



**Rack-Mounted  
LiFePO4 Battery System  
DP-51100-R**

**User Manual  
V1.1**



# Revision Table

| No | Version | Revised by | Content            | Revision Date |
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# Definition of Terms

The following acronyms and abbreviations are used in this manual.

|                |                                         |
|----------------|-----------------------------------------|
| BMS            | Battery Management System               |
| SOC            | State of Charge                         |
| SOH            | State of Health                         |
| DOD            | Depth of Discharge                      |
| Battery Module | Multiple cells connected together       |
| Cabinet        | A carrier that carries multiple modules |

# **1 Overview**

## **1.1 Scope of Application**

This document provides comprehensive information on Rack-mounted battery products, including their specifications, operational specifications, maintenance procedures and other relevant details. The Rack-mounted battery products are widely used in small and medium-size energy storage fields.

## **1.2 Target Audience**

This manual is intended for professionals and technical personnel who install, operate and maintain the batteries, as well as for end-users who may need to view relevant technical parameters.

## **1.3 User Manual**

Please read the user manual carefully before use to ensure a comprehensive understanding of the product. After reading, please store this manual in a secure location for future reference.

## **1.4 Disclaimers**

Failure to operate this product correctly may result in severe injury to oneself or others, as well as damage to the product or surrounding property. By using this product, you are deemed to have fully understood, acknowledged and accepted all the terms and contents in this document. Users assume responsibility for their actions and any resulting consequences. The company shall not be held liable for damages caused by the user's failure to comply with the provisions stated in this document or the user manual.

The content of this manual will be periodically updated and revised without prior notice. It is recommended to obtain the latest product manual.

# 2 Safety Instructions

## 2.1 Label Description

To ensure the user's personal safety when using this product, this manual provides relevant identification information and uses appropriate symbols to alert the user. It is recommended that the user carefully reads the following list of symbols used in this manual.

Table 2-1 Label description

|                                                                                     |                                                                                    |
|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
|    | Potentially Low Risk: May result in mild or moderate impairment if not avoided     |
|    | High Risk: May result in serious injury or death if not avoided                    |
|    | The battery terminals must be disconnected before commencing work on the battery   |
|    | The battery could explode and/or be severely damaged if dropped or crushed         |
|    | The battery may explode if exposed to open flames or other extreme sources of heat |
|  | Grounding: The system must be firmly grounded for the operator's safety            |
|  | This side should be facing up                                                      |
|  | Handle with care to avoid damage                                                   |
|  | Keep dry                                                                           |
|  | Keep the battery out of reach of children                                          |
|  | Do not short circuit                                                               |
|  | Do not reverse connection of the positive and negative terminals                   |

## 2.2 Installation Tools

Table 2-2 Installation Tool Sheet

|                    |                                                                                                           |                                                                                                        |                                                                                                                      |
|--------------------|-----------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| Tools              | Multi-meter<br>          | Protective gloves<br> | Insulated anti-smashing shoes<br> |
|                    | Protective suit<br>      | Safety glasses<br>    | ESD wrist strap<br>               |
| Installation Tools | Electric screwdriver<br> | Cross screwdriver<br> | Socket spanner<br>                |
|                    | Slotted screwdriver<br>  | Wire stripper<br>     |                                                                                                                      |

## 2.3 Attention Items

### 2.3.1 Manual Custody

This manual contains important information about the Rack-mounted lithium batteries. A careful reading of this manual will help you become familiar with this product. Please keep this manual in a safe place accessible to maintenance personnel whenever needed.

### 2.3.2 Product Identity Protection

Warning labels, back panels and front doors of cabinet contain important safety information and are strictly forbidden to be torn and damaged.

### 2.3.3 Operator Requirements

Only trained and qualified professionals should perform various operations on the product. The operator should be fully familiar with the product's system components, operating principles, and the user manual.

### 2.3.4 Safety Warning

 During the installation, daily maintenance, overhaul and other operations of products, the following guidelines should be observed to prevent accidental operations and proximity or occurrence of accidents by unrelated personnel: the front and rear switches of the products should be clearly marked to prevent accidents caused by wrong switches; warning signs or safety warning belts should be placed near the operation area to prevent the proximity of unrelated personnel.

Do not disassemble the battery top cover. For any internal maintenance required, the product shall be returned to the manufacturer for handling.

### 2.3.5 Electric Measurement

 Due to the high voltage of the battery that may endanger personal safety, accidental contact may cause serious injury. During measurement operations, please ensure adequate insulation protection (such as using insulating gloves).

### 2.3.6 Measuring Instrument

 To ensure that the electrical installation meets the requirements, please use the relevant electrical measuring equipment, such as multi-meter and power meters.

### 2.3.7 Maintenance

 During maintenance and repair operations, ensure that the energy storage battery cabinet is not accidentally charged. Use a multi-meter to ensure that there is no electricity in the energy storage battery cabinet. Utilize insulating materials to insulate the possible electrical parts of the system. Ensure that the system has necessary grounding connections in place.

### 2.3.8 Chemical Information



The battery contains hazardous substances such as polyvinylidene fluoride, graphite, copper (Cu), and lithium iron phosphate with carbon coating.

#### Personal Precautions, protective equipment, and emergency procedures:

In case of rupture. Attention! Corrosive material. Avoid contact with skin, eyes and clothing. Ensure adequate ventilation. Use personal protective equipment as required. Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak.

#### Environmental Precautions:

Prevent product from contaminating soil and from entering sewers or waterways.

#### Methods and materials for Containment:

Stop the leak if safe to do so. Contain the spilled liquid with dry sand or earth.

Clean up spills immediately.

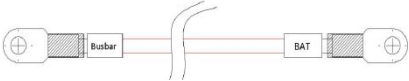
#### Waste Treatment:

Recycle or dispose of in accordance with government, state & local regulations.

# 3 Main Components

The core components of the battery module are shown in Table 3-1 below:

Table 3-1 Main components sheet

| No | Item                | Picture                                                                              |
|----|---------------------|--------------------------------------------------------------------------------------|
| 1  | DP-51100-R          |    |
| 2  | Power Cable         |    |
| 3  | Communication Cable |  |
| 4  | Manufacturer        | Jiangmen zetara power technology Co., LTD                                            |
|    |                     | Made in china                                                                        |

# 4 Product Description

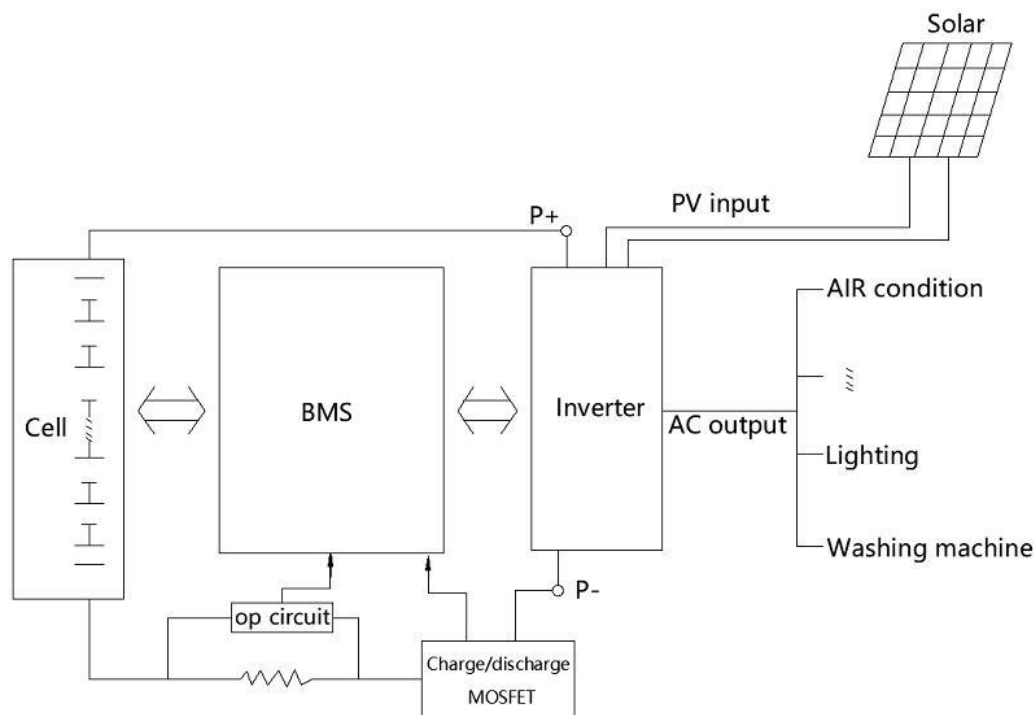
## 4.1 Product Introduction

Rack-mounted energy storage products are modular products for energy storage applications and are widely used in small and medium-sized energy storage systems. Each module consists of cells, a BMS and a shell. The BMS in each module is equipped with independent voltage, current, temperature detection and protection functions. The optimal configuration of the entire energy storage system can be achieved by adjusting the number of parallel modules.

The battery module consists of LiFePO4 cells , BMS, housing and wire, each module owns complete protection function. The module can be placed in a standard 19-inch cabinet and establish communication with the outside devices through CAN/RS485; the modules interact with each other through RS485. The modules can be connected in parallel to meet the expansion needs, and it maximum support 64 modules.

## 4.2 Connection Diagram

Figure 4-1 Working principle diagram of battery system



# 5 Battery module specification

| Item                  |                                 | Specification                 | Condition             |
|-----------------------|---------------------------------|-------------------------------|-----------------------|
| Nominal               | Voltage                         | 51.2V                         | 25°C,0.5C             |
|                       | Capacity                        | 100Ah                         |                       |
|                       | Energy                          | 5.12kWh                       |                       |
| Available             | Capacity                        | 100Ah                         |                       |
|                       | Energy                          | 5.12kWh                       |                       |
| Module weight         |                                 | 45Kg                          | ±1kg                  |
| Dimensions(W*D*H), mm |                                 | 442*470*154                   | ±2mm                  |
| Operating parameters  | Charging Voltage                | 56.0+/-0.8V                   |                       |
|                       | End-off Voltage                 | 44.8V                         |                       |
|                       | Charging current & Power        | Max 100A & 5kW                | Recommended 0.5C&0.5P |
|                       | Discharging current & Power     | Max 100A & 5kW                | Recommended 0.5C&0.5P |
| Temperature           | Charge range                    | 0°C~50                        | /                     |
|                       | Discharge range                 | -20°C~50°C                    | /                     |
|                       | Recommended storage temperature | 0°C~45°C                      |                       |
| BMS                   | Built-in active balancing BMS   | Voltage, current, temperature | RS485/CAN             |
| Service life          | Cycle life                      | >6000 <u>tims</u> ; 80%DOD    | @25°C,0.5C            |
|                       | Design life                     | >10years                      |                       |

# 6 Module Description

## 6.1 Module Specification

Rack-mounted battery adopts the highest safety performance lithium iron phosphate battery. Each battery module has a built-in full-featured and high-precision battery management system (BMS). The BMS enables real-time monitoring of voltage, current and temperature, and has a passive balancing function, effectively enhancing battery performance.

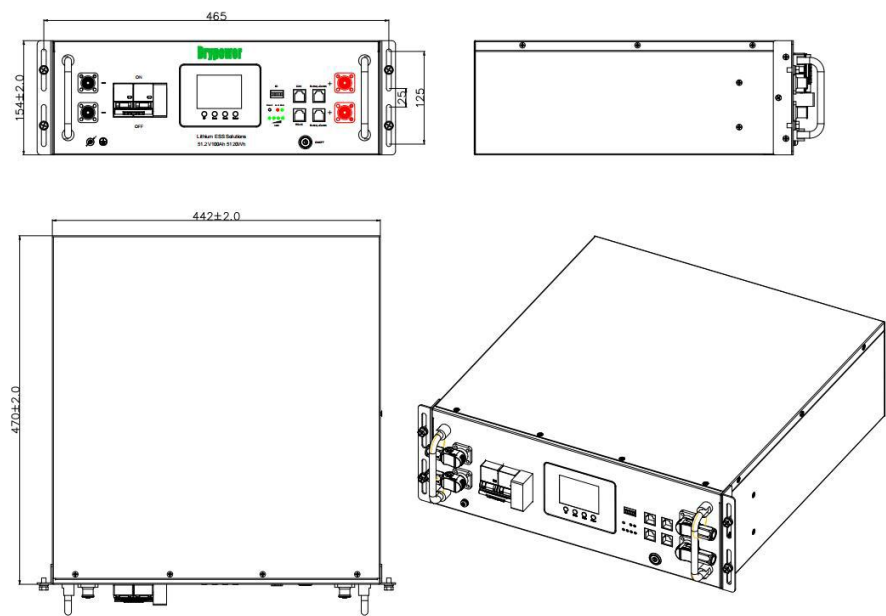
Table 6-1 Rack-mount battery Module Specification

| Type       | Voltage | Capacity | Energy | Width | Depth | Height | Weight |
|------------|---------|----------|--------|-------|-------|--------|--------|
| DP-51100-R | 51.2V   | 100Ah    | 5120Wh | 442mm | 470mm | 154mm  | 45Kg   |

## 6.2 Module Illustration and Front Panel Description

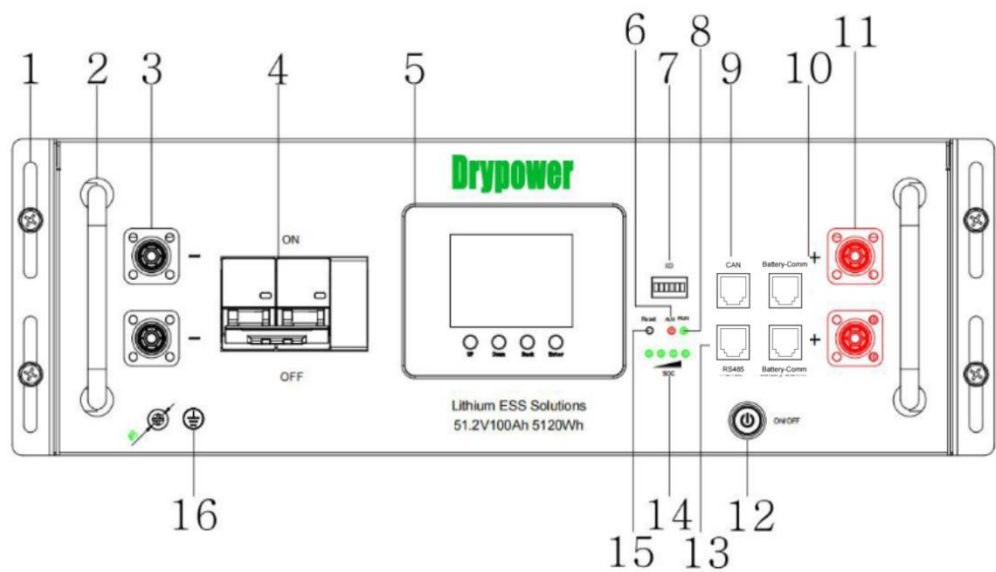
### 6.2.1 Appearance & Dimension Schematic Diagram

Figure 6-1 DP-51100-R Appearance & dimension drawing



### 6.2.2 Front Panel Diagram

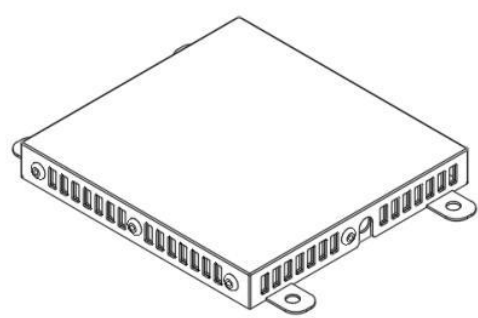
Figure 6-2 Front panel diagram



| No. | Item         | Function Description                        | Remarks                              |
|-----|--------------|---------------------------------------------|--------------------------------------|
| 1   | Hanger       | Fixed Hanger                                |                                      |
| 2   | handle       | For carrying, handling                      |                                      |
| 3   | Negative     | Battery negative terminals                  |                                      |
| 4   | Breaker      | Power output switch                         |                                      |
| 5   | LCD display  | Display battery information                 |                                      |
| 6   | ALM          | Alarming indicates LED                      | ALM                                  |
| 7   | ID           | Assign address of every model               | ID                                   |
| 8   | RUN          | Operating indicates LED                     | Always on when the system is running |
| 9   | CAN          | CAN Communication interface                 | CAN                                  |
| 10  | Battery-comm | Battery inter-comm when connect in parallel | Battery-com                          |
| 11  | Positive     | Battery positive terminals                  |                                      |
| 12  | ON/OFF       | Button Switch on/off the BMS                |                                      |
| 13  | RS485        | RS485 Communication interface               | Connected to inverter                |
| 14  | SOC          | The state of charge                         | 4 green lights mean fully charged    |
| 15  | Reset        | Emergency restart button                    |                                      |
| 16  | Grounding    | Preventing electric shock                   |                                      |

### 6.3 Aerosol Fire Extinguishing Device

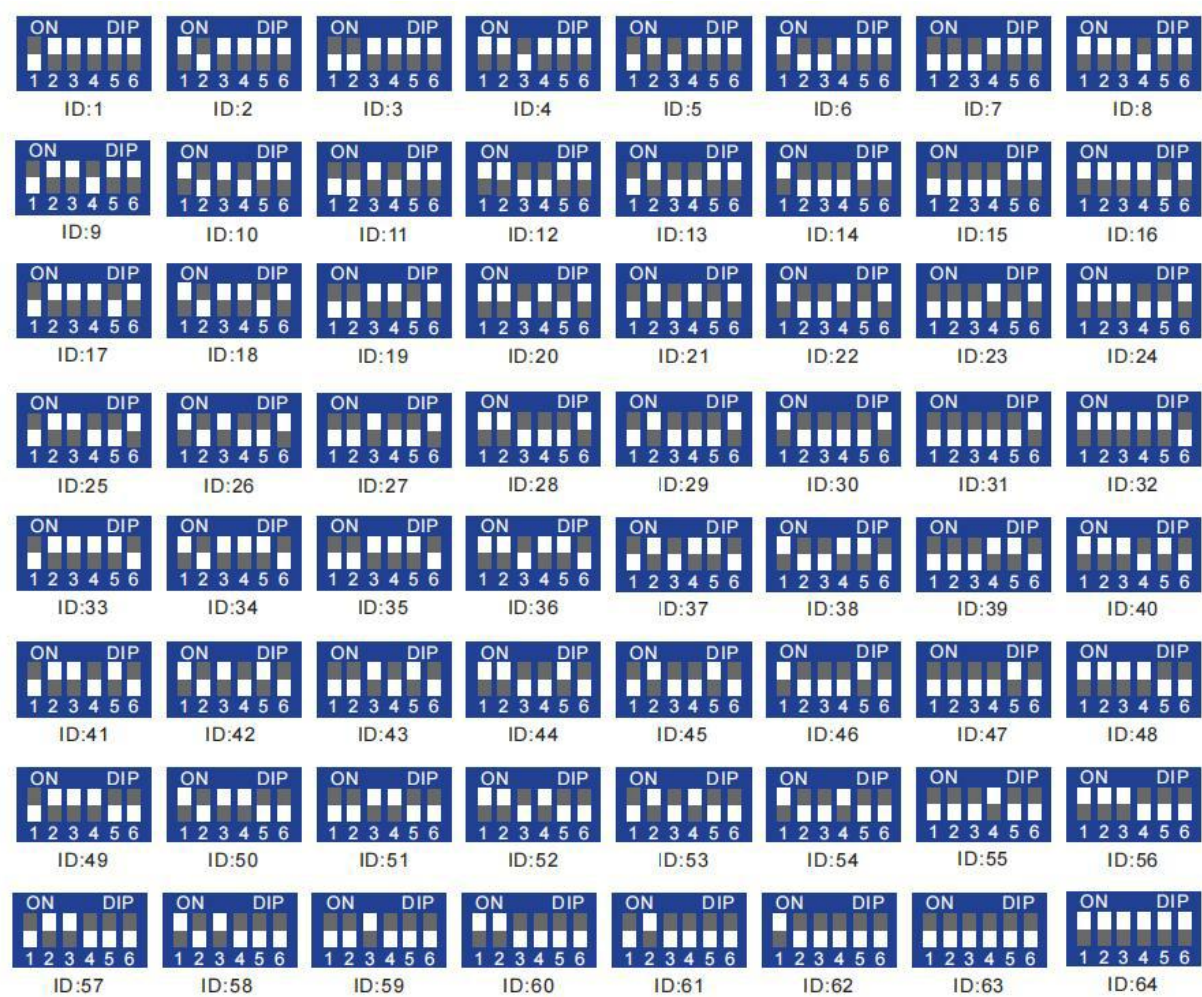
Figure 6-3 Front panel diagram



Each battery is equipped with 2 pcs of aerosol fire extinguishers, which can instantly extinguish the fire source in case of a fire, ensuring both personal safety and property protection!

# 6.4 ID Setting Description

Figure 6-4 6ID dialing code address assignment instructions



Notes:

1. The ID code bits correspond to binary digits, with down for "ON" and up for "OFF".
2. The left side of the code bit is the low bit, while the right side is the high bit. The code ranges from 1 to 64, and in communication mode, it can support up to 64 modules in parallel.
3. Reset the battery while configuring the dial code for standalone battery operation or parallel operation.

## 6.5 LED Indicator status and definition

Table 6-3 LED indicator status and definition

| Status           | Normal/Alarm/Protection              | RUN         | ALM             | SOC Indicate LED                                           | Notes                                 |
|------------------|--------------------------------------|-------------|-----------------|------------------------------------------------------------|---------------------------------------|
|                  |                                      | ●           | ●               | SOC1~SOC4●                                                 |                                       |
| Shutdown / Sleep |                                      | OFF         | OFF             | OFF                                                        |                                       |
| Stand by         | Normal                               | ON          | OFF             | Based on battery indicator<br>（Each LED indicators 25%SOC） |                                       |
|                  | Alarm                                | ON          | Flash           |                                                            | According to the state before standby |
| Charge           | Normal                               | Short flash | OFF             |                                                            |                                       |
|                  | Alarm                                | Short flash | Short flash     |                                                            |                                       |
|                  | End-off Voltage                      | OFF         | ON              |                                                            |                                       |
|                  | Over-Temp Protection                 | OFF         | Short flash     |                                                            |                                       |
|                  | Over-current transfer limit -current | Short flash | Short flash/OFF |                                                            | Over-current flash, limit-current OFF |
| Discharge        | Normal                               | Long Flash  | OFF             | Based on battery indicator                                 |                                       |
|                  | Alarm                                | Long Flash  | Long Flash      |                                                            |                                       |
|                  | End-off Voltage                      | OFF         | OFF             |                                                            | Go to sleep                           |
|                  | Over-Temp/Over-current Protection    | OFF         | ON              |                                                            |                                       |
| BMS Fault        |                                      | OFF         | Flash           | All OFF                                                    |                                       |

Notes:

Shutdown: All LED lights are off; Power on: RUN light is always on; System failure: ALM light is always on; each SOC light represents 25% capacity; Long flash: flash once every 2.4 seconds; Short flash: flash once every 1.2 seconds.

## 6.6 Communication Interface Diagram and Description

Figure 6-5 Communication interface diagram

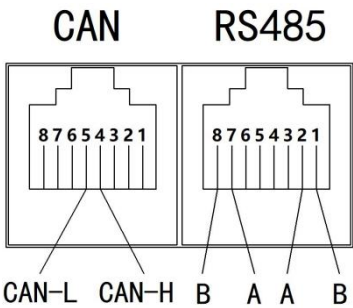


Table 6-4 Communication interface definition

| RS485- interface |                | CAN- interface |            |
|------------------|----------------|----------------|------------|
| Pin No.          | Definition     | Pin No.        | Definition |
| Pin-1,Pin-8      | RS485 B-(T/R-) | PIN-4          | CAN_H      |
| Pin-2,Pin-7      | RS485 A+(T/R+) | PIN-5          | CAN_L      |
| Others           | NC             | Others         | NC         |

## 7 Module Auxiliary Accessories

### 7.1 Power Cable

The power cable is used to connect the battery modules of the cabinet to carry the operating current so that multiple battery modules can form a complete power system.

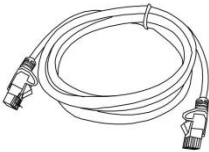
Table 7-1 Power cable Specification

| Picture                                                                             | Item                 | Specification |
|-------------------------------------------------------------------------------------|----------------------|---------------|
|  | Cross-sectional area | 4AWG          |
|                                                                                     | Safety Current       | 120A          |
|  | Cross-sectional area | 4AWG          |
|                                                                                     | Safety Current       | 120A          |

### 7.2 Communication Cable

The communication line is suitable for the information interaction between modules when the modules are used in parallel.

Table 7-2 Communication cable Specification

| Picture                                                                             | Item      | Specification |
|-------------------------------------------------------------------------------------|-----------|---------------|
|  | UL Rating | UL1007        |
|                                                                                     | Parameter | CAT6          |

# 8 System Installation

## 8.1 Handling, Transportation, Storage

### 8.1.1 Handling

 Improper handling practices may cause short circuits or damage to the battery pack, resulting in battery leakage or fire. Use forklifts or carts for handling. Ensure that the dimensions of materials do not exceed the width and height of aisles and doors, and maintain a moderate speed. Avoid situations where battery packs are inverted or stacked on top of each other during unloading.

### 8.1.2 Transportation

 To ensure safety, it is recommended to use a forklift or have multiple individuals handle the battery module due to its heavy weight. Avoid dropping, throwing, and exposing the equipment to collisions or strong vibrations during transportation.

Figure 8-1 Handling Tool diagram



8.1.3 Storage

 Short-term storage (within 3 months): If the battery is not used for a short period of time, the battery can be fully charged and stored in a dry, cool environment with non-corrosive gas. The recommended temperature range is 10~45°C, with a relative humidity of 60±30%. Store the battery away from strong electromagnetic fields and direct sunlight.

 Long-term storage (over 3 months): If the battery is not used for more than 3 months, keep the battery SOC at 50%~70%. Store it in a dry, cool environment with non-corrosive gas. The recommended temperature range is 20~35°C, with a relative humidity of 50±15%. Store the battery away from strong electromagnetic fields and direct sunlight. Charge the battery once every 6 months to avoid irreversible capacity loss caused by long-term storage.

8.2 Open-box Inspection

8.2.1 Unpacking Tools

| Table 8-1 Unpacking tools sheet |                                                                                     |                                                                                     |                                                                                       |
|---------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Item                            | Tools                                                                               |                                                                                     |                                                                                       |
| Tools                           | Slotted screwdriver                                                                 | Protective gloves                                                                   | Stripper                                                                              |
|                                 |  |  |  |
|                                 | Hammer                                                                              |                                                                                     |                                                                                       |
|                                 |  |                                                                                     |                                                                                       |

 The products undergo thorough testing and inspection prior to leaving the factory. Upon receipt, please carefully inspect the products and sign for them after confirming their condition. If any damage is observed, please promptly contact the local distributor. When opening the box, please check the following:

- (1) Outer Packaging: Ensure that the outer packaging is intact and not damaged
- (2) Quantity and Type: Verify that the quantity and type of goods received match the description provided in the bill of materials.
- (3) Internal Equipment: Inspect the internal components to ensure they are undamaged.

### 8.2.2 BOM List

The rack-mount lithium battery system supports up to 64 modules in parallel. Taking the 51.2V100Ah module system as an example, its BOM list is shown in the following table:

Table 8-2 51.2V100Ah Packing list

| No. | Item                | Quantity | Description                                | Remarks                                |
|-----|---------------------|----------|--------------------------------------------|----------------------------------------|
| 1   | Battery Module      | 1        |                                            |                                        |
| 2   | Power Cable         | 2        | 4awg, Red: 1pcs                            | Cabinet and external connection cables |
|     |                     |          | 4awg, Black: 1pcs                          |                                        |
| 3   | Communication Cable | 1        | International class 6 network cable, 210mm |                                        |
| 4   | User manual         | 1        |                                            |                                        |
| 5   | Terminal            | 2        | SC25-8                                     |                                        |
| 6   | GND                 | 1        | ground lead 6AWG                           |                                        |

## 8.3 Mechanical Installation

### 8.3.1 Installation Requirements

 The installation position of the battery has a direct impact on its safety, service life and performance. It should ensure that the wiring of the system is convenient, easy to maintain and operate, and should avoid placing the battery cabinet in a high temperature and high humidity environment. Use only indoors and keep well ventilated. Do not expose to sunlight, To ensure the firmness of installation floor.

- 1) The installation environment shall ensure continuous air circulation to prevent gas accumulation.
- 2) Confined spaces (such as battery cabinets and equipment rooms) must be equipped with mechanical ventilation with an air exchange rate of no less than 6 times per hour; or install a flammable gas detector that automatically activates exhaust ventilation when the gas concentration reaches 25% of the lower explosive limit (LEL).
- 3) Naturally ventilated environments shall have at least two opposite openings (e.g., doors and windows), with a total opening area of no less than 2% of the room floor area.
- 4) Installation is prohibited in windowless closed compartments without exhaust outlets or basements.

### 8.3.2 Module Installation

 According to the actual situation of the installation site, use manual or machine to carry the module; it is recommended that at least two people lift it together and wear anti-smashing shoes and non-slip gloves during installation. Taking 51.2V100Ah as an example,

Taking M6 screws as an example, wear protective equipment and use an electric screwdriver or manual screwdriver to remove matching screws from the battery or cabinet, or take corresponding screws from the accessory kit. Place the battery properly, then fasten the screws to the designated positions in accordance with the torque table below.

The left side of the module is positive, the right side is negative, and the communication port is in the middle, as shown in Figure 8-2:

Figure 8-2 Panel Diagram

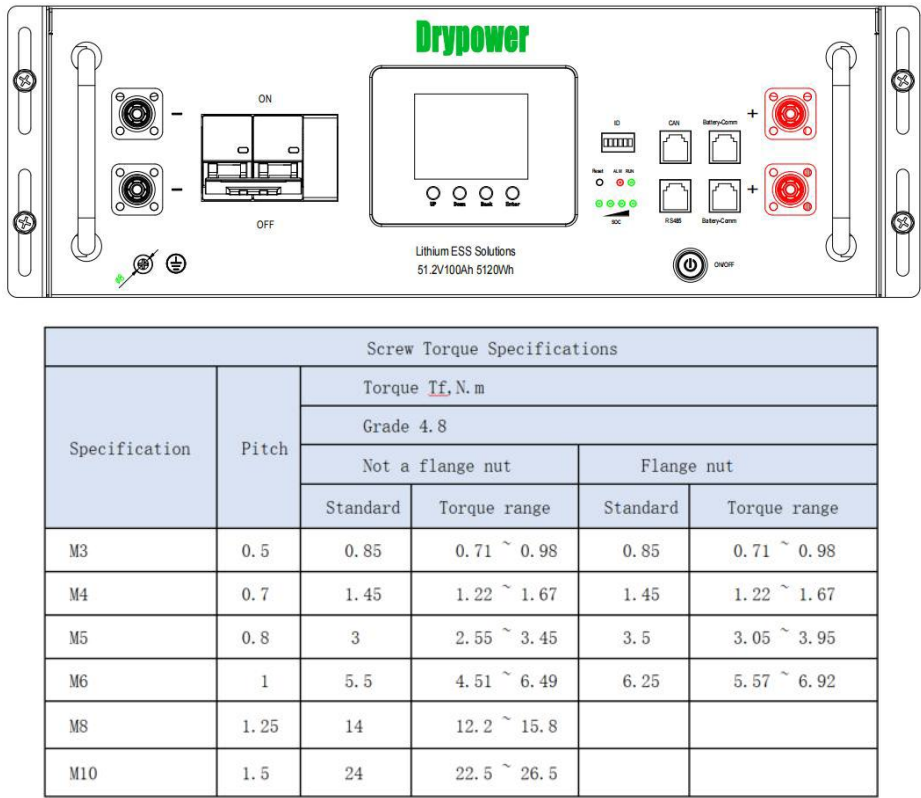


Figure 8-3 Panel Diagram

 When installing the module, follow the bottom-up, one-by-one installation method. Insert the battery modules into the rack tray, and then fix them with 4\*M6\*16 bolts one by one

8.3.3 single module i

nstallation

The fixing method of the inverter shall refer to the inverter user manual. Taking M6 screws as an example, wear protective equipment and use an electric screwdriver or manual screwdriver to remove matching screws from the battery or cabinet, or take corresponding screws from the accessory kit. Place the battery properly, then fasten the screws to the designated positions in accordance with the torque table below.

Figure 8-4 Installation diagram

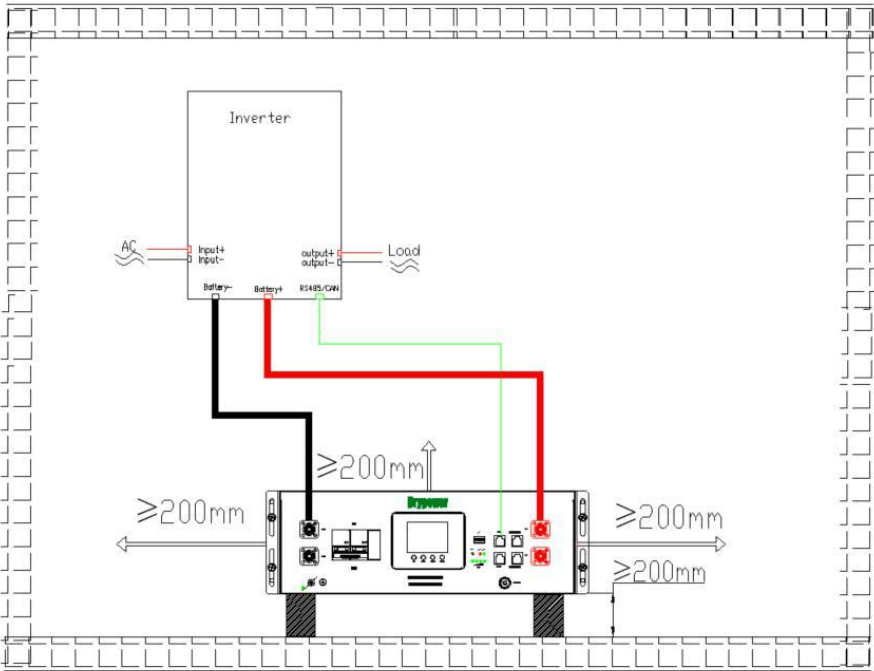


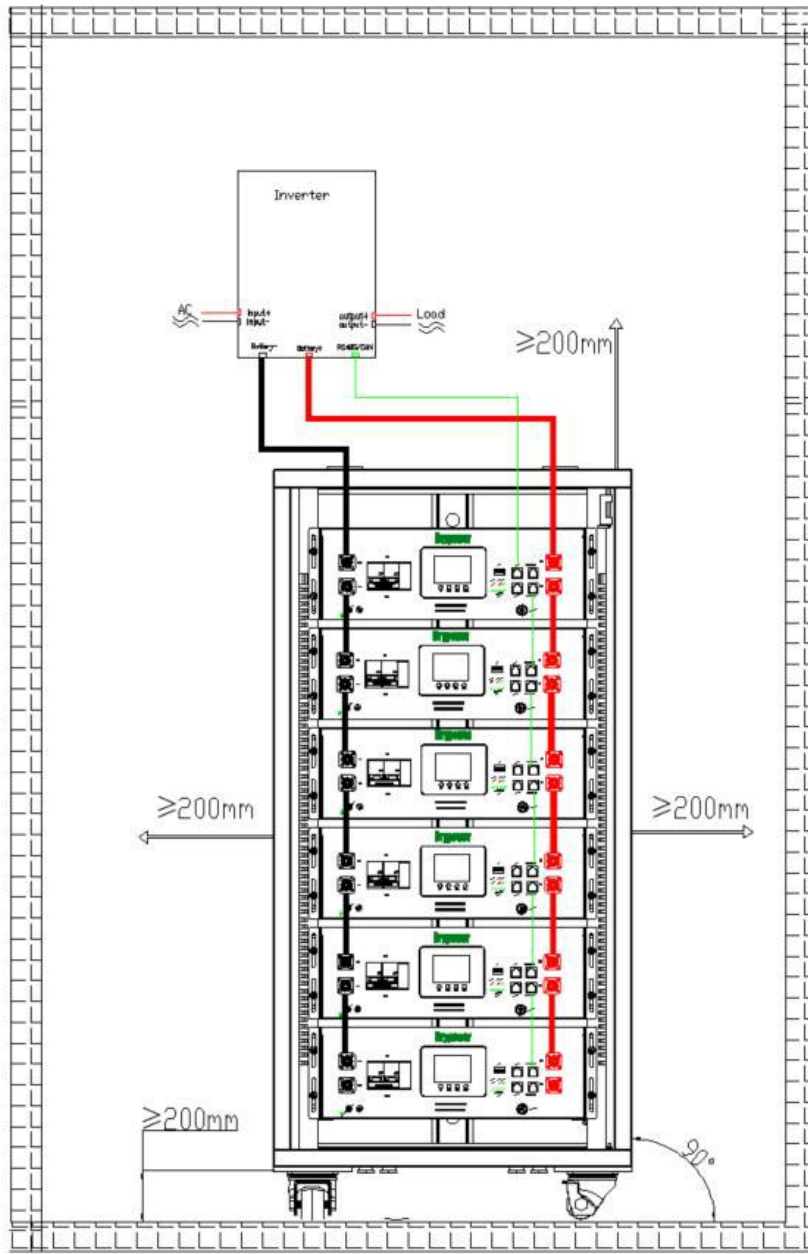
Figure 8-5 Installation diagram

| Screw Torque Specifications |       |                    |              |            |              |
|-----------------------------|-------|--------------------|--------------|------------|--------------|
| Specification               | Pitch | Torque $T_f$ , N.m |              |            |              |
|                             |       | Grade 4.8          |              |            |              |
|                             |       | Not a flange nut   |              | Flange nut |              |
|                             |       | Standard           | Torque range | Standard   | Torque range |
| M3                          | 0.5   | 0.85               | 0.71 ~ 0.98  | 0.85       | 0.71 ~ 0.98  |
| M4                          | 0.7   | 1.45               | 1.22 ~ 1.67  | 1.45       | 1.22 ~ 1.67  |
| M5                          | 0.8   | 3                  | 2.55 ~ 3.45  | 3.5        | 3.05 ~ 3.95  |
| M6                          | 1     | 5.5                | 4.51 ~ 6.49  | 6.25       | 5.57 ~ 6.92  |
| M8                          | 1.25  | 14                 | 12.2 ~ 15.8  |            |              |
| M10                         | 1.5   | 24                 | 22.5 ~ 26.5  |            |              |

8.3.4 multimodule installation

Wear protective equipment. Remove the battery from the carton and verify normal power-on status. Two personnel are required to lift and mount the battery onto the cabinet. Follow Section 8.3.3 for single-unit installation and fasten the screws to the specified torque values. Install and secure batteries inside the cabinet in a bottom-up sequence.

Figure 8-4 Installation diagram



**⚠** Rack-mount battery adopts fan-less design, which can effectively reduce the noise generated during the system operation. In order to ensure the effective heat dissipation of the whole system, it is recommended that the distance between the cabinet and the wall is  $\geq 200\text{mm}$ , and top margin  $\geq 200\text{mm}$ , Distance from ground  $\geq 200\text{mm}$ , as shown in Figure 8-3/8-4.

# 8.4 Electrical Installation

## 8.4.1 Tolls Introduction

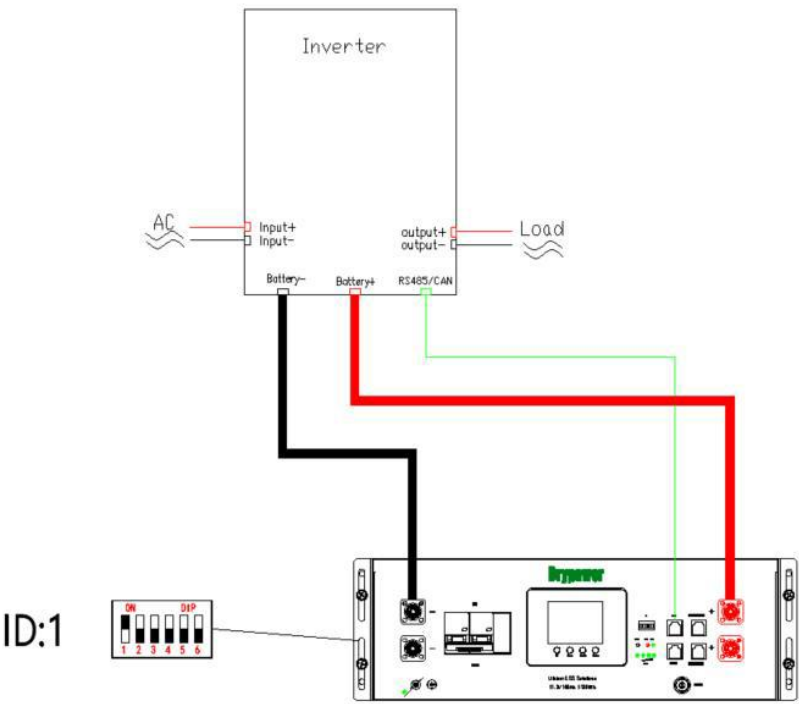
The following tools are required for electrical connection, as shown in Table 8-3:

Table 8-4 electrical installation tools diagram

| Item  | 工具             |                   |               |
|-------|----------------|-------------------|---------------|
| Tools | Multi-meter    | Protective gloves | Screwdriver   |
|       | Electric batch | Cross screwdriver | Socket wrench |

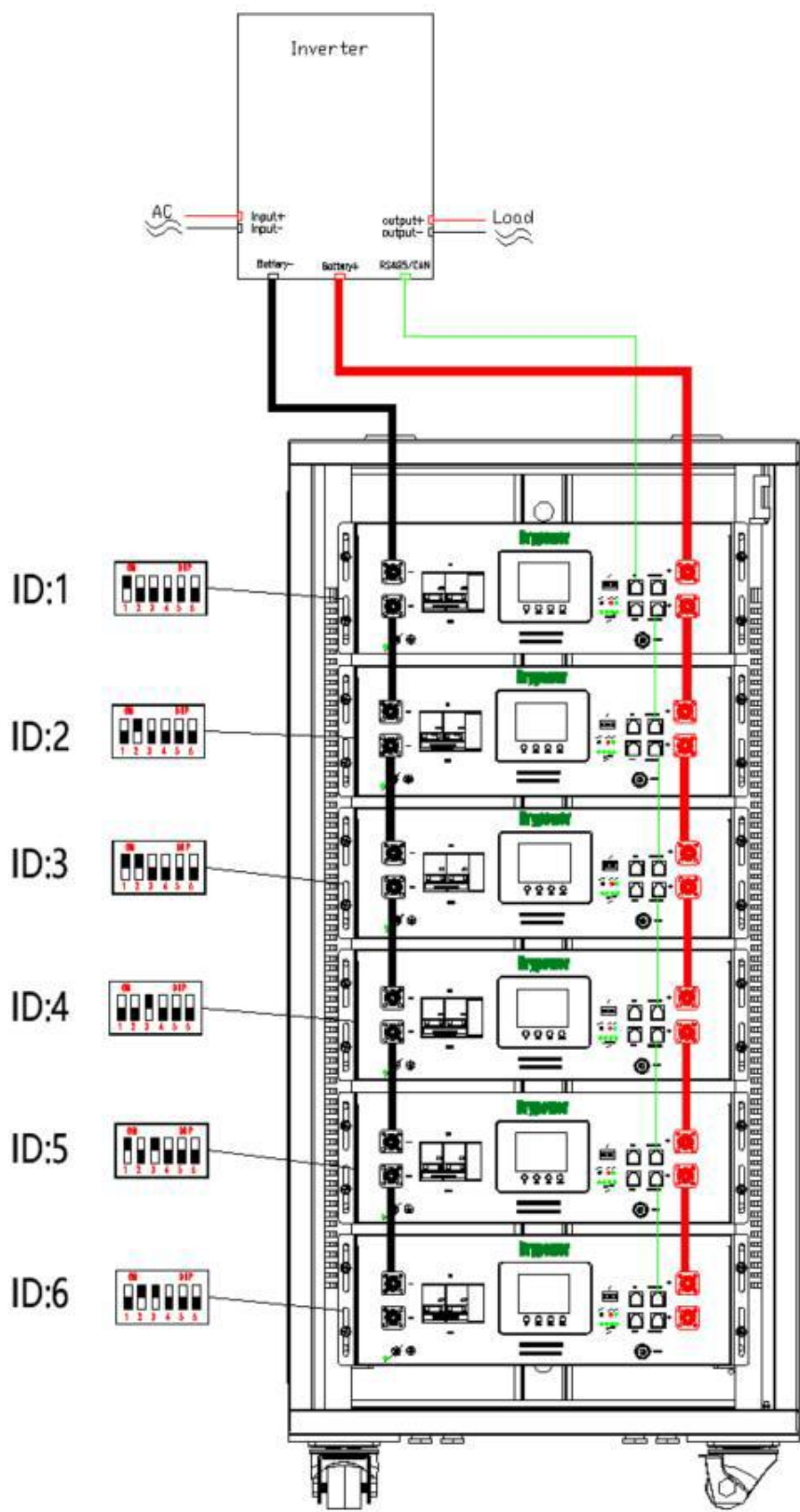
## 8.4.2 Electrical connection of a single module

Figure 8-5 System electrical connection diagram



### 8.4.3 Electrical Connection of Multiple Modules

Figure 8-6 System electrical connection diagram



 (1) When connecting the power line, make sure that the circuit breaker is in the OFF position, and measure that there is no voltage on P+ and P-. Then proceed with the operation.

 (2) Grounding. One end of the grounding cable is screwed to the grounding hole at the end of the chassis, and the other end is connected to the grounding copper strip of the rack (or cabinet) to ensure a solid connection.

Wear protective equipment. Use a screwdriver to remove the M5 pan-head combination screw at the grounding symbol on the battery enclosure. Thread the screw through the SC terminal at one end of the 6AWG PE wire from the accessory kit, fasten the PE wire to the battery in accordance with the torque specified in the torque table, and connect the other end to the grounding equipment.

 (3) Power cable installation. When a single battery, the battery terminals are directly connected to the equipment or switch power terminals; when there are multiple batteries used in parallel, first use the power cable to connect each battery in parallel, and then connect to the equipment or switch terminals.

 (4) Connect the equipment. Clearly identify the location of the positive and negative terminals of the system, red to the positive terminal, black to the negative terminal, to ensure no connection errors.

 (5) Communication cable installation. (When single module is used, please ignore this step) When multiple batteries are connected in parallel, please set the address code of the battery according to Figure 5-3 DIP Table (make sure there is no duplicate address code). Then connect the Battery-Comm interface of battery each other, Finally RS485/CAN interface of the No.1 address battery connect to the inverter by communication cable.

If there is one battery, the No.1 address battery directly connect to the inverter. And the RS485 or CAN communication port of battery connected to the corresponding inverter communication port.

Note: Address 1 will not communicate with BMS Tools correctly. To use BMS Tools change to another battery address unique to others in the system.

 (6) The inverter outputs AC power corresponding to its input, and the battery DC input is correctly connected.

## 8.5 System Starting Up

### 8.5.1 Start Up Checking

 After installation or maintenance, the lithium battery system needs to be started up. Before starting up, please check the following precautions carefully to make sure there are no errors.

All electrical connections must be made in accordance with the electrical diagrams in the manual; the DC combiner box must be open; the cables are properly distributed, without mechanical damage, and connected and fastened correctly; the internal protection devices in the combiner box must be firmly installed; No excess parts or conductive material remains.

### 8.5.2 Start and stop

  After completing the above steps, connect the miniature circuit breaker, then press the start-stop switch on the battery control panel to activate the device, and finally turn on the system power supply to complete the startup process. For shutdown, reverse the sequence: first disconnect the system power supply, then disconnect the miniature circuit breaker, and finally press the start-stop switch on the battery control panel.

System Connection of Multiple Inverters and Batteries:

System power-on shall follow the sequence from low voltage to high voltage. First turn on the switches of slave units to the master unit one by one, and wait for one minute to ensure stable battery startup. Then close the circuit breakers of slave units to the master unit in sequence. After another one-minute wait for stable system power supply, power on slave inverters followed by the main inverter, and finally switch on the mains power/PV.

2) System power-off shall follow the sequence from high voltage to low voltage. First turn off the mains power/PV of slave inverters and the main inverter in sequence, then switch off the battery circuit breakers, and finally turn off the battery switches. After completing all operations, wait approximately 3 minutes. Use a voltmeter to measure the system voltage and ensure no residual voltage exists before carrying out maintenance work.

### 8.5.3 System Charge

 When the battery system is transported or stored for a long time, the battery SOH may be low due to self-discharge of the cells and system consumption, and the lithium battery needs to be charged after normal start-up and before use.

# 9 LCD Screen and PC Software

Each module has a built-in LCD display, and the PC software is only suitable for installation, maintenance.

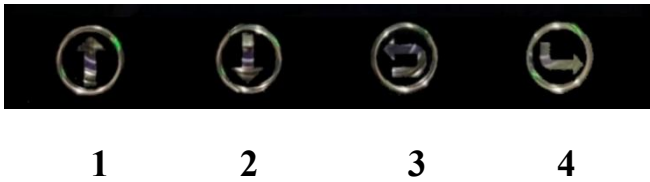
## 9.1 LCD Display Introduction

LCD display is embedded in each battery module, it's used to display some important information about the cells, such as voltage, current, temperature, SOC, capacity, running status etc.

### 9.1.1 Button Description

There are 4 function buttons below the display with detailed descriptions as shown in the table below.

Figure 9-1 Button description



The corresponding function description for each button is shown in the table below.

Table 9-1 Button description Table

| No. | Item   | Description |
|-----|--------|-------------|
| 1   | Up     | Page up     |
| 2   | Down   | Page down   |
| 3   | Return | Return      |
| 4   | Enter  | Confirm     |

### 9.1.2 Screen Wake Up

Press any key to wake up the screen when power is on, and more information will be shown on the display.

Figure 9-2 Main Page information



|                |                  |                        |           |
|----------------|------------------|------------------------|-----------|
| Battery ID     | 64               | CAPACITY               | 200Ah     |
| Battery status | Discharging      | Battery module voltage | 52.75V    |
| Battery SOC    | SOC: 96%         | PROTOCOL               | CAN: 01   |
| System time    | 2023-07-21 12:07 |                        | RS485: 01 |

### 9.1.3 Cell Information

Press the “Enter” button, check the cell information, there are 2 pages, “Up” and “Down” to change the page. Page 1 is for cell 01~ cell 9, page 2 is for cell 10 ~cell 16.

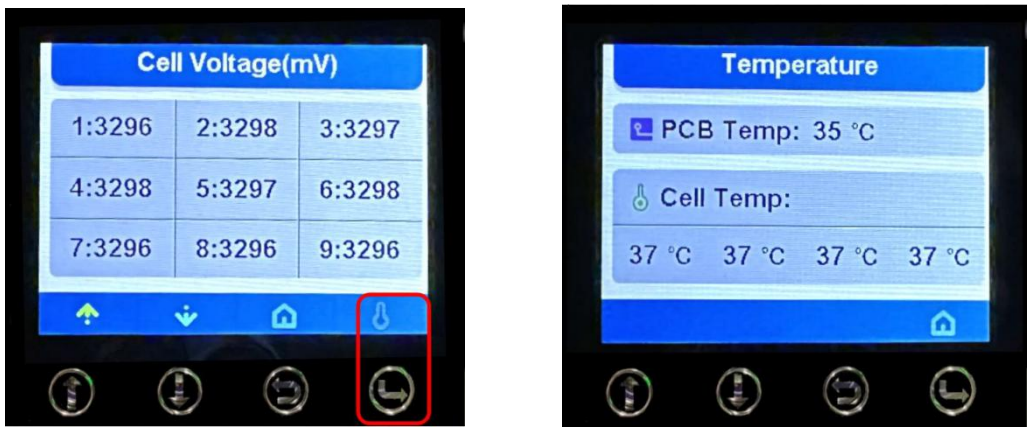
Figure 9-3 Cell information



### 9.1.4 Temperature Information

In the above interface, click the thermometer icon on the screen and press "Enter" below to view the information under the corresponding icon.

Figure 9-4 Temperature information



### 9.1.5 Working Mode Selection

To change the protocol to another, follow the steps:

1. Set the battery ID to No.64 (51.2V100Ah)
2. Turn on the battery, and press “Back” button for 5 seconds to enter the protocol selection screen;
3. Select the corresponding RS485 program or CAN program;
4. Press “Enter” to choose the protocol from the list;
5. Press the “Back” button to return to the main interface, restart the battery, and the battery will correspond to the program.

Figure 9-5 Working mode selection—RS485

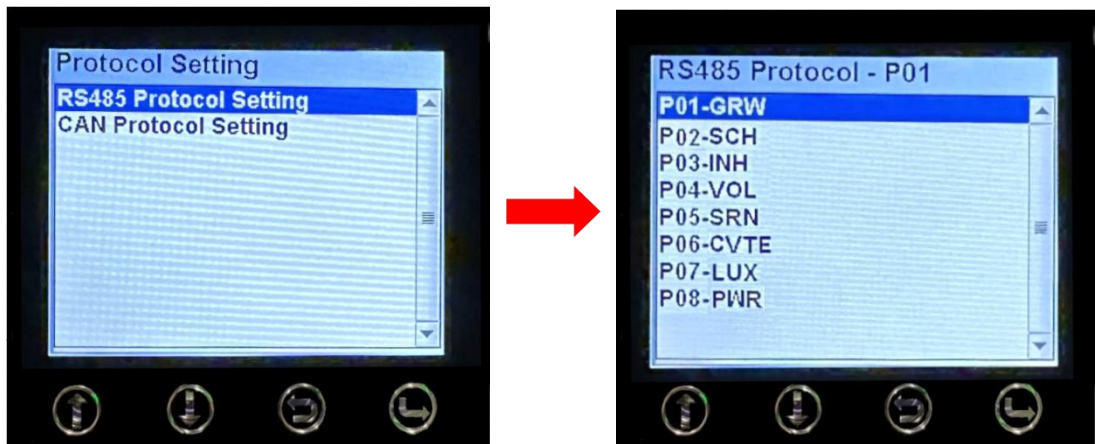


Figure 9-6 Working mode selection—CAN

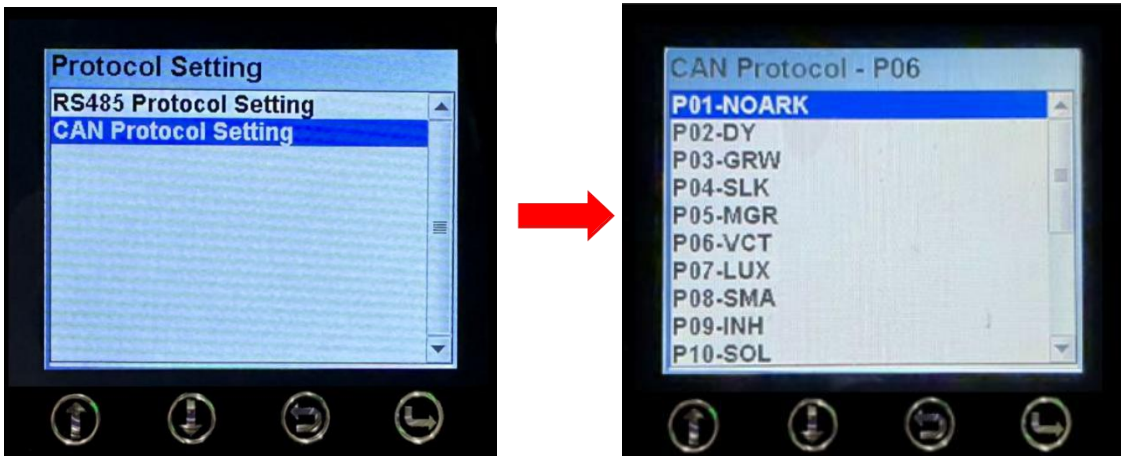


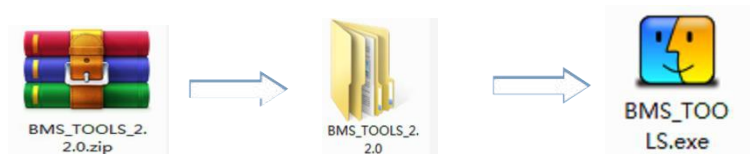
Table 9-3 The communication protocol list

| RS485         |                       | CAN           |                       |
|---------------|-----------------------|---------------|-----------------------|
| Protocol name | Inverter's brand name | Protocol name | Inverter's brand name |
| P01-DY        | Deye                  | P01-GRW       | Growatt               |
| P02-Noark     | Deye                  | P02-SLK       | Sol-Ark               |
| P03-GRW       | Growatt               | P03-DY        | Deye                  |
| P04-SCH       | Schneider             | P04-MGR       | Megarevo              |
| P05-INH       | Inhenergy             | P05-VCT       | Victron               |
| P06-VOL       | Voltronic             | P06-LUX       | Luxpower              |
| P07-SRN       | Srne                  | P07-SMA       | SMA                   |
| P08-CVTE      | CVTE                  | P08-INH       | Inhenergy             |
| P09-LUX       | Luxpower              | P09-SOL       | Solis                 |
| P10-PWR       | CVTE                  | P10-AFO       | Afore                 |
| P11-CROWN     | Voltronic             | P11-STU       | Studer                |
| P12-AKX       | Voltronic             | P12-MUST      | Must                  |
| P13-CROWN2    | Luxpower              | P13-SUN       | SAJ                   |
|               |                       | P14-PYL       | Pylon                 |
|               |                       | P15-TRB       | Turbo                 |
|               |                       | P16-HUB       | Pylon                 |

## 9.2 PC Software Installation

Contact your local distributor or official after-sales service to get the latest version of the software for free, and run the BMS\_tools.exe program directly after unpacking, as shown figure 8-7:

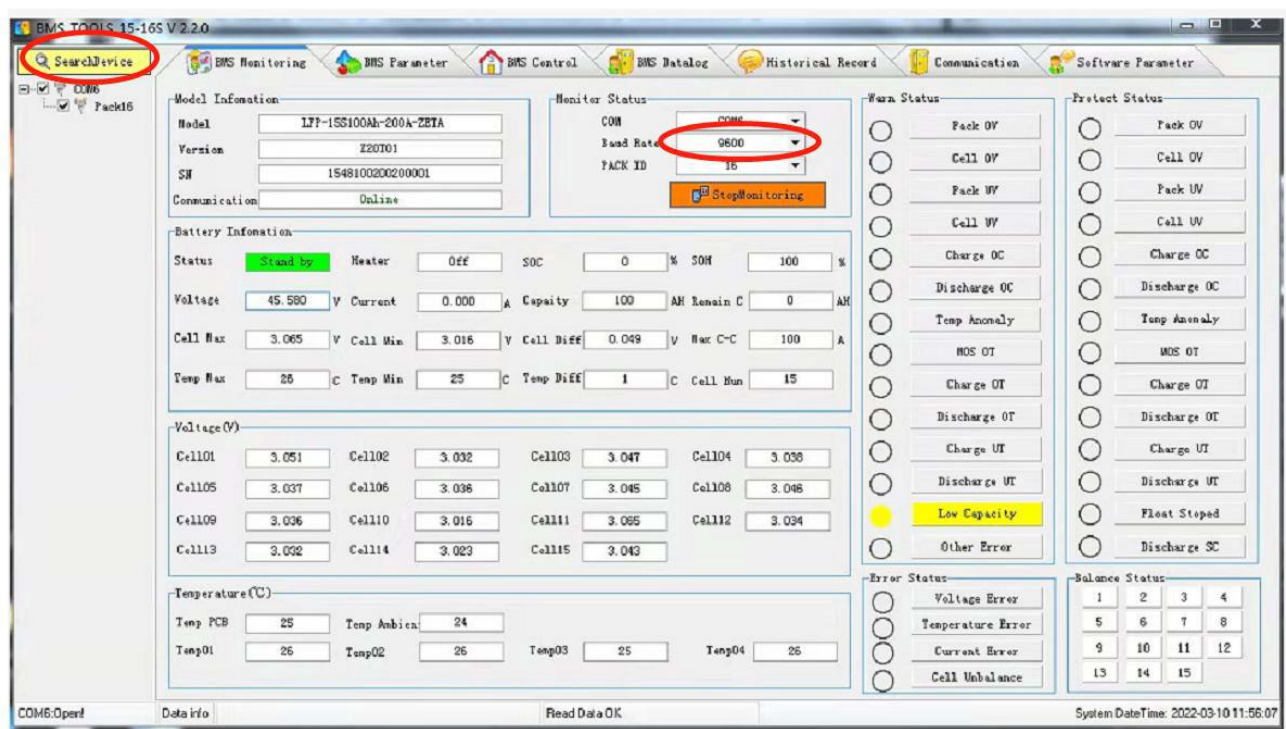
Figure 9-7 PC software installation steps



## 9.3 Communication Connection

Connect the 485 to USB cable; set the baud rate to 9600; click "Find Device" in the upper left corner; the software will automatically identify the connected battery pack. As shown in Figure 8-8.

Figure 9-8 Communication connection setting



## 9.4 Software Interface

The software interface is shown as figure 8-9:

Figure 9-9 Software interface

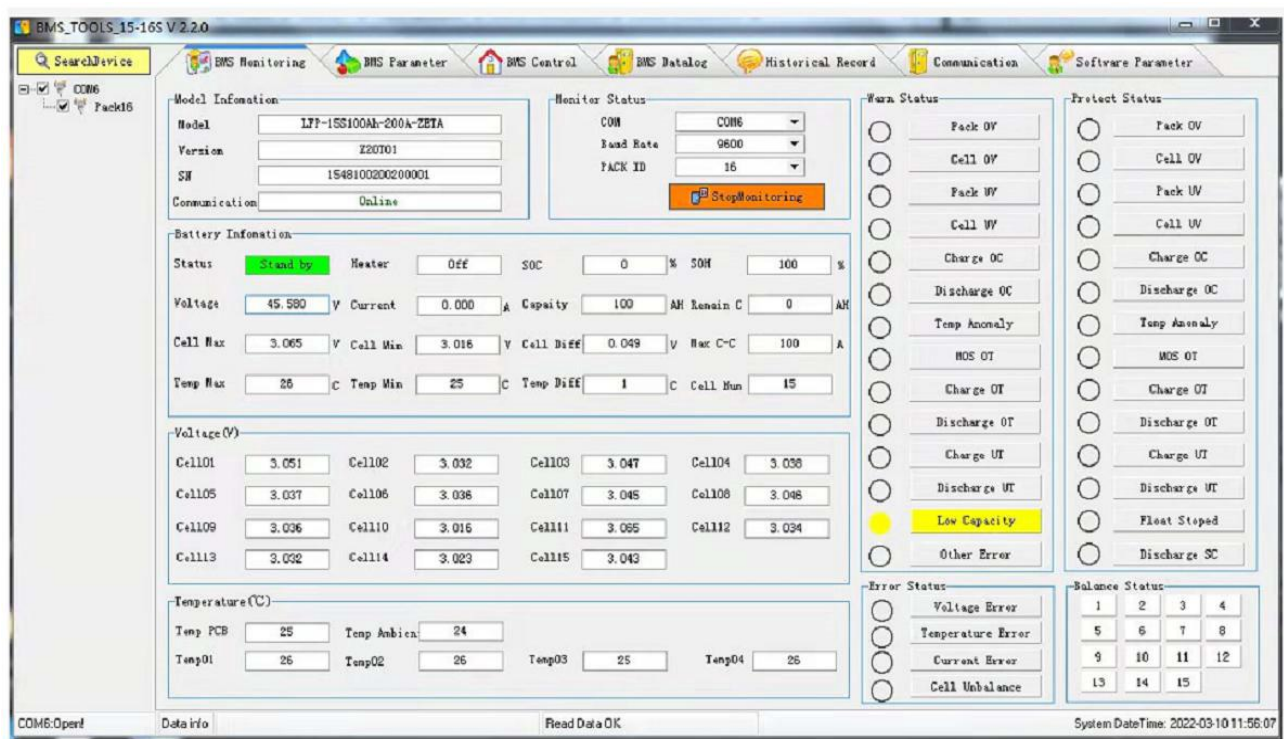


Table 9-4 Interface menu definition

| Item                       | Definition                                                                  |
|----------------------------|-----------------------------------------------------------------------------|
| BMS Real-time monitoring   | Real-time data and status monitoring of the BMS                             |
| BMS Parameter Setting      | BMS parameter Setting management                                            |
| BMS Control Management     | Control state management of BMS (not open)                                  |
| BMS Data Record (Optional) | BMS operation data logging                                                  |
| Monitoring History         | Battery operation data record in this machine (exportable)                  |
| Real-time data reception   | Record of sending and receiving of battery pack data (mainly for debugging) |
| Software system parameters | Software configuration, settings and language selection, etc.               |

# 10 Maintenance

## 10.1 Alarm Description and Handling

When the ALM light on the battery control panel is on, it means that the battery has given an alarm or has been protected, please check the cause of the failure through the computer and take appropriate measures or go directly to the site to troubleshoot. Common alarm conditions are shown in Table 9-1 below.

Table 10-1 Major alarms and protection

| State     | Type                    | Indicator | Disposal                                       |
|-----------|-------------------------|-----------|------------------------------------------------|
| Charge    | Over current protection | ALM       | Stop charge, check the settings and limitation |
|           | Temperature protection  | ALM       | Stop charge, wait for the temp recovery        |
| Discharge | Over current protection | ALM       | Stop discharge, check if there is an over load |
|           | Temperature protection  | ALM       | Stop discharge, wait for the temp recovery     |

## 10.2 Common Faults (Phenomenon) and Solutions

Common faults and solutions are shown in table 10-2.

Table 10-2 Common faults(phenomenon) and solutions

| NO. | Fault phenomenon                             | Analysis                                                              | Solution                                                                          |
|-----|----------------------------------------------|-----------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| 1   | Communication failure with inverter          | Communication port connect error or battery ID setting error          | Refer 8                                                                           |
| 2   | No DC output                                 | Not close breaker or low voltage                                      | Close breaker or charge the battery                                               |
| 3   | Power supply time is too short               | Battery capacity lack or not full power                               | Maintenance or replacement                                                        |
| 4   | Battery can't be charged fully               | Power system DC output voltage falls below the minimum charge voltage | Regulating DC output voltage of power supply to battery suitable charging voltage |
| 5   | ALM LED always lights                        | Power line connection short circuit                                   | Disconnect the power cable and check all cables                                   |
| 6   | The battery output voltage is unstable       | Battery management system do not operate normally                     | Press the reset button to reset the system, then reboot the system                |
| 7   | ALM LED flash 20 times and SOC1 LED on       | Unbalance voltage with cell                                           | Examine/balance the cell                                                          |
| 8   | ALM LED flash 20 times and SOC2 LED on       | Unbalance temperature                                                 | Replace temperature sensor cable                                                  |
| 9   | ALM LED flash 20 times and SOC3/4 LED on     | BMS damaged                                                           | Replace BMS                                                                       |
| 10  | Different SOC value of batteries in parallel | Normal phenomenon                                                     | No operation                                                                      |

|    |                                      |                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----|--------------------------------------|-------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 11 | Low voltage protection and no LED on | BMS goes into low voltage protection, and goes to sleep mode.                             | <p>Follow the below steps to reboot the module.</p> <ol style="list-style-type: none"> <li>1. Charge the battery immediately and it will reboot itself.</li> <li>2. Switch off and switch on, when it switch on, charge it immediately.</li> <li>3. Reboot and charge it immediately.</li> </ol> <p>If you follow step 1 or step 2 without charging immediately. BMS will protect and go to sleep mode in several minutes.</p> |
| 12 | Deep discharged and on LED on        | No charging in a long time after deep discharged, the voltage is too low to start the BMS | If the battery sleeps for a long time and the voltage is too low to start the BMS, you have to open the cover of the pack and charge it up to 40V before you reboot it.                                                                                                                                                                                                                                                        |

## 10.3 Daily Maintenance

Routine maintenance items are shown in Table 10-3 below.

Table 10-3 Routine maintenance items

| Item                                                                                                                                                                                                                                                                        | Maintenance Method                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Maintenance intervals |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| Power Cables<br>   | <ol style="list-style-type: none"> <li>1. check whether there is mechanical damage to the power cable and whether the terminal insulation sleeve has fallen off; if there is such a phenomenon, please turn off the machine and carry out maintenance or replacement.</li> <li>2. check whether the power cable is loose; if there is any sign of looseness, please use a standard torque wrench to tighten it.</li> <li>3. check the system for loose screws or discoloration of the copper bus bar; if the screws are loose, please tighten them with a standard torque wrench; if the copper bus bar is discolored, please contact the manufacturer for after-sales replacement.</li> </ol> | Once every 6 month    |
| Communication Cables<br>                                                                                                                                                                 | <ol style="list-style-type: none"> <li>1. check whether the parallel communication cable terminal is loose, if it is loose, re-tighten it.</li> <li>2. check whether the color of the communication cable has obvious discoloration, if discoloration, please shut down the machine to replace the communication cable</li> </ol>                                                                                                                                                                                                                                                                                                                                                              | Once a year           |
| Cabinet Cleanliness                                                                                                                                                                                                                                                         | Check the cleanliness of the front door, back door and battery module inside the cabinet, if there is obvious dusty, please clean up in time.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Once 6-12 month       |
| System running status<br>                                                                                                                                                                | <ol style="list-style-type: none"> <li>1. check if all parameters are normal when the system is running (system voltage, current, temperature, etc.)</li> <li>2. check whether the main core components of the system are normal, including system switches, contactors, etc. are normal</li> <li>3. check whether the system air inlet and outlet, air ducts are normal, if there is blockage and congestion, need to clean up in time</li> </ol>                                                                                                                                                                                                                                             | Once every 6 month    |
| Charge and discharge maintenance                                                                                                                                                                                                                                            | Use light load and shallow charge/discharge to check whether the SOC, SOH status of the battery is normal (using the upper computer software to read); it is recommended that the depth of discharge and charge/discharge power should not exceed 20% of the rated value                                                                                                                                                                                                                                                                                                                                                                                                                       | Once every 6 month    |

# 11 Cautions and Warranty

## 11.1 Cautions



Please read and comply with the following installation and usage conditions of the battery.

Incorrect installation or use of the battery may cause personal injury or damage to the product.

- (1) DO NOT throw the battery into water. Store the battery in cool and dry environment.
- (2) DO NOT put the battery into fire or heat the battery, as it may cause explosion or other hazardous incidents.
- (3) During battery charging, please choose specialized charging equipment and follow correct procedures. Do not use unqualified chargers.
- (4) DO NOT reverse positive and negative terminals. Do not connect the battery directly to AC power. Avoid battery short circuits.
- (5) DO NOT using batteries from different manufacturers or different types together, and do not mix old and new batteries.
- (6) DO NOT use the battery when it is hot, bulging, deformed or leaking.
- (7) DO NOT puncture the battery with nails or other sharp objects. Do not throw, stamp on, impact or hit the battery.
- (8) DO NOT open or try to repair the battery when it is defective. Warranty becomes invalid if the battery is repaired or disassembled.
- (9) Batteries are half charged before shipment. Do not use the battery if it feels hot, bulges, emits an abnormal smell, or exhibits any other abnormalities. Report it to the after-sale department immediately.
- (10) If a long-time storage is needed, please charge and discharge the battery every three months to ensure the optimal performance. The recommended state of charge for storage is between 50% and 60%.
- (11) Please use the battery within the temperature range specified in the manual.
- (12) The state of charge of batteries is 50% before shipment. Please charge the battery before using.

## 11.2 Description of Warranty

Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure