Version: 1.0

LiFePO4

# 51.2V 314AH LIFEPO4 BATTERY MANUAL

Operation and Maintenance


**SUPPORT**

If you are experiencing technical problems and cannot find a solution in this manual,please contact for further assistance.

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# Description

This manual describes in detail the requirements and procedures for safe installation and operation of lithium battery pack. Please read this manual carefully. Only qualified persons are allowed to install, operate and maintain the system, otherwise it may cause product damage or personal safety risks.

Any actions against safety operation, or do not follow rules of this manual and limited warranty letter, will void warranty and qualification of this product. Meanwhile, the manufacturer will be not responsible for the product damage, property damage, personal injury or even death.

The information contained in this manual is accurate when it's issued. Reserves right to change specification (such as optimization, upgrade or other operations) without prior notice, and please always view the latest document via QR code on the label.

In addition, please noted that the diagrams/schematics in this document are used to help understand system configuration and installation instructions, which may be different from the actual items in the installation.

# Contents

# I.Information

## 1.1 Validity

This document is valid for: **ECO-LFP-4831465**

## 1.2 Target Group

This document is intended for qualified persons and operators. Only qualified persons are allowed to perform activities marked with a warning symbol and the caption“Qualified person" in this document. Qualified persons must have the following skills:

* Knowledge of how lithium iron phosphate batteries work and are operated.

* Knowledge of how an energy storage system (including PV/battery/hybrid inverter, MPPT, Meter,Distribution box etc.) works and is operated.

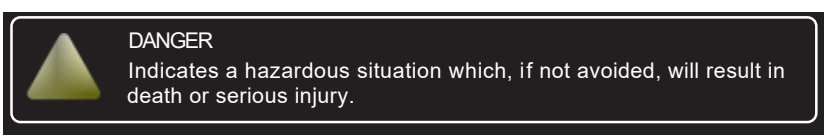
* Knowledge of local applicable connection requirements, standards, and directives.

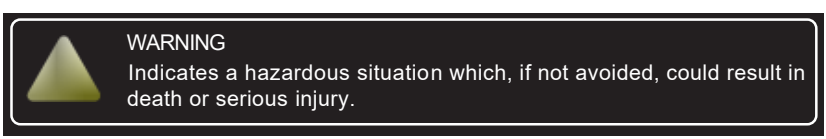
* Training in the installation and commissioning of electrical devices, batteries.

* Training in how to deal with the dangers and risks associated with installing, repairing and using electrical devices and batteries.

## 1.3 Levels of Warning Messages

The following levels of warning messages may occur when handling the product.




NOTICE
Indicates a situation which, if not avoided, can result in property damage or product not work or accelerated product damage.

## 1.4 Symbol Description

### 1.4.1 Symbols on products label

| Symbols | Definition |
|---|---|
|  | Indicates the danger of electric shock. If not avoided, it would cause casualities. |
|  | Indicates a potentially dangerous condition which could result in injury or death. |
|  | Indicates important information or warnings related to concepts talked about in the text. |
|  | Indicates more information is available in other documents relating to the subject and reader. |
|  | Indicates important steps or tips for optimal performance. |
|  | Do not place the battery within children/pet touchable area. |
|  | Do not place the battery near heat source and flammable material. |
|  | Do not expose the battery to direct sunlight, rain and snow. |
|  | Do not short circuit the battery. |
|  | Recycle label |
|  | WEEE designation |

1.4.2 Other symbols

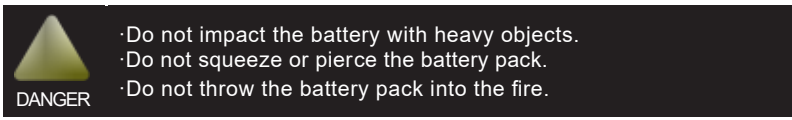
| Label | Definition |
| --- | --- |
| Qualified person | Indicates activities that can only be performed by qualified persons |
|  | Grounding point |

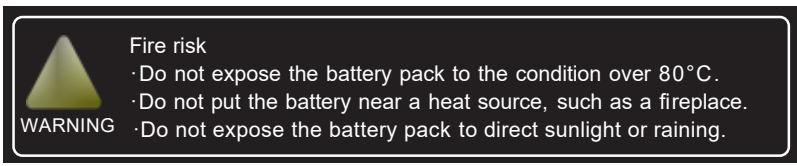
## 1.5 Abbreviation Description

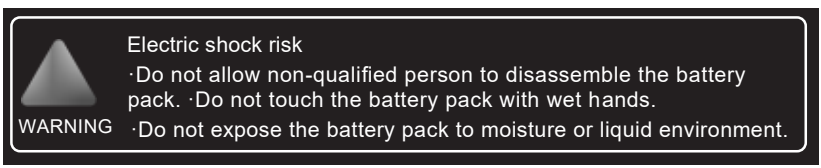
| Abbreviation | Definition |
| --- | --- |
| Battery/battery pack/battery module | Single ECO-LFP-4831465 rechargeable lithium rechargeable lithium iron phosphate battery pack including cells, BMSand enclosure etc. |
| Battery system/ cluster | Multiple ECO-LFP-4831465 battery pack connected in parallel with power, communication and grounding cables and installation auxiliaries. |
| BMS | Battery management system<br>Electronical Unit to ensure lithium cells'safety and display information or control the battery work mode. |
| SOC | State of charge<br>The battery state of charge refers to the percentage of the remaining capacity and rated capacity of the battery. |
| SOH | State of health<br>The battery health status refers to the percentage between the full charged capacity and the rated capacity of the battery. |
| DIP switch | Dual in-line package switch |

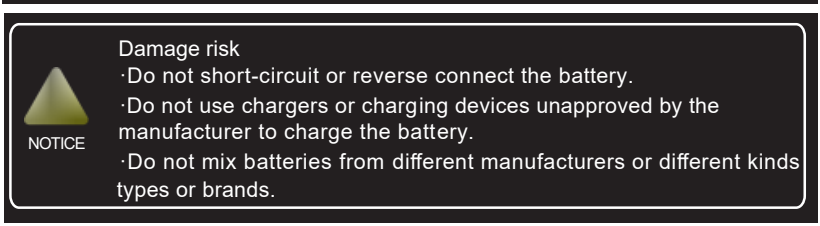
# II.Safety

## 2.1 Safety Precautions




## 2.2 Safety Instructions

The battery has been designed and tested in accordance with international (such as UL, IEC, UN38.3 etc.) safety requirements. However, Due to various factors during the whole lifetime process, we cannot guarantee absolute safety, in order to preventpersonal injury and property damage and ensure long-termoperation of the battery, please do read and following the below section carefully to operate the battery and handle emergency situations.

### 2.2.1 Safety gear

It is required to wear the following safety gear when installing and handling the battery pack.

Insulated gloves

Safety Glasses

Safety Shoes

### 2.2.2 Emergency safety measures

* Water invasion

Please cut off the AC power supply of the system first and then disconnect all switches under the premise of ensuring safety.

* Electrolyte or gas leakage

If the battery pack leaks electrolyte, avoid contact with the leaking liquid or gas. If one is exposed to the leaked substance, immediately perform the actions described below.

·Gas Inhalation: Evacuate the people from the contaminated area and seek medical aid immediately.

·Eye Contact: Flush your eye with clean and flowing water for 15 min, and then seek medical aid immediately.

·Skin Contact: Thoroughly rinse the exposed area with soap and water to be sure no chemical or soap is left on them, and seek medical aid immediately.

·Ingestion: Induce vomiting, and seek medical help immediately.

WARNING

In case of fire situations, please use carbon dioxide fire extinguisher rather than liquid to put out fires.

### 2.2.3 Other tips

·All the product are stric tly inspected before shipment, Please contact us for replacement if you notice there are any defectives such as swelling etc.

·Do not disassemble batteries and components, otherwise the manufacturer will not be responsible for any damage caused by unauthorizeddisassembly or repair.

·Enable the battery to be safely grounded before use to make sure the system in safe and normal operation.

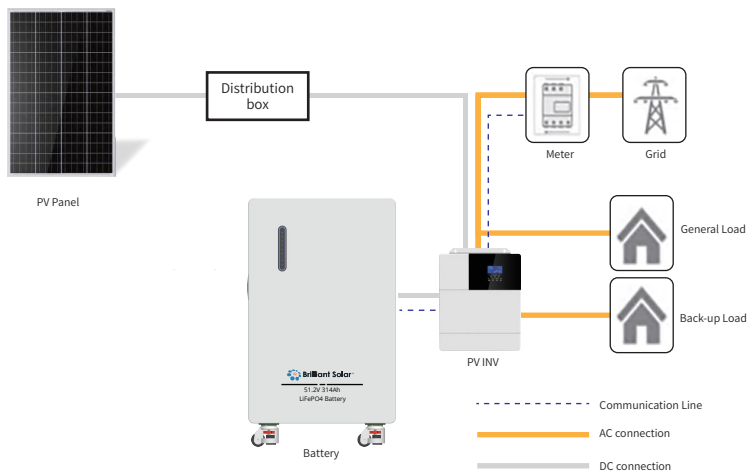
·Please ensure that the electric parameters of these devices are compatible mutually before connecting the battery to other devices.

·Please take the environmental factors into careful considerations to ensure that the system can work in a suitable condition as the environment and storage methods have a certain impact on the service life and reliability of this product.

# III.Product Overview

## 3.1 Introduction

The ECO-LFP-4831465 battery is designed for residential application and works as a storage unit in the photovoltaic system. It is a 48V Li-ion battery storage system, with BMS inside itself. It could be oper- ated in both on-grid, back-up and off-grid modes with compatible inverters. Below is the general schematic of an ac-coupled system.




CAUTION

This electrical connection in this diagram is only for illustration, please follow the Manual suggestions of related devices and operate in accordance with locally applicable connection requirements, standards, and directives.

## 3.2 Features

·Highest safety, battery is made from LiFePO4 chemistry and comply with highest international safety and transport standard.

·Modular and flexible, support up to 15 batteries connect together to expand the system energy.

·Build-in pre-charge circuit to avoid rush current when connecting with different inverter/chargers.

·Automatic dynamic addressing function when connected multiple batteries together.

·Rapid shutdown function for North American market.

·Support a maximum of 96% DOD under off-grid and back-up application

·Built in BMS provide warning and protection functions including over-discharged, over-charged, over- current, short-circuit and high/low temperature.

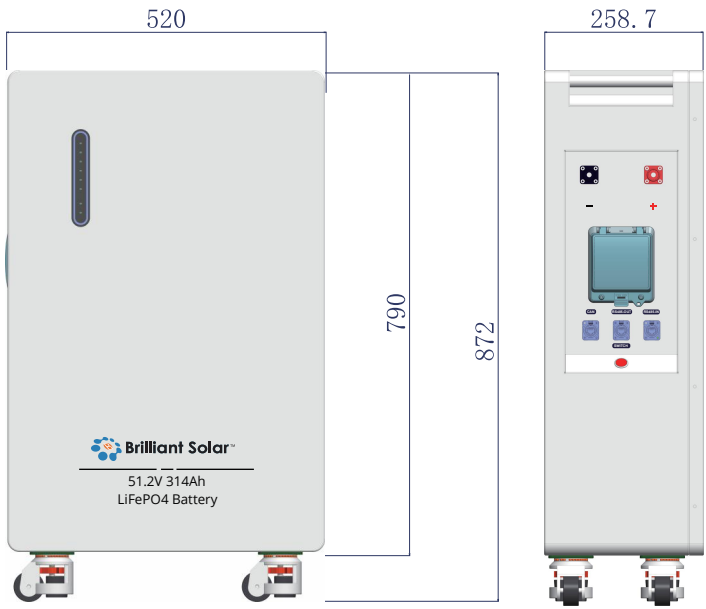
·LiFePO4 as cathode material and automatic balancing function to meet long cycle life

·Compact size and light weight for easy installation and maintenance.

·CAN/RS485 port for external communication and upgrade the BMS firmware.

## 3.3 Specification

### 3.3.1 Dimension



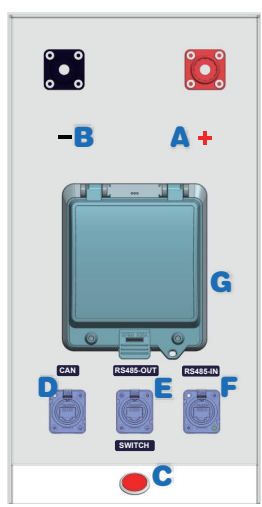

### 3.3.2 Parameters

| Items | ECO-LFP-4831465 |
|---|---|
| Nominal voltage | **51.2V** |
| Voltage range | **40~58.4V** |
| Charge cut-off voltage | **58.4V** |
| Discharge cut-off voltage | **40.0V** |
| Nominal energy | **16.08kWh** |
| Usable energy | **16.08kWh** |
| Nominal capacity | **314Ah** |

| | | |
|---|---|---|
| Dimension(L*D*H) | **520*258*872mm** | |
| Weight | **140kg** | |
| Standard charge current | **≤100A** | |
| Max. charge current | **200A** | |
| Standard discharge current | **≤100A** | |
| Max. discharge current | **200A(inital temp. ≤35℃)** | |
| Communication | **CAN/RS485** | |
| Max. parallel number | **15pcs** | |
| Operating temperature | **Charge: 0~55℃ Discharge:-20~60℃** | |
| Storage temperature | **0~45℃** | |
| | **Environment at the shipment state** | **60±25%R.H.** |

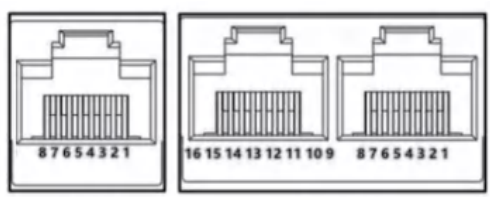
NOTICE
The optimum operating temperature range is from 15°C to 30°C, Frequent exposure to the harsh temperatures may worsen the performance of the battery pack and cycle life.

### 3.3.3 Panel Interface



| NO. | Items | Usage description | Remark |
|---|---|---|---|
| A | Positive terminal | Used to connect the inverter/charger | |
| B | Negative terminal | Used to connect the inverter/charger | |
| C | Power switch | Used to Power on/off battery | |
| D | CAN | Connect to host inverter | |
| E | RS485 IN | For communication between batteries | |
| F | RS485 OUT | For communication between batteries | |
| G | Breaker | The current is too high to disconnect the circuit | |

### 3.3.3.1 RS485 communication Interface Pin Diagram




| Communication Port | CAN1 | | RS485-2 | |
|---|---|---|---|---|
| Functional Description | Connect to host computer/inverter | | Parallel communication | |
| Pin Description | PIN | Description | | RS485-B2 |
| | 1，8 | NC | 1，8 | RS485-A2 |
| | 2、7 | NC | 2、7 | NC |
| | 4 | CANH1 | 4、5 | NC |
| | 5 | CANL1 | 3 | IN/OUT |
| | 3，6 | GND | 6 | GND |

## 3.3.3.2 LED Display Description

| System Status | event | ON/ OFF | RUN | ALM | SOC( LED 6~1 ) | | | | | | Description |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | LED1 | LED2 | LED3 | LED4 | LED5 | LED6 | |
| Shutdown | Dormancy | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF | All OFF |
| Standby | Normal | ON | Flash 1 | OFF | Refer to the table below | | | | | | Standby |
| | Warning | ON | Flash 1 | Flash 3 | | | | | | | / |
| Charge | Normal | ON | ON | OFF | According to battery state of charge (highest SOC LED: FLASH2) | | | | | | / |
| | Warning | ON | ON | Flash 3 | | | | | | | Overcharge alarm ALM does not flash |
| | Overvoltage protection | ON | ON | OFF | ON | ON | ON | ON | ON | ON | / |
| | Temperature, overcurrent, Fail-safe | ON | OFF | ON | OFF | OFF | OFF | OFF | OFF | OFF | / |
| Discharge | Normal | ON | Flash 3 | OFF | According to battery state of charge | | | | | | / |
| | Warning | ON | Flash 3 | Flash 3 | | | | | | | |
| | Temperature, overcurrent, Fail-safe | ON | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF | Stop dischargeing |
| | Overcurrent, short circuit, temperature, failure protection | ON | OFF | ON | OFF | OFF | OFF | OFF | OFF | OFF | Stop dischargeing |
| Failure | Cell disconnection, temperature disconnection,AFE sampling failure,discharge MOS failure | OFF | OFF | ON | OFF | OFF | OFF | OFF | OFF | OFF | Stop charging and discharging |

| State | | Charging status | | | | | | Discharge status | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LED | | LED 1 | LED 2 | LED 3 | LED 4 | LED 5 | LED 6 | LED 1 | LED 2 | LED 3 | LED 4 | LED 5 | LED 6 |
| SOC ( % ) | 0 ~ 16.6% | OFF | OFF | OFF | OFF | OFF | Flash 2 | OFF | OFF | OFF | OFF | OFF | ON |
| | 16.6 ~ 33.2% | OFF | OFF | OFF | OFF | Flash 2 | ON | OFF | OFF | OFF | OFF | ON | ON |
| | 33.2 ~ 49.8% | OFF | OFF | OFF | Flash 2 | ON | ON | OFF | OFF | OFF | ON | ON | ON |
| | 49.8 ~ 66.4% | OFF | OFF | Flash 2 | ON | ON | ON | OFF | OFF | ON | ON | ON | ON |
| | 66.4 ~ 83.0% | OFF | Flash 2 | ON | ON | ON | ON | OFF | ON | ON | ON | ON | ON |
| | 83.0 ~ 100% | Flash 2 | ON | ON | ON | ON | ON | ON | ON | ON | ON | ON | ON |
| RUN LED | | ON | | | | | | Flash 3 | | | | | |

## LED Flashing Description

| FLASH Type | ON | OFF |
|---|---|---|
| FLASH1 | 0.25S | 3.75S |
| FLASH2 | 0.5S | 0.5S |
| FLASH3 | 0.5S | 1.5S |

## 3.4 Protection

| Items | Description | Remark |
|---|---|---|
| Charge End Cell/ PACK high-voltage | The BMS will stop charging if any cell or PACK voltage reaches the protection value and it will be auto-released only when both Pack and cell voltage back to the release voltage range or there is efficient discharge current. | |
| Discharge End Cell/ PACK low-voltage | The BMS will stop discharging if any cell or PACK voltage is under the protection value and it will be released only when all the cell voltage back to the release voltage range or there is efficient charge current. | It can automatically recover. Please charge timely, otherwise it may be in Low-power mode to be over-discharged. |
| High temperature | The BMS will halt charging. discharging. or both if any cell. environmental. or MOSFET temp erature falls outside the acceptable range. | Automatic recovery |
| Low temperature | The BMS will stop charging or discharging or both if any cell/environment/MOS temperature is under the range. | Automatic recovery |
| Charge over-current | The BMS will stop charging when the charging current is higher than the protection value. And it will release from the protection when the system delays time is met. | It can automatically recover. If locked after three consecutive times, manual intervention is required. |
| Discharge over- current/ Overload | The BMS will stop discharging when the discharging current is higher than the protection value. And it will release from the protection when the system delays time is met | Automatic recovery. If locked after three consecutive times, manual intervention is required. |
| Short-circuit/ Reversed | Short-circuit and Reversed polarity protection happened | Charge to release Manual reset |
| Temperature, Voltage, Current sensor failure | Enter the failure mode, manual intervention is required no charging and discharging. | Manual intervention |
| Dormancy mode | After reaching a certain condition, it will be in the dormancy mode | Recoverable |

CAUTION
Please re-charge the battery via solar, grid/generator or other energy source within 24h if the battery is over discharged.

NOTICE
Manually short-circuit and reverse the battery will void the warranty.

# IV. Lithium Battery IoT Cloud

## 4.1 Introduce

4.1.1. Home energy storage product support: Bluetooth local connection or WiFi ( 2.4GHz ) network remote control.

4.1.2. Comprehensive data: Automatically calculate and summarize comprehensive information, such as SOC , voltage, current, PACK parallel number, cell voltage maximum and minimum values, cell temperature maximum and minimum values, inverter Protocol.

4.1.3. PACK data: switch to view each PACK data, such as S OC , SOH , voltage, current, capacity, number of cycles, charge and discharge status, number of cells, cell voltage, cell temperature,MOS temperature, ambient temperature, equilibrium state.

4.1.4. Parameter setting: Synchronize the comprehensive settings to PACK , or switch to each PACK to set parameters separately.

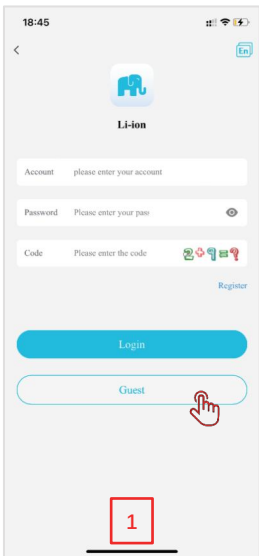
4.1.5. Device information: View the device information of each PACK , perform OTA upgrades on the PACK , and reconfigure the WiFi network.

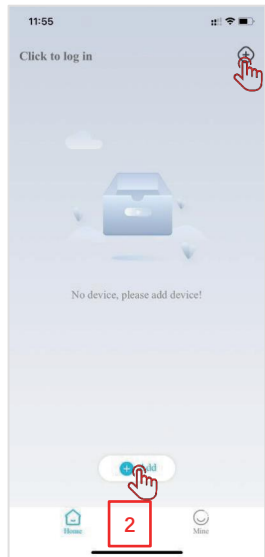
**Download the APP**

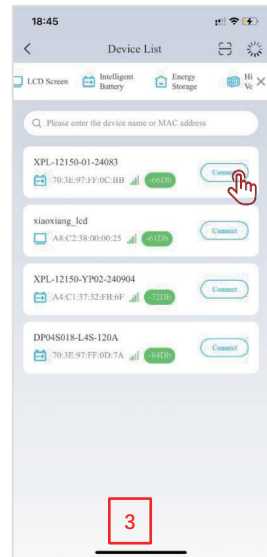
Scan the QR code to download the APP - JBD BMS

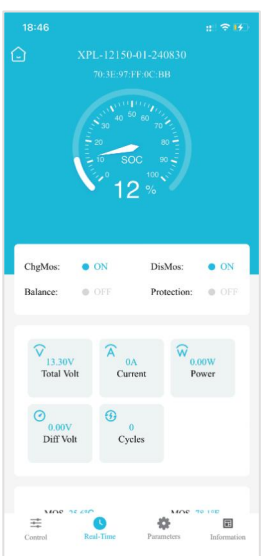
## 4.2 APP Use

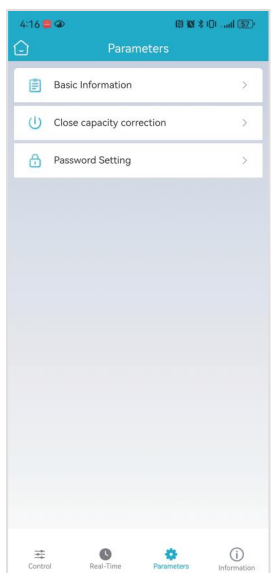
Open the APP and the enter the interface. You can read basic battery information but nor have operation and parameter setting permissions.

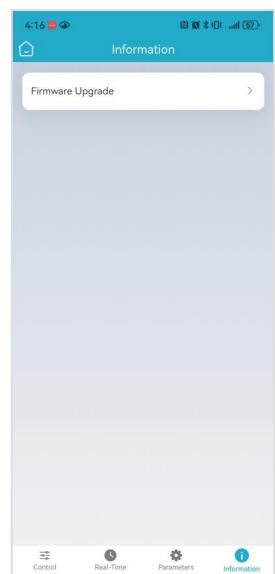


# V.Installation

## 5.1 Preparation

### 5.1.1 Safety compliance

The system installation must be finished by qualified person(s), During the whole installation process, please strictly follow the local safety regulations and related operating procedures.

### 5.1.2 Environment

The operating environment shall meet the following requirements:

| Category | Description |
|---|---|
| Working temperature | -20℃-55℃(maximum operating range)<br>15℃-30℃ (optimal temperature) |
| Relative humidity | 5%~90%, No condensation |
| Altitude | <3000m |
| Safety requirement | · Do not expose the battery to direct sunlight, rain and snow.<br>· Do not place the battery within children/pet touchable area.<br>· Do not place the battery near heat source and flammable material<br>· Do not place the battery in a closed place where the ventilation is not available.<br>· Do not drop, deform, impact, cut or spearing with a sharp object.<br>· Do not put heavy things on battery.<br>· Do not disassemble the battery without Manufacturer's permission.<br>· No conductive dust and water or other liquid to contact battery.<br>· Follow the emergency measure if there is water invasion or electrolyte and gas leakage.<br>· Contact your supplier within 24 hours if any product failure happens. |

### 5.1.3 Tools

| Tools | |
|---|---|
| Screwdriver (slot, cross) | Multi-meter |
| Wrench | Clamp meters |
| Diagonal pliers | Insulating tape |
| Needle nose pliers | Thermometer (observe the installation environment) |
| Clamping pliers | Anti-static bracelet |
| Wire stripper | cable ties |

## 5.2 Inspection

### 5.2.1 Unpack precautions

* Please load and unload it in accordance with the specified equirements to prevent sun and rain when you receive the equipment.

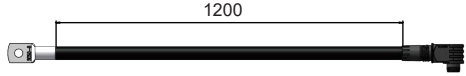
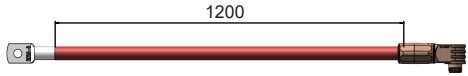
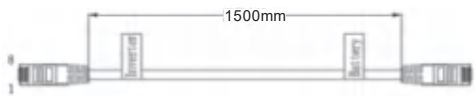
* Please check and confirm the goods (such as quantity, appearance, etc.) according to the "scope of delivery " before unpacking.

* Do light take and put during unpacking process to protect the surface coating of the object;

* Please record and contact to the manufacturer if the inner packing is damaged after unpacking.

### 5.2.2 Scope of delivery

| General materials | | |
|---|---|---|
|  Battery Pack *1pcs |  Manual *1pcs |  Communication cable *1pcs |

| Type | Detail | Qty. |
|---|---|---|
| Cables | A: Battery to Inverter positive cable(2AWG 1200mm BLACK)<br>1200<br>  | 1pcs |
| | B: Battery to Inverter positive cable(2AWG 1200mm RED)<br>1200<br>  | 1pcs |
| Communication Cables | C: Battery to Inverter communication cable (1500mm)<br>1500mm<br>  | 1pcs |

NOTICE

Keep the unused cable pins NULL to avoid affecting the closed loop communication.

NOTICE

A ground connection of communication cable may be required from some inverters, please follow the rules from inverter manufacture.

## 5.3 Start Installation

☐ **Qualified person**

### 5.3.1 Reminder

Before installation, please double check if the following conditions or equipment meet the requirements:

*Check if there is enough installation space and if the ground is flat enough

*Check if the power cords used meet the maximum current requirements for operation;

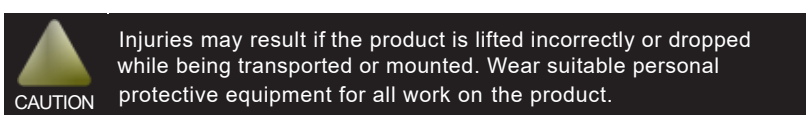
*Check whether the overall layout of power supply equipment and batteries on the construction site is reasonable;

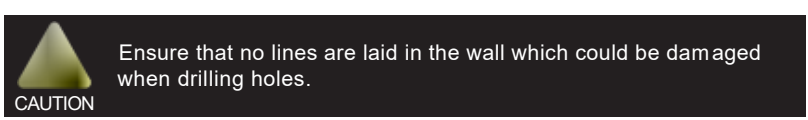
*Check if the installation personnel are wearing anti-static wristbands

*Check if there are two people performing installation work on the construction site

*Check the installation site for potential risks such as flooding, sun exposure, corrosion, and salt spray

### 5.3.2 Procedures



### 5.3.2.1 Unbox

1. Remove the battery from the wooden box.

2. Prepare the battery and place it horizontally in a reasonable position with the wheels facing down.

3. Rotate the red gear of the wheel clockwise, and then move the battery to the installation location.

4. Rotate the red gear counterclockwise to fix the wheel.

5. Complete the cable connection.

NOTICE

ANY others installations, please avoid the battery directly contacting the ground and avoid of high salinity, humidity to prevent the product from rusting and corrosion.

# VI.Cable Connection and Commissioning

☐ **Qualified person**

## 6.1 Get Battery Ready

6.1.1 Ensure all the battery is in OFF mode, and confirm the installation is tighten and stable.

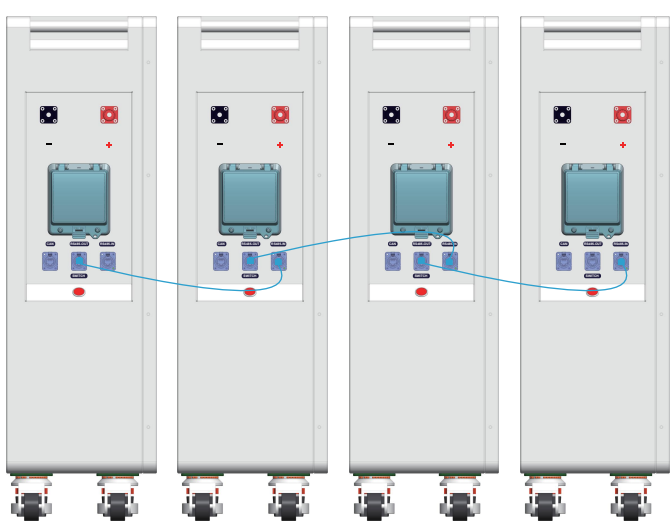
6.1.2 Check the number and specification of cable kit accessories are correct according to the Scope of delivery item, if you are making cable yourself, please follow manufacturer's requirements.

6.1.3 Switch on all battery individually, check whether there is any alarm/protection information, if yes, turns to troubleshooting. Then switch off all batter

## 6.2 Communication Cable Connection

6.2.1 Take out battery to battery communication cable.

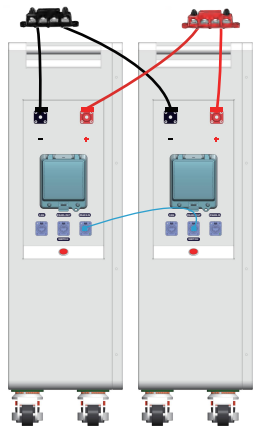
6.2.2 Confirm the location of Master battery, insert the RJ45 plug into the Link Out port and connect the other side to next battery Link IN port, chained all batteries.



## 6.3 DC power cable connection

6.3.1 Take out battery to battery power cable.

6.3.2 Connect the positive and negative electrodes of the battery to the combiner box for parallel connection，and fix the battery terminals and combiner box with M8 screws



## 6.4 Connecting with Inverter

6.4.1 Connecting Master battery Link IN port with inverter CAN communication port via inverter communication cable.

6.4.2 Connecting battery OUTPUT (+) with inverter battery INPUT (+), battery OUTPUT (-) with inverter battery INPUT (-), an external disconnection breaker between battery system and inverter is recommended, choose the corresponding power cable pair and wiring them correctly.

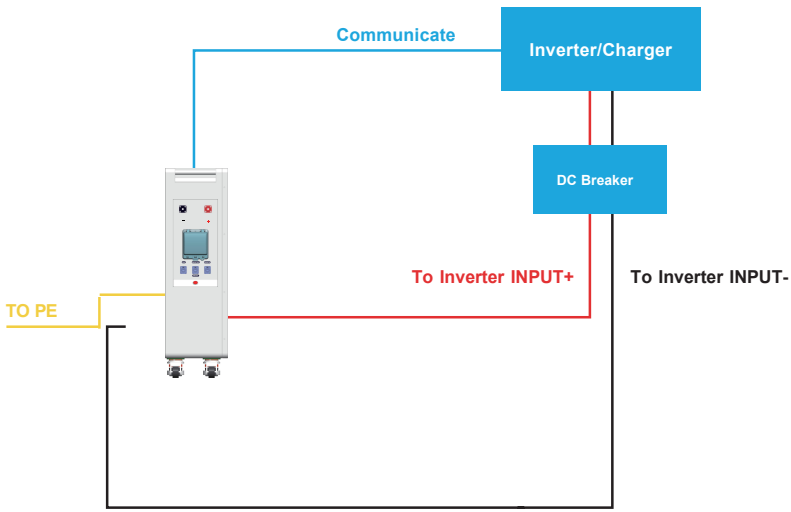
CAUTION

Confirm inverter AC input and PV input is disconnected befor wiring connection, and the DC/ signal switch of inverter/ is in off status.

NOTE

Choose the suitable disconnection breaker considering the inverter power/current, rated voltage, tripping characteristic etc.

**Wiring diagram allowed:**




NOTICE

The maximum communication cable length is required to be less than 15m between inverter/charge and battery.

The maximum power cable length is suggested to be less than 10m between inverter/charge and battery.

For other type of installation, please also follow the rules above to wiring your system.

CAUTION

The maximum tolerance current of each power cable and terminal is 200A, 200A for continuously is suggested, please use corresponding number of power cable pairs according to the field configuration and local connection requirements, standards, and directives.

## 6.5 Commissioning

6.5.1 Set the DIP address of the Master battery (and the Slave battery if there is any RS485 baud rate change).

6.5.2 Switch on all battery modules, wait 1 minute, and make sure that ON/OFF led is on Master battery.

6.5.3 Turn on the breaker between the inverter and battery if there is any, then turn on the inverter/charger isolation.

6.5.4 Finish the setting on inverter/charger or any other control devices. f everything is correct, you are ready to use the system.

CAUTION
If your system is an back-up or off-grid system, make sure your configuration can cover the worst situation to avoid battery to be over-discharged.

## 6.6 Switch off Battery

6.6.1 Turn off the inverter.
6.6.2 Turn off the disconnection breaker if there is any.
6.6.3 Turn off all batteries power switch

# VII.Troubleshooting

| Items | Solution | Measure |
|---|---|---|
| Unable to start | 1. Charge the battery use a charge or inverter to provide 54~57.6V voltage and observe it can be started. | If the abnormal status still alive after above steps, please contact your supplier.<br><br>If there is any other situation(s) excluding in this table, turn off the fault battery, contact your supplier. |
| Unable to charge | 1. Check whether the cable connection between the battery and the inverter/charger is correct.<br>2. Check whether the inverter/charger setting is correct.<br>3. Check whether the battery is in charge protection mode, if yes, try to discharge the battery. | |
| Unable to discharge | 1. Check whether the cable connection between the battery and the inverter/charger is correct<br>2. Check whether the battery occurs short circuit, reverse connection, pre-charge failure during connection inverter etc.<br>3. Check whether the battery is in discharge protection mode, if yes, try to charge the battery. | |
| High/Low temperature | 1. Stop the battery system for a while, check whether the installation location temperature meet the requirement.<br>2. Avoid continuous full charging and discharging | |
| High current | Check the configuration and parameters setting on the inverter/charger is correct. | |
| ALM ON | Turn off all the batteries, and remove the fault battery from the system. | |
| Communica-tion fail | 1. Check the communication cable type is correct and is contacted well.<br>2. Check the DIP switch setting is correct.<br>3. Check the inverter protocol related setting is correct.<br>4. Check both battery and inverter are working properly. | |

NOTICE
Please restart after software is upgraded.

## VIII.Transport and Storage

* Do not violently shake, impact or squeeze, and prevent sun and rain during the transportation.

* Do light take and put and strictly prevent falling, rolling, and heavy pressure during loading and unloading.

* The battery should be placed in a dry, clean, dark, and well ventilated indoor environment for long- term storage, and the recommended

storage temperature range is 25~40℃ .

* No harmful gases, flammable and explosive products and corrosive chemical substances in the storage location.

* The batteries should be stored and transported in close to 50% SOC, and do not store over 80% SOC for longtime.

* If do not use for a time, The battery needs to be charged every 6 months if it is not used for a long time.

* No fall down, no pile up.

## IX.Disposal of Battery

Disposal of battery must comply with the local applicable disposal regulations for electronic waste and used batteries, Please review your local Battery recycling or management regulations or contact us for more information.