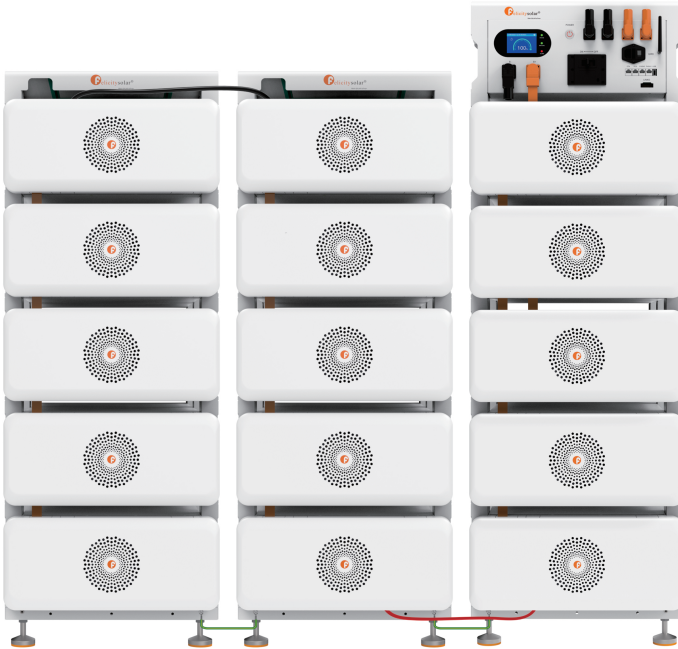


USER MANUAL



Model

FLH48314UG1

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Revision History

Revision No.	Revision Date	Revision Reason
1.0	2026.2	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 Instructions



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, ensure grid power is disconnected and the battery is in a power-off state.
- 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.
- Maintain the battery away from water and fire at all times.
- Connecting the battery with a different type of battery is strictly prohibited.
- Do not operate the battery with a faulty or incompatible inverter.
- Disassembly of the battery is strictly prohibited.
- In the event of a fire, only dry-powder fire extinguishers may be used, and liquid fire extinguishers are strictly forbidden.
- Please refrain from opening, repairing, or disassembling the battery unless performed by Felicitysolar staff or personnel authorized by Felicitysolar. We shall not be liable for any consequences or liabilities arising from improper operation, or violations of design, manufacturing, or equipment safety standards.
- Do not dispose of batteries in a fire. The batteries may explode.
- Do not open or damage batteries; the released electrolyte is harmful to the skin and eyes and 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 prior to shipment. If you observe any abnormal conditions, such as bulging of the device casing, contact us immediately.
- This product must be properly grounded prior to use to ensure safety. The battery pack must be grounded strictly in accordance with the specifications outlined in the product technical manual. Incorrect or inadequate grounding may result in safety hazards such as electric shock and equipment failure. All losses resulting from such violations shall be borne by the party responsible for non-compliance with these operating procedures.
- To ensure proper operation, verify that the parameters of all connected equipment are compatible. Do not mix batteries from different manufacturers, types, or models, and avoid using old and new batteries in combination.
- Ambient operating conditions and storage practices can impact the product's service life. Adhere to the operating environment guidelines to ensure optimal device performance.
- For long-term storage, recharge the battery every six months to maintain a state of charge exceeding 80% of its rated capacity.
- Recharge the battery within 18 hours of full discharge or activation of the over-discharge protection mode.
- The formula for calculating theoretical standby time is: $T = C/I$ (where T = standby time, C = battery capacity, and I = total current draw of all connected loads).
- Disconnect the charging source prior to connecting or disconnecting battery terminals. Do not wear metallic objects such as watches or rings.
- Do not place tools or metal components on top of the battery pack. Battery maintenance must be performed by a qualified technician. To do so:
 - Use tools with insulated handles
 - Wear rubber gloves and boots
 - Verify whether the battery is intentionally or inadvertently grounded. Contact with any part of a grounded battery can result in electric shock and severe burns due to high short-circuit currents.
- The risk of such hazards can be mitigated by removing all ground connections during installation and maintenance, which must be performed by a qualified technician.

1.3 Installation Personnel Requirements

- All work must comply with applicable local laws, regulations, and standards. Only qualified electricians (refer to the qualifications below) shall perform the installation of FLH48314UG1.
- **Qualifications and Training:** Hold a valid electrician vocational qualification certificate; complete training in the installation and commissioning of electrical equipment and battery systems, as well as risk management and emergency response; and stay updated on industry regulations.
- **Standard Compliance:** Strictly adhere to technical connection specifications, industry standards, regulations, and the requirements of this document. Promptly report any discrepancies between documented requirements and on-site conditions.
- **Professional Knowledge:** Be familiar with the full-process operation of lithium-ion batteries, their charge/discharge characteristics, and the identification and response to abnormal conditions; also be aware of potential hazard sources.
- **Safety and Emergency Response:** Maintain strong safety awareness, use protective equipment correctly, and master first-aid and emergency response procedures for electrical accidents and battery leakage incidents.

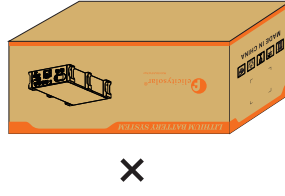
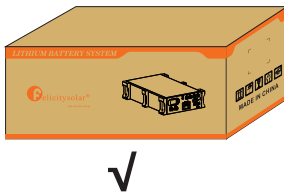
1.4 Storage Before Use

There are no user-serviceable components inside this equipment. Service must be performed exclusively by a qualified service technician.

- Do not expose the battery to an open flame.
- Do not place the product in direct sunlight.
- Do not place the product near flammable materials, as this may cause fire or explosion in the event of an accident.
- Store in a cool, dry, and well-ventilated area.
- Store the product on a stable, flat surface.
- Store the product out of reach of children and animals.
- Do not damage the unit by dropping, impacting, cutting, or penetrating it with a sharp object (as this may cause deformation).
- 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 while wearing 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

The FLH48314UG1 is a lithium iron phosphate (LiFePO₄) battery energy storage system designed for residential applications, whose primary function is to store electrical energy for on-demand use. The system consists of the following core components:

- An integrated battery module containing LiFePO₄ cells
- A built-in Battery Management System (BMS) for real-time monitoring and protection
- Essential internal safety and power conversion circuitry

The system operates in two primary modes:

1. Charging/Storage Mode: When connected to an external power source (e.g., the grid or a photovoltaic inverter), the system stores electrical energy in its battery module.

2. Discharging/Backup Mode: When required (e.g., during a grid outage or to optimize self-consumption), the system supplies stored energy to power connected household loads.

Multiple FLH48314UG1 units may be connected in parallel to expand total storage capacity, in accordance with the specifications and guidelines outlined in this manual.

3.3 Description of FLH48314UG1MN

1.FLH48314UCG1 is the master controller of the system, and one unit is mandatory for each system.

2.FLH48314UMG1 is the battery module, which must operate in conjunction with the FLH48314UCG1 controller.

3.A functional system requires a minimum configuration of 1 FLH48314UCG1 controller and 5 FLH48314UMG1 battery modules.

3.3.1 System Configuration and Capacity Table

Mode	System energy(kWh)	Discharge depth	Composition
FLH48314UG1M5	80.38	90%	FLH48314UCG1*1+ FLH48314UMG1*5
FLH48314UG1M6	96.46	90%	FLH48314UCG1*1+ FLH48314UMG1*6
FLH48314UG1M7	112.53	90%	FLH48314UCG1*1+ FLH48314UMG1*7
FLH48314UG1M8	128.61	90%	FLH48314UCG1*1+ FLH48314UMG1*8
FLH48314UG1M9	144.69	90%	FLH48314UCG1*1+ FLH48314UMG1*9
FLH48314UG1M10	160.76	90%	FLH48314UCG1*1+ FLH48314UMG1*10
FLH48314UG1M11	176.84	90%	FLH48314UCG1*1+ FLH48314UMG1*11
FLH48314UG1M12	192.92	90%	FLH48314UCG1*1+ FLH48314UMG1*12
FLH48314UG1M13	208.99	90%	FLH48314UCG1*1+ FLH48314UMG1*13
FLH48314UG1M14	225.07	90%	FLH48314UCG1*1+ FLH48314UMG1*14
FLH48314UG1M15	241.15	90%	FLH48314UCG1*1+ FLH48314UMG1*15

*Note: Currently, the battery supports a maximum of 15 battery modules. For the entire energy storage system, confirm the inverter's maximum supported voltage range to determine the maximum number of battery modules 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, MCCB with shunt trip function, and fuses.
- Flexible Installation: Standard Includes: 3 Installation Bases(supports configurations up to 15 battery packs). The battery stack 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 241.15 kWh, and it can support up to 4 sub-clusters. The system can be expanded to nearly 0.96MWh at maximum.
- Flexible Configuration and Upgrades: Upgrades and parameter configurations can be performed via RS485, WiFi, Bluetooth, Ethernet 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 Overview

3.6.1 External Packaging

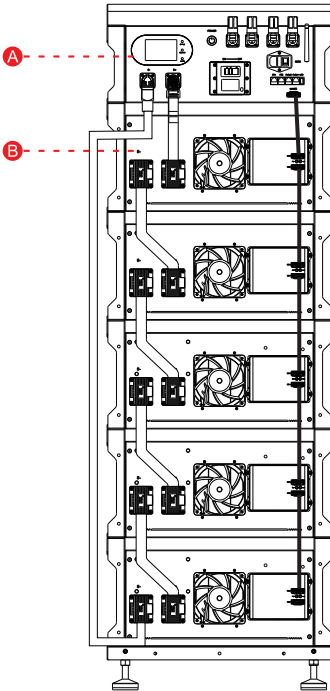


Carton box (FLH48314UCG1)



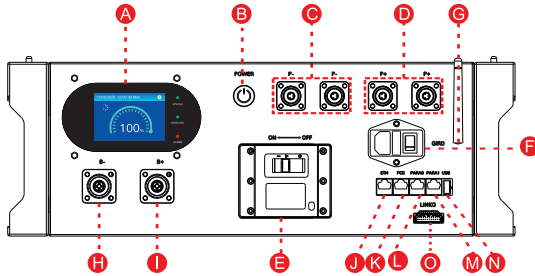
Wooden box (FLH48314UMG1)

3.5.2 Battery system introduction



Code	Name	Product Model
A	High-Voltage Battery Control Unit	FLH48314UCG1 (BCU)
B	High-Voltage Battery Module Unit	FLH48314UMG1 (BMU)

3.5.3 High-Voltage Battery Control Unit Description



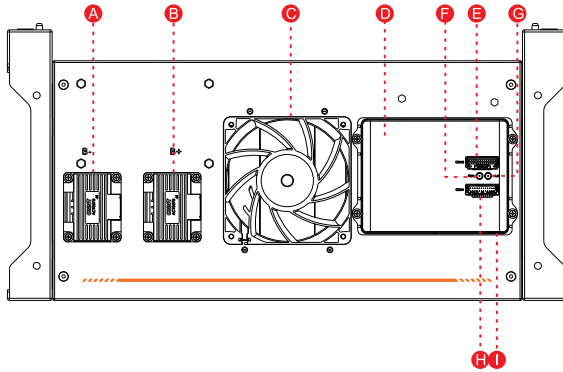
Code	Name	Definition
A	LCD Display	Indicate the important battery information
B	Power Switch	Indicate the power on/off function
C	PCS-	Connection terminal of PCS negative pole(Black)
D	PCS+	Connection terminal of PCS positive pole(Orange)
E	MCCB	Used to manually control the output situation of battery system
F	Grid	AC mains power powers fans and 12V backup, Required during operation: mains connected, switch ON
G	Antenna	Increase the WiFi receiving signal
H	BAT-	Connection terminal of the common negative pole of the battery(Black)
I	BAT+	Connection terminal of the common positive pole of the battery(Orange)
J	Ethernet	For cloud monitoring and remote firmware updates
K	PCS	CAN/RS485 port connects to other inverters CAN/RS485 interfaces through communication cable
L	PARA0	The clustered interface connected to the previous battery system
M	PARA1	The clustered interface connected to the next battery system
N	USB	BMS upgrade interface with USB
O	LINK0	Connect with the first battery module and communicate with all battery modules



Definition of ETH		Definition of PCS		Definition of PARA0		Definition of PARA1		P1.....P8
1	TX+	1	485B_PCS	1	485A_system	1	/	
2	TX-	2	485A_PCS	2	485B_system	2	/	
3	RX+	3	GND	3	/	3	/	
4	CT1	4	CANH_PCS	4	/	4	/	
5	CT2	5	CANL_PCS	5	/	5	/	
6	RX-	6	GND	6	/	6	/	
7	CT3	7	485A_PCS	7	CANL_BCU	7	CANL_BCU	
8	CT4	8	485B_PCS	8	CANH_BCU	8	CANH_BCU	

Definition of Link0				
1	12V0_COMISO	13	COM-GND	
2	12V0_COMISO	14	COM-GND	
3	BMU-ADD-OUT	15	CANL_BMU	
4	/	16	CANH_BMU	
5	DRY1A	17	DRY1B	
6	24V_FANPWR_OUT	18	FAN_GND	
7	24V_FANPWR_OUT	19	FAN_GND	
8	24V_FANPWR_OUT	20	FAN_GND	
9	24V_FANPWR_OUT	21	FAN_GND	
10	24V_FANPWR_OUT	22	FAN_GND	
11	24V_FANPWR_OUT	23	FAN_GND	
12	24V_FANPWR_OUT	24	FAN_GND	

3.5.4 High-Voltage Battery Module Unit Description



Model:FLH48314UMG1

Code	Name	Definition
A	BAT-	Negative terminal of battery module (Black)
B	BAT+	Positive terminal of battery module (Orange)
C	FAN	Used for assisting in cooling the battery pack
D	BMU Panel	Mounting Panel for BMU
E	COM0	Inter-BMU Connections: Communication, Power Supply, and Addressing
F	RUN	Indicates normal battery operating status (remains on during normal run)
G	ALM	Indicates battery fault status (illuminates when fault occurs)
H	COM1	Inter-BMU Connections: Communication, Power Supply, and Addressing
I	Fan Control	Fan Power, Control, and Status Feedback Connector

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: $-20^{\circ}\text{C}\sim+55^{\circ}\text{C}$
- Charging temperature range: $0^{\circ}\text{C}\sim+55^{\circ}\text{C}$
- Discharging temperature range: $-20^{\circ}\text{C}\sim+55^{\circ}\text{C}$
- Storage temperature: $0^{\circ}\text{C}\sim+35^{\circ}\text{C}$
- Relative humidity: 5% ~ 95%
- Elevation: $\leq 3000\text{m}$
- Heat source: $\geq 50\text{cm}$
- Fire source: $\geq 500\text{cm}$

Operating environment: Only suitable for indoor installation. It should be kept away from direct sunlight, wind, conductive dust and corrosive gases. It complies with pollution degree 2 and overvoltage category II requirements. Please ensure the following conditions are met:

- The installation site shall be located away from the sea to avoid exposure to saltwater.
- The ground at the installation site must be flat and level.
- The site shall be clear of flammable or explosive substances.
- Areas with excessive dust or clutter shall be avoided.
- Specified ambient temperature: $5^{\circ}\text{C}\sim 40^{\circ}\text{C}$
- Max. altitude: $\leq 3000\text{ m}$
- Max. operating relative humidity: 5%~85%(Non-condensing)

4.1.3 Tools



Screw Driver



Crimping Modular



Safety Shoes



Multimeter



Safety Gloves



Safety Goggles



Plier



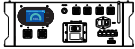








Ribbon





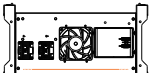



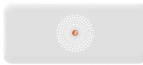
Electric drill





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.

FLH48314UCG1			
No.	Description	Quantity	Picture
1	High-Voltage Battery Control Unit 1000V/240A	1	
2	User manual	1	
3	Warranty card	1	
4	Communication Line 1: L=200mm, The master-slave communication cable connects between the FLH48314UCG1 and FLH48314UMG1, enabling communication between the master controller and the first slave unit.	1	
5	Termination Resistor Connector: L=70mm,Used for signal integrity. Must be plugged into the end slave's open COM port.	1	
6	Inter-Cluster Communication Cable,L=1000mm, Connects battery clusters. Match labels: "OUT" to previous cluster, "IN" to next cluster, See diagram for details.	2	
7	B+ Flexible Busbar: L=218.5mm, Connects the B+ terminal of the master controller to the B+ terminal of the first slave, serving as the master's positive input.	1	
8	B- Power Cable,3/0 AWG,L=3000mm,240A maximum current,Connects the master B- to the last slave B-	1	
9	Inter-Cluster Series Power Cable, 2/0 AWG,L=900mm, Connects the power terminals between two battery clusters. Attach the black end to the Negative (-) terminal of the upper cluster and the red end to the Positive (+) terminal of the lower cluster.	2	

10	RJ45 Connector (120Ω Terminated), Must be plugged into the PARA1 port of the final master unit when multiple masters are paralleled, to ensure communication integrity.	1	
11	Master Controller Top Cover, Installs on top of the master unit for aesthetic finishing.	1	

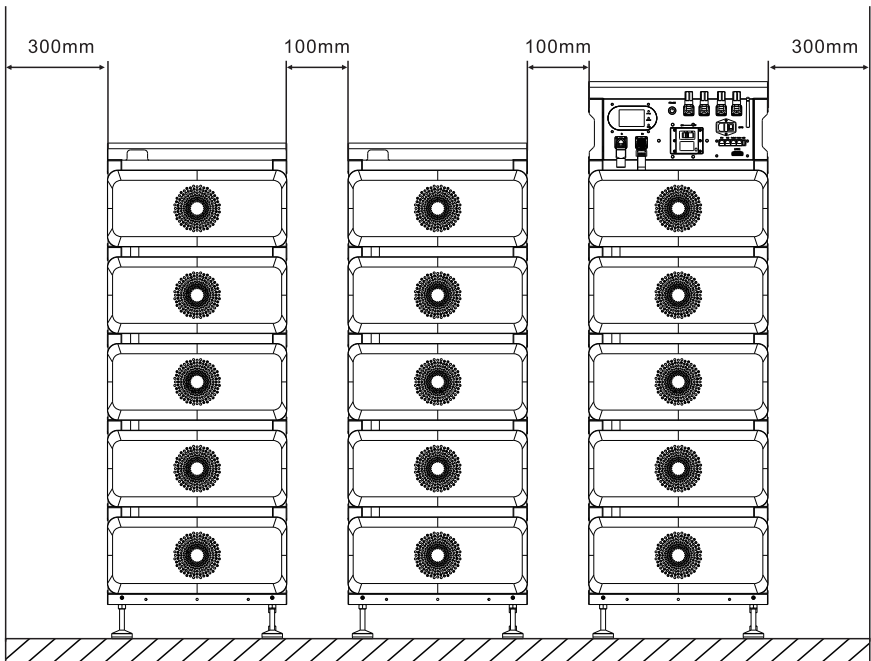
FLH48314UMG1			
No.	Description	Quantity	Picture
1	5,12 kWh Battery Module	1	
2	Inter-Slave Communication Cable, L= Connects between adjacent slave controllers. Attach the "OUT" end to the previous slave and the "IN" end to the next slave. Refer to the diagram.	1	
3	Series Connection Busbar, Links the power terminals of adjacent slave units in series.	1	
4	Warranty card	1	
	Slave Unit Front Cover, Provides protection for the slave unit, Install only after all connections are made and the system is fully debugged.	1	

FLH48314UG1 Accessory			
No.	Description	Quantity	Picture
1	Multi-Protocol Communication Cable, L=3000mm, Used for inter-cluster parallel communication, CAN communication between masters, and master-to-PCS communication (CAN/RS485).	3	
2	Grounding Wire, L=3000mm, Connects the grounding terminal of the base containing the master controller to the inverter chassis ground.	1	
3	PCS Positive Power Cable (Orange), L=5000mm, 2AWG, Connects the P+ terminal of the master controller to the BAT positive terminal of the PCS, SC35-6 Ring Terminal.	2	
4	PCS Negative Power Cable (Black), L=5000mm, 2AWG, Connects the P- terminal of the master controller to the BAT negative terminal of the PCS, SC35-6 Ring Terminal.	2	

5	Chassis Grounding Wire, L=1000mm, used to establish a chassis ground connection between two equipment bases.	2	
6	Communication Linet: 3m, It enables ommunication between the battery and the 8 computer host through an RS485 adapter. At the same time, it can flexibly match communication cables for different inverters.	1	
7	Battery Pack Base: Provides mounting and structural support for the battery pack.	3	
8	Slave Controller Top Cover ,Install after all setup is complete for a finished appearance.	2	
9	BOT Foot Cup: Used for supporting the product	12	

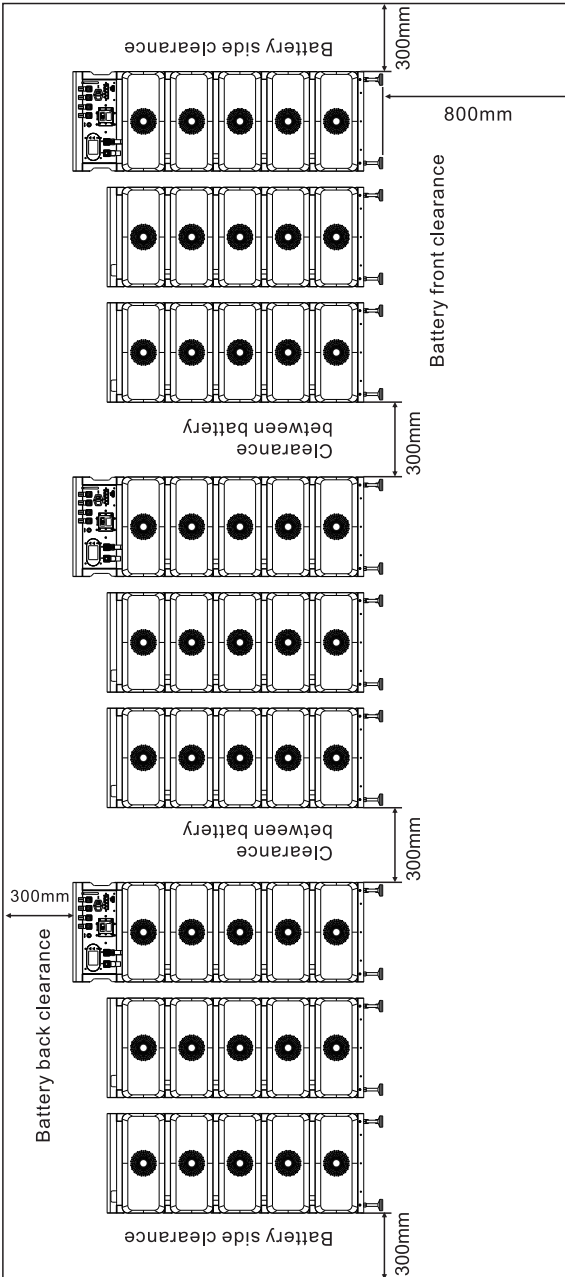
4.3 Installation Procedure

4.3.1 Clearance



Ground

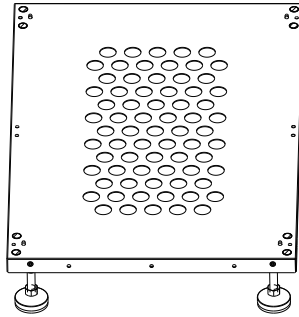
Installation spacing of three battery cluster



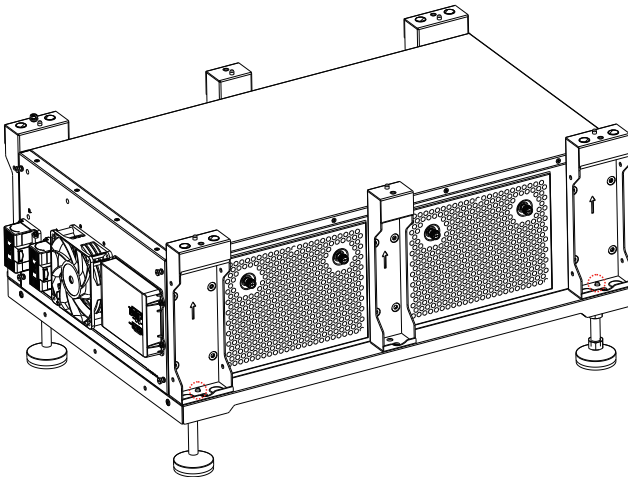
Note: The bases are fixed by sheet metal (Item W).
 Note: To ensure proper operation and long battery life, please make sure to leave at least 300mm of cooling space around the battery.
 Shading or insufficient space for heat dissipation will result in high battery temperatures, which may cause unplanned shutdowns and significantly shorten the service life of the battery.

4.3.1 Installation Steps

Step 1: Place the base (Item T or U) on the ground and level it. Then, after installing the feet, use a track leveling bar to check that it is level.



Step 2: Place the battery pack on the base and slide it until the raised sphere clicks into place to lock it.



A single cluster can hold up to 5 battery packs, and can be configured with either 4 or 5 packs. After stacking, ensure the assembly matches the configuration in Figure 1. Then, secure the stack by fastening bolts through all 6 mounting holes, as shown in Figure 2.

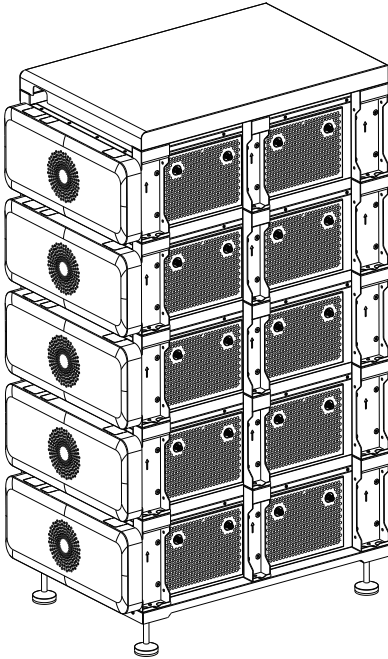


Fig.1

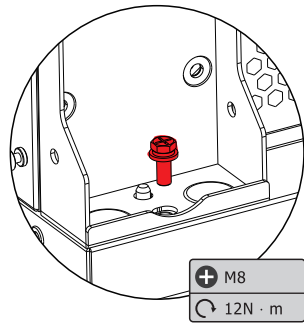


Fig.2

Cluster 1 (with Controller): Batteries BAT1 to BAT5, connected from top to bottom.
 Final Connection Rule: The negative (-) terminal of the last battery must connect to the controller's B- terminal.

5-Pack System: Single cluster only. Connect battery BAT5's B- terminal to the controller's B- terminal.

10-Pack System:

- Cluster 2: Batteries BAT6 to BAT10, stacked from bottom to top.
- Polarity: Busbars in Cluster 2 are mirrored (correct orientation).

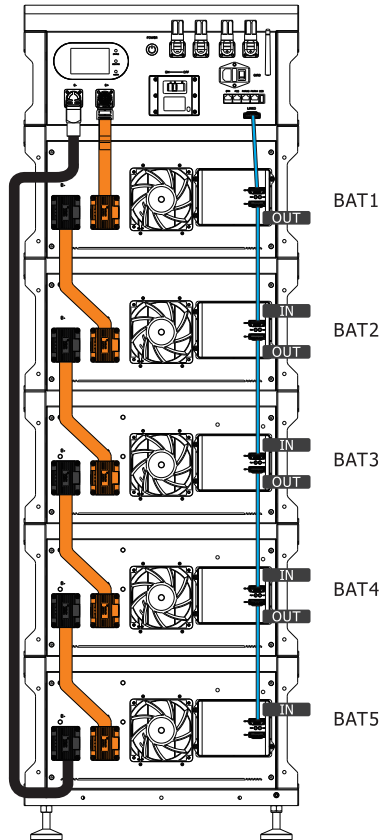
Linking Clusters: Use the provided cables:

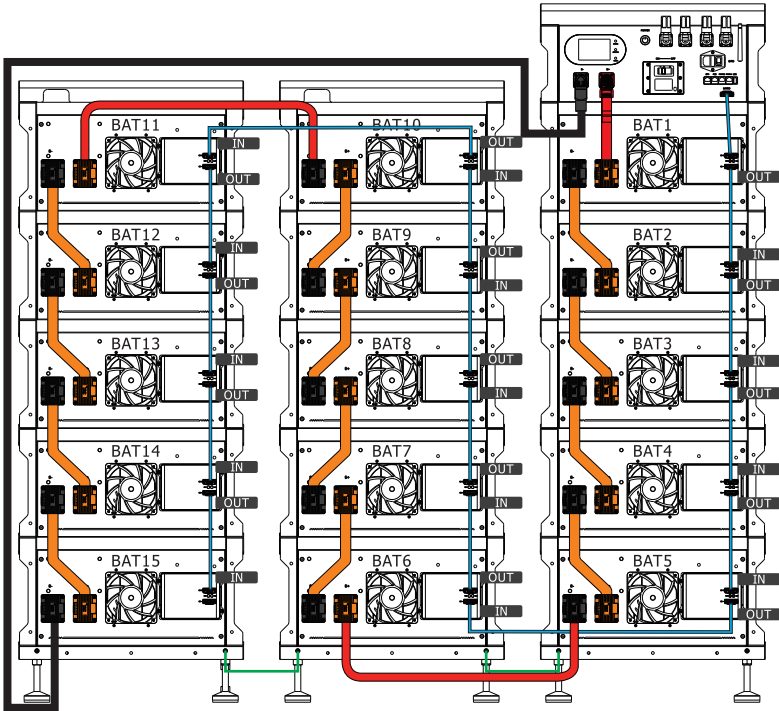
- Black: Connect to the negative (-) terminal of the previous cluster.
- Red: Connect to the positive (+) terminal of the next cluster.

12-Pack System: 3 clusters, 4 packs each. All batteries oriented from top to bottom.

15-Pack System: Cluster 2 is mirrored; Clusters 1 and 3 are standard.

Complete Circuit: Connect the negative (-) terminal of the final battery to the controller's B- terminal.





Note:

The busbar orientation in Cluster 3 is identical to that in Cluster 1.
 The busbar orientation in Cluster 2 is a mirror image of that in Cluster 1.

- Master to First Slave: Connect the master's LINK0 port to the first slave's COM0 port using the cable provided in the master box (Fig. 3).
- Inter-Slave Cables: Use the cables from the accessory box. Pay attention to the OUT and IN markings (Fig. 4, 5, 6).
- Connecting Slaves Within a Cluster: Connect the UP connector to the previous slave's COM1 port, and the DOWN connector to the next slave's COM0 port.
- Connecting Between Clusters: Use the long cable provided in the accessory box to connect the COM1 (OUT) port of the last battery in the first cluster to the COM1 (IN) port of the first battery in the next cluster. Refer to the installation diagrams for the correct wiring for each pack configuration.



Fig.3

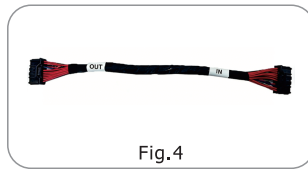


Fig.4

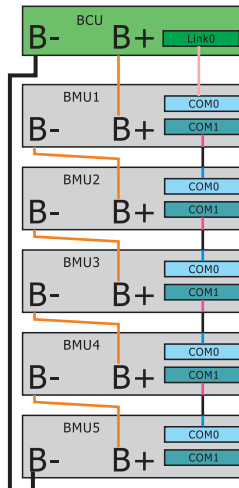


Fig.5



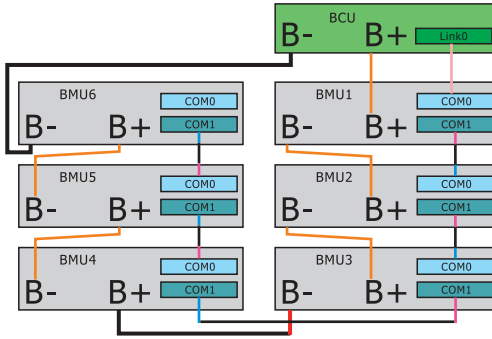
Fig.6

— OUT
— IN



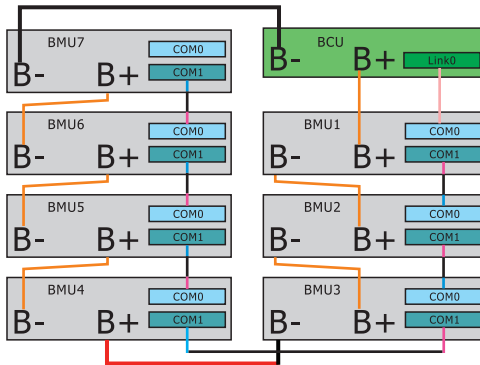
Recommended Installation for 5 Battery Packs

— OUT
 — IN



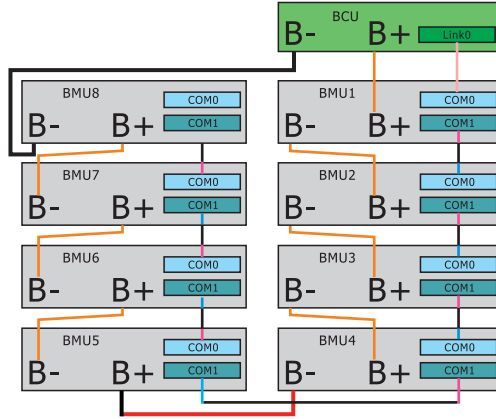
Recommended Installation for 6 Battery Packs

— OUT
 — IN



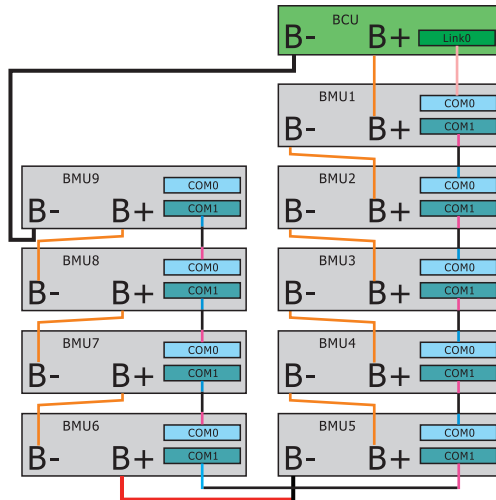
Recommended Installation for 7 Battery Packs

— OUT
 — IN



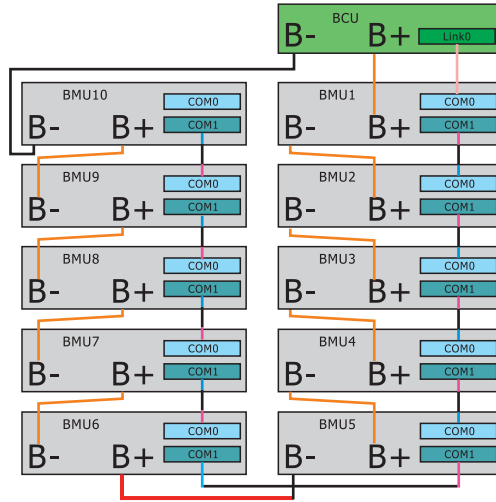
Recommended Installation for 8 Battery Packs

— OUT
 — IN



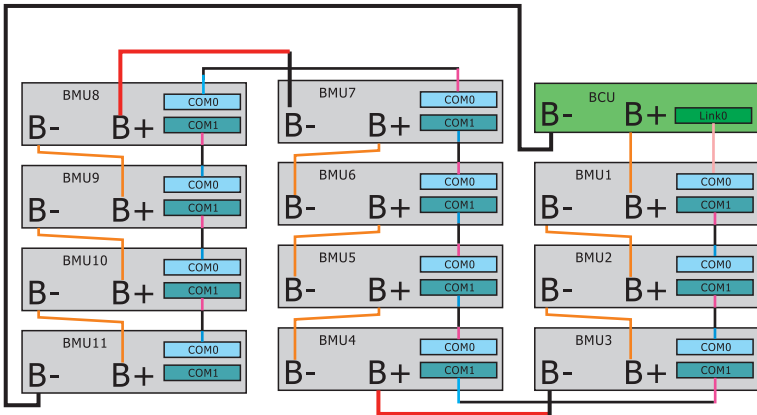
Recommended Installation for 9 Battery Packs

— OUT
 — IN



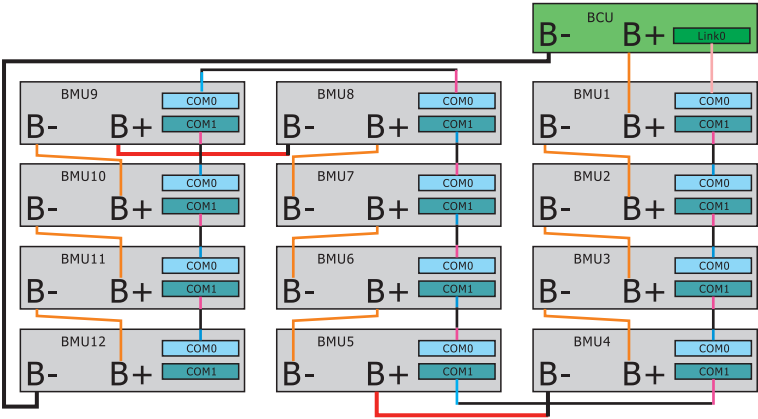
Recommended Installation for 10 Battery Packs

— OUT
 — IN



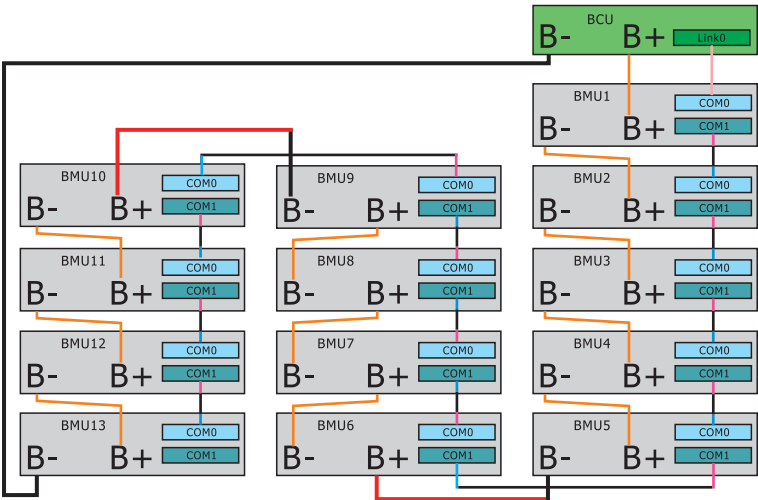
Recommended Installation for 11 Battery Packs

— OUT
 — IN



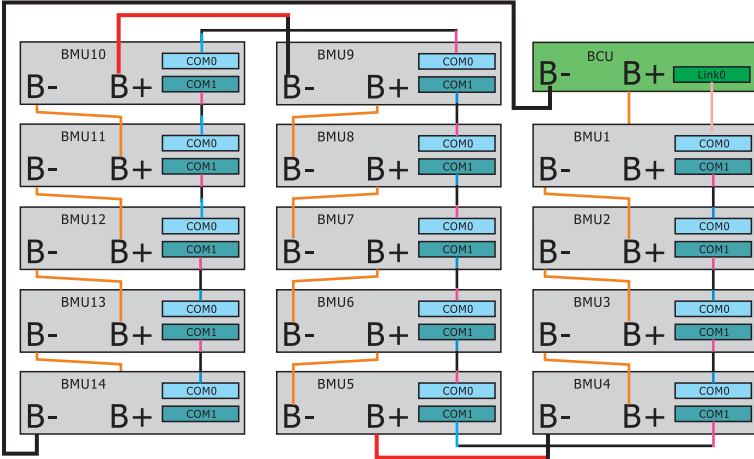
Recommended Installation for 12 Battery Packs

— OUT
 — IN



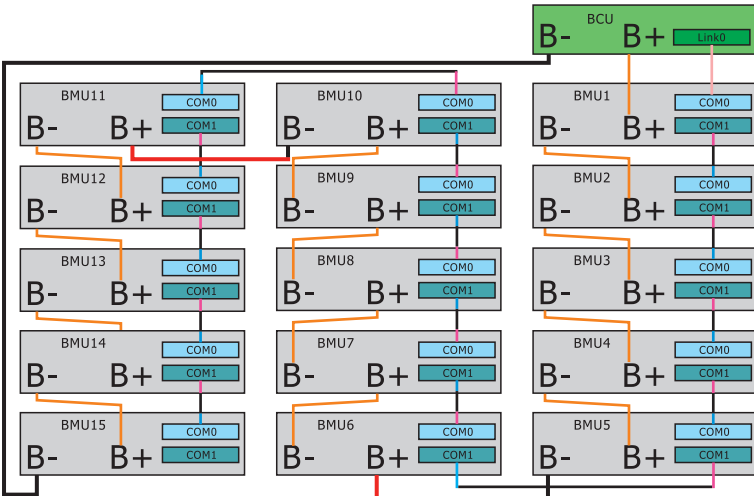
Recommended Installation for 13 Battery Packs

— OUT
 — IN



Recommended Installation for 14 Battery Packs

— OUT
 — IN



Recommended Installation for 15 Battery Packs

- Grounding: Connect all cluster chassis grounds to ground using the provided cables (Fig. 8).
- Turn on the MCCB: Turn the MCCB to the ON position.
- Power On: Press and hold the Power button for 3-4 seconds.
- Verification: Verify that the Run LED is on and the Alarm LED is off (see Fig. 9).
- Final Step: Power off the system and install the protective cover. The final installation should match Fig. 10.

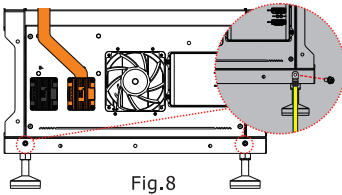


Fig.8

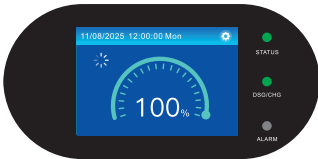


Fig.9

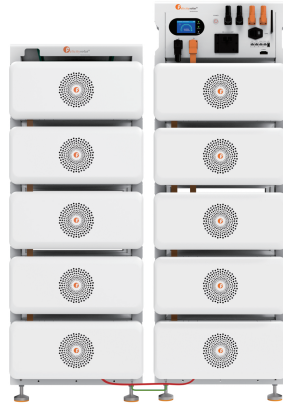
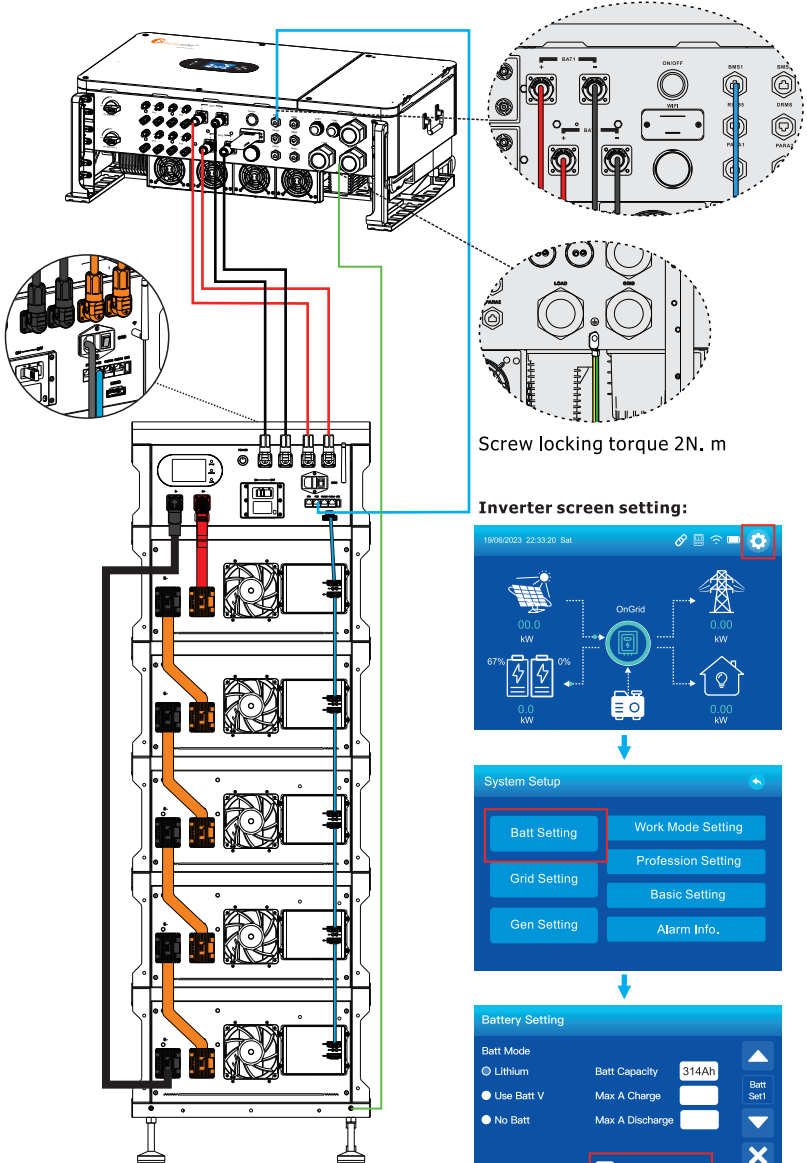


Fig.10

4.4 System Connection Diagram

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



4.5 Power On/Off Procedures

Power on steps:

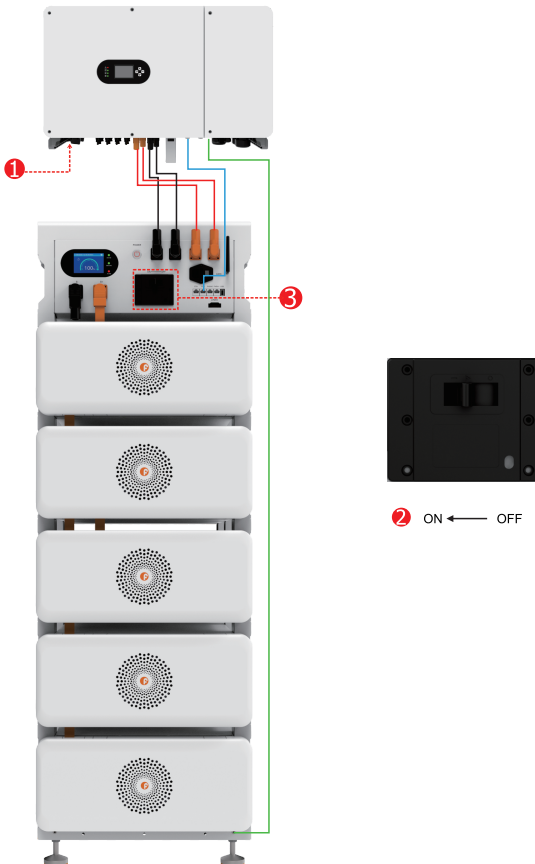
Step 1: Confirm that the battery and inverter are properly wired, then start the inverter **1** .

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

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

Ensure the mains power cable is plugged in and the mains power switch is set to the "— (ON)" position before powering on the device.

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



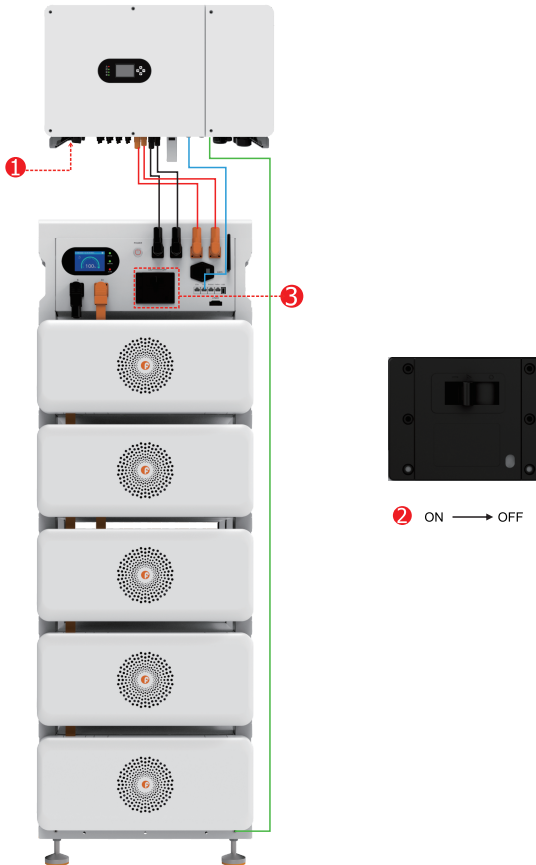
Power down steps:

Step 1: Shut down the inverter **1**;

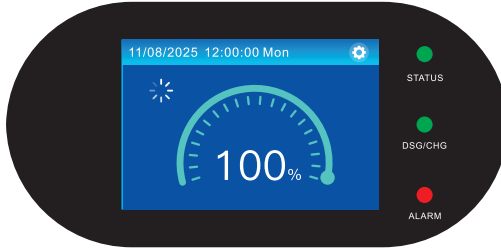
Step 2: Press and hold the power button **2** for 3 seconds to turn off the battery system;

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

Note: If batteries are connected in parallel, shut them down one by one. Both the positive and negative poles of the battery system are connected through the DC circuit breaker, Opening the breaker isolates all live conductors in the battery system.

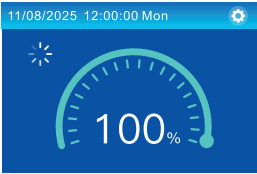





4.6 LCD Display Icons



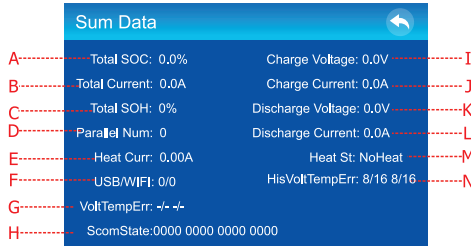
Name	Description
LCD touch screen	Display the information of the battery.
Status LED	Indicates the operating status of the battery, which is always on when running normally.
Charge&Discharge LED	Indicates the charging&discharging status of the battery; A long bright light indicates discharging, and a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

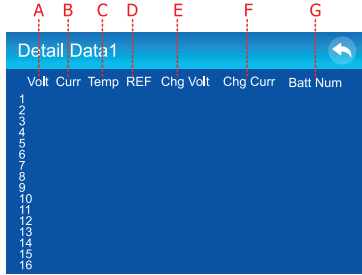
This page displays the summary information of parallel battery system(If it is a single-cluster system, the information displayed is its own):



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

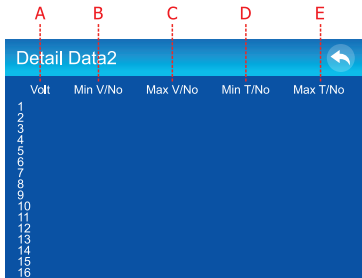
This page displays the detail information of parallel battery system:



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	Battery Number	Battery address number.

4.6.4 Detail Data2

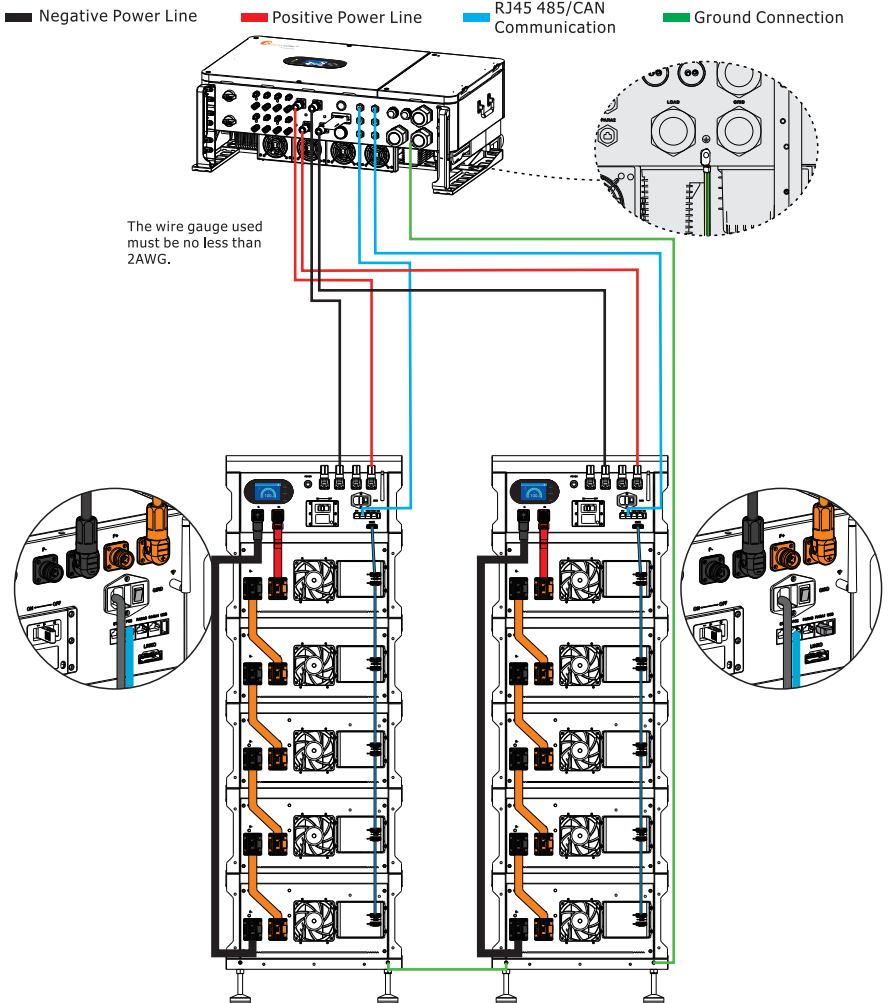
This page displays the detail information of battery system:



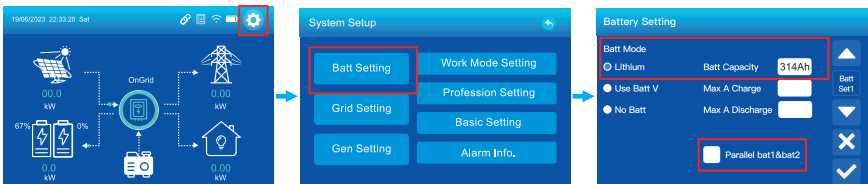
Code	Name	Definition
A	Voltage	Every BMU voltage of battery system.
B	Minimum Voltage/No	Minimum cell voltage of BMU and cell number.
C	Maximum Voltage/No	Maximum cell voltage of BMU cell number.
D	Minimum Temperature/No	Minimum cell temperature of BMU cell number.
E	Maximum Temperature/No	Maximum cell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

4.7 Multi-cluster Battery System Connection

4.7.1 Two battery clusters connected to the inverter



Inverter Display Setup Steps:



4.7.2 Three battery clusters connected to the inverter

The FLH48314UG1 supports parallel connection for expansion. It can support up to 16 clusters FLH48314UG1 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.

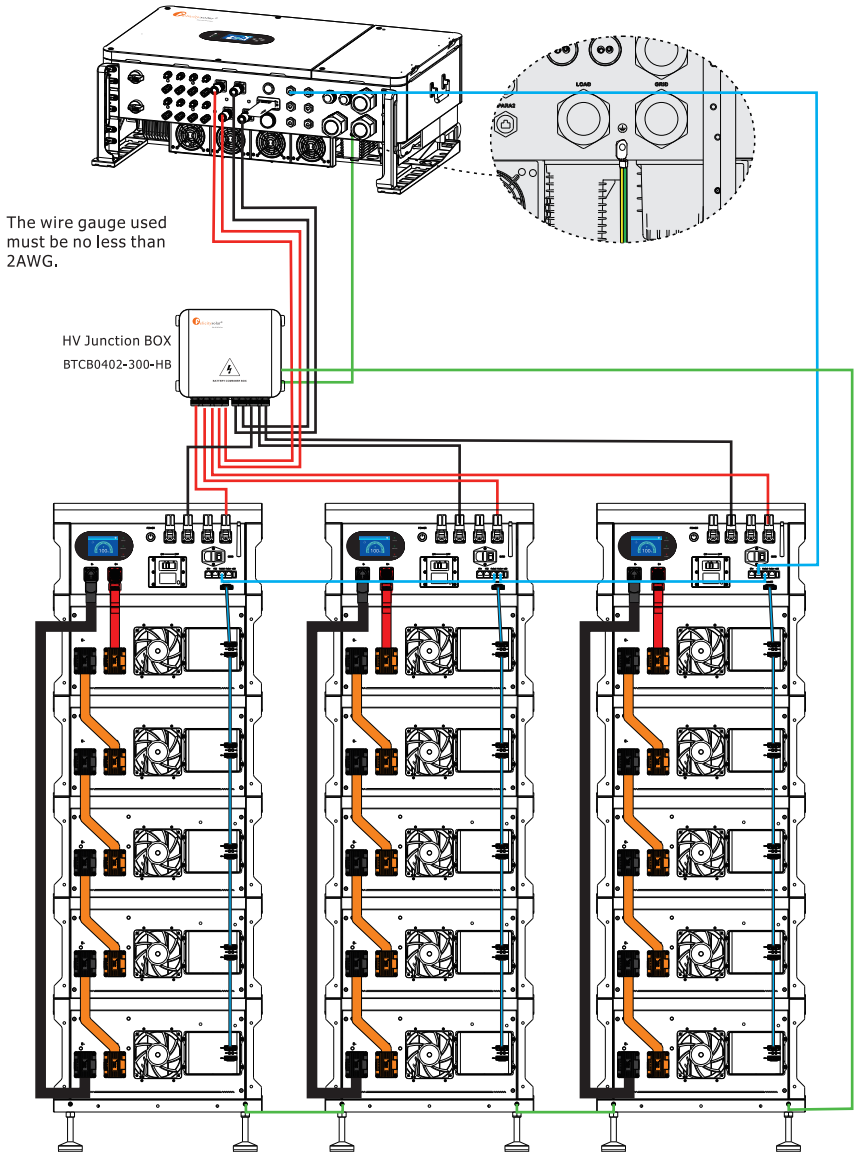
*For the specific combiner box model, please consult our after-sales support via:

Email: felicitysupport@felicitysolar.com

WhatsApp: +86 18022876286

1. Wiring Diagram

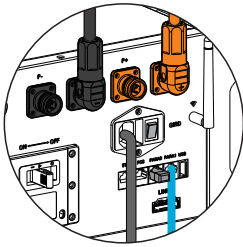
- Negative Power Line
- Positive Power Line
- RJ45 485/CAN Communication
- Ground Connection



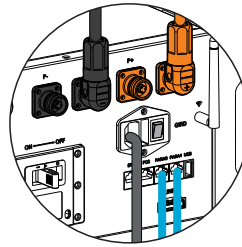
The wire gauge used must be no less than 2AWG.

HV Junction BOX
 BTCB0402-300-HB

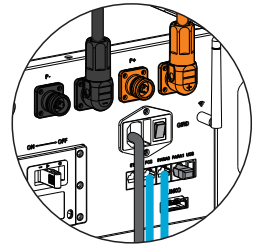
Schematic Diagram of Communication Port Connections



BAT1

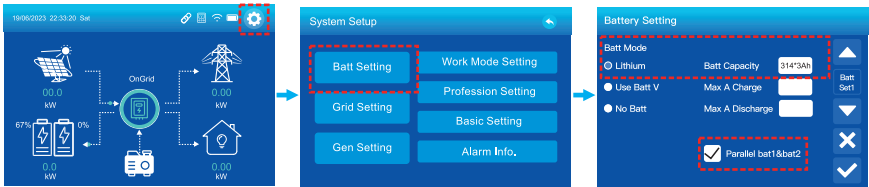


BAT2



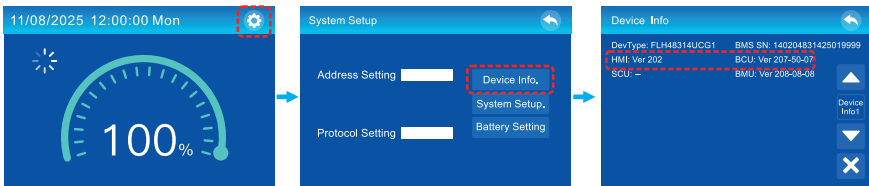
BAT3

2. Inverter Display Setup Steps



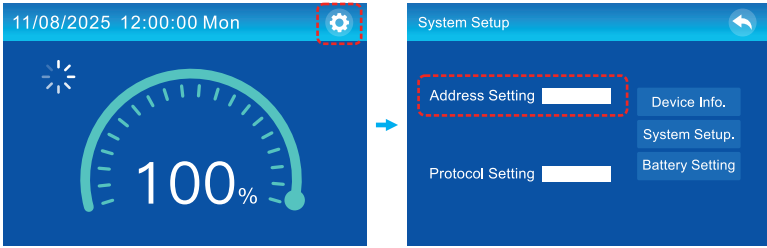
3. Battery Cluster Configuration Steps

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:

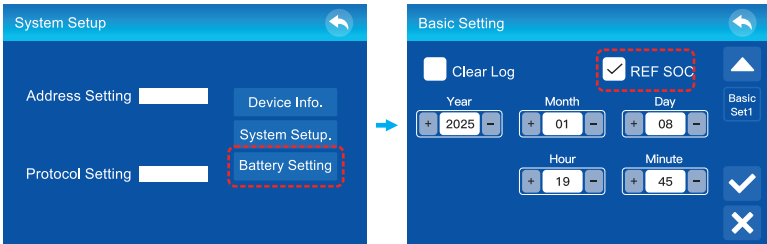
1. After connecting the battery cables, power on the battery pack and configure the main control address via the display. Main control addresses must be unique (no duplicates), with a maximum configurable address of 16.
2. Once the address is configured, restart the battery pack.



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

Parallel SOC Averaging Setting

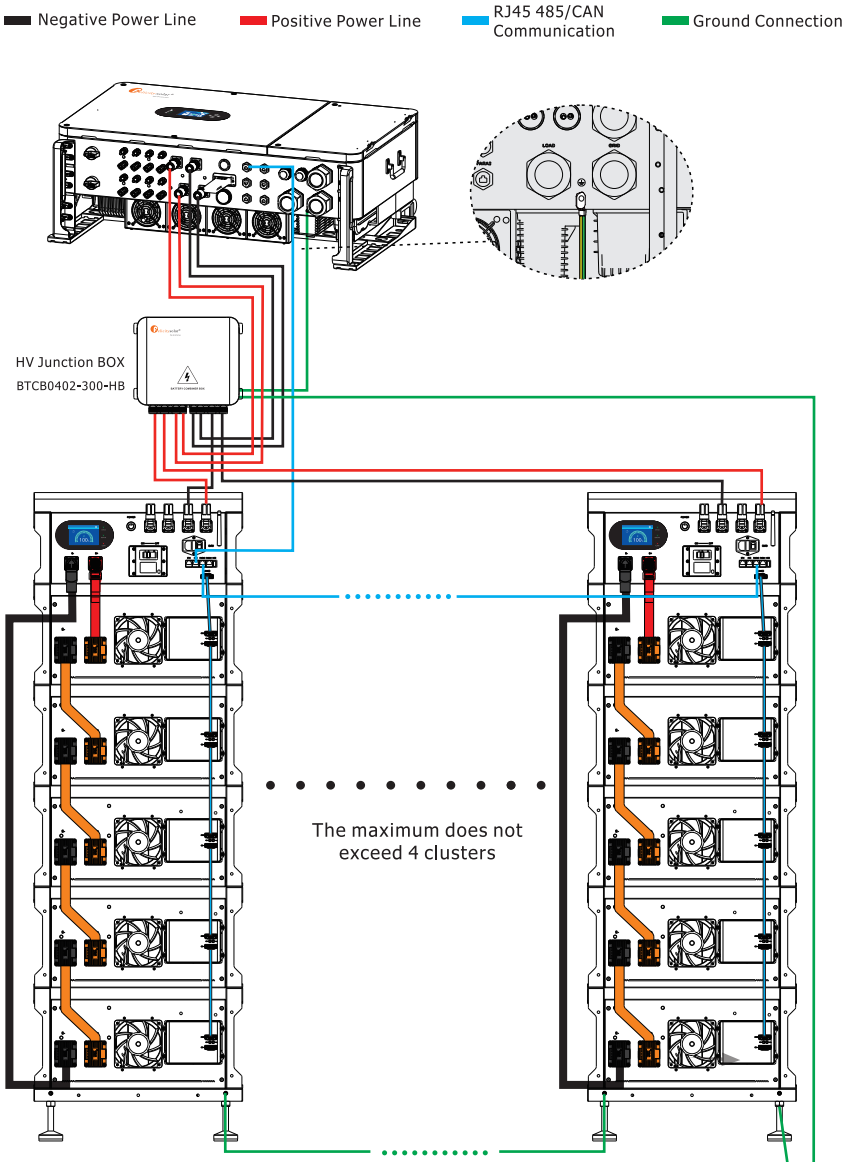
1. After connecting the battery cables, access the "System Setup" page and click "Basic Setting".
2. Check the "REF SOC" option.



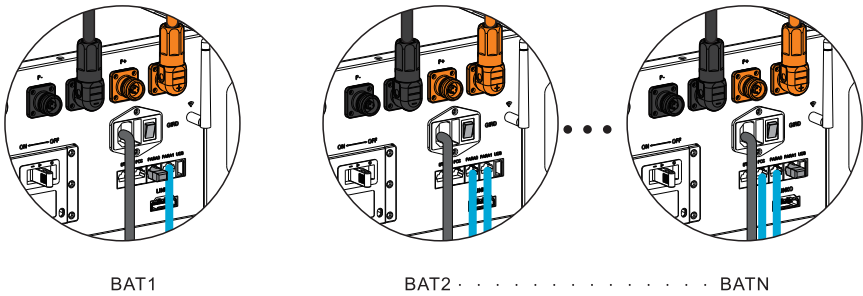
Click "REF SOC"

4.7.3 Multiple battery clusters connected to the inverter

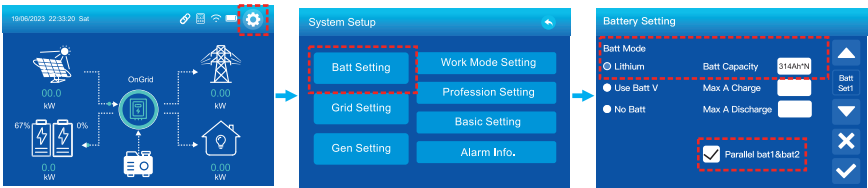
1. Wiring Diagram



Schematic Diagram of Communication Port Connections

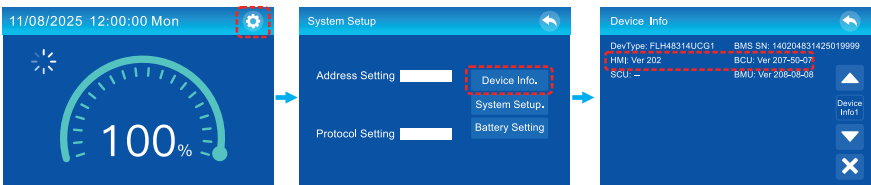


2. Inverter Display Setup Steps



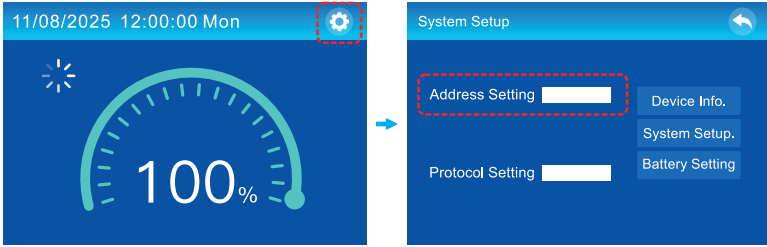
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Prior to system setup, upgrade the main control software and LCD firmware to a version no lower than that shown in the figure. If the program version is lower than the version shown in the picture, please contact the supplier.



Battery pack parallel operation address setting:

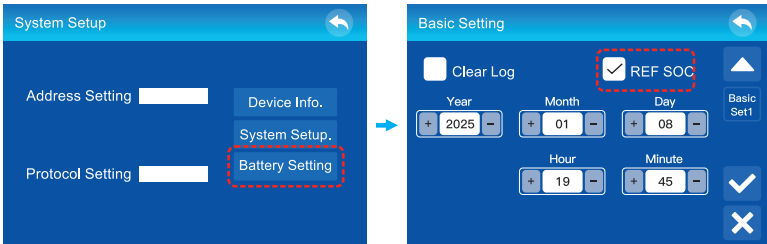
1. After connecting the battery cables, power on the battery pack and configure the main control address via the display. Main control addresses must be unique (no duplicates), with a maximum configurable address of 16.
2. Once the address is configured, restart the battery pack.



"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.

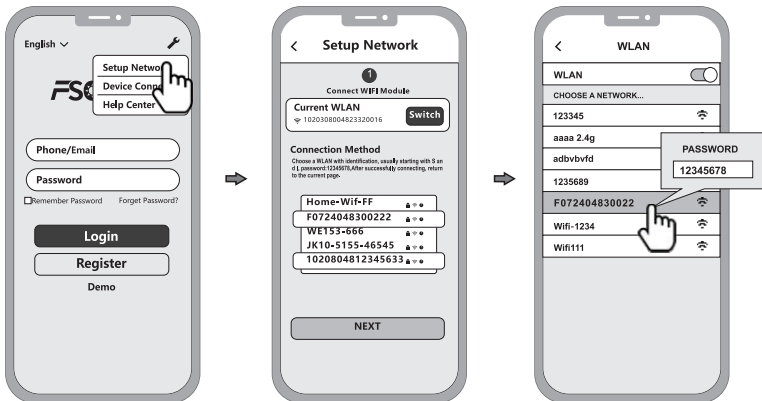


FsolAR APP

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.

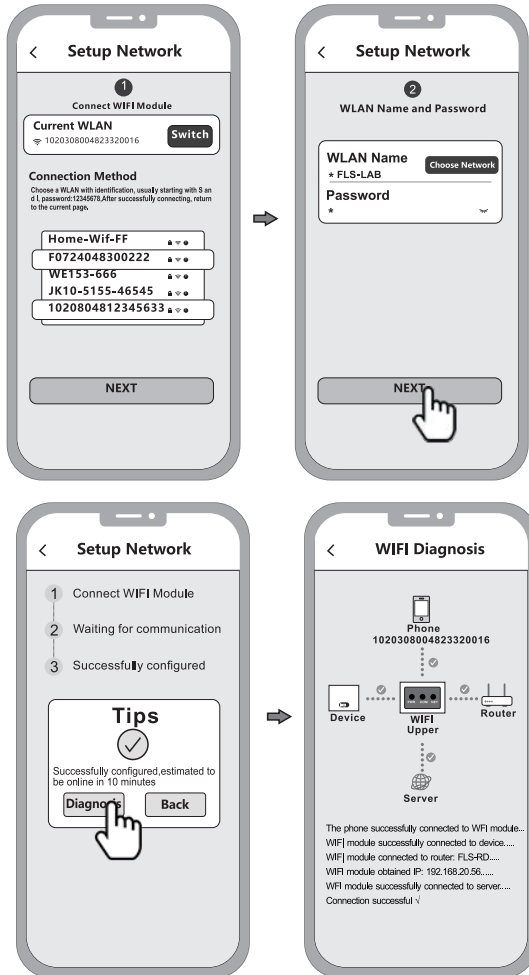
- 1) Launch the app, navigate to the login screen, and tap [Set Up Network] to access the network configuration page.
- 2) On the network configuration page, tap [Switch] to open the mobile device's WLAN settings.



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., Fxxxxxxxxxxxxxxxx, where "xxxxxxxxxxxxxxxx" 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.



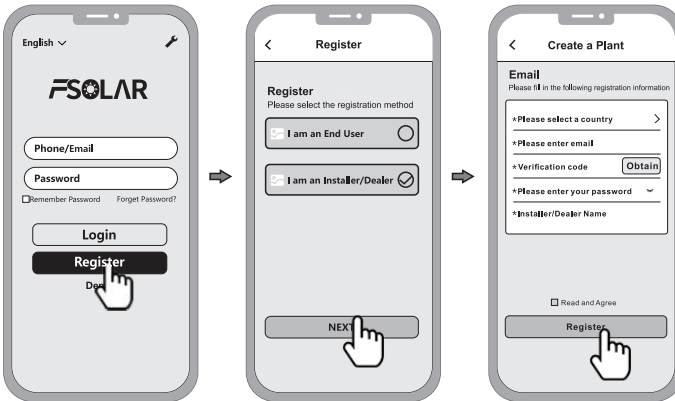
5.2 Plant Creation

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

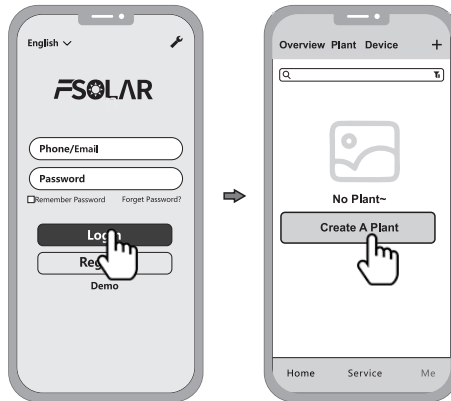
1) Register an account

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.

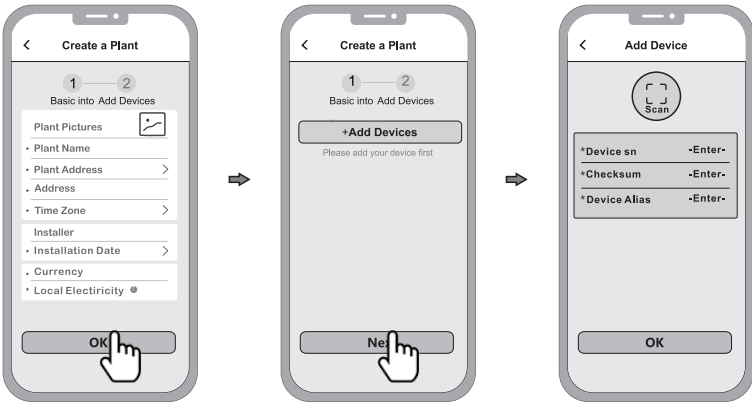


2) New plant construction

- 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 stand idle 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 NaAlO₂. 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 Fe₂(SO₄)₃ and Li₂SO₄, 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 Na₂CO₃ 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!


Appendix I: Specifications

Model	FLH48314UG1MN ^[1]			
Battery Type	LiFePO4			
Nominal Energy	16.07kWh			
Nominal Voltage	51.2V			
Nominal Capacity	314Ah			
Number of Battery Modules	5(Min)	8	12	15(Max) ^[2]
System Nominal Voltage	256V	409.6V	614.4V	768V
System Operating Voltage	232~288V	371.2~460.8V	556.8~691.2V	696~864V
System Rated Energy	80.38kWh	128.61kWh	192.92kWh	241.15kWh
System Usable Energy	72.34kWh	115.74kWh	173.62kWh	217.03kWh
Recommend Charge/Discharge current	157A			
Max. continuous charge/Discharge current[3]	240A			
Depth of discharge(DOD)	90%			
Display type	LED+LCD(Touch)			
IP Rating of Enclosure	IP20			
Working Temperature Range	Charge:0°C~+55°C			
	Discharge:-20°C~+55°C			
Storage Temperature Range	0°C~+35°C			
Humidity	5%~95%			
Altitude	≤3000m			
Cycle Life[4]	≥8000			
Installation	Module Stacking			
Protection	Built-in smart BMS, MCCB with shunt trip function, Fuse			
Communication Port	RS485/CAN /Ethernet/WiFi(2.4G) ^[5]			
Warranty Period[6]	10 Years			
Certification	CE / IEC62619 / IEC62040 / UN38.3			
Control Module FLH48314UCG1	Product Dimension	780x525.4x180mm		
	Package Dimension	890x602x333mm		
	Product Weight Approximate	28.8Kg		
	Package Weight Approximate	42.2Kg		

Battery Module FLH48314UMG1	Product Dimension	819.5x525.4x260mm
	Package Dimension	925x560x405mm
	Product Weight Approximate	127.2Kg
	Package Weight Approximate	146.5Kg
	Battery Designation[1]	IFpP74/176/210/[1P16S]E/-20+50/90
[1] N=5,6,7,8,9,10,11,12,13,14 or 15.N is the quantity of battery module connected series and should not exceed 15.(5≤N≤15)		
[2] Currently, the battery supports a maximum of 15 battery modules. For the entire energy storage system, confirm the inverter's maximum supported voltage range to determine the maximum number of battery modules that can be installed.		
[3] Max. continuous charge/discharge current is affected by temperature and SOC.		
[4] Test conditions: 0.5C Charging/Discharging@25±2°C,EOL70%.		
[5]A 10M/100M Ethernet port (RJ45) is provided for connecting the system to your local network via a router or switch.This connection enables core functions: software upgrades, remote monitoring & diagnostics, and cloud data synchronization.Advanced cloud-based services are in development. Availability and activation will be announced by the supplier. Contact them for future software updates to enable these features.		
[6] Conditions apply, refer to Felicitysolar Warranty policy.		

Appendix II: Labels

Lithium Iron Phosphate Battery System											
Model	<input type="checkbox"/> FLH48314 UG1M1	<input type="checkbox"/> FLH48314 UG1M2	<input type="checkbox"/> FLH48314 UG1M3	<input type="checkbox"/> FLH48314 UG1M4	<input type="checkbox"/> FLH48314 UG1M5	<input type="checkbox"/> FLH48314 UG1M6	<input type="checkbox"/> FLH48314 UG1M7	<input type="checkbox"/> FLH48314 UG1M8	<input type="checkbox"/> FLH48314 UG1M9	<input type="checkbox"/> FLH48314 UG1M10	<input type="checkbox"/> FLH48314 UG1M11
Battery Code	FP1P48V1000E 10P180V1000E 20P360V	FP1P48V1200E 10P180V1200E 20P360V	FP1P48V1400E 10P180V1400E 20P360V	FP1P48V1600E 10P180V1600E 20P360V	FP1P48V1800E 10P180V1800E 20P360V	FP1P48V2000E 10P180V2000E 20P360V	FP1P48V2200E 10P180V2200E 20P360V	FP1P48V2400E 10P180V2400E 20P360V	FP1P48V2600E 10P180V2600E 20P360V	FP1P48V2800E 10P180V2800E 20P360V	FP1P48V3000E 10P180V3000E 20P360V
Nominal Voltage	256V	307.2V	358.4V	409.6V	460.8V	512V	563.2V	614.4V	665.6V	716.8V	768V
Nominal Charging Voltage Range	252.989V	278.4A485.6V	324.3A432.2V	371.2A480.2V	417.9A518.4V	464.576V	511.4A532.8V	558.2A611.2V	605.2A748.8V	649.8A636.4V	696.884V
Nominal Energy	86.226kWh	95.420kWh	112.490kWh	128.256kWh	144.630kWh	161.716kWh	178.270kWh	192.846kWh	208.210kWh	224.889kWh	241.102kWh
Battery Type	LiFePO4										
Nominal Capacity	314Ah										
IP Class	IP20										
Protective Class	I										
Charging Temperature Range	0-55°C / -20-55°C										
Max. Continuous Charge/Discharge Current	240A										
High Voltage Battery Cluster Controller											
Model	FLH48314UCG1										
Nominal Voltage	232.884V										
Communication	RS485/CAN/Ethernet										
											

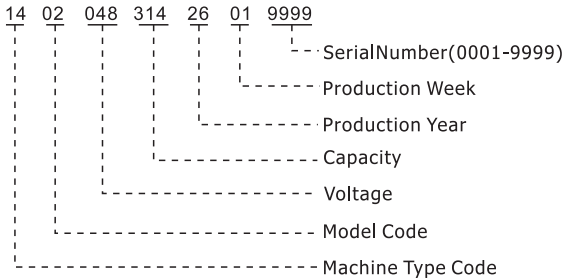
Lithium Iron Phosphate Battery	
Model	FLH48314UMG1
Nominal Voltage	51.2V
Nominal Capacity	314Ah
Nominal Energy	16.07kWh
IP Class	IP20
Protective Class	I
Charging Temperature Range	0-55°C
Discharging Temperature Range	-20-55°C
Max. Continuous Charge/Discharge Current	240A
Nominal Operating Voltage Range	48.4-57.8V
IF pP74-176/210(1P16S)E-20+50/90	
	

Appendix III: SN Description

1. High-Voltage Battery Control Unit SN Description

For example

FLH48314UCG1 SN: 140204831426019999



Note: The SN code of the main controller is the SN code of the entire system.

2. High-Voltage Battery module SN Description

For example

FLH48314UMG1 SN: 073804831426019999

