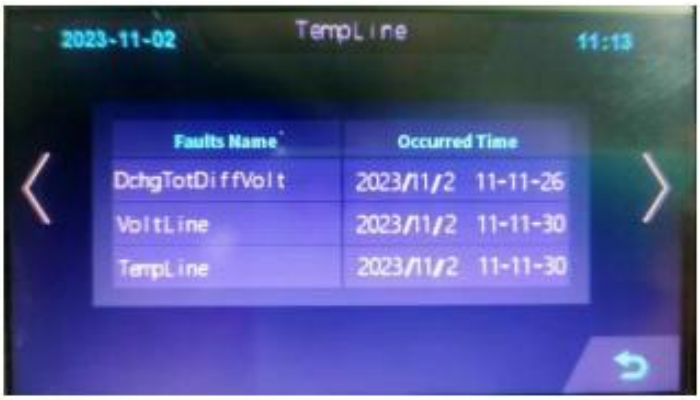
‘Others’: enter heating information, edge resistance value, diagnosis information and cumulative time information interface. Click each icon to enter the three-level interface to view details

## 6.3 Set Up

Click “Settings” to enter the settings interface, which includes language settings and brightness settings.

## 6.4 Fault Information Interface

Click the real-time status bar to enter the fault information interface, where you can view the fault name and time of occurrence. Swipe left and right to check see more faults




# 7 Cleaning and Maintenance

## 7.1 Cleaning Work

Please note: please turn off the power supply of the system before cleaning. It is recommended to clean battery regularly. If the shell is dirty, please use a soft and dry brush or dust collector to remove the dust. Do not use solvents, or corrosive liquids to clean the enclosure.

## 7.2 Maintenance

### 7.2.1 Recharging Requirements During Normal Storage

The battery shall be stored in an environment with a temperature range of -10℃~45℃ and shall be maintained regularly according to the following table to 0.5C current is charged until 60%SOC after long storage.

Charging conditions during storage

| Store the ambient temperature | Relative humidity of the storage environment | Storage time | SOC |
|---|---|---|---|
| Below -10℃ | | Prohibit | / |
| -10~25℃ | 5%~70% | ≤12 months | 30%≤soc≤60 |
| 25~35℃ | 5%~70% | ≤6 months | 30%≤soc≤60 |
| 35~45℃ | 5%~70% | ≤3 months | 30%≤soc≤60 |
| Above 45℃ | | Prohibit | |

### 7.2.2 Recharging Requirements for Excessive Discharge

Charge the over-discharge (90%DOD) battery within the time of meeting the table below, otherwise the over-discharge battery module will be damaged.

Charging requirements for excessive battery discharge

| Storage environment temperature | Storage time | Note: |
|---|---|---|
| -10~25℃ | ≤ on Day 15 | The battery pack disconnected to PCS, charge the battery with DC charger. |
| 25~45℃ | ≤ on Day 7 | |
| -10~45℃ | <12 hours | Battery pack connect to the Inverter, charge the battery with PV or grid. |

# 8 Common Issues and Solutions

## 8.1 Common Issues and Solutions

The user can monitor the operating status, warning, and alarm information through the battery LCD display.

1. The battery cannot be turned on, and the LED indicator lights all turn off the battery depth discharge and requires charging first. If unable to charge, contact the authorized dealer.

2. If red light shows system abnormal, please check below values:

1) Temperature: Above 60℃ or below 0℃, the battery protection turns on, could not charge.

Solution: Move the battery to normal operating temperature range between 0°C to 60 °C.

2) Temperature: above 60℃ or below -20℃, the battery cannot discharge.

Solution: Move the battery to normal operating temperature range between -20°C to 60 °C.

3) Current: If 51.2V200Ah-HV's current is greater than 100A, the battery protection device will be turned on.

Solution: Stop using electrical appliances that exceed the maximum battery power load.

4) High voltage: If the single battery cell's voltage is above 3.6V or higher, battery charging protection turns on.

Solution: The inverter will stop charging the battery if it sets the intelligent LI mode or a reasonable charging voltage.

5) Low voltage: If the single battery cell's voltage is below 2.9V or lower, battery charging protection turns on.

Solution: Charge the battery.

Excluding the above five points, if the fault cannot be found, turn off the battery and contact the authorized dealer.

3. It's normal that the SOC LED are different if in multiple battery parallel systems. Before installing batteries in parallel, measure the voltage of each battery to ensure that the voltage difference of each battery is within 1V, and the the battery production date within 1 year.

1) When installing for the first time, please charge in full first to balance the capacity gap;
2) If the error is within 10% when the lowest SOC display percentage is compared with the highest SOC display percentage, and the SOC display percentage is the same within 10 minutes, it is normal operation;
3) Before expanding battery capacity, please charge and discharge the online battery to 45%-50%SOC; After expanding the capacity, charge the battery system to balance the capacity gap. Ensure that the capacity difference before parallel is no more than 10%. If the capacity gap is large, it will take about 2 cycles to balance the capacity gap. The actual equilibrium time depends on the capacity difference and the charge-discharge current.

Exclude the above three points. If the SOC LED still fails, please contact the authorized dealer.

## 8.2 Emergency

**Please cut off the power supply and turn off the battery in an emergency.**

1. **If the battery pack is damp or immersed in water**, do not get close to the battery, and then contact the authorized dealer or an authorized dealer for technical support.
2. **Do not use water to fire when a fire!** Only dry powder extinguishers; place the battery pack in a safe area if possible.
3. **Battery leaking the electrolyte.** If the battery pack leaks the electrolyte, avoid contact with leaking liquid or gas.

**If someone is exposed to the leaking material, do the following immediately:**

**Inhalation:** evacuate the contaminated areas and seek medical treatment.

**Contact eye:** Rinse eyes with running water for 15 minutes and seek medical treatment.

**Contact skin:** Wash the infected site with soap and water and seek medical treatment.

**Swallow in:** urge vomiting, and seek medical treatment.

**Battery damage:** Damaged battery is dangerous and must be treated with very carefully. Battery cannot be used or may be dangerous to person or property. If the battery pack is damaged, contact the authorized dealer for handling.

## 8.3 About Battery System

1.The system treatment must comply with the locally applicable disposal regulations of electronic waste and second-hand batteries.

2.Do not treat the battery system along with household waste.

3.Avoid exposing the battery to high heat or direct sunlight.

4.Avoid exposing the battery to high humidity or corrosive environments.

5.Do not expose the battery to a combustible gas or liquid.