felicitysolar®

Make life full of hope

USER MANUAL

Model

FLH48100UG2

www.felicitysolar.com

Contents

Revision History

Revision No.	Revision Date	Revision Reason
1.0	2025.8	First Published

About This Manual

The manual mainly describes the introduction, installation, operation, and maintenance. Please read this manual carefully before installing and operating (the product). Keep this manual for future reference.

How to Use This Manual

Please read this manual and all relevant documents thoroughly before carrying out any operations on the battery, Ensure that the documents are stored securely and are accessible at all times. The content may be revised or updated periodically to reflect product improvements.

1. Safety Introductions

1.1 WARNING

1.1.1 Before Connecting

- After unpacking, inspect the product and the packing list carefully. If any damage is found or parts are missing, please contact your local retailer for assistance.
- Before installation, be sure to cut off the grid power and make sure the battery is in the turned-off mode.
- Ensure proper wiring by connecting the positive and negative cables correctly and avoiding short circuits with external devices.
- Directly connecting the battery to AC power is strictly prohibited.
- The battery system must be properly grounded, and the grounding resistance should be less than 1Ω.
- Verify that the electrical parameters of the battery system are fully compatible with the connected equipment.
- Keep the battery away from water and fire.

1.1.2 During Operation

- If the battery system needs to be moved or serviced, ensure that the power is disconnected and the battery is fully powered down.
- Keep the battery away from water and fire.
- Connecting the battery with a different type of battery is strictly prohibited.
- Do not operate the battery with a faulty or incompatible inverter.
- Disassembling the battery is not allowed.
- In the event of a fire, only dry - powder fire extinguishers should be used; liquid fire extinguishers must not be used.
- Please refrain from opening, repairing, or disassembling the battery unless performed by Felicitysolar staff or personnel authorized by Felicitysolar. Any consequences or responsibilities arising from improper operation or violations of design, manufacturing, or equipment safety standards will not be assumed by us.
- Do not dispose of batteries in a fire. The batteries may explode.
- Do not open or mutilate batteries. Released electrolyte is harmful to the skin and eyes. It may be toxic.

- A battery can present a risk of electric shock and burns by high short-circuit current.
- Failed batteries can reach temperatures hot enough to cause burns on contact.

1.2 CAUTION

- Our products undergo rigorous inspection before shipment. If you notice any unusual signs, such as the device casing bulging, please contact us promptly.
- **The product must be properly grounded prior to use to ensure safety. This battery pack must be grounded strictly as specified in the product technical manual. Incorrect grounding or poor grounding may lead to safety risks such as electric shock and equipment failure. All losses arising therefrom shall be borne by the party that violates the operation rules.**
- To ensure correct usage, verify that the parameters of connected devices are compatible. Avoid mixing batteries from different manufacturers, types, or models, and avoid using old and new batteries together..
- The ambient environment and storage methods can affect the product's lifespan. Please adhere to the operating environment guidelines to ensure the device functions optimally.
- For long-term storage, recharge the battery every six months, ensuring the charge exceeds 80% of its rated capacity.
- Recharge the battery within 18 hours after it has fully discharged or when over-discharge protection mode is triggered.
- The formula for calculating theoretical standby time is: T = C/I (where T represents standby time, C is the battery capacity, and I is the total current of all loads).
- Disconnect the charging source prior to connecting or disconnecting battery terminals;
- Do not wear any metal objects including watches and rings;
- Do not lay tools or metal parts on top of batteries; and in addition,
- Battery maintenance must be performed by a skilled person. To do so:
- Use tools with insulated handles;
- Wear rubber gloves and boots;
- Determine if battery is either intentionally or inadvertently grounded. Contact with any part of a grounded battery can result in electric shock and burns by high short-circuit current.
- The risk of such hazards can be reduced if grounds are removed during installation and maintenance by a skilled person.

1.3 Installation Personnel Requirements

- All work must comply with applicable local laws, regulations, and standards. Only qualified electricians (see below for qualifications) may install FLH48100UG2.
- **Qualifications and Training:** Hold a valid electrician vocational qualification certificate, receive training in the installation, commissioning of electrical equipment and batteries, as well as risk handling, and keep abreast of industry regulation updates.
- **Standard Compliance:** Strictly abide by technical connection conditions, standards, regulations and the requirements of this document, and promptly report any discrepancies between the documents and the actual situation.
- **Professional Knowledge:** Be familiar with the full - process operation of lithium - ion batteries, charging and discharging characteristics, abnormal situation judgment, and understand potential hazard sources.
- **Safety and Emergency Response:** Have a strong sense of safety, use protective equipment correctly, and master first - aid and emergency response skills for electrical accidents and battery leakage.

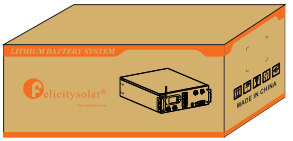
1.4 Storage Before Use

There are no operator serviceable parts in side this equipment. Service should be provided only by a qualified service technician.

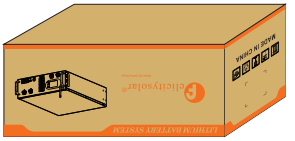
- Do not expose battery to open flame.
- Do not place the product in direct sunlight.
- Do not place the product near flammable materials (may cause fire or explosion if an accident occurs).
- Store in a cool, dry, and well-ventilated area.
- Store the product on a flat surface.
- Store the product out of reach of children and animals.
- Do not damage the unit by dropping, deforming, impacting, cutting or penetrating with a sharp object.
- This may cause electrolyte leakage or fire.
- Do not touch any liquid spilled from the product, as it poses a risk of electric shock or skin damage.
- Always handle the battery wearing the insulated gloves.
- Do not step on the product or place any foreign objects on it. This can result in damage
- Do not charge or discharge a damaged battery.

2. Transportation

The battery module can only be transported in an upright position.



√



×

- Smoking is prohibited in the vehicle during transportation or in the vicinity during loading and unloading

- Dangerous goods transport vehicles must meet relevant road transportation regulations and be equipped with two properly tested CO2 fire extinguishers.

- If possible, do not remove the transport packaging before arrival at the installation site.Before removing the transport protector, check if the transport packaging is damaged.

- Improper transport of battery modules may cause injury. Battery modules could be damaged if they fall or slip. Use only suitable transport/lifting equipment for safe handling.

- Wear safety shoes to avoid injury. Battery modules are heavy, and their parts could crush feet—so all personnel in transport must wear steel-toe safety shoes. Observe safety regulations at the end customer's site, especially during loading/unloading

- During transportation and installation of unpacked battery storage cabinets, the risk of injury increases, especially on sharp metal panels. Therefore, all personnel involved in transportation and installation must wear protective gloves.

- Improper vehicle transportation can cause injury. Improper transportation or improper transportation locks may cause the load to slip or overturn,resulting in injury.

- Lithium-ion battery transport is classified under hazard category UN3480, Class 9. For transport by sea or land, these batteries fall under Packaging Group PI903, Section II. Use Class 9 'Miscellaneous Dangerous Goods' and UN identification labels when transporting Class 9 lithium-ion batteries. Refer to relevant transport documentation for details.

3. Introductions

3.1 Symbol Definition

	Danger! Serious physical injury or death may occur if not following relevant requirements.		Keep the product out of reach of children.
	Caution: Risk of electric shock.		Do not place or install near flammable or explosive materials.
	In case of electrolyte leakage, avoid contact with eyes or skin.		Disconnect the equipment before carrying out maintenance or repair.
	Do not reverse-connect the Pack's positive (+) and negative (-) terminals.		EU WEEE mark: Product should not be disposed of as household waste.
	Observe precautions when handling electrostatic discharge - sensitive devices.		Instruction manual: Read it before starting installation and operation.
	Caution: Risk of electric shock due to timed energy storage discharge.		CE mark: The battery system is CE certified.
	This product is recyclable.	NOTE	NOTE: Procedures to ensure proper operation.
	Do not use the Pack outside of specified conditions.		Earth terminal: The battery system must be reliably grounded to the inverter.
	Caution: This Pack is heavy and may cause serious injury if mishandled.		

3.2 General Description

FLH48100UG2 is equipped with a lithium iron phosphate battery designed for household use. Developed to meet customer needs and market demands, this advanced battery storage solution provides high-quality, reliable power supply for various devices. The product features a long lifespan, suitability for high-temperature environments, and a compact design requiring minimal installation space.

FLH48100UG2 features a battery management system independently developed by our team. When it is connected to a grid or photovoltaic system as the power source, the product can store energy by charging the battery. In the event of a power outage from the grid or photovoltaic system, the product can independently supply electricity to household loads. Additionally, multiple units can be connected in parallel to form a high-capacity, multi-module system to meet long-term energy storage requirements.

3.3 Description of FLH48100UG2

1. FLH48100UMG2 is a battery module, it needs to be used with FLH48100UCG2 controller;
2. FLH48100UCG2 is the controller of the entire system, so each system has at least five FLH48100UMG2.
3. Our system consists of at least 1 FLH48100UCG2+5 FLH48100UMG2 and up to 16 FLH48100UMG2.

Mode	System energy(kWh)	Discharge depth	Composition
FLH48100UG2M5	25.6	90%	FLH48100UCG2*1 + FLH48100UMG2*5
FLH48100UG2M6	30.72	90%	FLH48100UCG2*1 + FLH48100UMG2*6
FLH48100UG2M7	35.84	90%	FLH48100UCG2*1 + FLH48100UMG2*7
FLH48100UG2M8	40.96	90%	FLH48100UCG2*1 + FLH48100UMG2*8
FLH48100UG2M9	46.08	90%	FLH48100UCG2*1 + FLH48100UMG2*9
FLH48100UG2M10	51.2	90%	FLH48100UCG2*1 + FLH48100UMG2*10
FLH48100UG2M11	56.32	90%	FLH48100UCG2*1 + FLH48100UMG2*11
FLH48100UG2M12	61.44	90%	FLH48100UCG2*1 + FLH48100UMG2*12
FLH48100UG2M13	66.56	90%	FLH48100UCG2*1 + FLH48100UMG2*13
FLH48100UG2M14	71.68	90%	FLH48100UCG2*1 + FLH48100UMG2*14
FLH48100UG2M15	76.8	90%	FLH48100UCG2*1 + FLH48100UMG2*15
FLH48100UG2M16	81.92	90%	FLH48100UCG2*1 + FLH48100UMG2*16

*Note: Currently, the battery supports a maximum of 16 BMUs. For the entire energy storage system, confirm the inverter's maximum supported voltage range to determine the maximum number of slave controllers that can be installed.

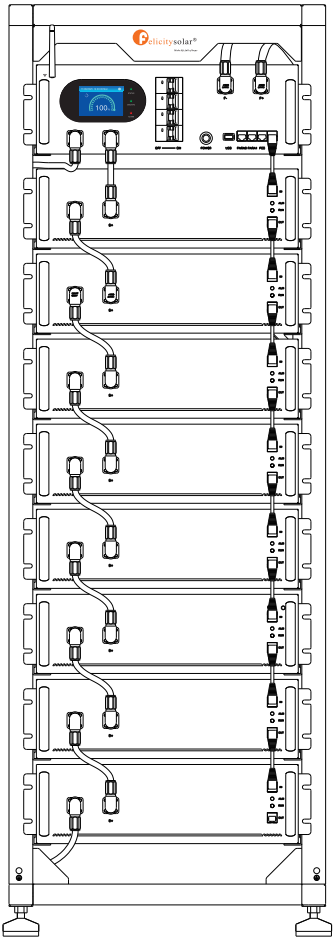
3.4 Features

- Safety and Robustness: LiFePO4 battery cells with higher safety performance and longer cycle life. The battery module is equipped with a standard aerosol fire protection system.
- Multiple Protection: Built-in smart BMS, breakers, and fuses.
- Flexible Installation: Depending on the number of modules, multiple types of multi-level racks are available. The rack integrates grounding functionality, eliminating the need for additional grounding wires.
- Wide Compatibility: Compatible with leading inverter brands.
- High Scalability: The capacity of a single cluster can reach up to 87.04 kWh, and it can support up to 16 sub-clusters. The system can be expanded to nearly 1.4 MWh at maximum.
- Flexible Configuration and Upgrades: Upgrades and parameter configurations can be performed via RS485, WiFi, Bluetooth, and USB.
- Efficient Balancing: Supports module-level voltage balancing and automatically allows the use of both new and old batteries (please contact the supplier for installation guidance).
- Wide Operating Temperature: Operates from -20°C to 55°C with excellent discharge performance and cycle life.

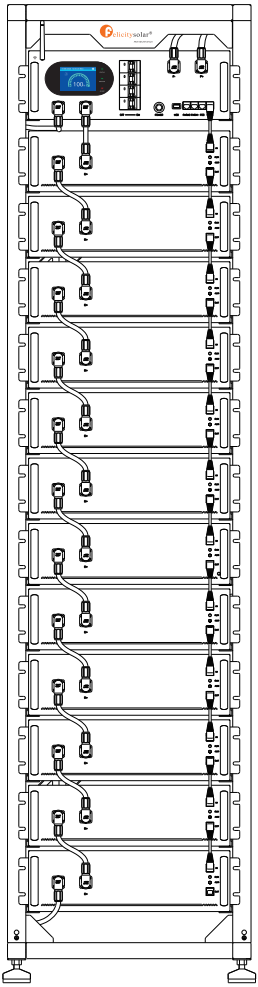
3.5 Product selection

We offer our customers four options:

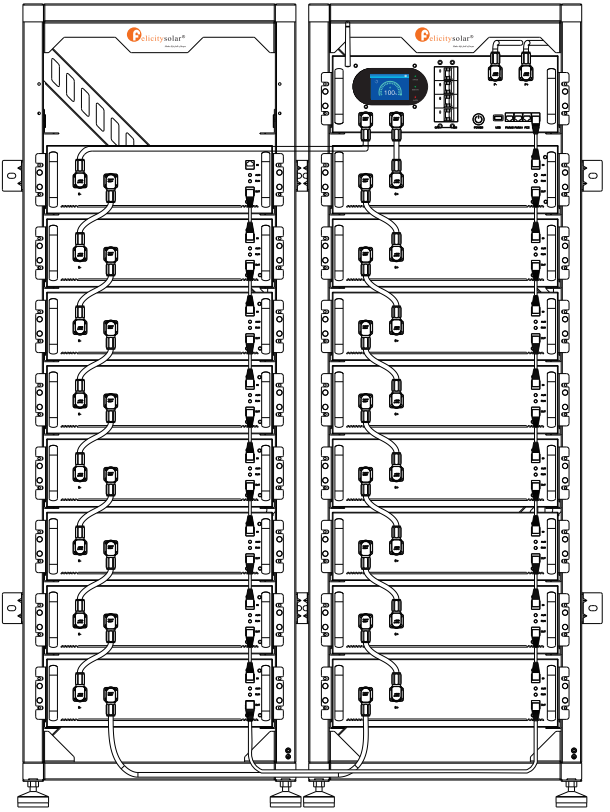
1. First option: 5 to 8 battery modules are required. A 9-layer product can be chosen, as shown in the following figure:



2. Second option: requires 9 to 12 battery modules, can choose 13 layer product solution. As shown in the following figure:



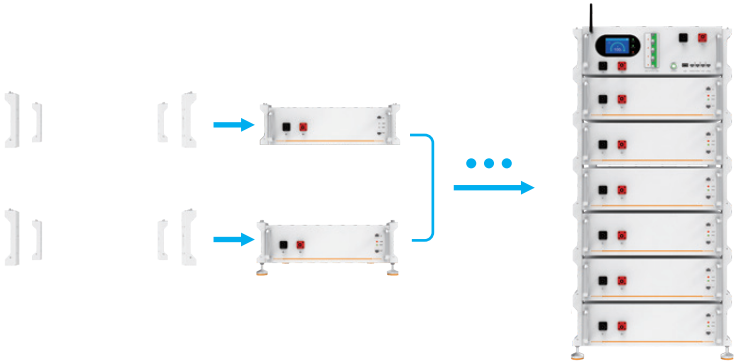
3. Third option: 13~16 battery modules are required, and two 9-layer products can be selected, as shown in the figure below:



4. According to customer needs, if the customer needs less than 7 battery packs (5~6 battery packs +1 high voltage box), then the customer can choose a simple rack.

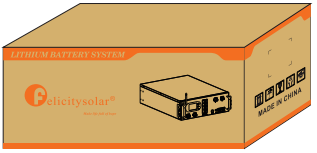
Note: Simple bracket is optional.

The installation Procedure of the simple mounting rack is shown in the figure.

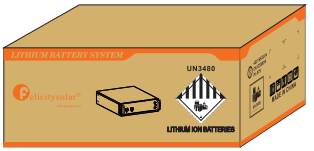


3.6 Product Overview

3.6.1 External Packaging

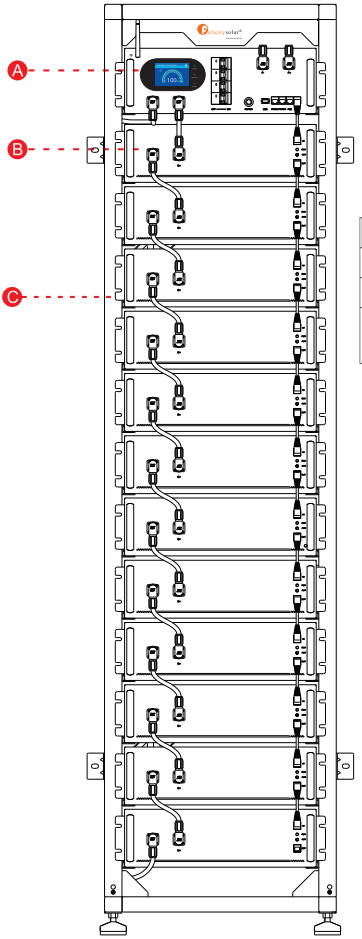


Carton box(FLH48100UCG2)



Carton box(FLH48100UMG2)

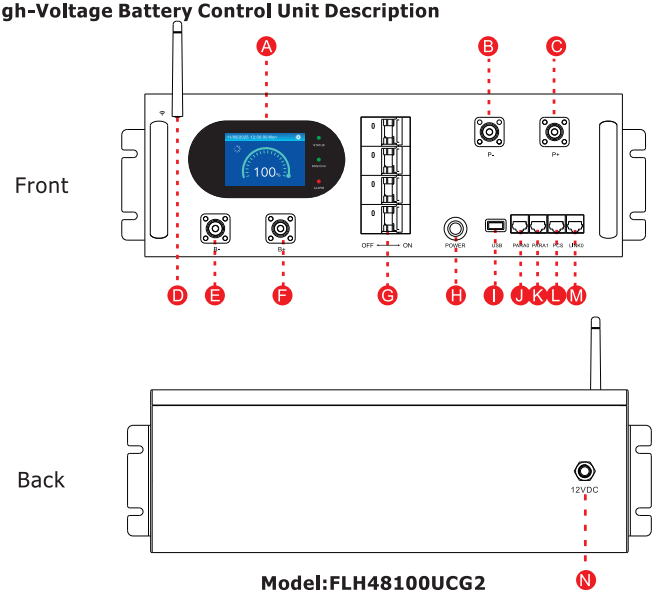
3.6.2 Battery system introduction



Code	Name	Product Model
A	High-Voltage Battery Control Unit	FLH48100UCG2(BCU)
B	High-Voltage Battery Module	FLH48100UMG2(BMU)
C	Rack	*FLH48100R13G2 *FLH48100R9G2

* FLH48100R13G2:
  Built in 1 control module and UP to 12 battery modules
* FLH48100R9G21:
  Built in 1 control module and UP to 8 battery modules

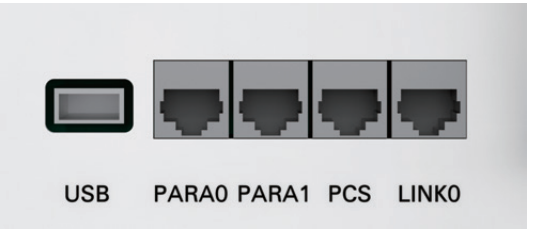
3.6.3 High-Voltage Battery Control Unit Description



Model:FLH48100UCG2

Code	Name	Definition
A	LCD Display	Indicate the important battery information
B	PCS-	Connection terminal of PCS negative pole(black)
C	PCS+	Connection terminal of PCS positive pole(red)
D	Antenna	Increase the WiFi receiving signal
E	BAT-	Connection terminal of the common negative pole of the battery(black)
F	BAT+	Connection terminal of the common positive pole of the battery(red)
G	DC Circuit Breaker	Used to manually control the output situation of battery rack
H	Power Switch	Indicate the power on/off function
I	USB	BMS upgrade interface with USB
J	PARA0	The clustered interface connected to the previous battery system
K	PARA1	The clustered interface connected to the next battery system

L	PCS	The clustered interface connected to the previous battery system
M	LINK0	Connect with the first batterymodule and communicate with all battery modules
N	12VDC	Connect with external 12VDC power supply and dubug for battery control unit



Definition of PARA0		Definition of PARA1		Definition of PCS		Definition of LINK0		P1.....P8
1	BCU-ADD-OUT	1	BCU-ADD-IN	1	485B_PCS	1	BMU-ADD-IN	
2	BCU-ADD-IN	2	BCU-ADD-OUT	2	485A_PCS	2	BMU-ADD-OUT	
3	/	3	/	3	GND	3	COM-GND	8.....1
4	DAY1A	4	/	4	CANH_PCS	4	12V0_COMISO	
5	DAY1B	5	/	5	CANL_PCS	5	12V0_COMISO	
6	/	6	/	6	GND	6	COM-GND	
7	CANL_BCU	7	CANL_BCU	7	485A_PCS	7	CANL_BMU	
8	CANH_BCU	8	CANH_BCU	8	485B_PCS	8	CANH_BMU	

PCS Port Pin Definition

Battery-Felicity Solar

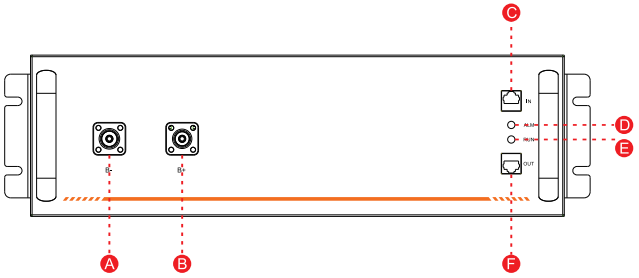
Picture	Pin	Color	Definition
P1.....P8 	1	ORG-WH	485A
	2	ORG	485B
	3	GN-WH	NC
	4	BU	CANH
	5	BU-WH	CANL
	6	GN	GND
	7	BN-WH	485A
	8	BN	485B

Inverter-Felicity Solar

Pin	Color	Definition	Picture
1	ORG-WH	/	
2	ORG	/	P1.....P8
3	GN-WH	/	
4	BU	CANH	
5	BU-WH	CANL	
6	GN	GND	
7	BN-WH	485A	
8	BN	485B	

* If using this product with an inverter from another brand, please confirm the pin definition for the connection between the inverter and the battery.

3.6.4 High-Voltage Battery Module Description

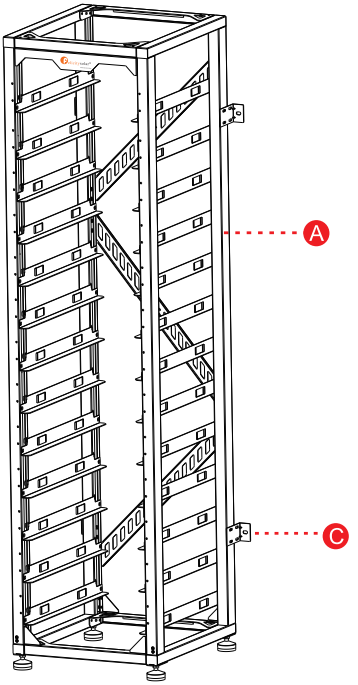


Model:FLH48100UMG2

Code	Name	Definition
A	BAT-	Negative terminal of battery module (black)
B	BAT+	Positive terminal of battery module (red)
C	IN	Communication input connection to previous FLH48100UMG2
D	ALM	Indicates battery fault status (illuminates when fault occurs)
E	RUN	Indicates normal battery operating status (remains on during normal run)
F	OUT	Communication output connection to next FLH48100UMG2

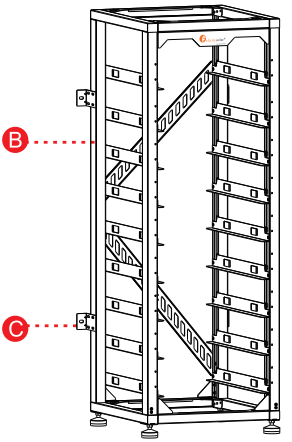
3.6.5 Rack Introduction

- FLH48100R13G2:Built in 1 control module and UP to 12 battery modules;
- FLH48100R9G2: Built in 1 control module and UP to 8 battery modules;



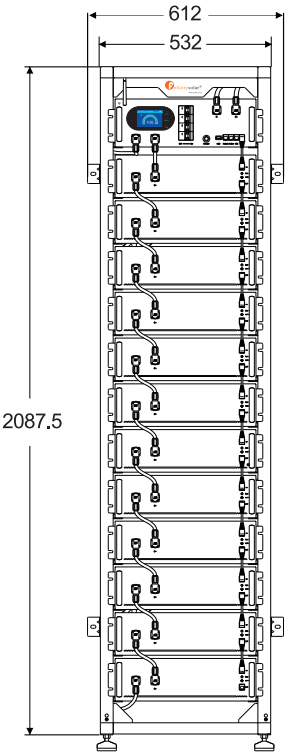
FLH48100R13G2

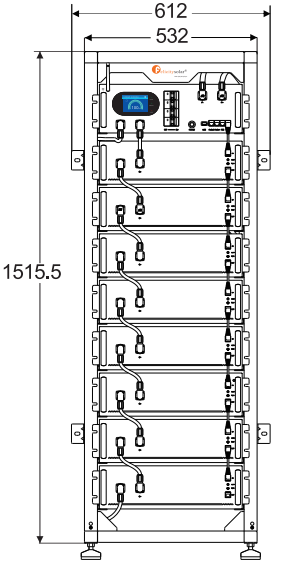
Code	Name
A	Rack(R13)
B	Rack(R9)
C	Fixed trestle

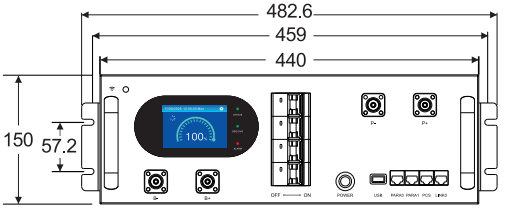


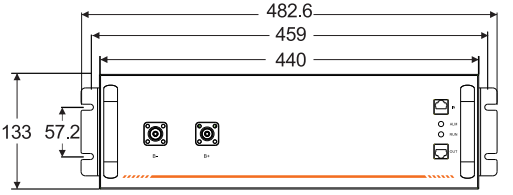
FLH48100R9G2

3.6.6 Product size information









4. Installation and Configuration

4.1 Pre-Installation Preparation

4.1.1 Safety Requirement

This system shall only be installed by personnel who have received training in power supply systems and possess sufficient expertise in such systems.

During installation, the safety guidelines outlined below, together with applicable local safety standards, must be strictly followed.

- All circuits that interface with this power system and carry external voltages below 48 V must comply with the SELV (Safety Extra-Low Voltage) requirements as specified in IEC 60950.
- Before working inside the power system cabinet, ensure that the system is completely de-energized and all battery devices are turned off.
- Distribution cables shall be organized in a systematic manner and fitted with protective measures to prevent accidental contact during the operation of power equipment.

4.1.2 Installation Environment

- Working temperature: -20℃~+55℃
- Charging temperature range: 0℃~+55℃
- Discharging temperature range: -20℃~+55℃
- Storage temperature: 0℃~+35℃
- Relative humidity: 5% ~ 95%
- Elevation: ≤3000m
- Heat source: ≥50cm
- Fire source: ≥500cm

Operating environment: Suitable for installation indoors or outdoors in locations protected from direct sunlight, wind, conductive dust, and corrosive gases. Comply with Pollution Degree 2 and Overvoltage Category II. Ensure the following conditions are met:

- The installation site shall be located away from the sea to avoid exposure to saltwater and high humidity.
- The ground at the installation site must be flat and level.
- The site shall be clear of flammable or explosive substances.
- The optimal ambient temperature range is 20°C to 30°C.
- Areas with excessive dust or clutter shall be avoided.

4.1.3 Tools

Screw Driver

Crimping Modular

Safety Shoes

Multimeter

Safety Gloves

Safety Goggles

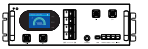
Plier

Ribbon

Electric drill

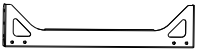
4.2 Unpacking Inspection

- Upon arrival at the installation site, loading and unloading shall strictly comply with prescribed procedures to protect against direct sunlight and rain.
- Prior to unpacking, shall verify the total number of packages against the shipping list attached to each package, and inspect the outer casings for any signs of damage. After unpacking, conduct a thorough inspection for loose or damaged wiring, contacts, cracks, deformations, leaks, or any other forms of damage. If any damage is detected, the battery must be replaced immediately. Never attempt to charge or use a damaged battery, and avoid contact with any liquid from a ruptured battery.
- During unpacking, exercise caution when handling all components to protect the surface coating from damage.

FLH48100UCG2			
No.	**Description**	**Quantity**	**Picture**
1	High-Voltage Battery Control Unit 1000V/100A	1	
2	User manual	1	
3	Warranty card	1	
4	Power Cable 1: 5 meters, 4AWG, allows for charging and discharging up to 100A, used to connect to external PCS+ (red).	1	
5	Power Cable 2: 5 meters, 4AWG, allows for charging and discharging up to 100A, used to connect to external PCS- (black).	1	
6	Power Cable 3: 2 meters, 4AWG, used for serial connection from master control to slave control (black).	1	
7	Power Cable 4: 35 millimeter, 4AWG, used for serial connection from master control to slave control (red).	1	
8	Communication Line1: 3 meters. It enables communication between the battery and the computer host through an RS485 adapter. At the same time, it can flexibly match communication cables for different inverters.	1	
9	Communication Line2: 3 meters, Communication between the battery pack and the Felicity inverter	1	
10	Communication Line3: 1.2 meters, Paralleled communication between the battery clusters.	1	
11	Communication Line 4: 102 millimeters, used for the communication connection between the battery control unit FLH48100UCG2 and the first battery model FLH48100UMG2	1	

12	Communication Line 5:150 mm, used for the communication connection between the battery control unit FLH48100UCG2 and the first battery model FLH48100UMG1.	1	
13	Screw: used for installing control box.	4	
14	Signal Terminal: For making custom communication cables.	2	
15	Ground Cable:145 mm, used for the ground wire connection between the battery control unit FLH48100UCG2 and the first battery model FLH48100UMG1.	1	
16	Ground Cable: 2m length, used to connect the inverter to the battery ground.	1	
17	External 12VDC Power Supply Debugging Harness	1	
18	120Ω Terminal Resistor: Used for BMU communication and parallel communication.	2	
19	Terminal SC25-8: For inverter battery terminals; connects to the combiner box during installation.	2	

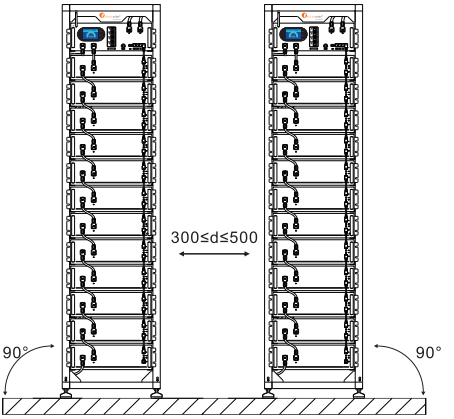
FLH48100UMG2			
No.	**Description**	**Quantity**	**Picture**
1	5.12 kWh Battery Module	1	
2	Warranty Card	1	
3	Power Cable: For series connections between battery pack modules.	1	
4	Communication Cable: 102 millimeters, used for communication connection between FLH48100UMG2 battery modules	1	
5	Screws: For installing battery pack modules.	4	

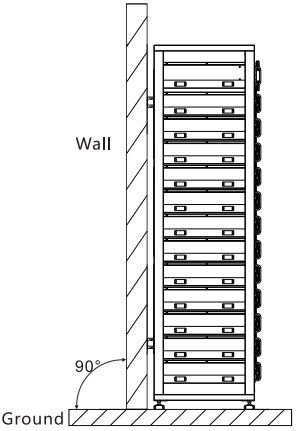
FLH48100R13G2			
No.	**Description**	**Quantity**	**Picture**
1	LOGO board	1	
2	Cross beam	4	
3	Right side beam	1	
4	Left side beam	1	
5	Left diagonal brace	1	
6	Right diagonal brace	2	
7	Rack fastener	4	
8	BOT foot cup	4	
9	Tripod	4	
10	Expansion screw	4	
11	Screw M6×12*66 PCS Screw M5×12*2 PCS	/	
12	Ribbon:Used to fix the power cord	5	
13	Quick installation guide	1	
14	Warranty card	1	

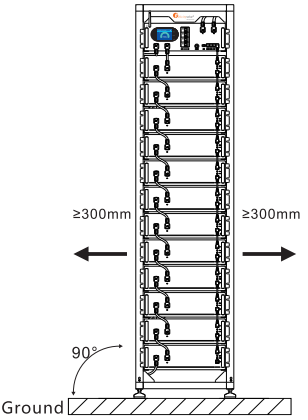
4.3 Installation Procedure

4.3.1 Battery Mounting

(a) Floor-Mounted method

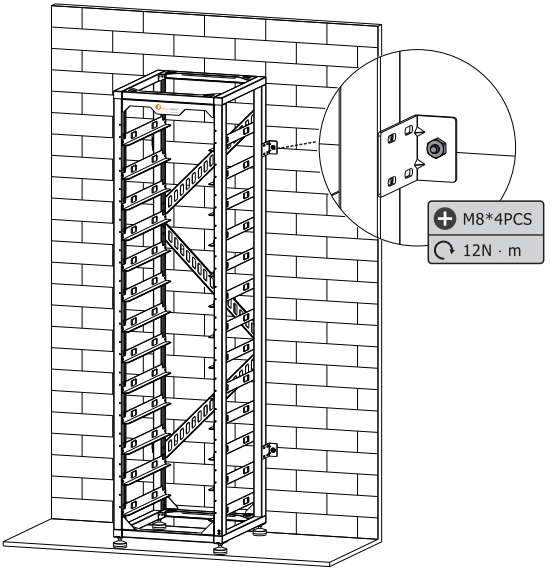




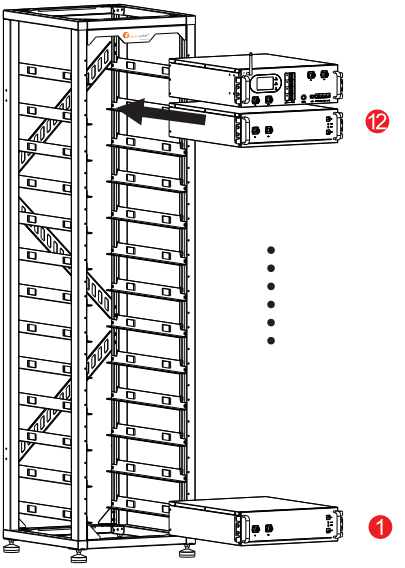


(b)Wall-Mounted Method

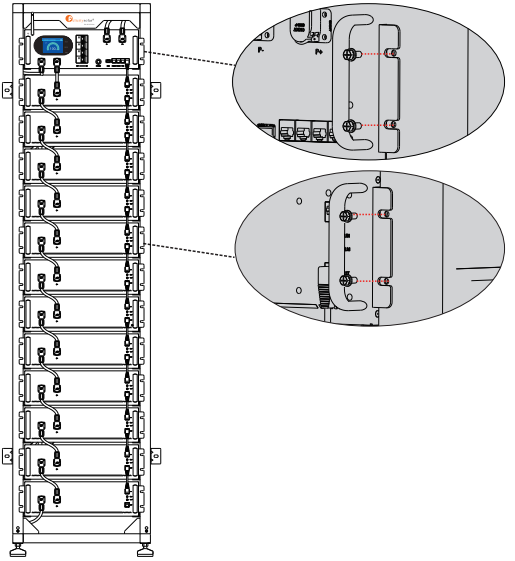
Step 1: Remove the battery, control box, and frame from the packaging. Use a hammer drill to drill a mounting hole for the frame in the wall. The hole should have a diameter of 10 mm and a depth of 60 mm.



Step 2: Secure the rack to the wall, then insert the battery and control box into the rack from the bottom up.



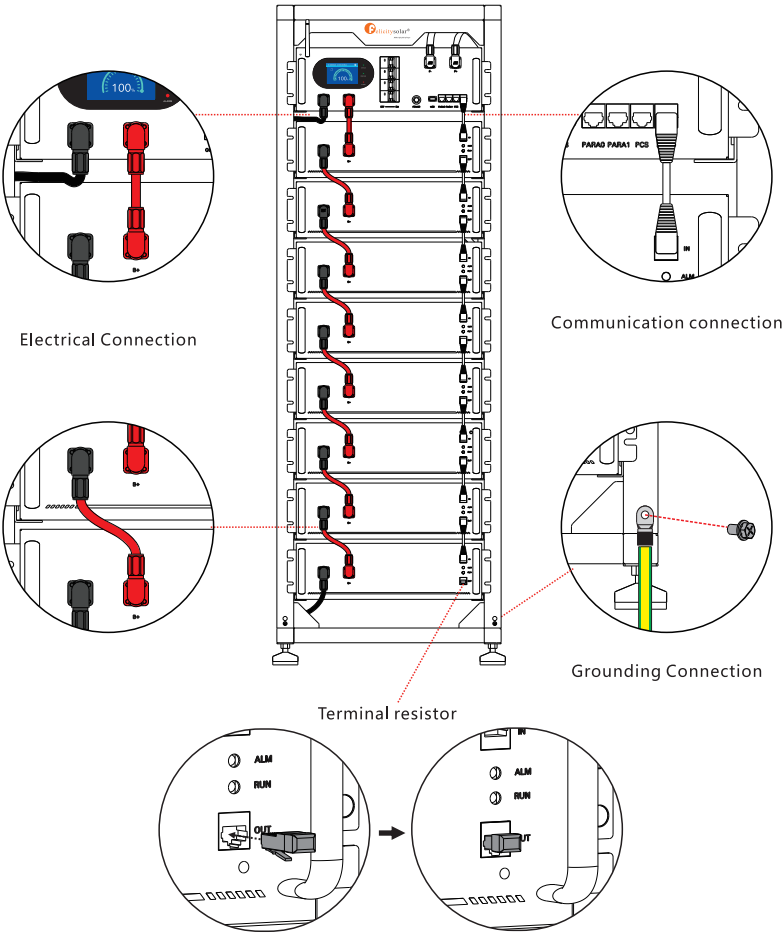
Step 3: Secure the battery and control box to the rack.



Note:

1. Prior to installation, verify that the ground surface is level and free of inclinations.
2. Ensure the rack is positioned against a wall and properly secured.
3. During placement, push inward from the bottom upward, following the direction indicated by the arrow.
4. When installing the battery, ensure it is pushed all the way to the bottom of its compartment.
5. Secure the battery using the provided accessory screws. Exercise caution to prevent the battery from falling.
6. Once the battery is secured, connect the power cable.

4.3.2 Wiring procedure



Note:

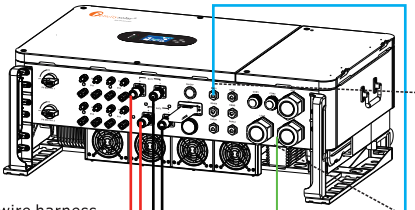
- During equipment installation: First, establish a reliable ground connection to the inverter through the grounding port at the bottom of the frame. Then, establish reliable ground connections for both the battery system and the frame.
- During equipment disassembly: First, disconnect the power circuit between the battery system and the inverter. Next, disconnect the ground connection between the battery system and the frame. Finally, disconnect the ground connection between the frame and the inverter.

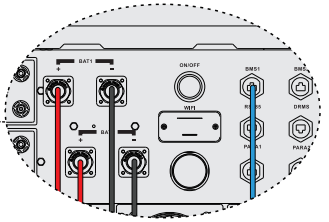
Screw tightening torque: 5 N·m (Newton-meters).

The control box must be connected to the ground wire of the base.

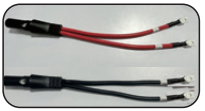
4.4 System Connection Diagram

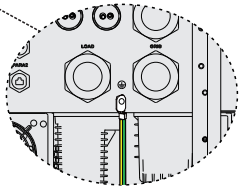
Negative Power Line Positive Power Line RJ45 485/CAN Communication Ground Connection



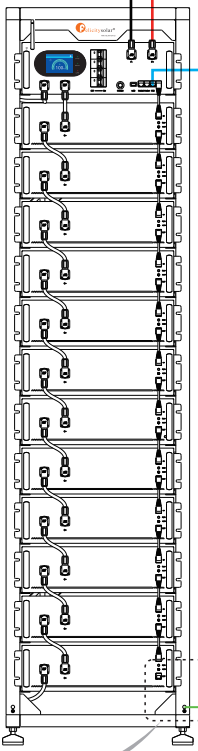


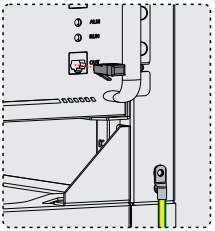
1-to-2 wire harness

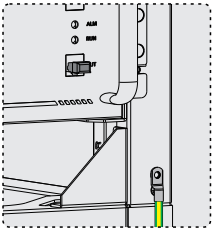




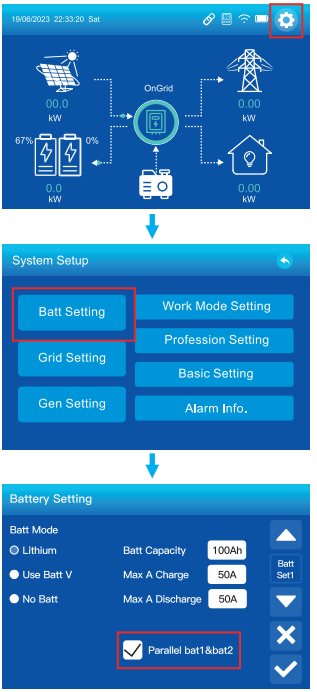
Screw locking torque 2N. m







Inverter screen setting:



4.5 Power On/Off Procedures

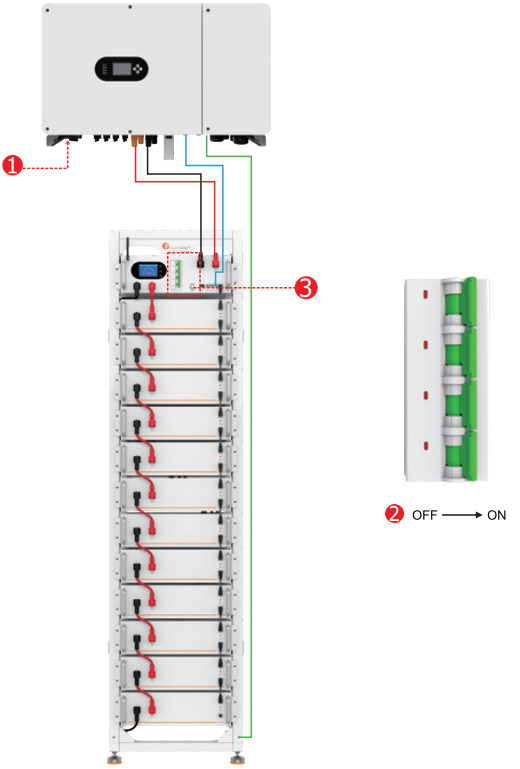
Power on steps:

Step 1: Confirm that the battery and inverter are properly wired, then start the inverter ❶ .

Step 2: Turn on the battery breaker by switching it from "OFF" to "ON" ❷

Step 3: Press and hold the power button ❸ for 3 seconds to activate the battery system.

If the battery clusters are connected in parallel, connect the harnesses in sequence as indicated and then turn on them one by one.



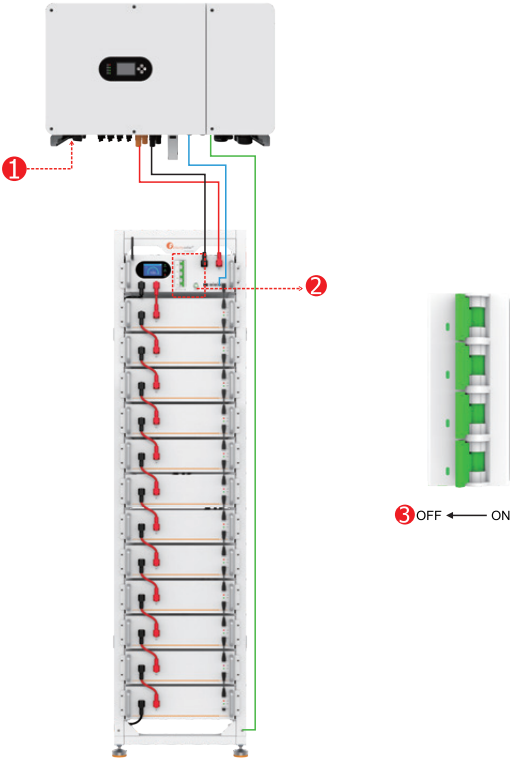
Power down steps:

Step 1: Shut down the inverter❶;

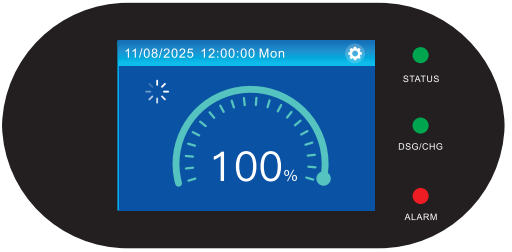
Step 2: Press and hold the power button❷for 3 seconds to turn off the battery system;

Step 3: Turn off the battery breaker by switching it from "ON" to "OFF"❸

Note: If batteries are connected in parallel, shut them down one by one.

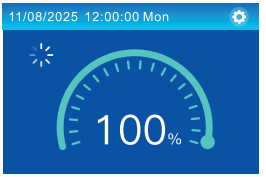


4.6 LCD Display Icons



Name	Description
LCD touch screen	Display the information of the battery.
Status LED	Indicates the operating status of the battery, which is always on when running normally.
Charge&Dischage LED	Indicates the charging&discharging status ot the battery; A long bright light indicates discharging, and a flashing light indicates charging.
Alarm LED	Indicates the fault status of the battery, which lights up when the fault occurs.

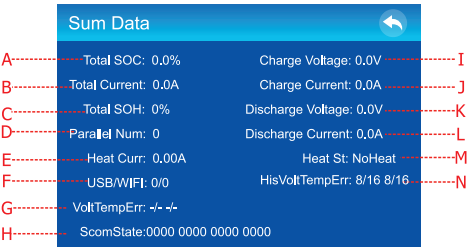
4.6.1 Main Interface



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

4.6.2 Sum Data

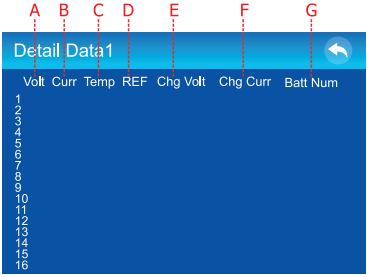
This page displays the summary information of parallel battery system(If it is a single-cluster system, the information displayed is its own):



Code	Name	Definition
A	Total SOC	SOC of battery system.
B	Total Current	Total Current of battery system.
C	Total SOH	SOH battery system.
D	Pararrel Number	The number of successfully paralleled batteries.
E	Heat Current	Heat Current of battery system. If this battery does not support the heating function, please ignore it.
F	USB/WIFI	USB/WIFI connection state. 1 represents connected, and 0 represents disconnected.
G	Voltage Temperature Error	Current records of BMU cells or temperatures error
H	Slave Com State	BMU communication state. Binary numbers are used to determine which BMUs are online.
I	Charge Voltage	Charge limited voltage of battery system.
J	Charge Current	Charge limited current of battery system.
K	Discharge Voltage	Discharge limited voltage of battery system.
L	Discharge Current	Discharge limited current of battery system.
M	Heat State	Heat state of battery system. If this battery does not support the heating function, please ignore it.
N	History Voltage Temperature Error	Historical records of battery cells or temperatures;

4.6.3 Detail Data1

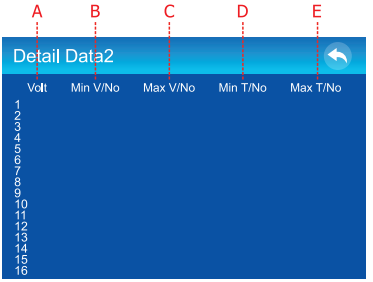
This page displays the datail information of parallel battery system:



Code	Name	Definition
A	Voltage	Every battety voltage of parallel battery system.
B	Current	Every battety current of parallel battery system.
C	Temperature	Every battety temperature of parallel battery system.
D	Reference SOC	Every battety reference SOC of parallel battery system.
E	Charge Voltage	Every battety charge limited voltage of parallel battery system.
F	Charge Current	Every battety charge limited current of parallel battery system.
G	Battety Number	Battery address number.

4.6.4 Detail Data2

This page displays the datail information of battery system:

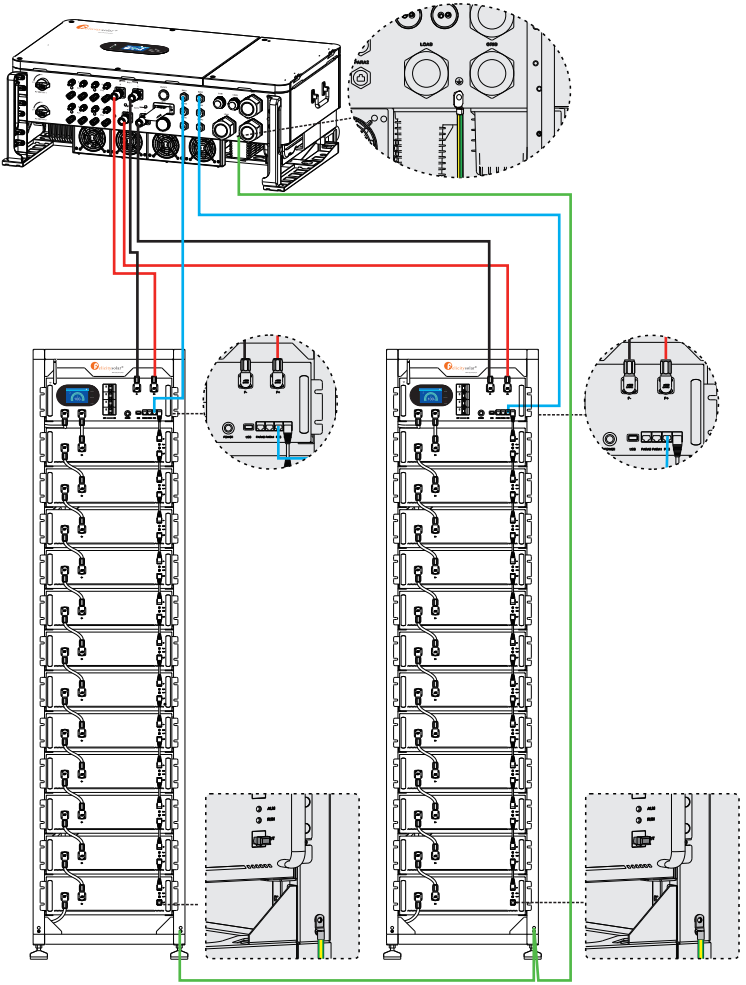


Code	Name	Definition
A	Voltage	Every BMU voltage of battery system.
B	Minimum Voltage/No	Minimum cell voltage of BMU and cell number.
C	Maximum Voltage/No	Maximum cell voltage of BMU cell number.
D	Minimum Temperature/No	Minimum cell temperature of BMU cell number.
E	Maximum Temperature/No	Maximum cell temperature of BMU cell number.

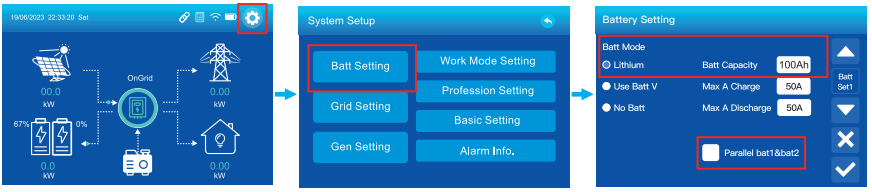
4.7 Multi-cluster Battery System Connection

4.7.1 Two battery clusters connected to the inverter

Negative Power Line Positive Power Line RJ45 485/CAN Communication Ground Connection



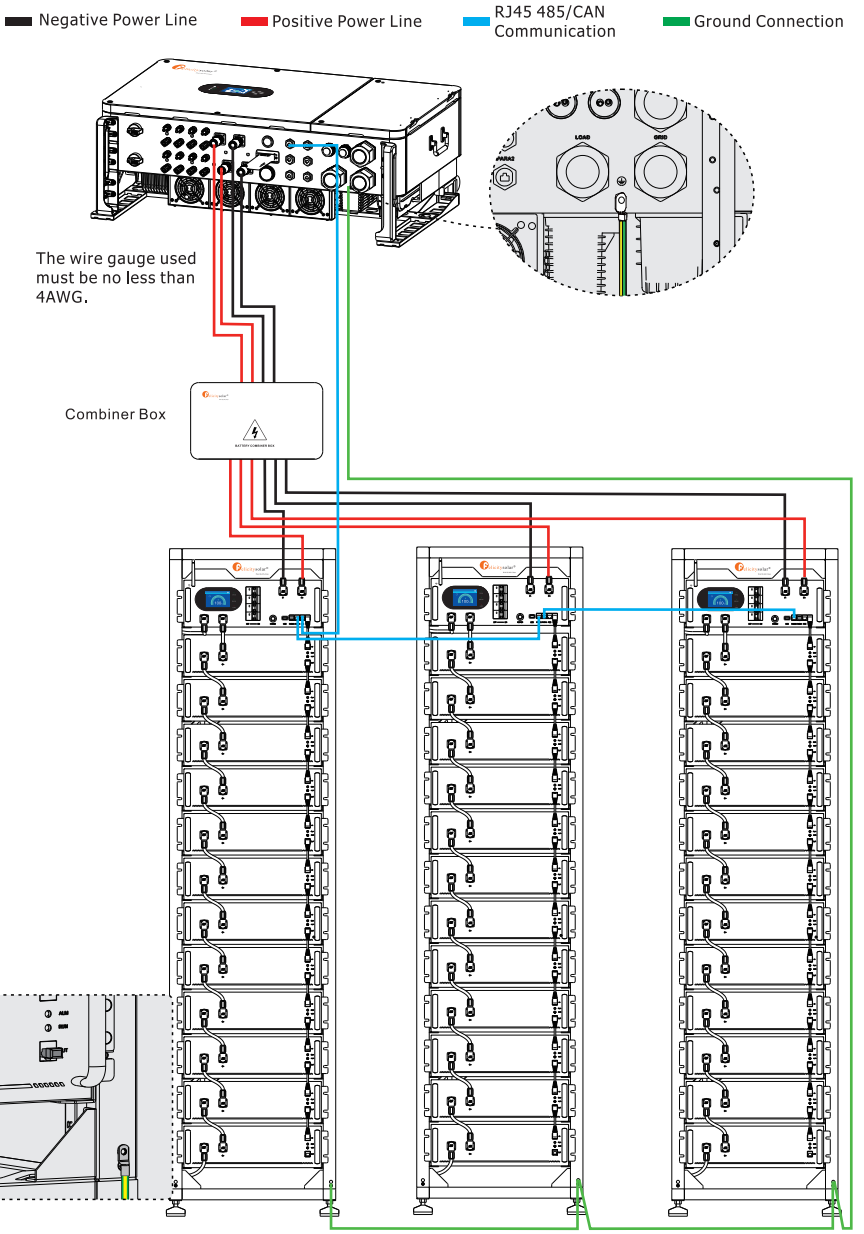
Inverter Display Setup Steps:



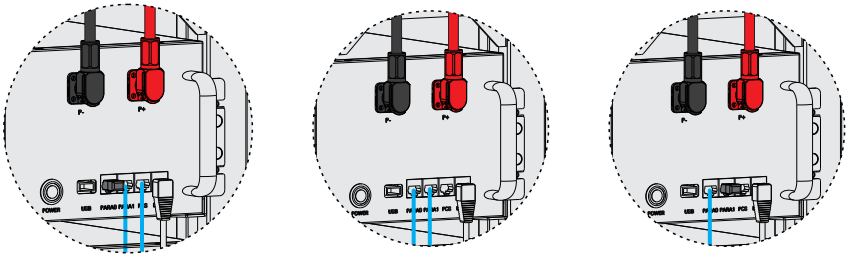
4.7.2 Three battery clusters connected to the inverter

The FLH48100UG2 supports to be connected in parallel for expansion. It can support up to 16 clusters FLH48100UG2 in parallel. Before setting up the parallel system, it is necessary to carefully read this chapter to ensure that the number of each cluster's BMUs is consistent, that the addresses are set correctly, and that the electrical connections are safe and correct.
*For the specific combiner box model, please consult our after-sales support via:
Email: felicitysupport@felicitysolar.com
WhatsApp: +86 18022876286

1.Wiring Diagram

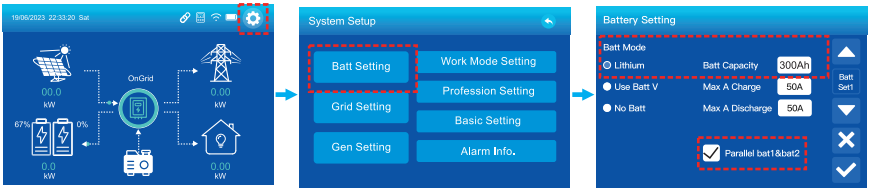


Schematic Diagram of Communication Port Connections



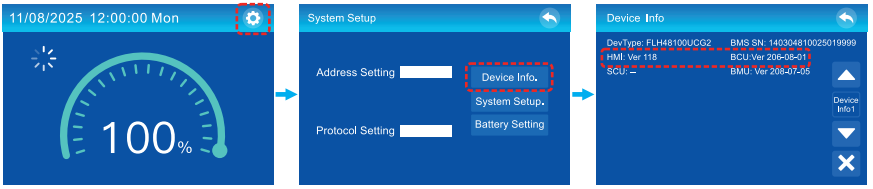
BAT1 BAT2 BAT3

2. Inverter Display Setup Steps



3. Battery Cluster Configuration Steps

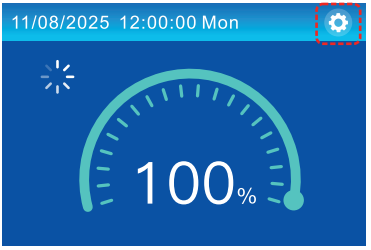
Prior to system setup, upgrade the main control software and LCD firmware to a version no lower than that shown in the figure. If the program version is lower than the version shown in the picture, please contact the supplier.

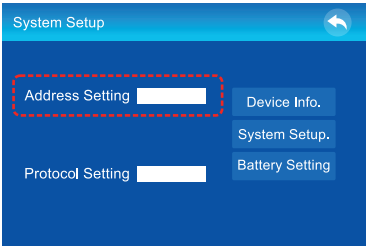


Battery pack parallel operation address setting:

1.After connecting the battery cables, power on the battery pack and configure the main control address via the display. Main control addresses must be unique (no duplicates), with a maximum configurable address of 16.

2.Once the address is configured, restart the battery pack.



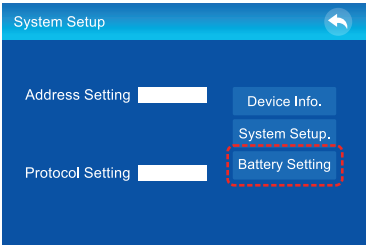


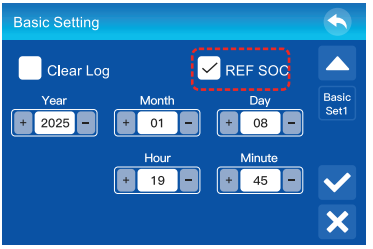
"Protocol Setting": This feature is currently under development and requires no attention for the time being.

Parallel SOC Averaging Setting

1.After connecting the battery cables, access the "System Setup" page and click "Basic Setting".

2.Check the "REF SOC" option.

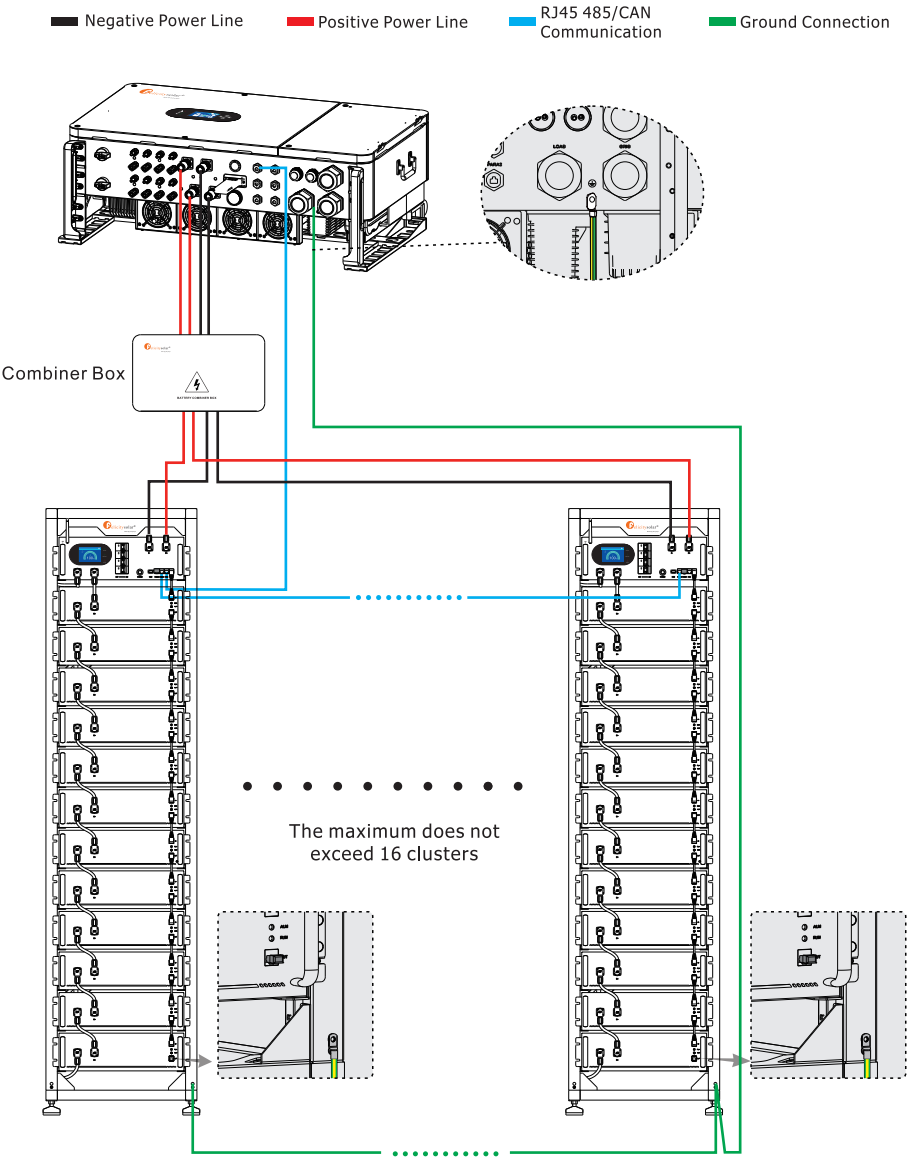




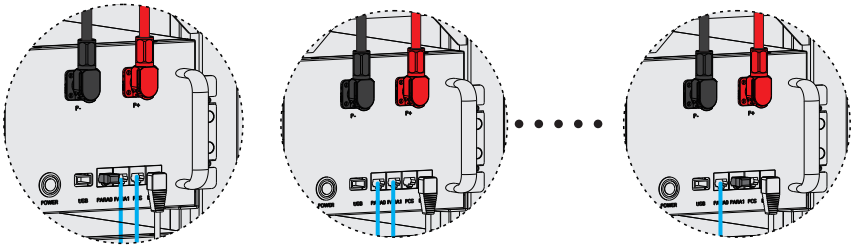
Click "REF SOC"

4.7.3 Multiple battery clusters connected to the inverter

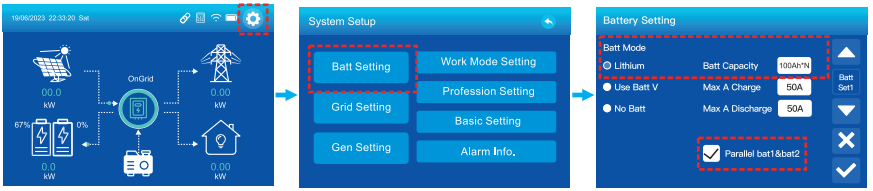
1.Wiring Diagram



Schematic Diagram of Communication Port Connections

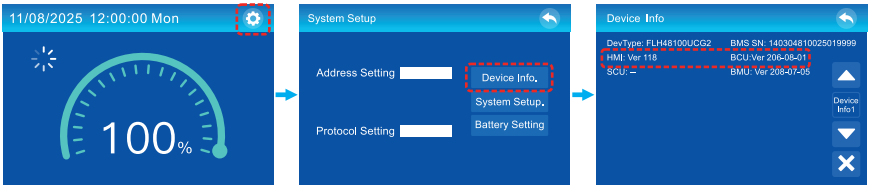


2. Inverter Display Setup Steps



3. Battery Cluster Configuration Steps

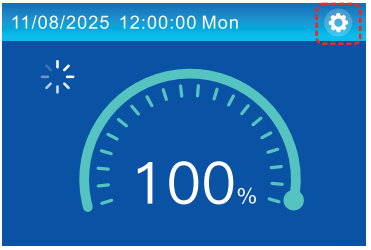
Prior to system setup, upgrade the main control software and LCD firmware to a version no lower than that shown in the figure. If the program version is lower than the version shown in the picture, please contact the supplier.

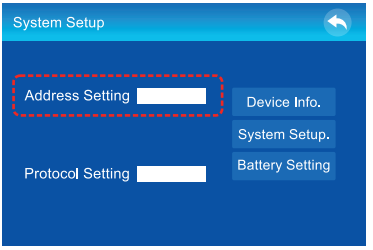


Battery pack parallel operation address setting:

1.After connecting the battery cables, power on the battery pack and configure the main control address via the display. Main control addresses must be unique (no duplicates), with a maximum configurable address of 16.

2.Once the address is configured, restart the battery pack.



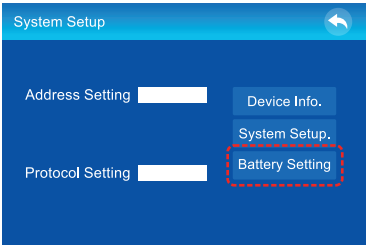


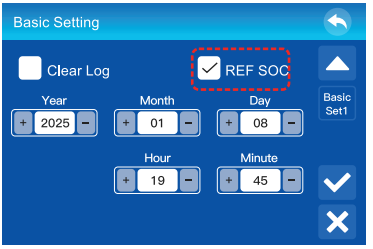
"Protocol Setting": This feature is currently under development and requires no attention for the time being.

Parallel SOC Averaging Setting

1.After connecting the battery cables, access the "System Setup" page and click "Basic Setting".

2.Check the "REF SOC" option.





Click "REF SOC"

5. Network Device Management

***If the entire system uses Felicitysolar products, the battery information can be monitored through the inverter. If paired with inverters from other brands, please follow the steps below:**

5.1 Network Configuration

5.1.1 APP Download

Scan the QR code on the right to download the app.

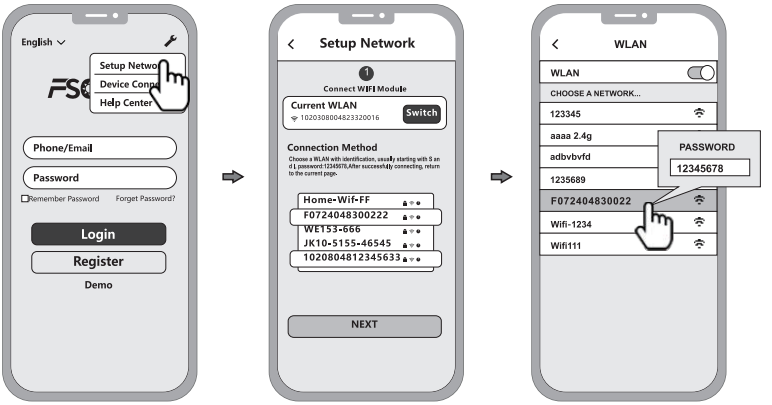
Fsolar APP

5.1.2 Connect to Built-in Wi-Fi Network

Configure your mobile device's WLAN to connect to the built-in Wi-Fi network.

1)Launch the app, navigate to the login screen, and tap [Set Up Network] to access the network configuration page.

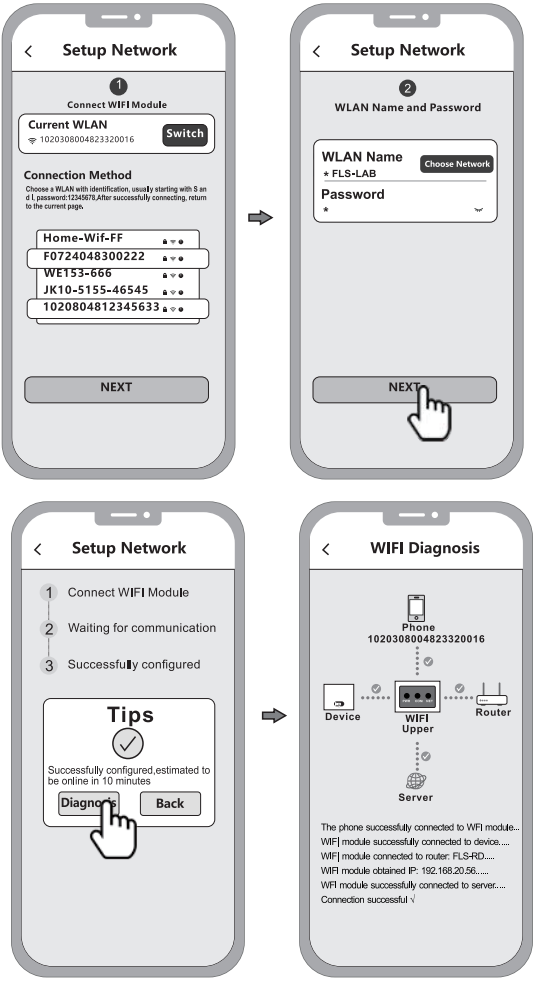
2)On the network configuration page, tap [Switch] to open the mobile device's WLAN settings.



On your mobile device's WLAN settings page, locate the wireless network corresponding to the Smart WiFi Module. Its SSID starts with "F" (e.g., Fxxxxxxxxxxxxxxxxx, where "xxxxxxxxxxxxxxxxx" matches the device serial number). Enter the module's wireless network password (default: 12345678) to connect to the built-in Wi-Fi network.

5.1.3 Network Configuration Steps

1) Once your mobile device's WLAN is connected to the built-in Wi-Fi network, return to the app's network configuration page and tap [NEXT] to access the Wi-Fi network page.
2) On the Wi-Fi network page, select the router's wireless network that the built-in Wi-Fi needs to connect to, or directly enter the router name. Input the router's wireless password and tap [NEXT].
3) Allow time for the built-in Wi-Fi to connect to the router's wireless network. If issues arise, use the app's diagnostic function or refer to the troubleshooting appendix for solutions.



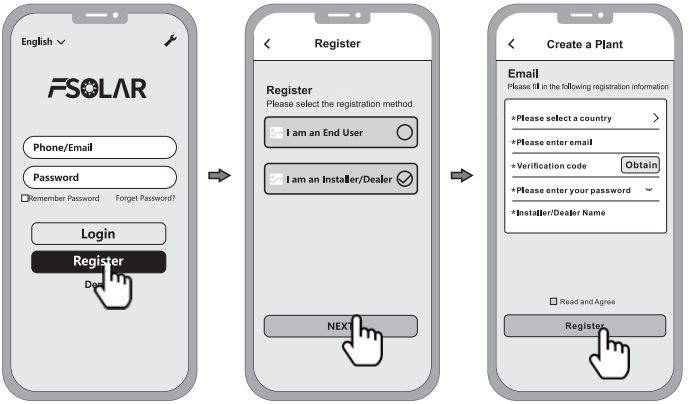
5.2 Plant Creation

After the Built-in WIFI is connected to the server, it will transmit the data of the device to the server. And after the plant is created, users can view and manage the device via the APP or web browser.

5.2.1 Device Management via APP

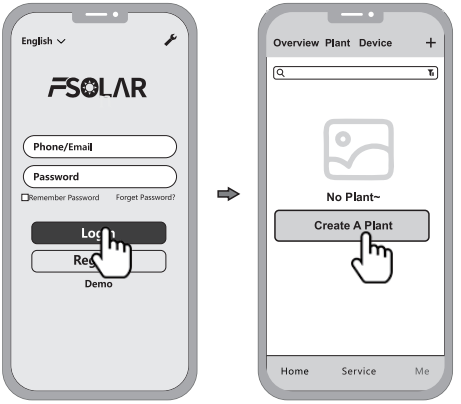
1)Register an account

Run the app, enter the login page, click the [Register] button, select the role you want to register, enter and fill in the relevant information (optional email) to register.

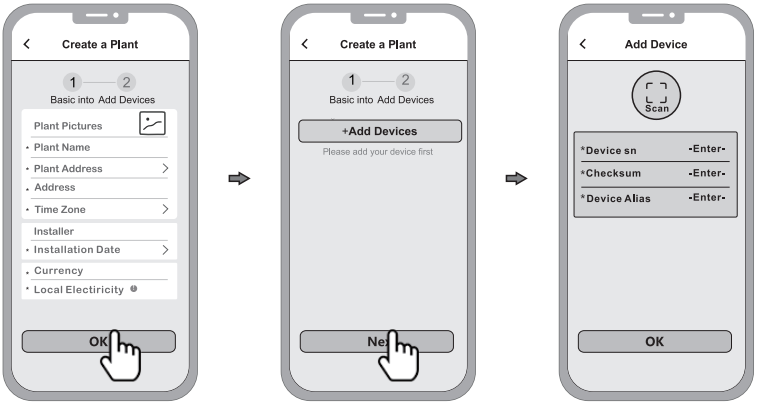


2)New plant construction

- Log in with the newly registered account, enter the homepage, and click on [Create A Plant]



- Fill in the corresponding information and click [OK]
- Click [Add device], click the above icon [scan, align the bar code/two-dimensional code on the side of the inverter or battery pack to scan, or fill in the SN and activation code on the label.



- Manage the device via a web browser, please refer to: https://shine.felicitysolar.com

6. Fault Code Table

Code	Fault Description	Recommended Action
F01	Battery Voltage High	Battery overvoltage fault & Battery undervoltage fault. Please check whether the power cables and communication cables of the battery system are connected correctly. After checking the wiring harness connections and restarting the system, if the fault is not eliminated, please contact the battery supplier.
F02	Battery Voltage Low	
F03	Cell Voltage High	Battery cell overvoltage fault & Battery cell undervoltage fault. If the same fault is reported multiple times, please contact the battery supplier.
F04	Cell Voltage Low	
F05	Battery Charge Current High	Battery charge overcurrent & Battery discharge overcurrent. If the same fault is reported multiple times, please contact the battery and converter supplier.
F06	Battery Discharge Current High	
F07	BCU Temperature High	BCU over temperature. The battery system may have been exposed to extremely high ambient temperatures for an extended period while operating at high power continuously. Please let it stand idle for a while before continuing to use it. If the same fault is reported multiple times, please contact the battery supplier.
F08	TBD	The F08 code has not been assigned a specific fault yet. Please ignore it.
F09	Cell Temperature High	Cell over temperature. The battery system may have been exposed to extremely high ambient temperatures for an extended period while operating at high power continuously. Please let it standidle for a while before continuing to use it. If the same fault is reported multiple times, please contact the battery supplier.
F10	Cell Temperature Low	Cell under temperature. Please note the installation and usage environmental temperatures. If the same fault is reported multiple times, please contact the the battery supplier.
F11	AFE Communication Fault	The chip operation is stuck. Please try to restart the battery. If the same fault is reported multiple times, please contact the battery supplier.
F12	Soft Start Fault	Battery soft start fault. Please confirm whether there is a short circuit on the P+/P-. After checking it and restarting the system, if the fault is not eliminated, please contact the battery supplier.

F13	BMU Device Communication Fault	BMU communication fault. Please confirm whether the BMUs communication harness are well connected. After checking it and restarting the system, if the fault is not eliminated, please contact the battery supplier.
F14	Insulation Resistance Low Fault	Insulation resistance low fault. Please turn off the battery system and contact the battery supplier.
F15	TBD	The F15 code has not been assigned a specific fault yet. Please ignore it.
F16	TBD	The F16 code has not been assigned a specific fault yet. Please ignore it.
F17	Parallel Fault	Batteries in parallel fault. Please confirm whether the parallel battery system has been set up correctly in accordance with the requirements, such as the 120R terminal resistor, parallel cluster network cable, the parallel cluster addresses on the LCD must be inconsistent, and the number BMUs in each cluster's battery system, etc. After checking them and restarting the system, if the fault is not eliminated, please contact the battery supplier.
F18	Relay Self-diagnosis Fault	Please turn off the battery system and contact the battery supplier.
F19	PCS Voltage fault	PCS voltage measurement fault. Please try to restart the battery. If the same fault is reported multiple times, please contact the battery supplier.
F20	Fuse Fault	Fuse fault. Please turn off the battery system and check the fuse status.
F21	Insulation Function Fault	BCU insulation function fault. Please try to restart the battery. If the same fault is reported multiple times, please contact the battery supplier.
F22	BMU Address Fault	BMU Address Fault Please try to restart the battery and check the blinking status of the BMU's status indicator lights. If the same fault is reported multiple times, please contact the battery supplier.

F23	Cell Temperature Harness Shortage Fault	Cell temperature harness shortage fault. If the same fault is reported multiple times, please contact the battery supplier and check the BMU temperature harness state.
F24	Cell Temperature Harness Open Fault	Cell temperature harness open fault. If the same fault is reported multiple times, please contact the battery supplier and check the BMU temperature harness state.
F25	Cell Voltage Harness Open Fault	Cell Voltage Harness Open Fault If the same fault is reported multiple times, please contact the battery supplier and check the cell voltage harness state.
F26	Heating Power Over Fault	Heating power over fault. Please turn off the battery system and contact the battery supplier.
F27	Heating Circuit Fault	Heating circuit fault. Please turn off the battery system and contact the battery supplier.
F28	Module Balance Relay Fault	Module balance relay fault. Please turn off the battery system and contact the battery supplier.
F29	Delta Voltage Fault	Excessive voltage difference fault. If the same fault is reported multiple times, please contact the battery supplier and check the cell voltage harness state.

7. Battery Recycling

Aluminum, copper, lithium, iron, and other metal materials are extracted from discarded LiFePO4 batteries using an advanced hydrometallurgical process, achieving a comprehensive recovery efficiency of up to 80%. The detailed process steps are outlined as follows.

7.1 Cathode Material Recycling Process and Steps

The aluminum foil used as a current collector is an amphoteric metal. Initially, it is dissolved in an NaOH alkaline solution, which allows aluminum to enter the solution as $NaAlO_2$. After filtration, the filtrate is neutralized using a sulfuric acid solution, leading to the precipitation of $Al(OH)_3$. When the pH exceeds 9.0, most of the aluminum precipitates, and the resulting $Al(OH)_3$ can meet chemical-grade purity specifications upon analysis.

The filter residue is treated with sulfuric acid and hydrogen peroxide, which allows lithium iron phosphate to dissolve into the solution as $Fe_2(SO_4)_3$ and Li_2SO_4, while separating it from carbon black and the carbon coating on lithium iron phosphate. After filtration, the pH of the filtrate is adjusted using NaOH and ammonia solution. Iron is first precipitated as $Fe(OH)_3$; subsequently, the remaining solution is treated with a saturated Na_2CO_3 solution at 90°C to induce precipitation.

7.2 Anode Material Recycling

The recovery process for anode materials is rather straightforward. Upon separation of the anode plates, the copper achieves a purity exceeding 99%, qualifying it for further refining into electrolytic copper.

7.3 Diaphragm Recycling

The diaphragm material is primarily non-hazardous and holds no recycling value.

7.4 Recycling Equipment List

Automatic dismantling machine, pulverizes, wet gold pool, etc.

8. Disposal

Please abide by the regulations for the disposal of used batteries. Damaged batteries must be stopped immediately. Before disposal, please contact the installer or sales partner and ensure that the batteries are kept away from moisture and direct sunlight.

For details on battery module processing, please contact us in a timely manner:
E-mail: technicalsupport@felicitysolar.com
Web: **https://www.felicitysolar.com**

Caution:

1. Do not discard batteries (including rechargeable batteries) as household garbage! According to regulatory requirements, you are obligated to hand over used batteries and rechargeable batteries to the designated recycling channels for disposal.
2. If used batteries are not properly disposed of, they may release pollutants, posing a threat to the environment and health.Improper storage or handling may lead to the leakage of harmful substances.
3. Batteries contain recyclable resources such as iron and lithium, and recycling them can achieve circular value.

Don't regard batteries as household garbage!

AppendixI: Specifications

Model		FLH48100UG2			
Battery Type		LiFePO4			
Nominal Energy		5.12kWh			
Nominal Voltage		51.2V			
Nominal Capacity		100Ah			
Number of Battery Modules		5(Min)	8	12	16(Max)[1]
System Nominal Voltage		256V	409.6V	614.4V	819.2V
System Operating Voltage		232~288V	371.2-460.8V	556.8~691.2V	742.4-921.6V
System Energy		25.6kWh	40.96kWh	61.44kWh	81.92kWh
System Usable Energy		23.04kWh	36.86kWh	55.3kWh	73.73kWh
Rated DC Power		25.6kWh	40.96kWh	61.44kWh	81.92kWh
Recommend Charge/Discharge current		50A			
Max. continuous charge/Discharge current[2]		100A			
Depth of discharge(DOD)		90%			
Display type		LED+LCD			
IP Rating of Enclosure		IP20			
Working Temperature Range		Charge:0°C~+55°C			
		Discharge:-20°C~+55°C			
Storge Temperature Range		0°C~+35°C			
Humidity		5%~95%			
Altitude		≤3000m			
Cycle Life[3]		≥6000			
Installation		Rack-Mounting			
Protection		Built-in smart BMS, Breaker, Fuse			
Communication Port		RS485/CAN			
Warranty Period[4]		10 Years			
Certification		CE/ IEC62619/ UN38.3			
Control Module FLH48100UCG2	Product Dimension	482.6x565x150mm			
	Package Dimension	687x562x269mm			
	Product Weight Approximate	10.3kg			
	Package Weight Approximate	16.7kg			

Battery Module FLH48100UMG2	Product Dimension	482.6x565x133mm
	Package Dimension	687x562x250mm
	Product Weight Approximate	41.3kg
	Package Weight Approximate	45kg
	Battery Designation[5]	IFpP54/150/120[(1P16S)NS]M/-20+50/90
Rack FLH48100R13G2	Product Dimension	590×532×2087.50mm(13th floor)
	Package Dimension	657×138×2167mm
	Product Weight Approximate	49kg
	Package Weight Approximate	57kg
Rack FLH48100R9G2	Product Dimension	590×532×1515.5(9th floor)
	Package Dimension	657×138×1595mm
	Product Weight Approximate	37.7kg
	Package Weight Approximate	43.2kg

[1] Currently, the battery supports a maximum of 16 BMUs. For the entire energy storage system, confirm the inverter's maximum supported voltage range to determine the maximum number of BMUs that can be installed.

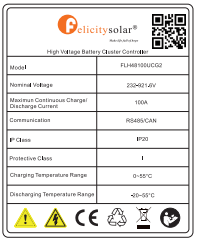
[2] Max. continuous charge/discharge current is affected by temperature and SOC.

[3] Test conditions: 0.5C Charging/Discharging@25±2°C,EOL70%.

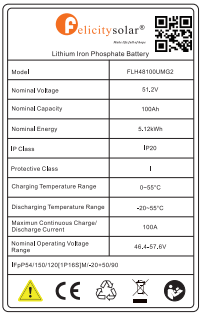
[4] Conditions apply, refer to Felicitysolar Warranty policy.

[5] "N"means the number of battery packs connected series and should not exceed 16.(N≤16)

Appendix II: Labels

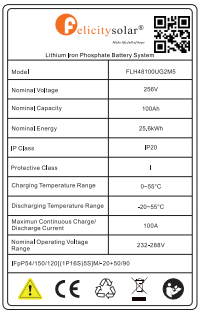


High Voltage Battery Cluster Controller	
Model	FLH48100UCG2
Nominal Voltage	232~921.2V
Maximum Continuous Charge/ Discharge Current	100A
Communication	RS485/CAN
IP Class	IP20
Protective Class	I
Charging Temperature Range	0~55°C
Discharging Temperature Range	-20~55°C



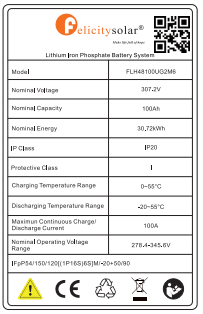
Lithium Iron Phosphate Battery	
Model	FLH48100UMG2
Nominal Voltage	51.2V
Nominal Capacity	100Ah
Nominal Energy	5.12kWh
IP Class	IP20
Protective Class	I
Charging Temperature Range	0~55°C
Discharging Temperature Range	-20~55°C
Maximum Continuous Charge/ Discharge Current	100A
Nominal Operating Voltage Range	46.4~57.6V

IFpP54/150/120[(1P16S]80[M]-20+50/90



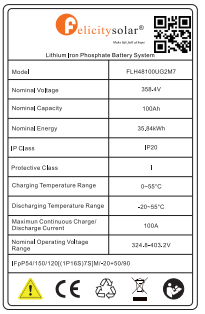
Lithium Iron Phosphate Battery System	
Model	FLH48100UG2M5
Nominal Voltage	256V
Nominal Capacity	100Ah
Nominal Energy	25,6kWh
IP Class	IP20
Protective Class	I
Charging Temperature Range	0~55°C
Discharging Temperature Range	-20~55°C
Maximum Continuous Charge/ Discharge Current	100A
Nominal Operating Voltage Range	232~288V

IFpP54/150/120[(1P16S]55[M]-20+50/90



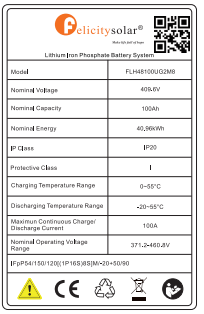
Lithium Iron Phosphate Battery System	
Model	FLH48100UG2M6
Nominal Voltage	307.2V
Nominal Capacity	100Ah
Nominal Energy	30,72kWh
IP Class	IP20
Protective Class	I
Charging Temperature Range	0~55°C
Discharging Temperature Range	-20~55°C
Maximum Continuous Charge/ Discharge Current	100A
Nominal Operating Voltage Range	278.4~345.6V

IFpP54/150/120[(1P16S]65[M]-20+50/90



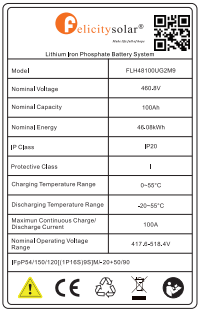
Lithium Iron Phosphate Battery System	
Model	FLH48100UG2M7
Nominal Voltage	358.4V
Nominal Capacity	100Ah
Nominal Energy	35,84kWh
IP Class	IP20
Protective Class	I
Charging Temperature Range	0~55°C
Discharging Temperature Range	-20~55°C
Maximum Continuous Charge/ Discharge Current	100A
Nominal Operating Voltage Range	324.8~403.2V

IFpP54/150/120[(1P16S]75[M]-20+50/90



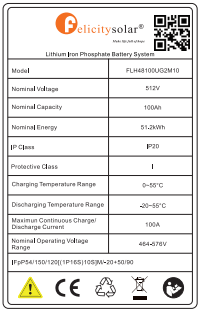
Lithium Iron Phosphate Battery System	
Model	FLH48100UG2M8
Nominal Voltage	409.6V
Nominal Capacity	100Ah
Nominal Energy	40,96kWh
IP Class	IP20
Protective Class	I
Charging Temperature Range	0~55°C
Discharging Temperature Range	-20~55°C
Maximum Continuous Charge/ Discharge Current	100A
Nominal Operating Voltage Range	371.2~460.8V

IFpP54/150/120[(1P16S]85[M]-20+50/90



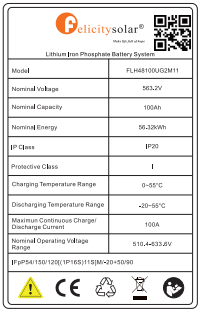
Lithium Iron Phosphate Battery System	
Model	FLH48100UG2M9
Nominal Voltage	460.8V
Nominal Capacity	100Ah
Nominal Energy	46,08kWh
IP Class	IP20
Protective Class	I
Charging Temperature Range	0~55°C
Discharging Temperature Range	-20~55°C
Maximum Continuous Charge/ Discharge Current	100A
Nominal Operating Voltage Range	417.6~518.4V

IFpP54/150/120[(1P16S]95[M]-20+50/90



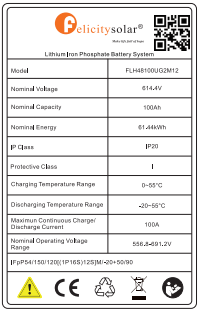
Lithium Iron Phosphate Battery System	
Model	FLH48100UG2M10
Nominal Voltage	512V
Nominal Capacity	100Ah
Nominal Energy	51,2kWh
IP Class	IP20
Protective Class	I
Charging Temperature Range	0~55°C
Discharging Temperature Range	-20~55°C
Maximum Continuous Charge/ Discharge Current	100A
Nominal Operating Voltage Range	464~576V

IFpP54/150/120[(1P16S]105[M]-20+50/90



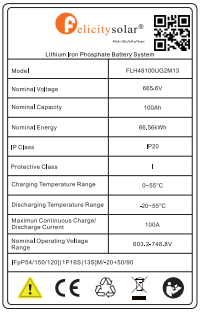
Lithium Iron Phosphate Battery System	
Model	FLH48100UG2M11
Nominal Voltage	563.2V
Nominal Capacity	100Ah
Nominal Energy	56,32kWh
IP Class	IP20
Protective Class	I
Charging Temperature Range	0~55°C
Discharging Temperature Range	-20~55°C
Maximum Continuous Charge/ Discharge Current	100A
Nominal Operating Voltage Range	510.4~633.6V

IFpP54/150/120[(1P16S]115[M]-20+50/90



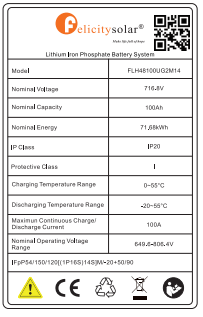
Lithium Iron Phosphate Battery System	
Model	FLH48100UG2M12
Nominal Voltage	614.4V
Nominal Capacity	100Ah
Nominal Energy	61,44kWh
IP Class	IP20
Protective Class	I
Charging Temperature Range	0~55°C
Discharging Temperature Range	-20~55°C
Maximum Continuous Charge/ Discharge Current	100A
Nominal Operating Voltage Range	556.8~691.2V

IFpP54/150/120[(1P16S]125[M]-20+50/90



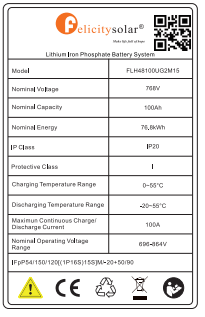
Lithium Iron Phosphate Battery System	
Model	FLH48100UG2M13
Nominal Voltage	665.6V
Nominal Capacity	100Ah
Nominal Energy	66,56kWh
IP Class	IP20
Protective Class	I
Charging Temperature Range	0~55°C
Discharging Temperature Range	-20~55°C
Maximum Continuous Charge/ Discharge Current	100A
Nominal Operating Voltage Range	603.2~748.8V

IFpP54/150/120[(1P16S]135[M]-20+50/90



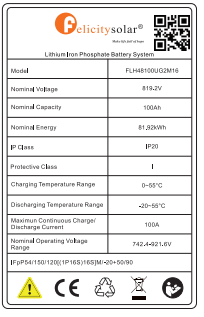
Lithium Iron Phosphate Battery System	
Model	FLH48100UG2M14
Nominal Voltage	716.8V
Nominal Capacity	100Ah
Nominal Energy	71,68kWh
IP Class	IP20
Protective Class	I
Charging Temperature Range	0~55°C
Discharging Temperature Range	-20~55°C
Maximum Continuous Charge/ Discharge Current	100A
Nominal Operating Voltage Range	649.6~806.4V

IFpP54/150/120[(1P16S]145[M]-20+50/90



Lithium Iron Phosphate Battery System	
Model	FLH48100UG2M15
Nominal Voltage	768V
Nominal Capacity	100Ah
Nominal Energy	76,8kWh
IP Class	IP20
Protective Class	I
Charging Temperature Range	0~55°C
Discharging Temperature Range	-20~55°C
Maximum Continuous Charge/ Discharge Current	100A
Nominal Operating Voltage Range	696~864V

IFpP54/150/120[(1P16S]155[M]-20+50/90



Lithium Iron Phosphate Battery System	
Model	FLH48100UG2M16
Nominal Voltage	819.2V
Nominal Capacity	100Ah
Nominal Energy	81,92kWh
IP Class	IP20
Protective Class	I
Charging Temperature Range	0~55°C
Discharging Temperature Range	-20~55°C
Maximum Continuous Charge/ Discharge Current	100A
Nominal Operating Voltage Range	742.4~921.6V

IFpP54/150/120[(1P16S]165[M]-20+50/90