

# USER MANUAL



**Model**

**FLH96050SG1**

# Contents

<b>1. Safety Introductions</b> .....	1
1.1 Warning.....	1
1.1.1 Before Connecting.....	1
1.1.2 In Using.....	1
1.2 Caution.....	2
1.3 Requirements for Installation Personnel.....	2
<b>2. Transportation</b> .....	3
<b>3. Introductions</b> .....	4
3.1 Symbol Definition.....	4
3.2 Brief Introduction.....	4
3.3 Features.....	5
3.4 Product Overview.....	5
3.4.1 External Packaging.....	5
3.4.2 Battery System Introduction.....	5
3.5 LCD Display Icons.....	8
3.5.1 Main Interface.....	8
<b>4. Installation and Configuration</b> .....	11
4.1 Preparations for Installation.....	11
4.1.1 Safety Requirement.....	11
4.1.2 Installation Environment.....	11
4.1.3 Tools.....	11
4.2 Unpacking Inspection.....	12
4.3 Installation Procedure.....	14
4.3.1 Mounting the Battery.....	14
4.3.2 System Connection Diagram.....	18
4.3.3 Batteries in parallel.....	18
4.3.4 Cluster Setting Instructions.....	22
<b>5. Operation</b> .....	23
5.1 PCS Port Pin Definition.....	23
5.2 Switch On/Off.....	23

<b>6. Maintenance and Troubleshooting</b> .....	24
6.1 Storage.....	24
6.2 Maintenance Troubleshooting.....	25
6.2.1 Analysis and Treatment of Common Faults.....	25
6.2.2 Fault Code Table.....	27
<b>7. Battery recovery</b> .....	28
7.1 Recovery process and steps of cathode materials.....	28
7.2 Recovery of anode materials.....	28
7.3 Recovery of diaphragm.....	28
7.4 List of recycling equipment.....	28
<b>8. Disposal</b> .....	29
<b>Appendix I</b> .....	30

## Revision History

Revision NO.	Revision Date	Revision Reason
1.0	2025.5	First Published

## About This Manual

The manual mainly describes the introduction, installation, operation, and maintenance. Please read this manual carefully before installation and operation. 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 remain accessible at all times. The content may be periodically revised or updated to reflect product improvements.

## 1. Safety Introductions



### 1.1 Warning

#### 1.1.1 Before Connecting

- After unpacking, inspect the product and packing list carefully. If any damage is found or parts are missing, please reach out to 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 any short circuits with external devices.
- Directly connecting the battery to AC power is strictly prohibited.
- The battery system must be properly grounded, with a grounding resistance of less than  $1\Omega$ .
- Verify that the electrical parameters of the battery system are fully compatible with the connected equipment.

#### 1.1.2 In Using

- 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 batteries 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.



## 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.
- To ensure correct usage, verify that the parameters of the connected devices are compatible and matched. Avoid mixing batteries from different manufacturers, types, or models, as well as 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).

## 1.3 Requirements for Installation Personnel

- All work shall comply with local applicable laws, regulations and standards. The installation of BOS-G Pro can only be carried out by electricians with the following qualifications:
- **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.

## 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



- The dangerous goods transport vehicles shall meet relevant regulations concerning roadtransportation and shall be equipped with two 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. It could cause injury if it falls or slips. Use only suitable transport and lifting equipment to ensure safe transport.



- Wear safety shoes to avoid the danger of injury. When transporting the battery module, their parts may be crushed due to their heavy weight. Therefore, all persons involved in transportation must wear safety shoes with toe caps. Please observe the safety regulations for transportation at the end customer's site, especially during loading and 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.



- The transportation of Li-Ion batteries is classified under hazard category UN3480, Class 9. For transport via sea, air, or land, the batteries are categorized under Packaging Group PI965 Section I. Use Class 9 Miscellaneous Dangerous Goods and UN Identification labels for transportation of lithium-ion batteries which are assigned Class 9. Please refer to the relevant transportation documentation for details.

## 3. Introductions

### 3.1 Symbol Definition

	Danger! Serious physical injury or even death may occur if not follow the relative requirements.		Install the product out of reach of children
	Caution, risk of electric shock.		Do not place nor install near flammable or explosive materials
	In case of electrolyte leakage, keep leaked electrolyte away from eyes or skin.		Disconnect the equipment before carrying out maintenance or repair
	Do not connect the Pack's positive(+) and negative(-)terminal reversely.		Societe Generale de Surveillance S.A.
	Observe precautions for handling electrostatic discharge sensitive devices.		Instruction manual: Read the instruction manual before starting installation and operation.
	Caution, risk of electric shock, energy storage timed discharge		CE mark: The inverter complies with the CE directive.
	Recyclable.	<b>NOTE</b>	Note:The procedures taken for ensuring proper operation.
	Do not use the Pack beyond specified conditions		Earth terminal: The inverter must be reliably grounded.
	Take care! This Pack is heavy enough to cause serious injury.		EU WEEE mark: Product should not be disposed as household waste.

### 3.2 Brief Introduction

FLH96050SG1 is equipped with a lithium iron phosphate battery designed for household use. Developed based on customer needs and market demands, this advanced battery storage solution provides high-quality, reliable power for various devices. The product features a long lifespan, suitability for high-temperature environments, and a compact design that requires minimal installation space.

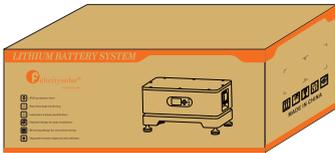
FLH96050SG1 features a battery management system independently developed by our team. When connected to a grid or photovoltaic system as the power source, the product can store energy by charging the battery. In the event of a power outage from the grid or photovoltaic system, the product independently supplies electricity to household loads. Additionally, multiple units can be connected in parallel to form a high-capacity, multi-module system, meeting long-term energy storage requirements.

### 3.3 Features

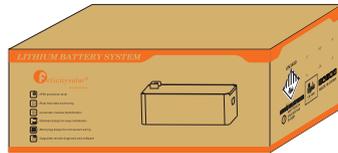
- LiFePO4: Higher safe performance and longer cycle life.
- Multiple Protection: Built-in smart BMS, Breaker and Fuse.
- Flexible Installation: Floor-Mounted.
- Wide Compatibility: Compatible with leading inverter brands.
- High Scalability: Capacity up to 30.72kWh.
- Built-in WIFI/Bluetooth: Remote monitoring of battery pack data.
- IP65 Protection Level: Suitable for Outdoor Use.
- Equipped with an aerosol fire extinguishing system.

### 3.4 Product Overview

#### 3.4.1 External Packaging

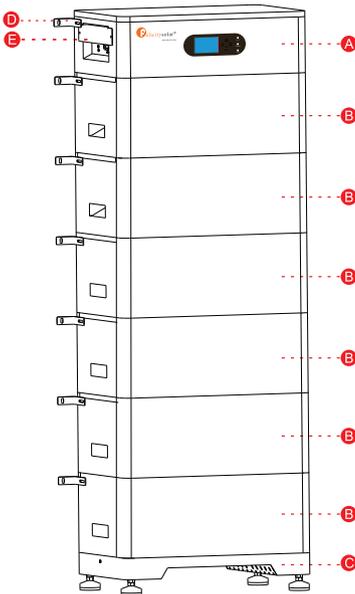


Carton box(FLH96050SCG1)

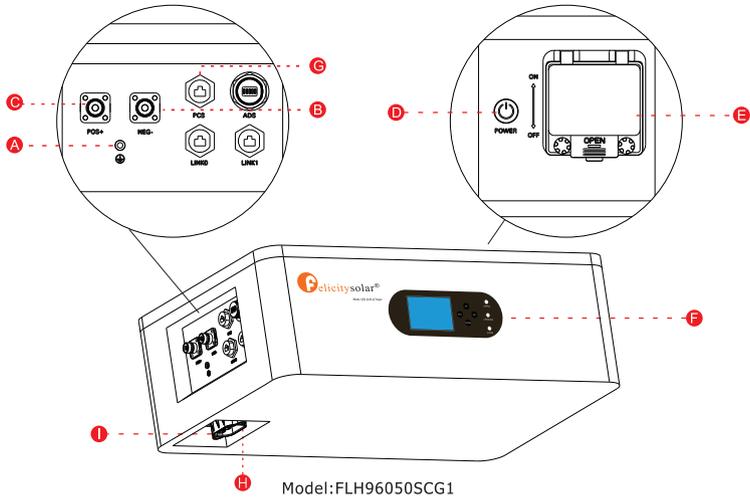


Carton box(FLH96050SMG1)

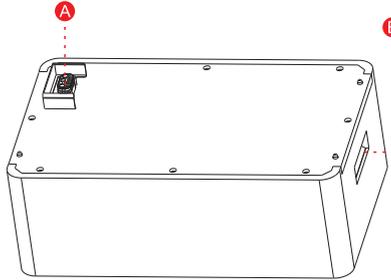
#### 3.4.2 Battery system introduction



Code	Name
A	High-Voltage Battery Control Unit(BCU)
B	High-Voltage Battery Module(BMU)
C	Pedestal
D	Fixed trestle
E	Safety shield

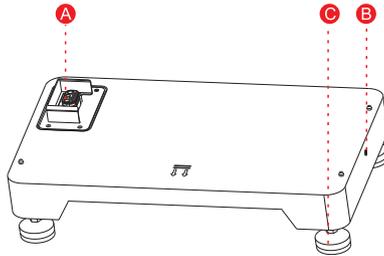


Code	Name	Definition
A	PE	Shell ground connection
B	NEG-	Connection terminal of negative pole(black)
C	POS+	Connection terminal of positive pole(red)
D	Power Switch	Indicate the power on/off function
E	DC Circuit Breaker	Used to manually control the output situation of battery rack
F	LCD Display	Indicate the important battery information
G	PCS	The clustered interface connected to the previous battery system
H	Blind plug terminal	The direct connection terminals of the battery pack include communication cables and power cables.
I	Bleed valve	When the pressure inside the battery pack is too high, the breather valve works to release the pressure to protect the battery pack.



Model:FLH96050SMG1

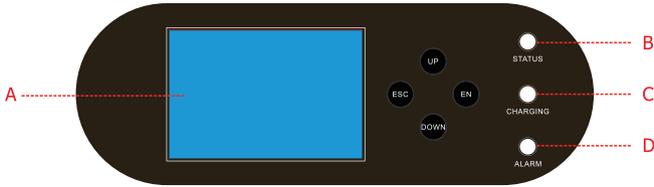
Code	Name	Definition
A	Blind plug terminal	The direct connection terminals of the battery pack include communication cables and power cables.
B	Handle	Handle



Model:Pedestal

Code	Name	Definition
A	Blind plug terminal	The direct connection terminals of the battery pack include communication cables and power cables.
B	PE	Shell ground connection
C	Foot cup	Foot cup

### 3.5 LCD Display Icons



Object	Name	Description
A	LCD touch screen	Display the information of the battery.
B	Status LED	Indicates the operating status of the battery, which is always on when running normally.
C	Charge&Discharge LED	Indicates the charging&discharging status of the battery;
D	Alarm LED	Indicates the fault status of the battery, which lights up when the fault occurs
	Function Button	Esc:Return from current interface or function
		Up:Move cursor to upside or increase value
		Down:Move cursor to downside or decrease value
		Enter:Confirm the selection.

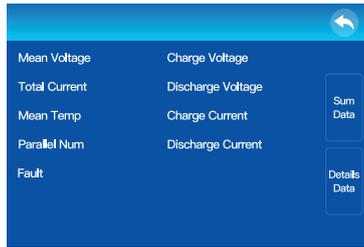
#### 3.5.1 Main Interface

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

	<p>When charging, this icon lights up</p>
	<p>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.</p>

Sum data interface:

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



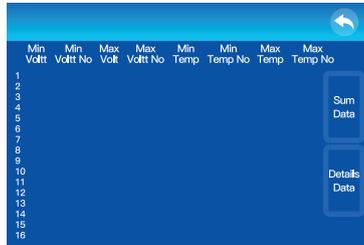
Details data interface:

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



Details data interface:

This interface displays detailed information about parallel batteries, including minimum cell voltage minimum cell voltage number, maximum cell voltage, maximum cell voltage number, minimum cell temperature, minimum cell temperature number, maximum cell temperature, and maximum cell temperature number 1 to 16 represent the addresses of parallel batteries.



	Min Volt	Min Volt No	Max Volt	Max Volt No	Min Temp	Min Temp No	Max Temp	Max Temp No
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								

## 4. Installation and Configuration

### 4.1 Preparations for Installation

#### 4.1.1 Safety Requirement

This system must only be installed by personnel trained in power supply systems and possessing adequate knowledge of such systems. The safety guidelines outlined below, along with applicable local safety standards, must be strictly adhered to during installation.

- All circuits interfacing with this power system and carrying external voltages below 48V must comply with SELV requirements as specified in the IEC60950 standard.
- If working within the power system cabinet, ensure the system is completely powered down, and all battery devices are switched off.
- The distribution cables should be arranged systematically and equipped with protective measures to prevent accidental contact while operating 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:  $\leq 2000\text{m}$

Operating environment: Suitable for indoor or outdoor installation at locations shielded from direct sunlight, wind, conductive dust, and corrosive gases.

Ensure the following conditions are met:

- The installation site should be distant from the sea to prevent exposure to saltwater and high humidity.
- The ground at the installation location must be flat and level.
- The site should be free of flammable or explosive materials.
- Optimal ambient temperature:  $20^{\circ}\text{C}$  to  $30^{\circ}\text{C}$ .
- Avoid areas with excessive dust or clutter.

#### 4.1.3 Tools



Screw Driver



Crimping Modular



Safety Shoes



Multimeter



Safety Gloves



Safety Goggles



Plier



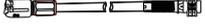
Ribbon

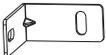


Electric drill

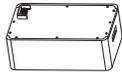
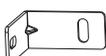
## 4.2 Unpacking Inspection

- Upon arrival at the installation site, loading and unloading should strictly follow the established rules and procedures to prevent exposure to sunlight and rain.
- Before unpacking, verify the total number of packages against the shipping list attached to each package, and inspect the outer cases for any signs of damage. After unpacking, carefully check for loose or damaged wiring and contacts, cracks, deformations, leaks, or any other form of damage. If any damage is detected, the battery must be replaced immediately. Do not attempt to charge or use a damaged battery, and avoid contact with any liquid from a ruptured battery.
- During unpacking, handle all components with care to protect the surface coating from damage.

<b>FLH96050SCG1</b>			
<b>No.</b>	<b>Description</b>	<b>Quantity</b>	<b>Picture</b>
1	High-Voltage Battery Control Unit	1	
2	Pedestal	1	
3	User manual	1	
4	Quick installation guide	1	
5	Warranty card	1	
6	Power Cable 1: 2 meters, 6mm <sup>2</sup> , allows for charging and discharging up to 30A, used to connect to external PCS- (black)	1	
7	Power Cable 2: 2 meters, 6mm <sup>2</sup> , allows for charging and discharging up to 30A, used to connect to external PCS+ (red)	1	
8	Communication Cable 1: Use an RS485 adapter to achieve communication between the battery and the computer	1	
9	Communication Cable 2: Communication between the battery pack and the Felicity inverter	1	
10	Communication Cable 3: Used for the clustering function	1	

11	Ground Cable: The 2m ground cable is used to connect the inverter to the battery ground	1	
12	Battery Terminal : Connection ports for batteries and inverter Bat Port	2	
13	Magnetic Ring: Improve the electromagnetic anti-interference performance (31x19x30 mm)	1	
14	Screw: Used for installing control cabinet (M5x12*3 PCS)	3	
15	Expansion Plastic Screw: Used together for product fixation	2	
16	BOT Foot Cup: Used for supporting the product	4	
17	Signal Terminal: Used for creating custom communication cables	2	
18	Fixed Trestle : Used for fixing products	2	

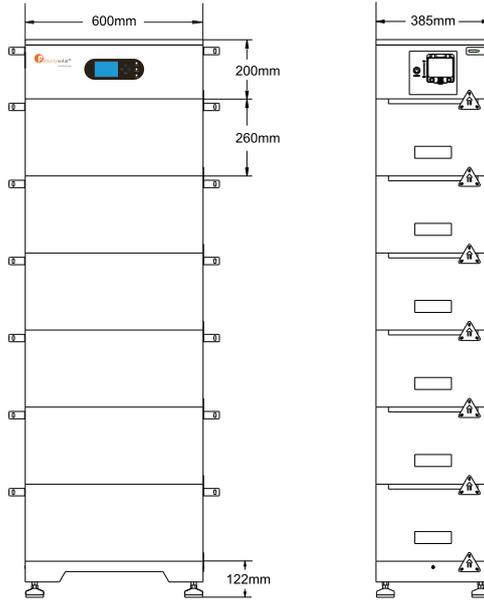
**FLH96050SMG1**

No.	Description	Quantity	Picture
1	High-Voltage Battery Module	1	
2	Warranty card	1	
3	Expansion Plastic Screw: used together for product fixation.	2	
4	Screw: used for installing battery pack modules. (M5x12*4 PCS).	4	
5	Fix the bracket	1	
6	Fixed trestle : Used for fixing products	2	

### 4.3 Installation Procedure

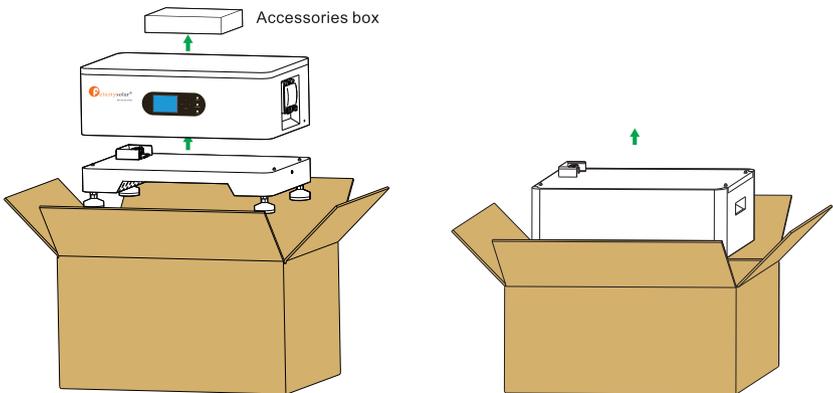
#### 4.3.1 Mounting the Battery

(a) Product size information



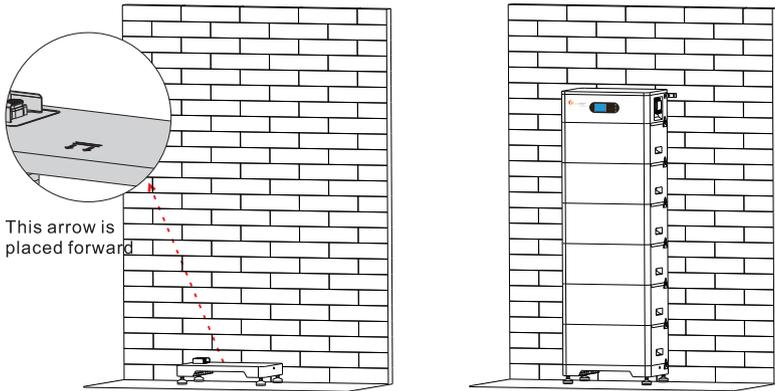
(b) Wall-mounted method

Step 1: Remove the battery, base and control box from the carton.



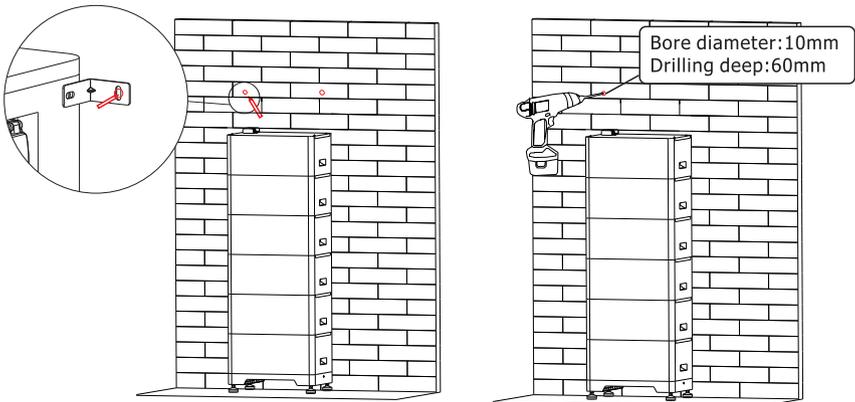
Step 2: Place the base against the wall.

Step 3: Install 1~6 battery boxes on the base, and then place the control box above the installed battery to ensure it is firmly placed.

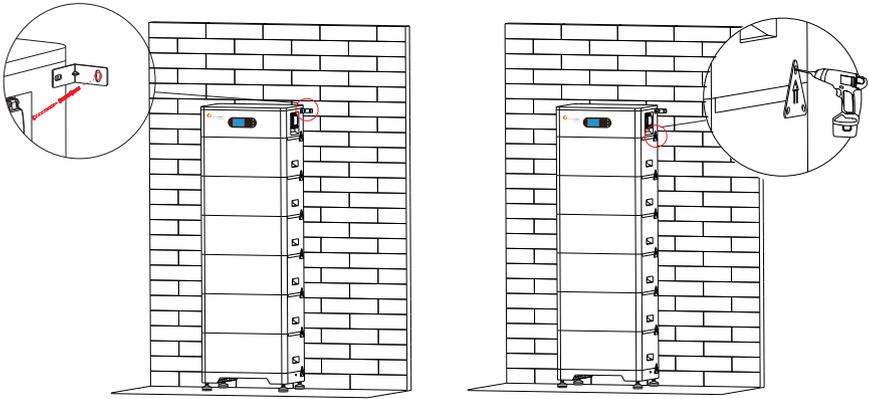


Step 4: install the anti-tipping bracket of the control box, mark the punching position with a marker, and remove the anti-tipping bracket and the control box.

Step 5: Use the impact drill to drill holes. (Aperture: 10mm, depth: 60mm).



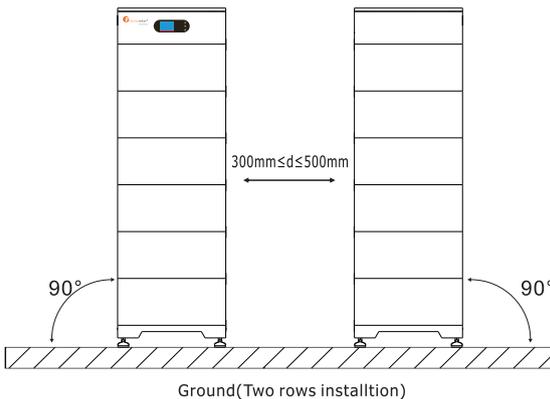
Step 6: Use a hammer to knock the plastic plug into the hole, fit it to the wall, then reinstall the control box and the anti-tipping bracket, and tighten the screws on the anti-tipping bracket. The torque requirement is 10N · m to ensure that the control box is firmly installed.

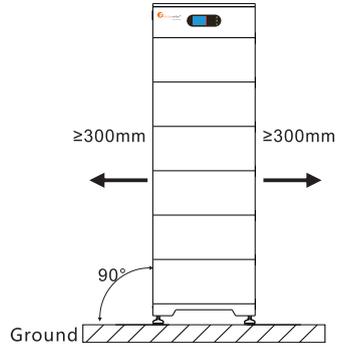
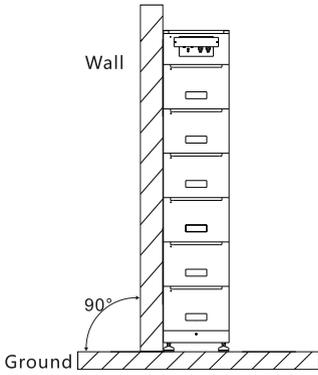


**Note:**

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

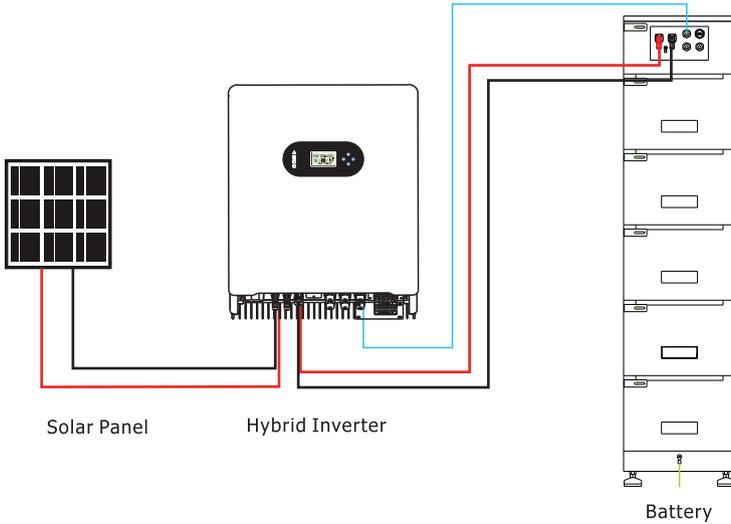
(c) Floor-Mounted method





### 4.3.2 System Connection Diagram

█ Negative Power Line     
 █ Positive Power Line     
 █ RJ45 485/CAN Communication



### 4.3.3 Batteries in Parallel

Link1, Link0 Port Definition

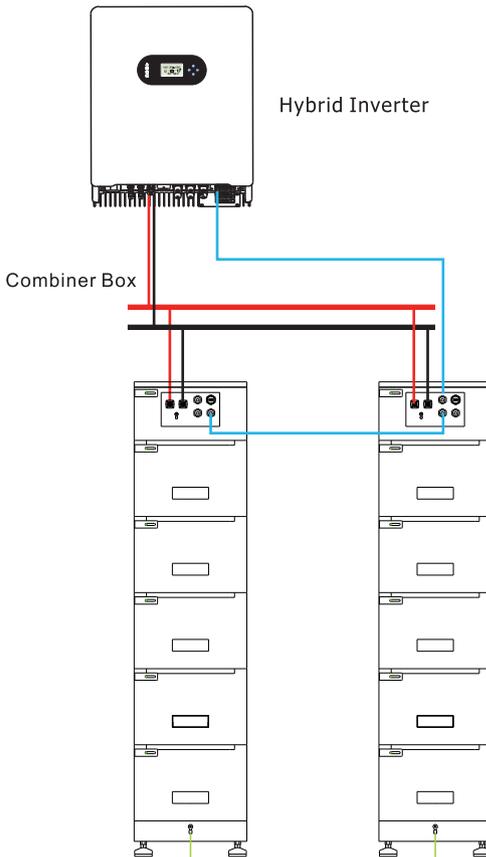
Picture	Pin	Color	Definition
	1	ORG-WH	NC
	2	ORG	NC
	3	GN-WH	NC
	4	BU	NC
	5	BU-WH	NC
	6	GN	NC
	7	BN-WH	CANH
	8	BN	CANL

The FLH96050SG1 supports to be connected in parallel for expansion. It can support up to 16 clusters FLH96050SG1 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.

\* It is recommended to use battery pack combiner box(BTCB0606/BTCB0303) or confluence copper bar confluence.

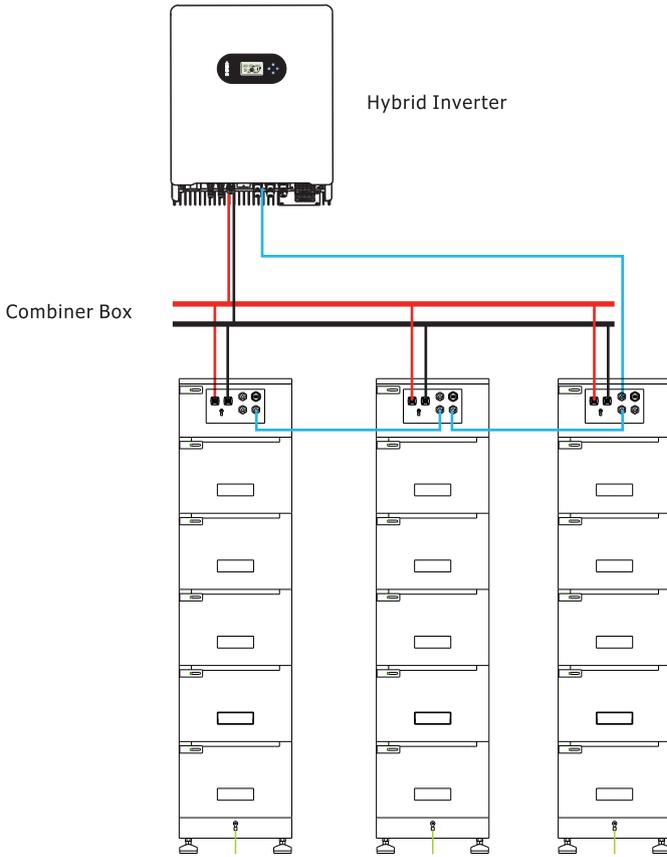
### Two battery clusters connected to the inverter

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



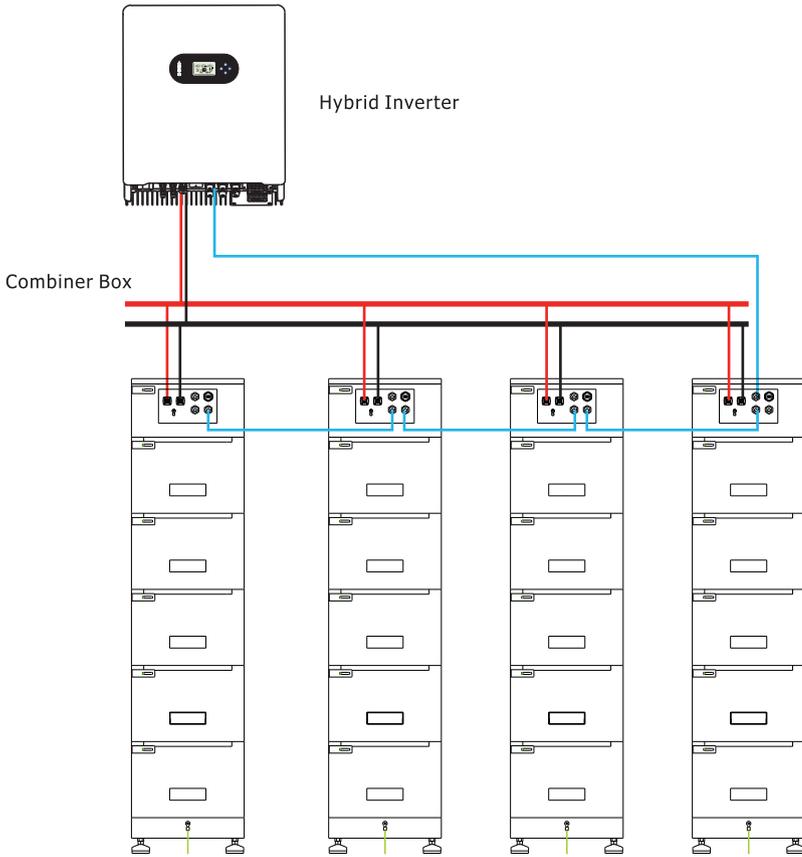
### Three battery clusters connected to the inverter

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



### Multiple battery clusters connected to the inverter

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



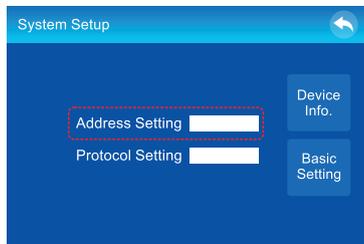
### 4.3.4 Cluster Setting Instructions

Before the system is set up, upgrade the software version of the main control and LCD screen to be no lower than that indicated in the picture



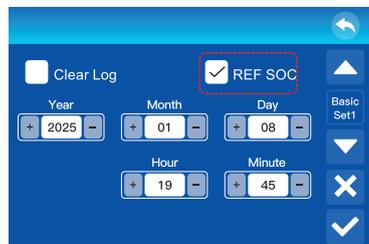
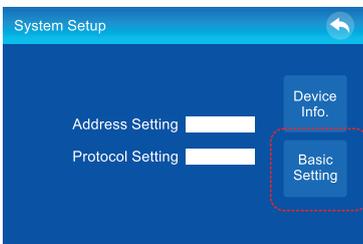
#### Battery pack parallel operation address setting:

1. After connecting the battery cable, power on the battery pack and set the main control address through the screen. Each main control address cannot be set repeatedly, and the maximum setting is 16.
2. After setting the address, restart the battery.



#### SOC Averaging Settings for Parallel Connection:

1. After connecting the battery cable, enter the System Setup page and click on Basic Settings.
2. Check the "REF SOC" option



## 5. Operation

### 5.1 PCS Port Pin Definition

BATTERY-Felicitysolar

INVERTER

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



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

### 5.2 Switch On/Off

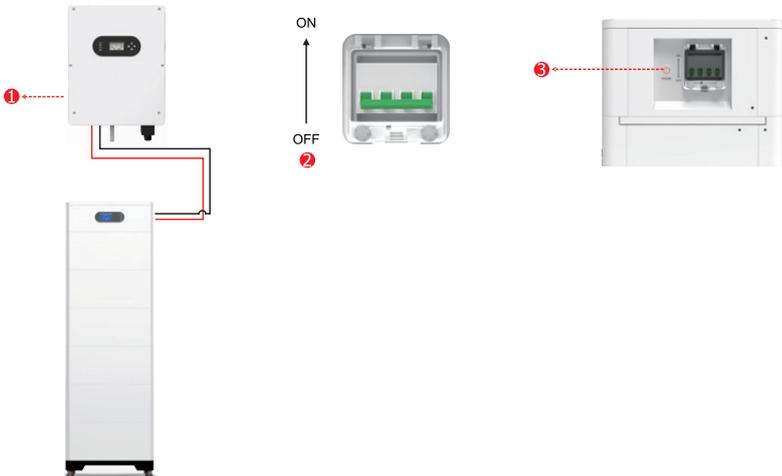
#### Power on steps:

Step 1: First connect the PV, then connect the mains power, finally connect the battery, and finally start the inverter **1**;

Step 2: Turn on the battery breaker **2** ("OFF" to the "ON");

Step 3: Press the battery switch button **3**.

If the battery clusters are connected in parallel, connect the wireharnesses in sequence as



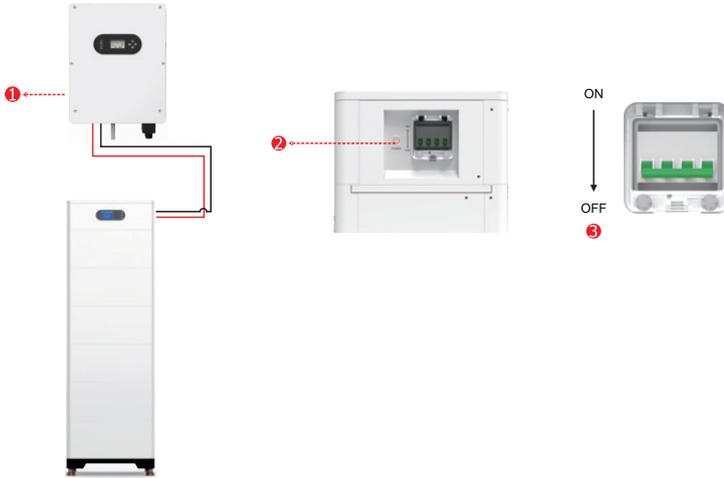
**Power down steps:**

Step 1: Turn off the inverter **1**;

Step 2: Press the button and pop out **2**;

Step 3: Disconnect the breaker of the battery **3** ( "ON" to "OFF" ).

If the batteries are connected in parallel, turn off them one by one.



## 6. Maintenance and Troubleshooting

### 6.1 Storage

- Do not expose battery to open flame.
- Do not place the product under direct sunlight.
- Do not place the product near flammable materials. It may lead to fire or explosion in case of accident.
- Store in a cool and dry place with ample ventilation.
- 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.
- It may cause leakage of electrolyte or fire.
- Do not touch any liquid spilled from the product. There is a risk of electric shock or damage to skin.
- 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 damaged battery.

## 6.2 Maintenance Troubleshooting

### 6.2.1 Analysis and Treatment of Common Faults

#	Fault Phenomenon	Reason Analysis	Solution
1	Unable to communicate with the inverter	The wrong communication harness was used	Check the communication port definition and use the correct communication harness to connect the battery and the inverter.
2	BMU address allocation failure, the number of BMU is abnormal	Poor contact of the connectors between battery modules; Low software version, insufficient anti-interference ability.	After powering off, shake the battery and then recharge it to confirm. The BCU and BMU communicate one-on-one to identify which BMU has the problem; Contact the supplier to upgrade to the latest version of the software;
3	Cell overvoltage failure	When the SOC reaches 100%, the inverter still charges the battery with a small current, causing the battery cells to over-voltage.	Contact the inverter supplier to upgrade the inverter.
4	Inaccurate SOC display	The battery's SOC has not been calibrated.	The SOC will automatically calibrate after one full chargecycle. First, discharge the battery to 0%, then charge it to 100%.
5	SOC fluctuation, capacity not meeting standards	Low software version, insufficient anti-interference ability; During operation, the BMU was replaced or added.	Contact the supplier to upgrade to the latest version of the software; If there has been any replacement or addition of the BMU during the operation, please contact the supplier for capacity balancing.
6	F3&F4 The voltage difference between adjacent battery cells is extremely large	The voltage sampling harness of the battery cell became loose, resulting in abnormal sampling.	Contact the supplier for repair.
7	F8 Cell over temperature fault	The temperature sampling harness of the battery cell became loose, resulting in abnormal sampling.	Contact the supplier for repair.
8	F13 slave communication fault	Poor contact of the connectors between battery modules: Low software version, insufficient anti-interference ability	After powering off, shake the battery and then recharge it to confirm. The BCU and BMU communicate one-on-one to identify which BMU has the problem; Contact the supplier to upgrade to the latest version of the software;

9	F17 Parallel fault	<p>Poor contact of the connectors between battery cluster, Battery cluster address setting repeatedly;                  Low software version, insufficient anti-interference ability</p>	<p>Check whether the communication harness is properly connected. According to 4.3.4 requirements, each BCU address cannot be set repeatedly, and the maximum setting is 16. Contact the supplier to upgrade to the latest version of the software;</p>
---	--------------------	--	---

### 6.2.2 Fault Code Table

<b>Fault Code</b>	<b>Explain</b>	<b>Tretment Measure</b>
01	High Battery Voltage	Stop charging
02	Low Battery Voltage	Stop discharging
03	High Cell Voltage	Stop charging
04	Low Cell Voltage	Stop discharging
05	High Charging Current	Reduce charging current
06	High Discharging Current	Reduce discharging current
07	High Bms Temperature	Stop charging and discharging ,wait for the temperature to drop
08	Low Bms Temperature	Wait for temperature rise
09	High Cell Temperature	Stop charging and discharging , wait for the temperature to drop
10	Low Cell Temperature	Wait for temperature rise
11	Afe fault	Restart,if the fault stil exists, contact our engineer
12	Soft Start Failed	Restart,if the fault stil exists, contact our engineer
13	Slave Communication Failure	Check for poor contact of the communication line
14	Low Output Impedance	Restart,if the fault stil exists, contact our engineer
15	Slave Version Fault	Contact ourengineer to upgrade the program
16	Slave Device Version Fault	Contact ourengineer to upgrade the program
17	Parallel Fault	1. Please check if the number of parallel battery slave controls is the same 2. Please check if a single unit is installed in a parallel system 3.If this error occurs during parallel installation, please check the wiring. If they are connected correctly, please install them in parallel first and then restart the device. 4.If the problem persists, please contact the installation personnel.
18	Relay Adhesion Fault	Restart,if the fault stil exists, contact our engineer

## 7. Battery recovery

Aluminum, copper, lithium, iron, and other metal materials are extracted from discarded LiFePO<sub>4</sub> 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 Recovery process and steps of cathode materials

The aluminum foil used as collector is an amphoteric metal. Initially, it is dissolved in a NaOH alkaline solution, allowing aluminum to enter the solution as NaAlO<sub>2</sub>. After filtration, the filtrate is neutralized with a sulfuric acid solution, resulting in the precipitation of Al(OH)<sub>3</sub>. When the pH exceeds 9.0, the majority of the aluminum precipitates, and the resulting Al(OH)<sub>3</sub> can achieve chemical-grade purity upon analysis.

The filter residue is treated with sulfuric acid and hydrogen peroxide, allowing lithium iron phosphate to dissolve into the solution as Fe<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub> and Li<sub>2</sub>SO<sub>4</sub>, 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)<sub>3</sub>, followed by the precipitation of the remaining solution using a saturated Na<sub>2</sub>CO<sub>3</sub> solution at 90°C.

### 7.2 Recovery of anode materials

The recovery process for anode materials is relatively straightforward. After separating the anode plates, the copper purity exceeds 99%, making it suitable for further refining into electrolytic copper.

### 7.3 Recovery of diaphragm

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

### 7.4 List of recycling equipment

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](mailto: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

Model		FLH96050SG1				
Battery Type		LiFePO4				
Module Energy		5.12kWh				
Module Nominal Voltage		102.4V				
Module Capacity		50Ah				
Number of Battery Modules		2	3	4	5	6
System Energy		10.24kWh	15.36kWh	20.48kWh	25.6kWh	30.72kWh
System Nominal Voltage		204.8V	307.2V	409.6V	512V	614.4V
System Operating Voltage		192-230.4V	288-345.6V	384-460.8V	480-576V	576-691.2V
Recommend Charge/Discharge current		25A	25A	25A	25A	25A
Max. continuous charge/discharge current[1]		50A	50A	50A	50A	50A
Peak Charge/Discharge current(15S)		60A	60A	60A	60A	60A
Depth of discharge(DoD)		≥95%				
Display type		LED+LCD(Touch)				
IP Rating of Enclosure		IP65				
Operating Temperature Range		Charge:0~+55°C/Discharge:-20°C~+55°C				
Storage Temperature Range		0°C~+35°C				
Humidity		5%~95%				
Altitude		≤2000m				
Cycle Life[2]		> 6000 Cycles				
Installation		Stacking-Mounting/Floor-Mounting				
Protection		Built-in smart BMS, Breaker				
Communication Port		RS485/CAN				
Warranty Period[3]		10 Year				
Control Module FLH96050SCG1	Net Weight	12.5 kg				
	Gross Weight(with base)	24.5 kg				
	Product Dimension	600x385x200 mm				
	Package Dimension(with base)	712x497x352 mm				
Battery Module FLH96050SMG1	Battery Designation[4]	IFpP/41/150/102/[(1P32S)NS]M/-10+50/90				
	Net Weight	57.5kg				
	Gross Weight	62kg				
	Product Dimension	600x385x260 mm				
	Package Dimension(with base)	712x497x378 mm				
[1] Max. continuous charge/discharge current is affected by temperature and SOC						
[2] Test conditions: 0.2C Charging/Discharging @25°C, 80% DOD						
[3] Conditions apply, refer to Felicitysolar Warranty policy.						
[4]"N" means the number of battery packs connected series and should not exceed 6.(N≤6)						

