



# 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 LUX-X-96050HMG01

The battery system is mainly used insolar power system for family house self also has a switch to control the battery easily and 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, FelicityESS cannot guarantee their absolute safety. Under exposure to the internal materials of the battery the following recommendations should be carried out by the user.

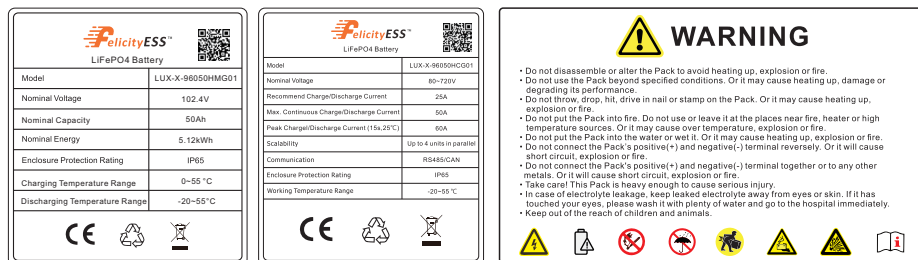
- If there has been inhalation, please leave the contaminated area immediately and seek medical attention.
- If there has been contact with eyes, rinse the eyes with running water for 15 minutes and seek medical attention immediately.
- If there has been contact with the skin, wash the contacted area 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. LUX-X-96050HCG01 is a battery module, it needs to be used with LUX-X-96050HCG01 controller;
2. LUX-X-96050HMG01 is the controller of the whole system, so each system must have one LUX-X-96050HCG01;
3. Our system consists of at least 1 LUX-X-96050HCG01 + 1 LUX-X-96050HCG01 and up to 6 LUX-X-96050HMG01 + 1 LUX-X-96050HCG01.

### 5.1 Battery Module Specifications

|   |  |            |            |            |          |            |
|---|--|------------|------------|------------|----------|------------|
| Model                                       | LUX-X-96050HG01                        |            |            |            |          |            |
| Battery Type                                | LiFePO4                                |            |            |            |          |            |
| Module Energy                               | 5.12kWh                                |            |            |            |          |            |
| Module Nominal Voltage                      | 102.4V                                 |            |            |            |          |            |
| Module Capacity                             | 50Ah                                   |            |            |            |          |            |
| Number of Battery Modules                   | 1                                      | 2          | 3          | 4          | 5        | 6          |
| System Energy                               | 5.12kWh                                | 10.24kWh   | 15.36kWh   | 20.48kWh   | 25.6kWh  | 30.72kWh   |
| System Nominal Voltage                      | 102.4V                                 | 204.8V     | 307.2V     | 409.6V     | 512V     | 614.4V     |
| System Operating Voltage                    | 96-115.2V                              | 192-230.4V | 288-345.6V | 384-460.8V | 480-576V | 576-691.2V |
| Scalability                                 | Max. 4 clusters in parallel(122.88kWh) |            |            |            |          |            |
| Recommend Charge/Discharge current          | 25A                                    | 25A        | 25A        | 25A        | 25A      | 25A        |
| Max. continuous charge/discharge current[1] | 50A                                    | 50A        | 50A        | 50A        | 50A      | 50A        |
| Peak Charge/Discharge current(15S)          | 60A                                    | 60A        | 60A        | 60A        | 60A      | 60A        |
| Depth of discharge(DOD)                     | ≥ 95%                                  |            |            |            |          |            |
| Display type                                | LED+LCD(Touch)                         |            |            |            |          |            |
| Protection Level                            | IP65                                   |            |            |            |          |            |

|  |                                     |                                       |
|--|-------------------------------------|---------------------------------------|
| Operating Temperature Range  | Charge:0~+55°C/Discharge:-20C~+55°C |                                       |
| Storage Temperature Range  | 0°C~ +35°C                          |                                       |
| Humidity   | 5%~95%                              |                                       |
| Altitude   | ≤2000m                              |                                       |
| Cycle Life[2]  | ≥ 6000 Cycles                       |                                       |
| Installation   | Stacking-Mounting / Floor-Mounting  |                                       |
| Protection   | Built-in smart BMS, Breaker         |                                       |
| Communication Port   | RS485 / CAN                         |                                       |
| Warranty Period  | 7 Year                              |                                       |
| Control Module<br>LUX-X-96050HCG01   | Net Weight                          | 12 kg                                 |
|  | Gross Weight(with base)             | 24.5 kg                               |
|  | Product Dimension                   | 600x385x200 mm                        |
|  | Package Dimension(with base)        | 712x497x352 mm                        |
| Battery Module<br>LUX-X-96050HMG01   | Battery Designation                 | IFpP24/141/161/[(1P32S)nS]E/-20+60/90 |
|  | Net Weight                          | 51 kg                                 |
|  | Gross Weight                        | 54 kg                                 |
|  | Product Dimension                   | 600x385x260 mm                        |
| Package Dimension  | 712x497x378 mm                      |                                       |
| [1] Max. continuous charge/discharge current is affected by temperature and SOC. |                                     |                                       |
| [2] Test conditions: 0.2C Charging/Discharging @25°C, 80% DOD.                   |                                     |                                       |

### Charging method:

When the battery and inverter establish communication, the constant current of 50A is charged until the battery voltage reaches 108.8V \* N, and then the current decreases linearly until the voltage reaches 113.6V \* N and the current drops to 0A (N is the number of battery packs in series)

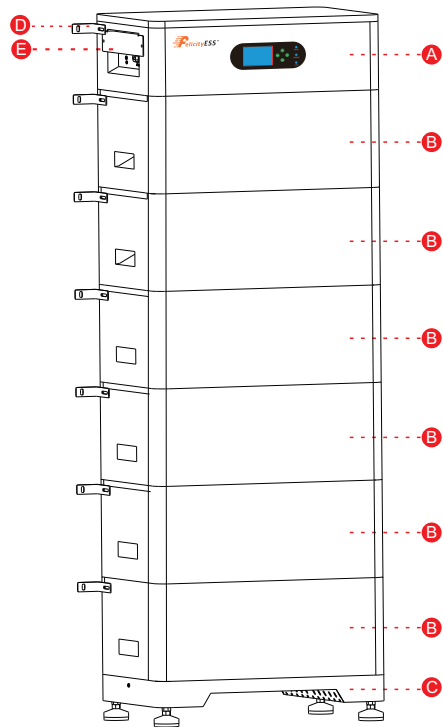
## 6. ELECTRICAL CONNECTIONS

### 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:

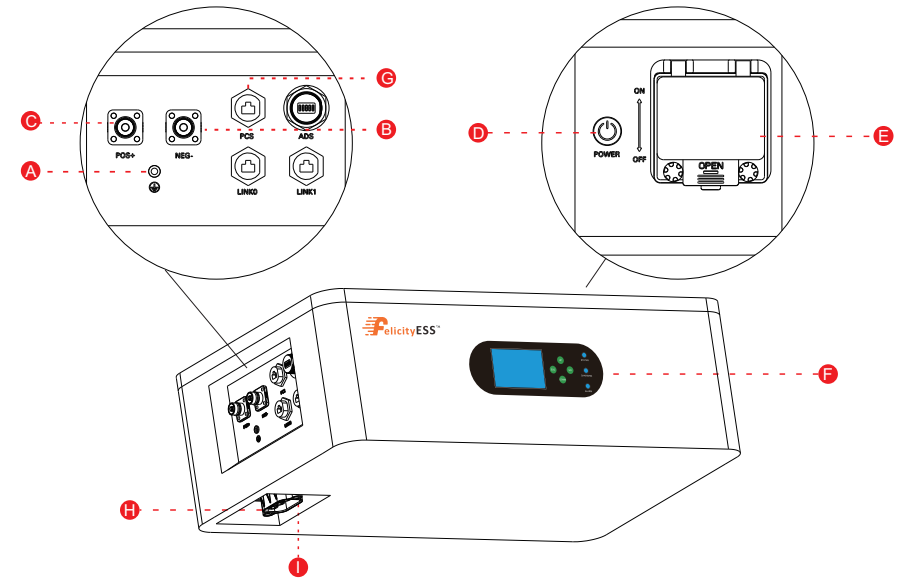
- Inverter interface protection: Over voltage, Over current, External Short Circuit, Reverse Polarity Ground Fault, Over Temp, In rush current.
- Battery Protection: Internal Short Circuit, Over voltage, over current, over temp, Under voltage The battery system contains the following Interface to allow 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 30.72kWh.
- Long Warranty: 7 Years.

### 6.2 Battery system introduction



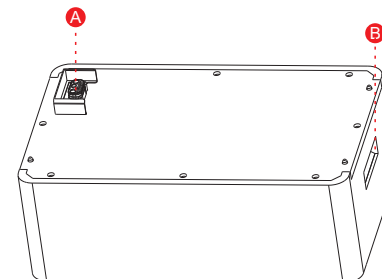
| Code | Name            |
|------|-----------------|
| A    | Control cabinet |
| B    | Battery box     |
| C    | Pedestal        |
| D    | Fixed trestle   |
| E    | Safety shield   |

### 6.3 Electrical Interface Description of Control cabinet



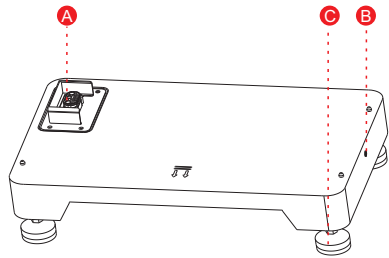
| Code | Name                |
|------|---------------------|
| A    | Earth Terminal      |
| B    | NEG -               |
| C    | POS +               |
| D    | Power Switch        |
| E    | Breaker             |
| F    | LCD display         |
| G    | PCS Communication   |
| H    | Blind plug terminal |
| I    | Bleed valve         |

### 6.4 Battery box introduction



| Code | Name                |
|------|---------------------|
| A    | Blind plug terminal |
| B    | Handle              |

### 6.5 Base introduction

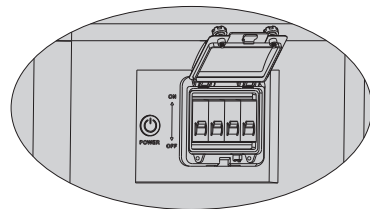


| Code | Name                |
|------|---------------------|
| A    | Blind plug terminal |
| B    | Earth terminal      |
| C    | Foot cup            |

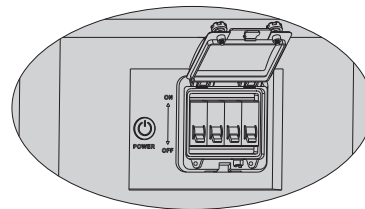
### 6.6 Switch On / Off

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



Power OFF battery system


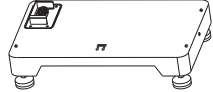

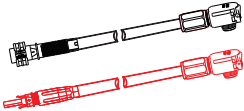
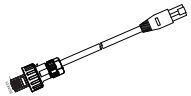

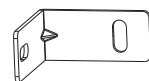


## 7. INSTALLATION

### 7.1 Items in the package

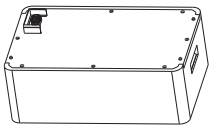




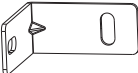

Packaging information

- The battery system consists of a battery, a control box, and a base.
- 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.

#### FOR LUX-X-96050HCG01

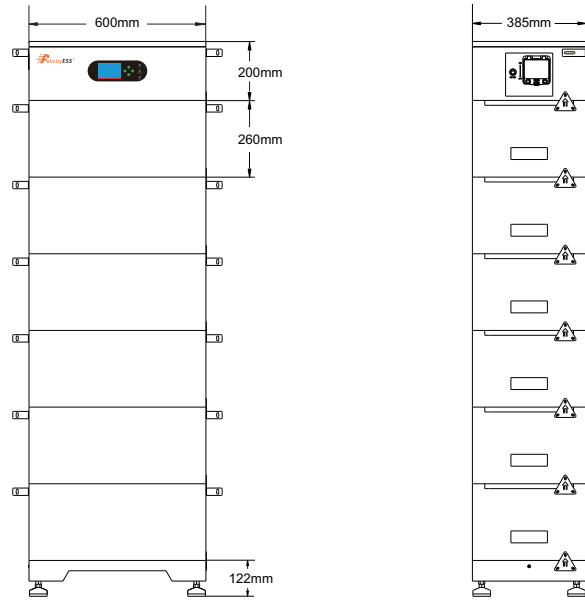
|   |  |  |
|---|--|--|
| <br>Control cabinet x1 | <br>Pedestal x1           | <br>User manual x1    |
| <br>Power line x1      | <br>Communication line x4 | <br>Guarantee card x1 |
| <br>Fixed trestle x2   | <br>Distribution screw x2 | <br>Cross screw x3    |

#### FOR LUX-X-96050HMG01

|   |  |  |
|---|--|--|
| <br>Battery box x1       | <br>Distribution screw x2 | <br>User manual x1    |
| <br>Guarantee card x1   | <br>Cross screw x4       | <br>Fixed trestle x2 |
| <br>Fix the bracket x1 |  |  |

**Note:** Power line & Communication line & Communication line Both are two meters  
Power wire diameter 6MM<sup>2</sup>

### 7.2 Product size information



### 7.3 Tools



Screw Driver



Crimping Modular



Safety Shoes



Multimeter



Safety Gloves



Safety Goggles



Plier



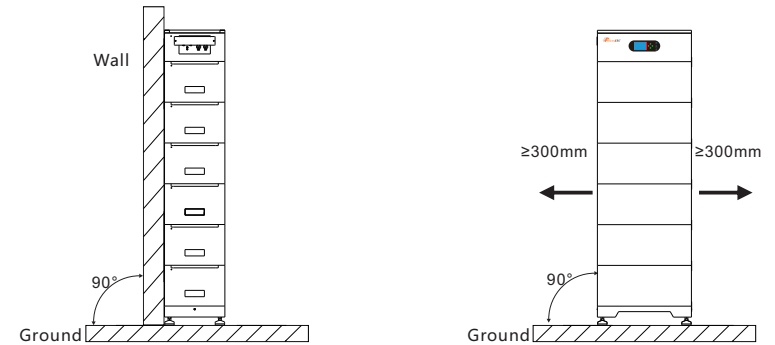
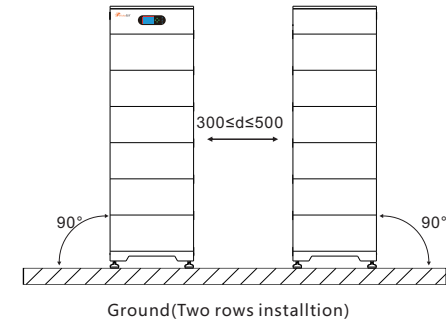
Ribbon



Electric drill

### 7.4 Floor installation with base

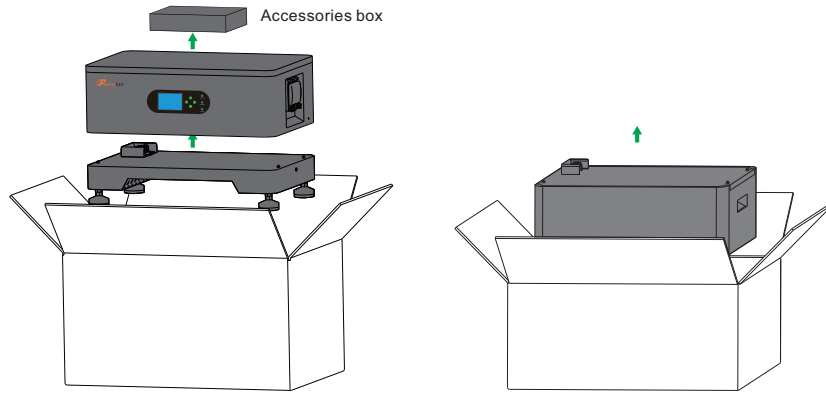
#### Installation Location Requirements



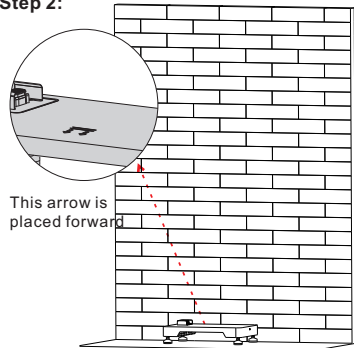
### 7.5 Installation Procedure

- Step 1: Remove the battery, base and control box from the carton.
- Step 2: Place the base against the wall.
- Step 3: Install 1~6 battery boxes on the base, and then place the control box above the installed battery to ensure it is firmly placed.
- Step 4: Install the anti-tipping bracket of the control box, mark the punching position with a marker, and remove the anti-tipping bracket and the control box.
- Step 5: Use the impact drill to drill holes. (Aperture: 10mm, depth: 60mm).
- Step 6: Use a hammer to knock the plastic plug into the hole, fit it to the wall, then reinstall the control box and the anti-tipping bracket, and tighten the screws on the anti-tipping bracket. The torque requirement is 10N · m to ensure that the control box is firmly installed.

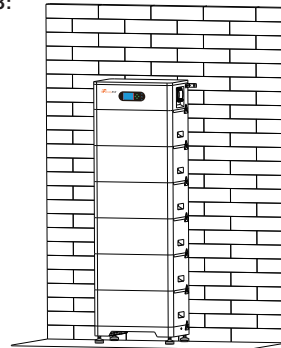
Step 1:



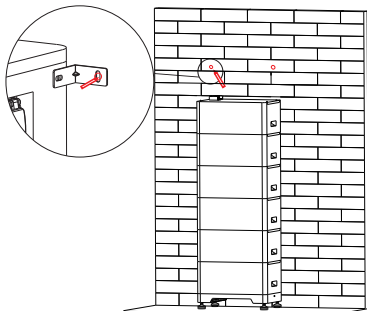
Step 2:



Step 3:

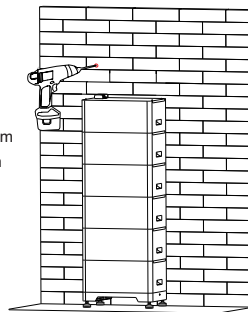


Step 4:

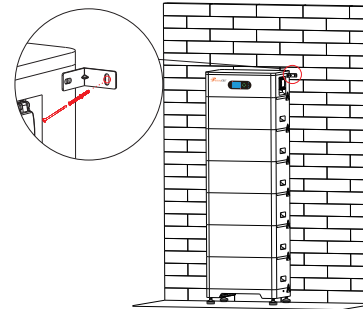


Step 5:

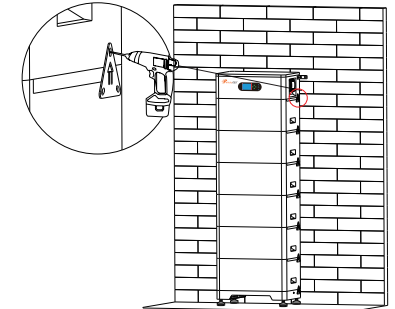
Bore diameter: 10mm  
Drilling deep: 60mm



Step 6:



Step 7:

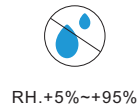
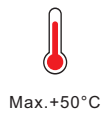
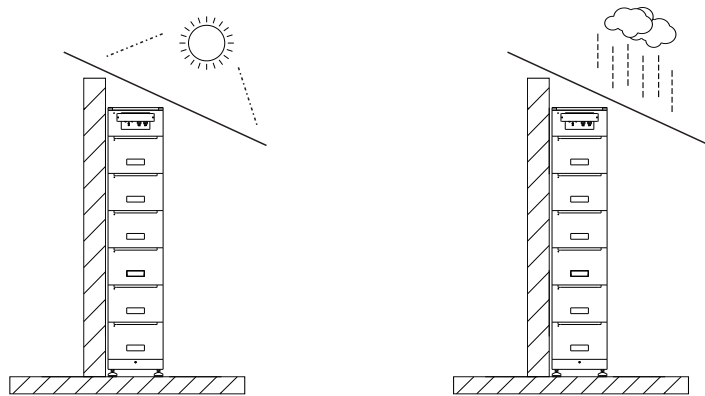


Note:

1. Check that the ground is flat and free of tilt before installation.
2. Make sure that the base is vertical and close to the ground.
3. Make sure that the base is against the wall and the arrow direction on the base faces outward when placing.
4. When placing the upper battery, make sure that the upper and lower hole positions are aligned.
5. Be careful of the battery falling.
6. Avoid installing the anti-tipping bracket on the same side
7. There is no gap between battery packs and battery packs during stack installation. If there is a gap, place the battery pack with the gap on the lower layer.

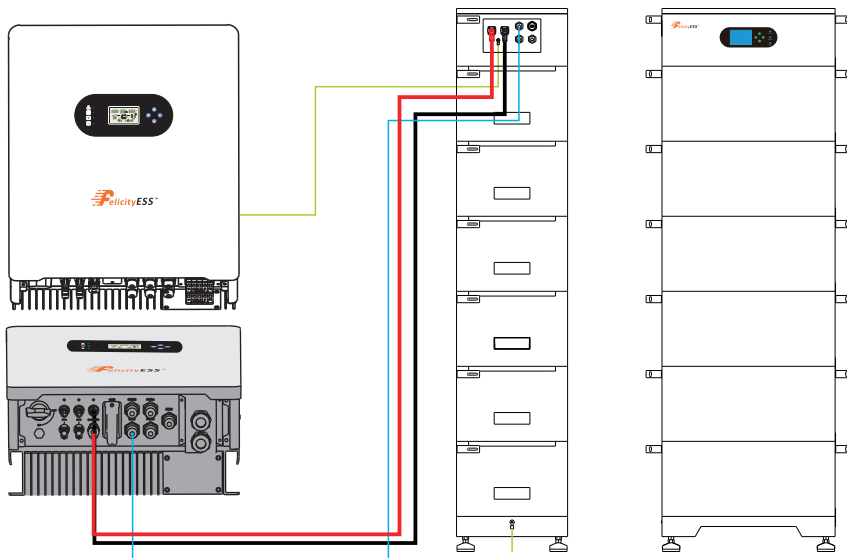


### 7.6 Install Environment

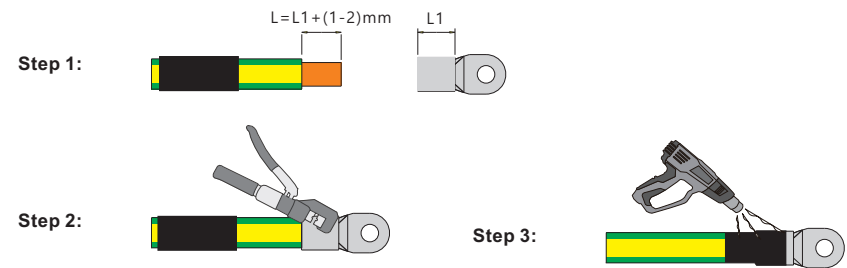


### 7.7 System Wiring Schematic

Matching side inverter T-REX-10KHP3G01

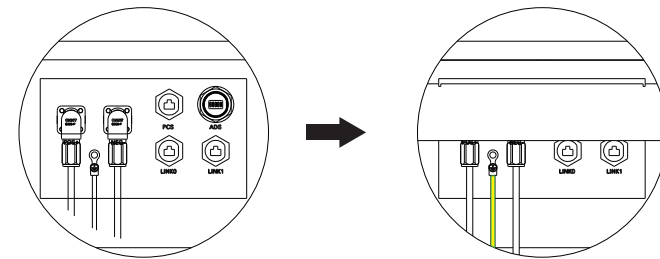


### 7.8 Ground connection



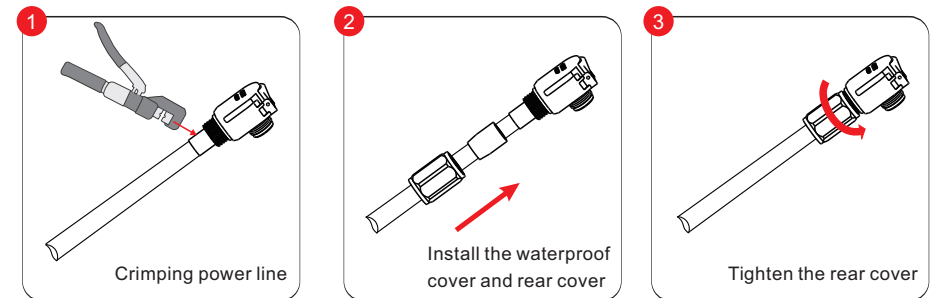
Note:

- 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.



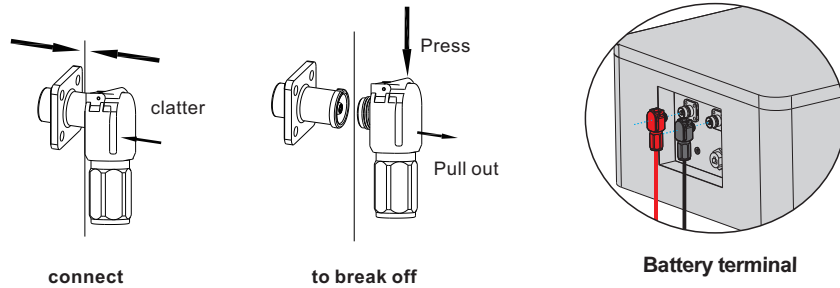
Note: Press the position indicated in the figure above before disconnecting the power terminal.

### 7.9 Power line connection



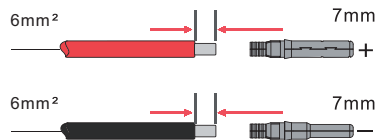
### 7.10 Terminal Connection

#### Power terminal

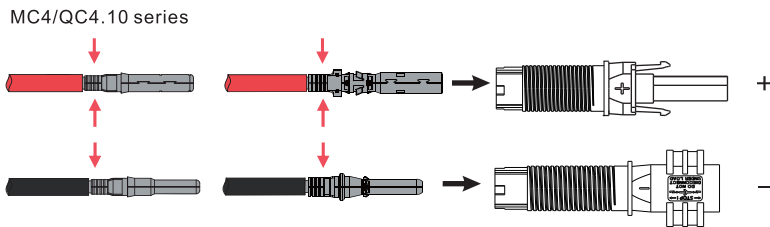


**Note:** Press the position indicated in the figure above before disconnecting the power terminal.

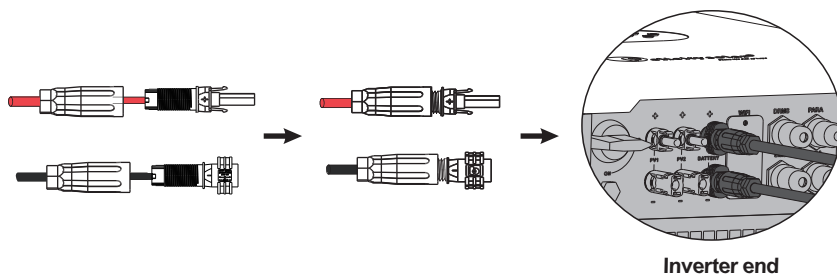
#### Step 1. Prepare PV positive and negative power cables



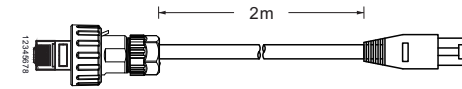
#### Step 2. Connect PV cables to PV connectors.



#### 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.

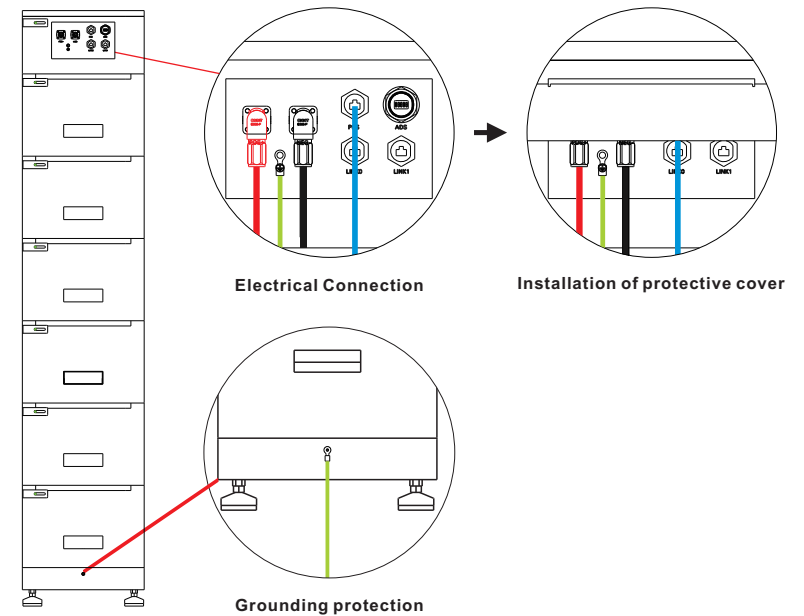


### 7.11 Description for Communication port

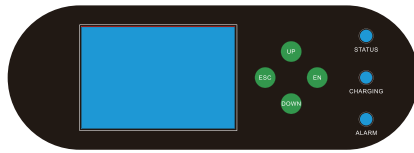


| Pin | Function Definitions | Function Declaration |
|-----|----------------------|----------------------|
| 1   | NC                   | NC                   |
| 2   | NC                   | NC                   |
| 3   | NC                   | NC                   |
| 4   | CAN-H                | CAN-H                |
| 5   | CAN-L                | CAN-L                |
| 6   | CAN-GND              | CAN-GND              |
| 7   | RS485-A              | RS485-A              |
| 8   | RS485-B              | RS485-B              |

### 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.  |

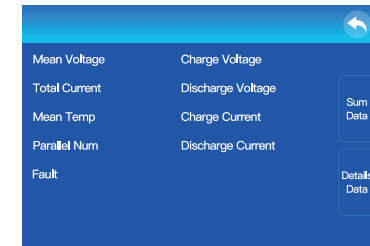
### 8.1 Main interface

| Battery Information |  |
|---------------------|--|
|                     | Indicate SOC.  |
|                     | 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. |

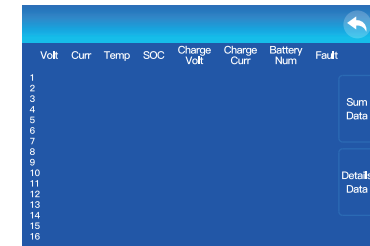
Sum data interface:

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:

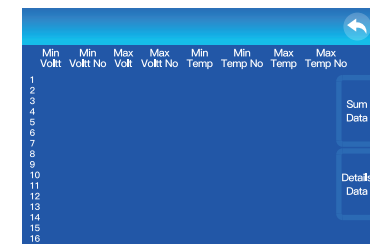
This interface displays a summary of battery parallel connection information, including average battery voltage, total battery current, average BMS temperature, number of parallel connections, charging limit voltage, discharging limit voltage, charging limit current, discharging limit current, and fault 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.



## 8.2 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                       |

## 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 FelicityESS, 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. FelicityESS 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 LUX-X-96050HCG01 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 LUX-X-96050HCG01 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 LUX-X-96050HCG01 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.