

User Manual



LiFePO4 Battery System

High voltage energy storage Lithium battery pack

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
1. INTRODUCTION

The document describes the installation, commissioning, maintenance and troubleshooting of the following high voltage battery listed below.

The battery chemistry of these products is Lithium Iron Phosphate. This manual is designed for qualified personnel only. The tasks described in this document should be performed by authorized and qualified technicians only.

After Installation the Installer must explain the user manual to the end user.

2. SYMBOLS

	Caution, risk of electric shock.
	Do not place nor install near flammable or explosive materials.
	Install the product out of reach of children.
	Read the instruction manual before starting installation and operation.
	Do not dispose of the product with household wastes.
	Recyclable.
	Disconnect the equipment before carrying out maintenance or repair.
	Observe precautions for handling electrostatic discharge sensitive devices.
	Protective Class 1.
	Caution, risk of electric shock, energy storage timed discharge.

SPECIFICATIONS FOR BCU600050

The battery system is mainly used insolar power system for family houselt also has a switch to control the battery easilyand timely protect our Household application

3. Safety

3.1 Handling

- Do not expose battery to open flame.
- Do not place the product under direct sunlight.
- Do not place the product near flammable materials.
- Store the product on a flat surface.
- Store the product out of reach of children and animals.
- Do not damage the unit by dropping, deforming, impacting, cutting or penetrating with a sharp object.
- Do not touch any liquid spilled from the product.
- Always handle the battery wearing the insulated gloves.
- Do not step on the product or place any objects on it.
- Do not charge or discharge damaged battery.

3.2 Installation

- After unpacking, please check the product for damages and missing parts.
- Make sure that the inverter and battery is completely turned off before commencing installation.
- Do not interchange the positive and negative terminals of the battery.
- Ensure that there is no short circuit of the terminals or with any external device.
- Do not exceed the battery voltage rating of the inverter.
- Do not connect the battery to any incompatible inverter.
- Do not connect different battery types together.
- Please ensure that all the batteries are grounded properly.
- Do not open the battery to repair or disassemble.
- In case of fire, use only dry powder fire extinguisher.
- Install the battery away from children or pets.
- Do not use battery in high static environment where the protection device might be damaged.
- Do not install with other batteries or cells.

4. RESPONSE TO EMERGENCY SITUATIONS

The batteries comprise of multiple batteries connected in series. It is designed to prevent hazards or failures. However, Felicity cannot guarantee their absolute safety. Under exposure to the internal materials of the battery the following recommendations should be carried out by the user.

- If there has been inhalation, please leave the contaminated area immediately and seek medical attention.
- If there has been contact with eyes, rinse the eyes with running water for 15 minutes and seek medical attention immediately.
- If there has been contact with the skin, wash the contacted area with soap thoroughly and seek medical attention immediately.
- If there has been ingestion, induce vomiting and seek medical attention.

4.1 Fire Situation

Use a FM-200 or Carbon Dioxide (CO2) fire extinguishers to extinguish the fire if there is a fire in the area where the battery pack is installed. Wear a gas mask and avoid inhaling toxic gases and harmful substances produced by the fire.

4.2 Warning Labels

Warning labels and other relevant labels are attached on the battery pack.

5. PRODUCT INFORMATION

1. FHU48100-M is a battery module, it needs to be used with FHU48100-C controller;
2. FHU48100-C is the controller of the whole system, so each system must have four FHU48100-M;
3. Our system consists of at least 1 FHU48100-C + 4 FHU48100-M and up to 12 FHU48100-M + 1 FHU48100-C.

5.1 Battery Module Specifications

Model	FHU48100		
Module Energy	5.12KWh		
Module Nominal Voltage	51.2V		
Module Capacity	100AH		
Number of Battery Modules (Optional)	4(Min)	8	12
System Energy	20.48kWh	40.96kWh	61.44kWh
System Nominal Voltage	204.8V	409.6V	614.4V
System Operating Voltage	192-230.4V	384-460.8V	576-691.2V
Recommend Charge/Discharge Current[1]	≤100A	≤100A	≤100A
Recommend Charge/Discharge Power[1]	≤20,000W	≤40,000W	≤60,000W
Maximum Charge/Discharge Current(15s)	120A	120A	120A
Maximum Charge/Discharge Power(15s)	24,000W	48,000W	72,000W
Battery Type	LiFePO4		

Depth of Discharge(DOD)	≥ 95%		
Scalability	up to 16 units in parallel(983kwh)		
Communication	RS485 / CAN		
Protection Level	IP21		
Cycle Life[2]	≥ 6000 Cycles		
Charging Temperature Range	0-55°C		
Discharging Temperature Range	-20-55 °C		
Display	LCD/LED		
Installation	Stack-Mounted		
Protection	Built-in smart BMS, Breaker, Fuse		
Warranty	10 Years		
Certification			
Weight			
Gross Weight			
Control Module FHU48100-C	Net Weight	10.3kg	
	Gross Weight	16.7kg	
	Product Dimension	440x150x515mm	
	Package Dimension	597x562x269mm	
Battery Module FHU48100-M	Battery Designation		
	Net Weight	41.3kg	
	Gross Weight	44.35kg	
	Product Dimension	440x131x565mm	
Package Dimension	687x562x244mm		
[1] Recommend charge/discharge current/power is affected by temperature and SOC.			
[2] Test conditions: 0.5C Charging/Discharging @25°C, 80% DOD, 60%EOL.			

Charging method:

When the battery and inverter establish communication, the constant current of 100A is charged until the battery voltage reaches 54.4V * N, and then the current decreases linearly until the voltage reaches 56.8V * N and the current drops to 0A (N is the number of battery packs in series)

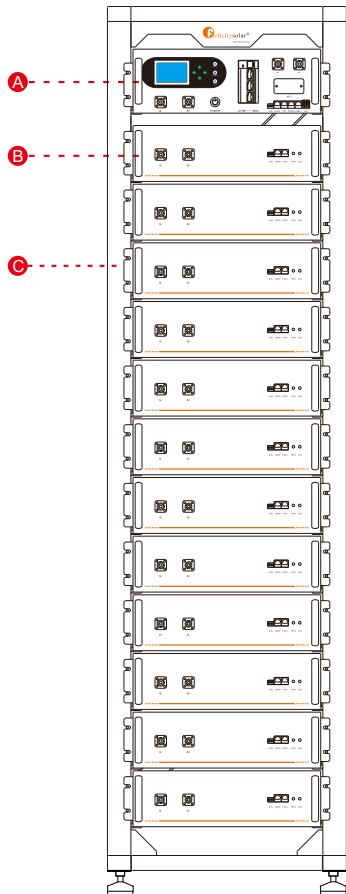
6. ELECTRICAL CONNECTIONS

6.1 Battery System Features

The batteries have been fitted with multiple protection systems to ensure the safe operation of the system. Some of the protection system includes:

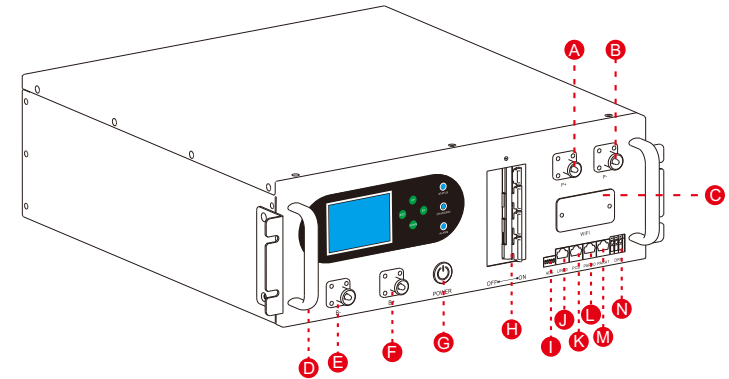
- Inverter interface protection: Over voltage, Over current, External Short Circuit, Reverse Polarity Ground Fault, Over Temp, In rush current.
- Battery Protection: Internal Short Circuit, Over voltage, over current, over temp, Under voltage The battery system contains the following Interface to allow it to connect and operate efficiently.
- LiFePO4: Higher safe performance and longer cycle life.
- Flexible Installation: Stack-Mounted.
- Wide Compatibility: Compatible with leading inverter brands.
- High Scalability: Capacity up to 983kwh.
- Long Warranty: 10 Years.

6.2 Battery system introduction



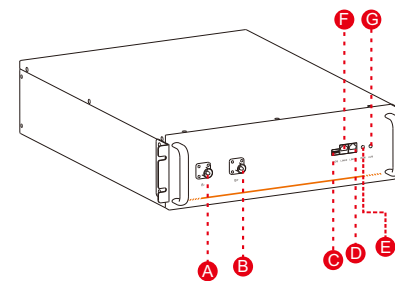
Code	Name
A	Control cabinet
B	Battery box
C	Rack

6.3 Electrical Interface Description of Control cabinet



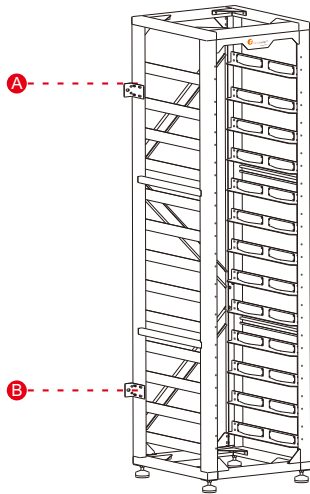
Code	Name	Code	Name
A	PCS +	H	Breaker
B	PCS -	I	ADS
C	WiFi Communication	J	LINK0
D	andle	K	PCS Communication
E	BAT-	L	Parallel Interface 0
F	BAT+	M	Parallel Interface 1
G	Power Switch	N	Power Switch

6.4 Battery box introduction



Code	Name
A	BAT-
B	BAT+
C	ADS
D	LINK1
E	Status LED
F	LINK0
G	Alarm LED

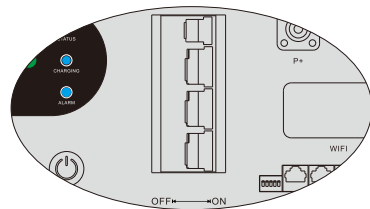
6.5 Base introduction



Code	Name
A	Rack
B	Fixed trestle

6.6 Switch On / Off

Switch on: close the breaker to the ON block, press and hold Power switch for 2-3 seconds, the battery will perform self-test before output. The LCD will show SOC.
 Switch off: close the breaker to the OFF block, the battery will shut down directly.



Power ON battery system

7. INSTALLATION

7.1 Items in the package

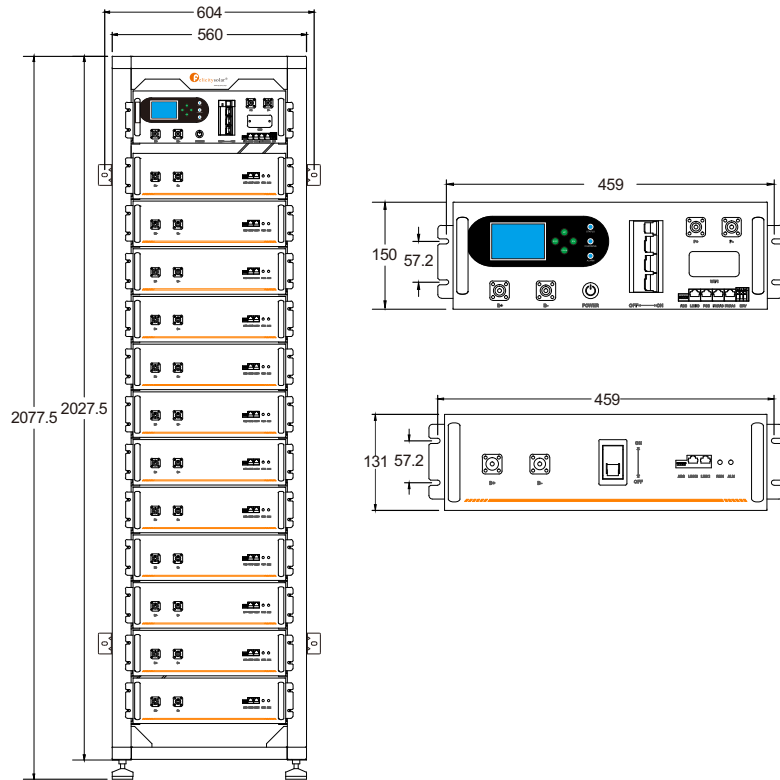
Packaging information

- The battery system consists of a battery, a control box, and a rack.
- Before unpacking the battery system, check whether the packaging is damaged and check the battery system model. If anything goes wrong, Do not open the packing case, and contact the after-sales service center as soon as possible.
- After unpacking the battery system, check the completeness of the product delivery against the packaging information. If there is any anomaly, please contact the after-sales service center as soon as possible.

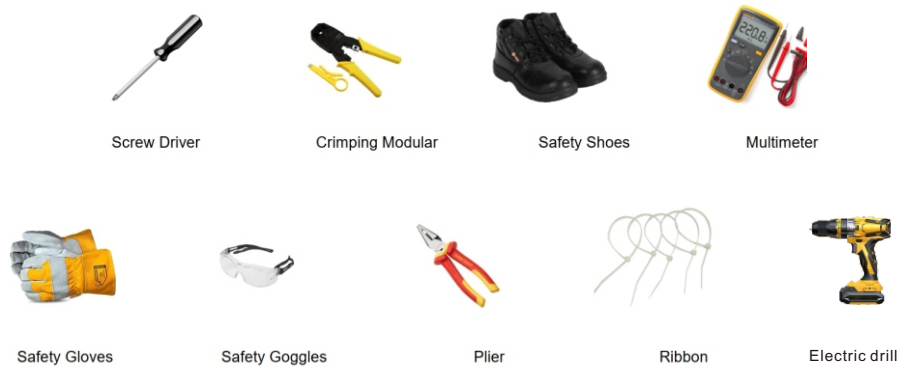
FHU48100-C			
Control cabinet x1	User manual	Guarantee card	Power line x1
Power line 5M x1/2M x1	Power line 5Mx1	Communication line x1	Cross screw x4
FHU48100-M			
Battery box x1	Power line x1	Communication line x1	Cross screw x4
FHU48100-R			
Battery box x1	Fixed trestle x4	Screw x4	Cross screw x4

Note: Power line & Communication line & Communication line Both are two meters
 Power wire diameter 6MM²

7.2 Product size information

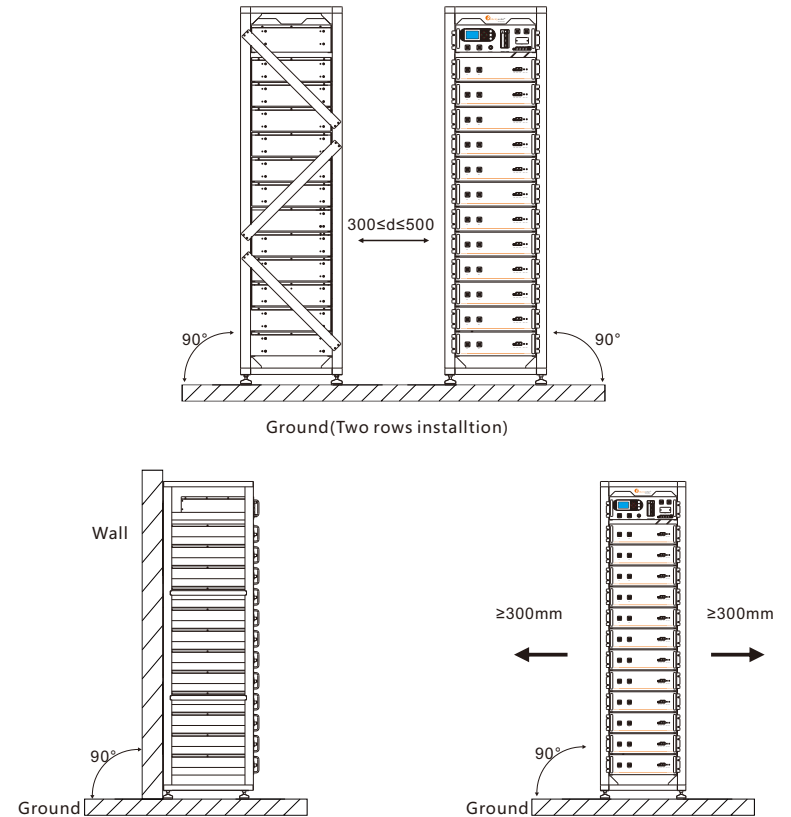


7.3 Tools



7.4 Floor installation with base

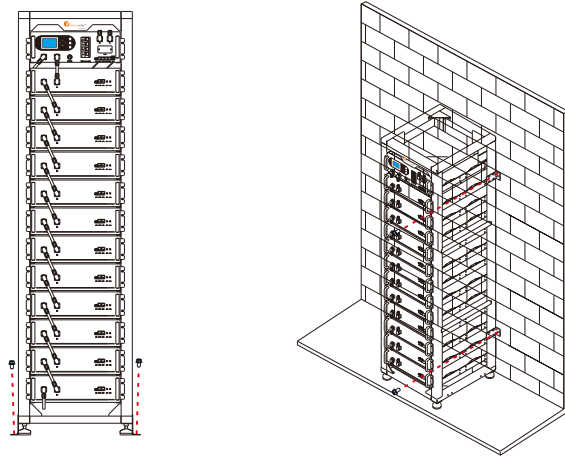
Installation Location Requirements



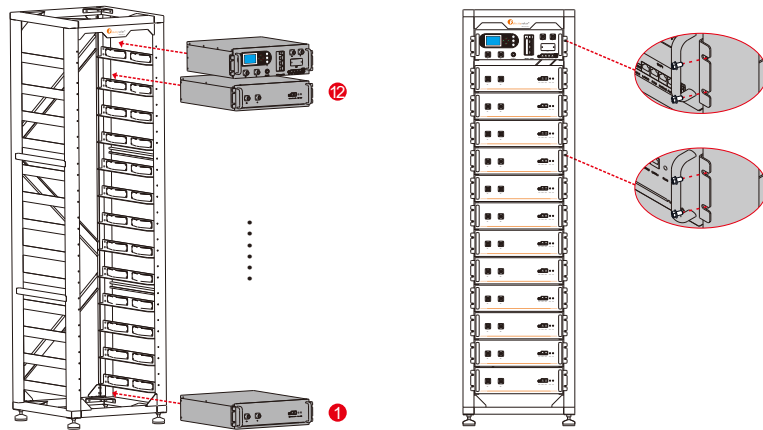
7.5 Installation Procedure

- Step 1: Remove the battery, control box, and frame from the packing case.
- Step 2: Remove the support for fixing the rack package and fix it on the rack.
- Step 3: Use a hammer drill to make a frame fixing hole in the wall. (Aperture 10mm, depth 60mm).
- Step 4: Attach the rack to the wall, then install the battery from the bottom to the top, and make sure the battery is secured.

Step 1:



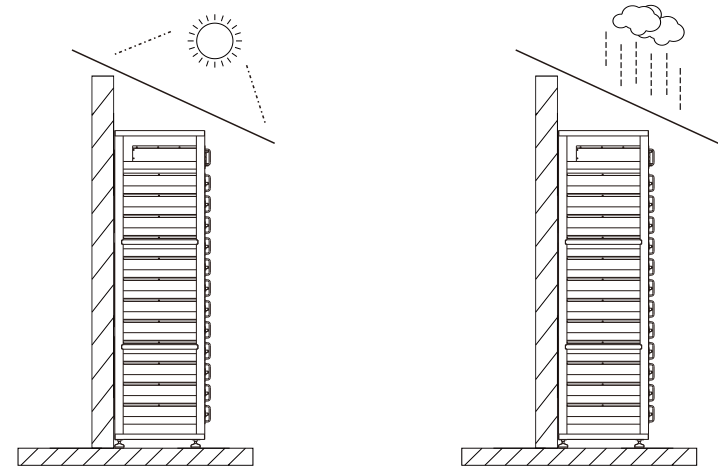
Step 2:



Note:

1. Before installation, check that the ground is flat and has no tilt.
2. Ensure that the rack is against a wall and secured.
3. When placed, it should be pushed inward from the bottom up and from the direction of the arrow.
4. When placing the battery, ensure that the battery is pushed to the bottom.
5. Fasten the battery with the accessory screws. Be careful that the battery falls down.
6. After securing the battery, insert the power cable.

7.6 Install Environment



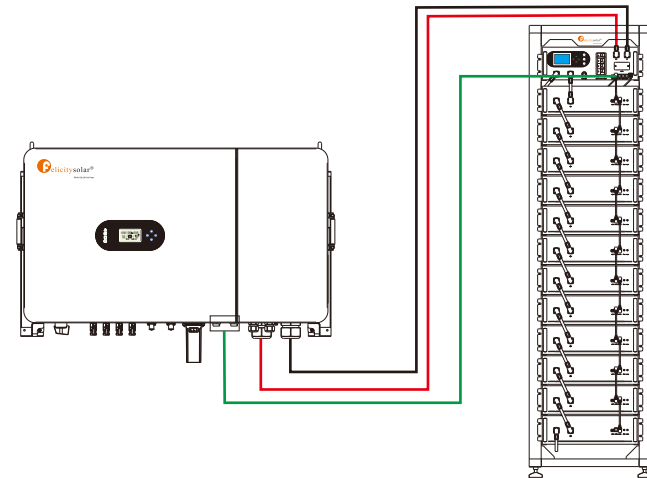
Max. +50°C

Min. -10°C

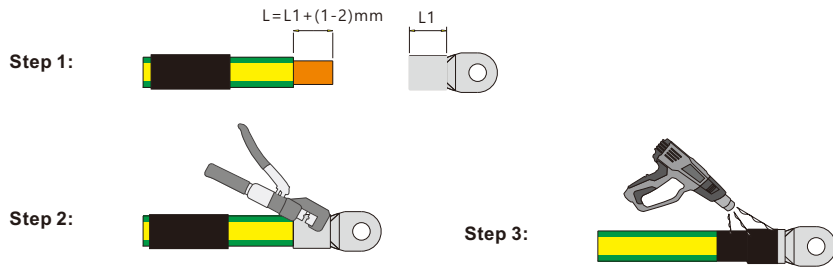
RH. +5%~+95%

7.7 System Wiring Schematic

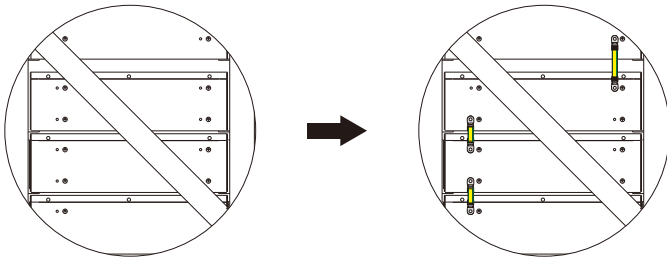
Matching side inverter HY-50K-HT



7.8 Ground connection

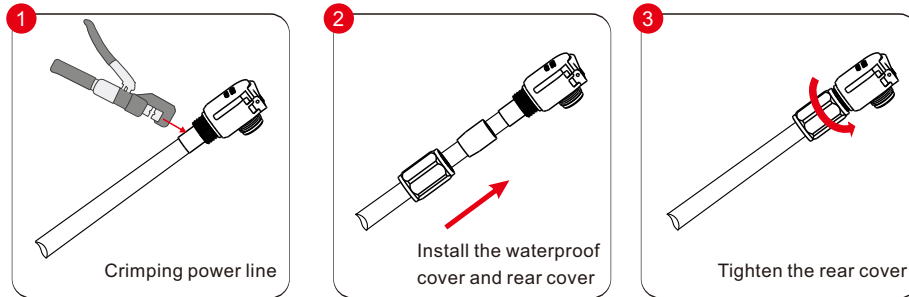


- Note:
- When installing equipment, the protective ground wire must be installed first;
 - When removing the equipment, the protective ground wire must be removed finally.
 - The drawing force after crimping shall be greater than 400N.
 - The control box is connected to the ground wire of the base.



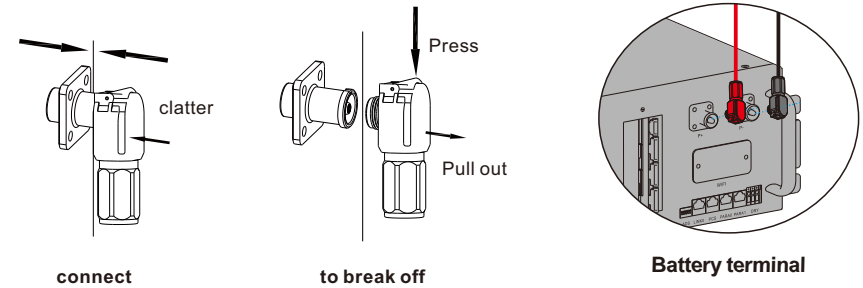
Note: Press the position indicated in the figure above before disconnecting the power terminal.

7.9 Power line connection



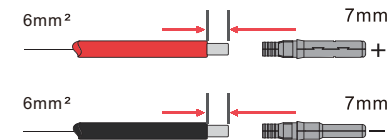
7.10 Terminal Connection

Power terminal

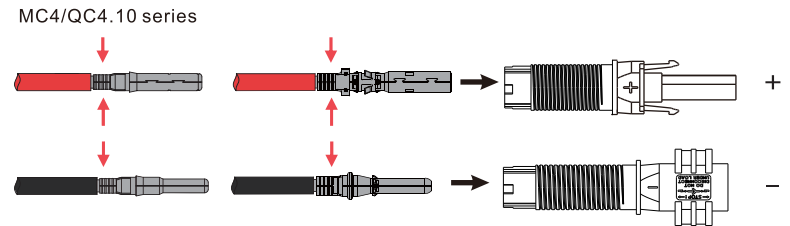


Note: Press the position indicated in the figure above before disconnecting the power terminal.

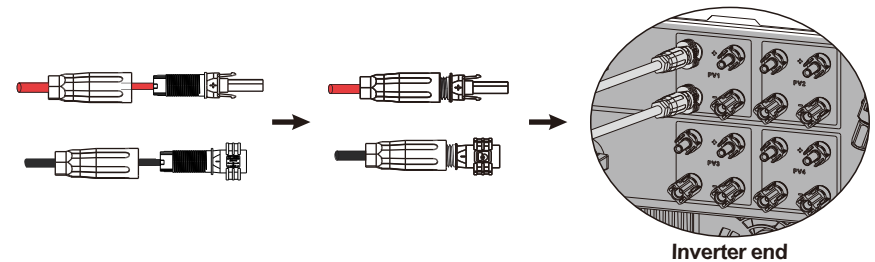
Step 1. Prepare PV positive and negative power cables



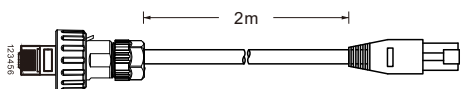
Step 2. Connect PV cables to PV connectors.



Step 3. Screw the cap on and plug it onto inverter side. There will be a click sound if connectors are inserted correctly into PV plugs.



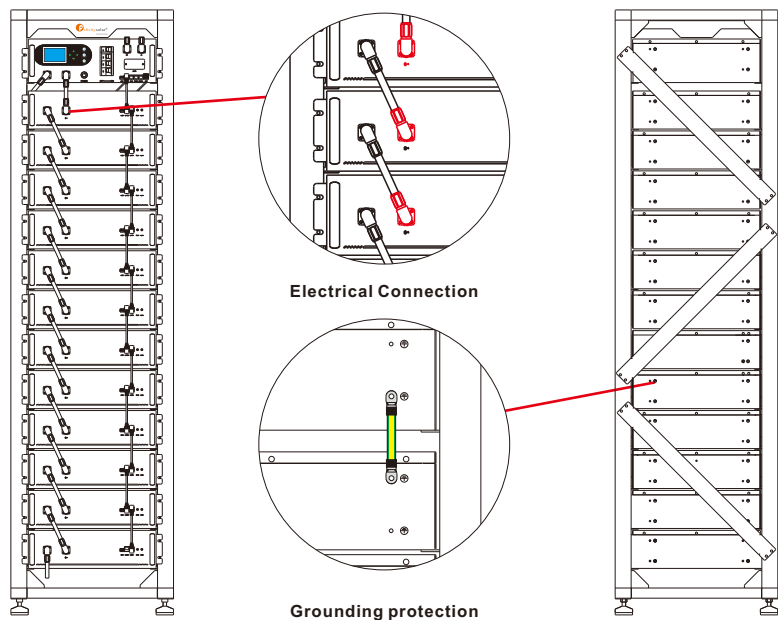
7.11 Description for Communication port



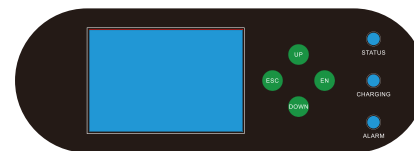
RS-485

Pin	Function Definitions	Function Declaration
1	GND	Power/signal ground
2	12V	
3	NC	
4	NC	
5	485B	RS485-B
6	485A	RS485-A
7	NC	CANL_PCS
8	NC	CANH_PCS

7.12 Install protective cover





8. LCD Displaycons



OBJECT	NAME	DESCRIPTION
A	LCD touch screen	Display the information of the battery.
B	Status LED	Indicates the operating status of the battery, which is always on when running normally.
C	Charging LED	Indicates the charging status of the battery, flashing indicates charging.
D	Alarm LED	Indicates the fault status of the battery, which lights up when the fault occurs.
ESC	Function Button	Esc: Return from current interface or function.
UP		Up: Move cursor to upside or increase value.
DOWN		Down: Move cursor to downside or decrease value.
EN		Enter: Confirm the selection.

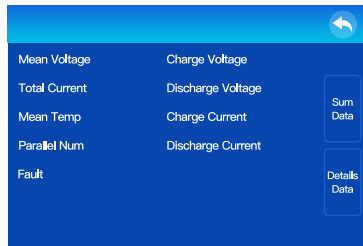
8.1 Main interface

Battery Information	
	Indicate SOC.
	I Indicates the battery level, with each grid representing 5%.

	When charging, this icon lights up
	This icon lights up to indicate that the battery is waiting to be connected, and there is no output at this time. After entering normal working mode, this icon disappears.

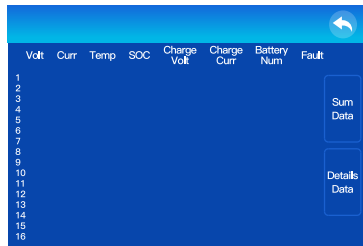
Sum data interface:

This interface displays a summary of battery parallel connection information, including average battery voltage, total battery current, average BMS temperature, number of parallel connections, charging limit voltage, discharging limit voltage, charging limit current, discharging limit current, and fault information. Click "Sum Data" and "Details Data" to switch between summary data or detailed data of parallel batteries



Details data interface:

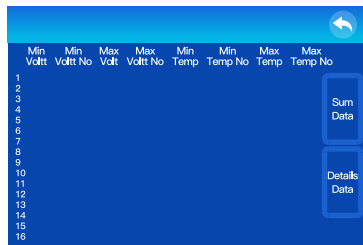
This interface displays a summary of battery parallel connection information, including average battery voltage, total battery current, average BMS temperature, number of parallel connections, charging limit voltage, discharging limit voltage, charging limit current, discharging limit current, and fault information. Click "Sum Data" and "Details Data" to switch between summary data or detailed data of parallel batteries



Details data interface:

This interface displays detailed information about parallel batteries, including minimum cell voltage, minimum cell voltage number, maximum cell voltage, maximum cell voltage number, minimum cell temperature, minimum cell temperature number, maximum cell temperature, and maximum cell temperature number

1 to 16 represent the addresses of parallel batteries.



8.1 Fault Code Table

FAULT CODE	EXPLAIN	TREATMENT MEASURE
01	High Battery Voltage	Stop charging
02	Low Battery Voltage	Stop discharging
03	High Cell Voltage	Stop charging
04	Low Cell Voltage	Stop discharging
05	High Charging Current	Reduce charging current
06	High Discharging Current	Reduce discharging current
07	High Bms Temperature	Stop charging and discharging ,wait for the temperature to drop
08	Low Bms Temperature	Wait for temperature rise
09	High Cell Temperature	Stop charging and discharging , wait for the temperature to drop
10	Low Cell Temperature	Wait for temperature rise
11	Afe fault	Restart, if the fault still exists, contact our engineer
12	Soft Start Failed	Restart, if the fault still exists, contact our engineer
13	Slave Communication Failure	Check for poor contact of the communication line
14	Low Output Impedance	Restart, if the fault still exists, contact our engineer
15	Slave Version Fault	Contact our engineer to upgrade the progra
16	Slave Device Version Fault	Contact our engineer to upgrade the program
17	Parallel Fault	<ol style="list-style-type: none"> 1. Please check if the number of parallel battery slave controls is the same 2. Please check if a single unit is installed in a parallel system 3.If this error occurs during parallel installation, please check the wiring. f they are connected correctly, please install them in parallel first and then restart the device. 4.If the problem persists, please contact the installation personnel.
18	Relay Adhesion Fault	Restart, if the fault still exists, contact our engineer

9. WARRANTY

The warranty shall not cover the defects caused by normal wear and tear, inadequate maintenance, handling, storage faulty repair, modifications to the battery or pack by a third party other than Felicity, failure to observe the product specification provided herein or improper use or installation, including but not limited to the following.

- Damage during transport or storage.
- Incorrect Installation of battery into pack or maintenance.
- Use of battery pr pack in inappropriate environment.
- Improper, inadequate, or incorrect charge, discharge or production circuit other than stipulated herein.
- Incorrect use or inappropriate use.
- Insufficient ventilation.
- Ignoring applicable safety warnings and instructions.
- Altering or attempted repairs y unauthorized personnel.
- In case of force majeure (ex: lightning, storm, flood, fire, earthquake, etc.).
- There are no warranties-IMPLIED or express-other than those stipulated herein. Felicity shall not be liable for any consequential or indirect damages arising or in connection with the product specification, battery or pack.

10. TROUBLESHOOTING AND MAINTENANCE

10.1 Maintenance

- 1.Regularly check whether the service environment of the battery meets the requirements, and the installation position should be far away from the heat source.
- 2.In case of one of the following situations, it needs to be charged in time:
 - The battery is often under charged;
 - The battery has been out of use or stored for more than 3 months.
- 3.Regularly check whether the battery and its supporting terminals, connecting cables and indicator lights are normal.

10.2 Troubleshooting

When the red / white LCD on the panel is flashing or normally on, it does not mean that the Battery system is abnormal, it may be just an alarm or protection. Please check the 'LCD fault message' in chapter 7 for the detailed faulty definition before any trouble-shooting steps. In general, the alarm indication is normal without manual intervention. When the alarm triggering state is removed, Battery system will automatically return to normal use.

- Problem determination based on the following points

- Whether the red light on the BCU600050 is on;
- Whether the battery can be output voltage or not.
- Whether the battery system can be communicated with inverter;

- Preliminary determination steps

LiFePO4 Battery System for HouseholdsBattery system cannot work, when DC switch on and POWER on, the LCD doesn't light up or flash, please consider contact the local distributor.

- The LCD display of BCU600050 is normal, but it cannot charge and discharge. Observe the display screen of inverter and there is no SOC. Please check whether the CAN communication between BCU600050 to inverter is well connected. If the connection is good, please replace a CAN communication cable. If the SOC is still not visible on the inverter display screen, please contact the local distributor.
- After the battery system is powered on, if you can see the alarm information on the LCD and inverter display screen at the same time, please contact the local distributor.