Household High Voltage Energy Storage Battery System

User Manual

Rechargeable Li-ion Battery System

For HV Series_24.11 V1.0

This manual introduces HV series Product. HV series is a high voltage Lithium-Ion Phosphate Battery storage system. Please read this manual before you install the battery and follow the instruction carefully during the installation process. If you have any questions, please do not hesitate to contact our distributors or contact us directly for advice and clarification.

Content

1. Safety

The HV Series is a high voltage DC system, operated by skilled/qualified personnel only. Read all safety instructions carefully prior to any work and observe them at all times when working on with the system.

Incorrect operation or work may cause:

※ Injury or death to the operator or a third party;

※ Damage to the system hardware and other properties belonging to the operator or a third party.

Skills of Qualified Personnel

Qualified personnel must have the following skills:

※ Training in the installation and commissioning of the electrical system, as well as the dealina with hazards;

※ Knowledge of this manual and other related documents;

※ Knowledge of the local regulations and directives.

1.1 Symbol

	**Danger**	Lethal voltage! ※ Battery strings will produce HIGH DC power and can cause a lethal voltage and an electric shock. ※ Only qualified person can perform the wiring of the battery strings.
	**Warning**	Risk of battery system damage or personal injury ※ DO not pull out the connectors while the system is working! ※ De-energize from all multiple power sources and verify that there is no voltage
	**Caution**	Risk of battery system failure or life cycle reduces.
	**Symbol in label**	Read the product and operation manual before operating the battery system!
	**Symbol in label**	Danger! Safety!
	**Symbol in label**	Warning electric shock!
	**Symbol in label**	Do not place near flammable material
	**Symbol in label**	Do not reverse connection the positive and negative.

	**Symbol in label**	Do not place near open flame
	**Symbol in label**	Do not place at the children and pet touchable area.
	**Symbol in label**	Recycle label.
	**Symbol in label**	Label for Waste Electrical and Electronic Equipment (WEEE) Directive(2012/19/EU)
	**Symbol in label**	The certificate label for EMC.

Danger: Batteries deliver electric power, resulting in burns or a fire hazard when they are short circuited, or wrongly installed.

Danger: Lethal voltages are present in the battery terminals and cables. Severe injuries or death may occur if touch the cables and terminals.

Warning: DO NOT open or deform the battery module, otherwise the product will be out of warranty scope

Warning: Whenever working on the battery,wear suitable personal protective equipment (PPE) such as rubber gloves, rubber boots and goggles.

Warning: HV Series system working temperature range: 0°C ~ 50 °C; Optimum temperature:18℃~28℃. Out of the working temperature range may cause the battery system over /low temperature alarm or protection which further lead to the cycle life reduction as well as. It will affect the warranty terms as well.

Warning: For battery installation, the installer shall refer to NFPA70 or similar local installation standard for operation.

Caution: Improper settings or maintenance can permanently damage the battery.
Caution: Incorrect inverter parameters will lead to a further faulty/damage to battery.

Reminding

1) It is very important and necessary to read the user manual carefully (in the accessories) before installing or using battery. Failure to do so or to follow any of the instructions orwarnings in this document can result in electricalshock, serious injury, or death, or can damage battery, potentially rendering it inoperable.
2) If the battery is stored for long time, it is required to charge them every six months and the SOC should be no less than 90%;
3) Battery needs to be recharged within 12 hours, after fully discharged;
4) Do not expose cable outside:

1.2 Before Connecting

1) After unpacking, please check product and packing list first, if product is damaged or lack of parts, please contact with the local retailer;
2) Before installation, be sure to cut off the grid power and make sure the battery is in the switched-off mode;
3) Wiring must be correct, do not mistake the positive and negative cables, and ensure no short circuit with the external device;
4) It is prohibited to connect the battery and AC power directly;
5) Battery system must be well ground and the resistance must be less than 100mΩ;
6) Please ensured the electrical parameters of battery svstem are compatible to related equipment;
7) Keep the battery away from water and fire.

1.3 In Using

1) If the battery system needs to be moved or repaired, the power must be cut off and the battery is completely shut down;
2) It is prohibited to connect the battery with different type of battery.
3) It is prohibited to put the batteries working with faulty or incompatible inverter.
4) It is prohibited to disassemble the battery (OC tab removed or damaged);
5) In case of fire, only dry powder fire extinguisher can be used, liquid fire extinguishers are prohibited:

2. System introduce

2.1 Product introduce

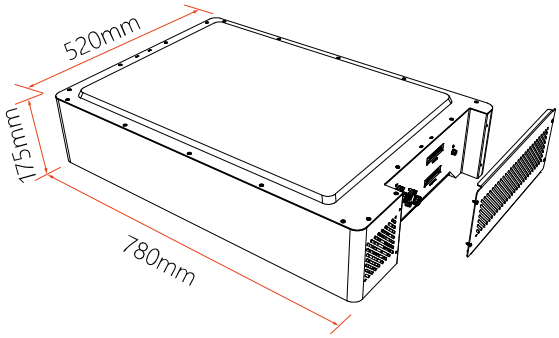
HV Series is a high voltage battery storage system based on lithium iron phosphate battery, It is a new energy storage product developed and produced. It can be used to support reliable power for various types of equipment and systems. HV Series is especially suitable for those application scenes which required high power output, limited installation space, restricted load-bearing and long cycle life.

2.2 Specifications

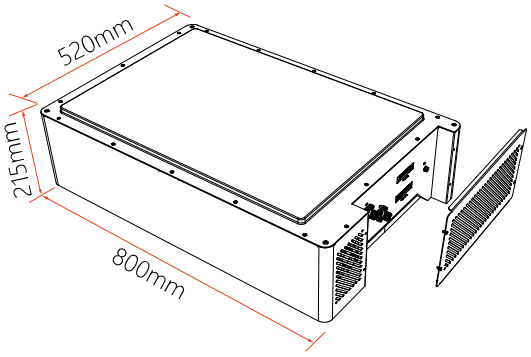
2.2.1 The parameter of system

Parameters		Data Sheet			
Battery Module		HV32-10 / HV32-15			
Battery Module Voltage		102.4V			
Battery Controller Name		HVB-3U-40565			
Number of Modules Supported		3	4	5	6
Nominal Voltage		307.2V	409.6V	512V	614.4V
Operating Voltage		288~336V	384V~448V	480V~560V	576V~672V
Energy Capacity	HV32-10	30.72kWh	40.96kWh	51.20kWh	61.44kWh
	HV32-15	48.23kWh	64.3kWh	80.38kWh	96.46kWh
Dimensions (L*D*H)	HV32-10	780x520x755mm	780x520x920mm	780x520x1085mm	780x520x1250mm
	HV32-15	800x520x880mm	800x520x1083mm	800x520x1286mm	800x520x1500mm
Weight	HV32-10	≈309Kg	≈395Kg	≈480Kg	≈566Kg
	HV32-15	≈416Kg	≈537Kg	≈658Kg	≈779Kg
Standard Charge/ Discharge Current		Charge 20A / 0.2C； Discharge 50A / 0.5C			
Battery Cell Type		LiFePO4 Battery (Lithium iron phosphate battery)			
Enclosure Protection Rating		IP20			
Round-trip Eficiency		≥92%			
Applications		ON Grid / ON Grid + Backup / OFF Grid			
Communication Mode		RS485 / CAN (Built-in BCU + BMU)			
BMS Monitoring Parameters		Cascade communication, Software upgrade, Automatic encoding and Monitoring of SOC, System voltage, Current, Cell voltage, Cell temperature			
Working Temperature		0°C~50°C Charge / -10°C~50°C Discharge			
The Shelf Temperature		-20°C~60°C			
Humidity		5~95%(RH)			
Design Life Cycle		10+Years (25°C/77°F)			
Cycle Life		≥6500 at 25°C			

2.2.2 Battery Module

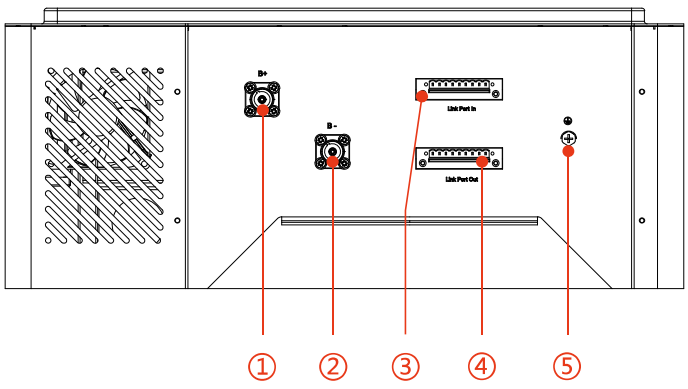


(HV32-10)



(HV32-15)

Parameters	Data Sheet	
Battery Module	HV32-10	HV32-15
Nominal Voltage	102.4V	102.4V
Nominal Voltage	100Ah	157Ah
Operating Voltage Range	96V~112V	96V~112V
Energy Capacity	10.24kWh	16kWh
Dimensions (L*D*H)	780x520x175mm	800x520x215mm
Weight	≈86Kg	≈121Kg
Standard Charge/ Discharge Current	Charge 20A / 0.2C; Discharge 50A / 0.5C	Charge 30A / 0.2C; Discharge 75A / 0.5C
Battery Cell Type	LiFePO4 Battery (Lithium iron phosphate battery)	
Working Temperature	0°C~50°C Charge / -10°C~50°C Discharge	
The Shelf Temperature	-20°C~60°C	
Design Life Cycle	10+Years (25°C/77°F)	
Cycle Life	≥6500 at 25°C	



①、B+ Battery Module Positive

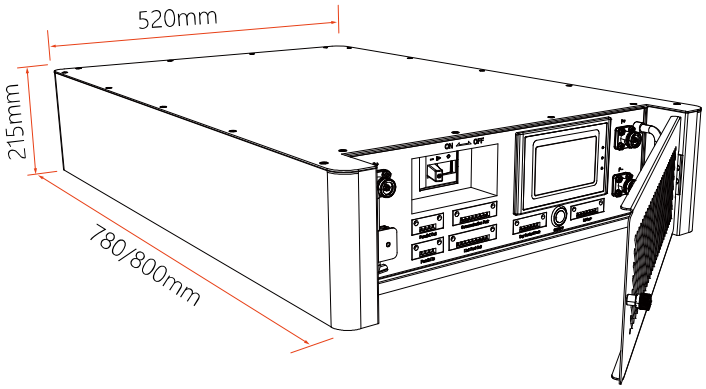
②、B- Battery Module Negative

③、Link Port In
(Communicate with the upper level)

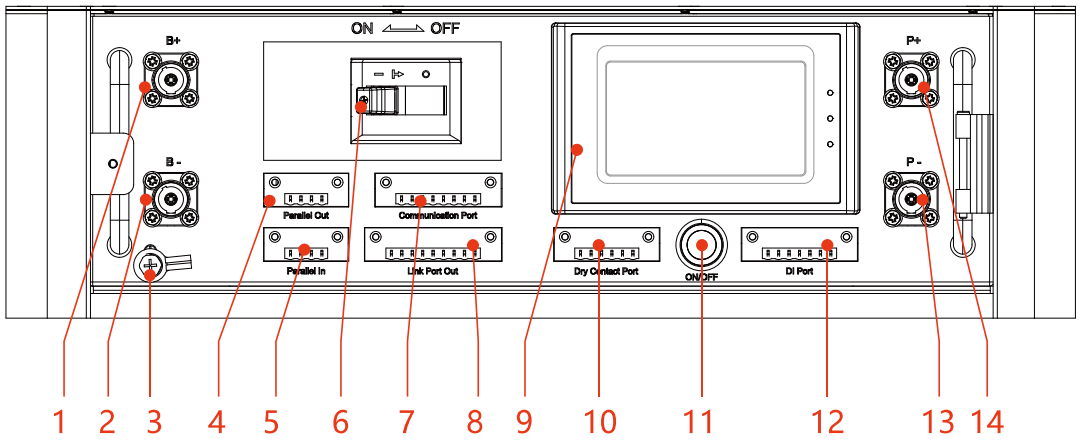
④、Link Port Out
(Communicate with the next level)

⑤、PE / Ground Terminal

2.2.3 Control Module HVB-3U-40565 (internal power supply)



(HVB-3U-40565)



1、B+ Battery Input
(Connect The Positive Terminal of The Battery)

2、B- Battery Input
(Connect The Negative Terminal of The Battery)

3、PE / Ground Terminal

4、Parallel Interface (Output)

5、Parallel Interface (Input)

6、Circuit Breaker (System Switch)

7、External Communication Interface
(Connecting to The Inverter / PCS)

8、Master-slave Connection Port
(Connect The Battery Slave Control Interface)

9、Industrial Control Display
(View The Entire System Information)

10、Dry Contact Interface

11、Self-reset Normally Open Contact Push Button Switch

12、External Communication Input Interface

13、P+ System Positive Output
(Connecting to The Inverter / PCS)

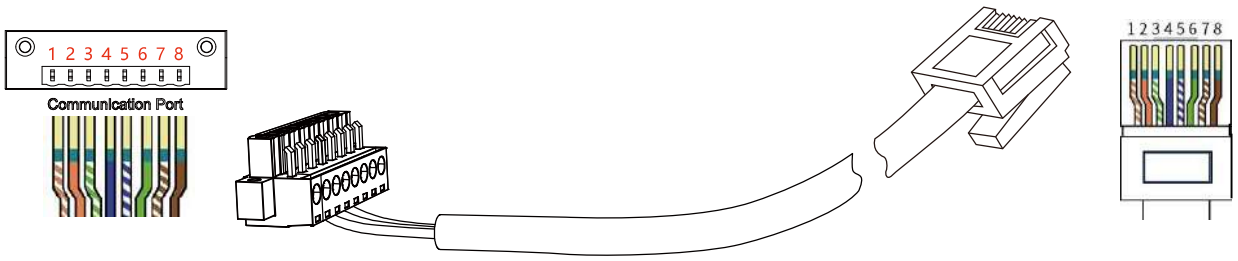
14、P- System Negative Output
(Connecting to The Inverter / PCS)

2.2.4 Control Module HVB-3U-40565 Interface Definition

Dry Contact Port 					
PIN	Definition	Explanation	PIN	Definition	Explanation
1	RLY-OUT1+	Dry contact 1 output positive terminal	4	RLY-OUT2-	Dry contact 2 output negative terminal
2	RLY-OUT1-	Dry contact 1 output negative terminal	5	NC	/
3	RLY-OUT2+	Dry contact 2 output positive terminal	6	NC	/

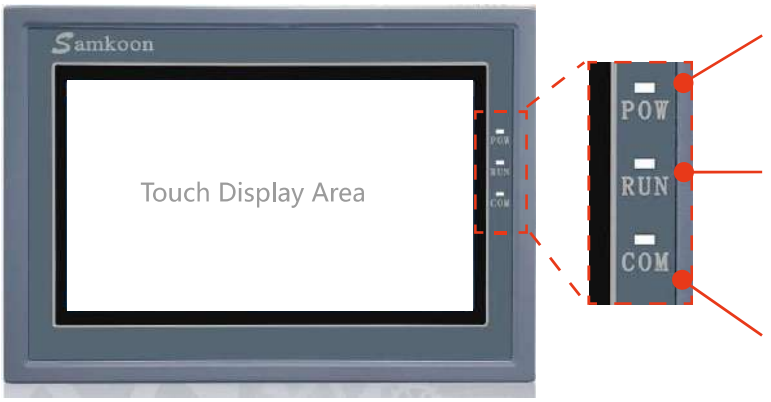
External Communication Input Interface 					
PIN	Definition	Explanation	PIN	Definition	Explanation
1	5VO	Output 5V/1A	5	SIN1-	Input Detection 1
2	5V_GND	Output 5V/1A	6	SIN2+	Input Detection 2
3	DOPWM	Output PWM	7	SIN2-	Input Detection 2
4	SIN1+	Input Detection 1			

External Communication Interface (Connecting to The Inverter / PCS) 					
PIN	Definition	Explanation	PIN	Definition	Explanation
1	RS485-A1	Local RS485 communication	5	RS485-A3	Reserve 485_A3 communication
2	RS485-B1	Local RS485 communication	6	RS485-B3	Reserve 485_A3 communication
3	GND_A1	RS485_A1 Communication ground	7	CAN-L3	Communicate with PCS
4	GND_A3	Reserved RS485_A3 Communication ground	8	CAN-H3	Communicate with PCS



***Note:** The external communication port can be adjusted according to the protocol pins of the PCS/inverter and correspond to the RJ45 terminal. The battery system pin sequence is shown in the table above.

2.2.5 Control Module HVB-3U-40565 Control Display



Indicator Lights

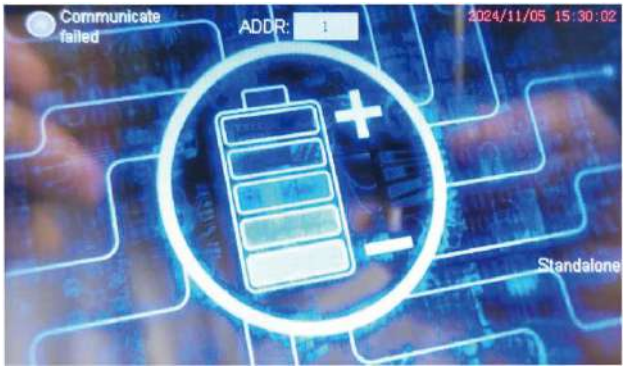
When powered on, the power indicator (PWR) is always green.

When the machine is working normally, the running indicator light (RUN) is always on in yellow. When there is a fault, the running indicator light (RUN) is off.

During communication, the communication indicator (COM) is flashing green.

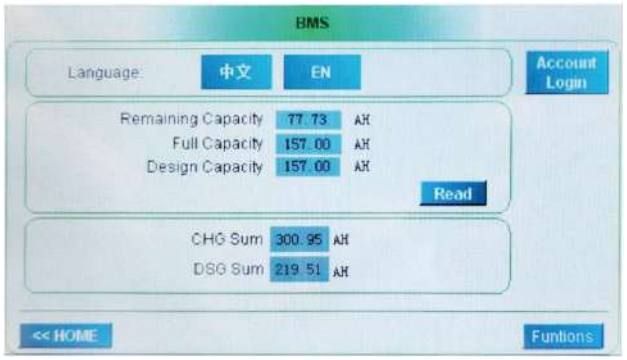
Device Status	PWR	RUN	COM
Power Off	Off	Off	Off
Power On	On		
Normal Operation	On	On	
Communication	On	On	Flashing Green

Industrial Control Screen Interface Introduction

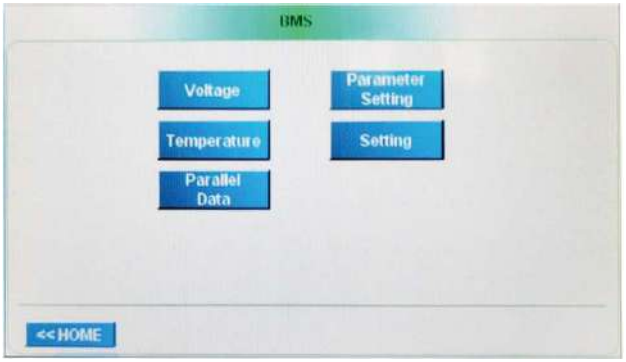


Boot Interface

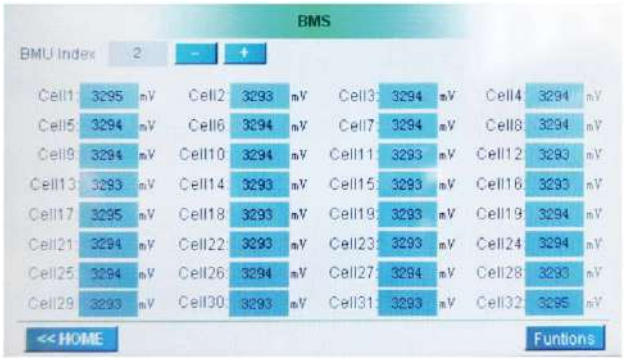
Main Interface



Settings Interface

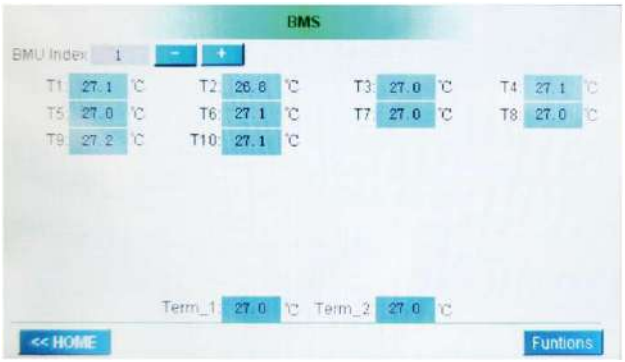


Function List Interface

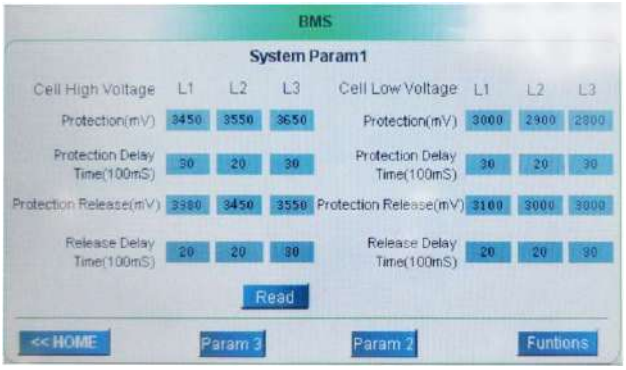


Monomer Voltage Interface

*** Note:** A single BMU supports querying up to 64 battery voltage information, and a single page displays 32 battery voltage information. Click the next page to monitor the remaining battery voltage information.



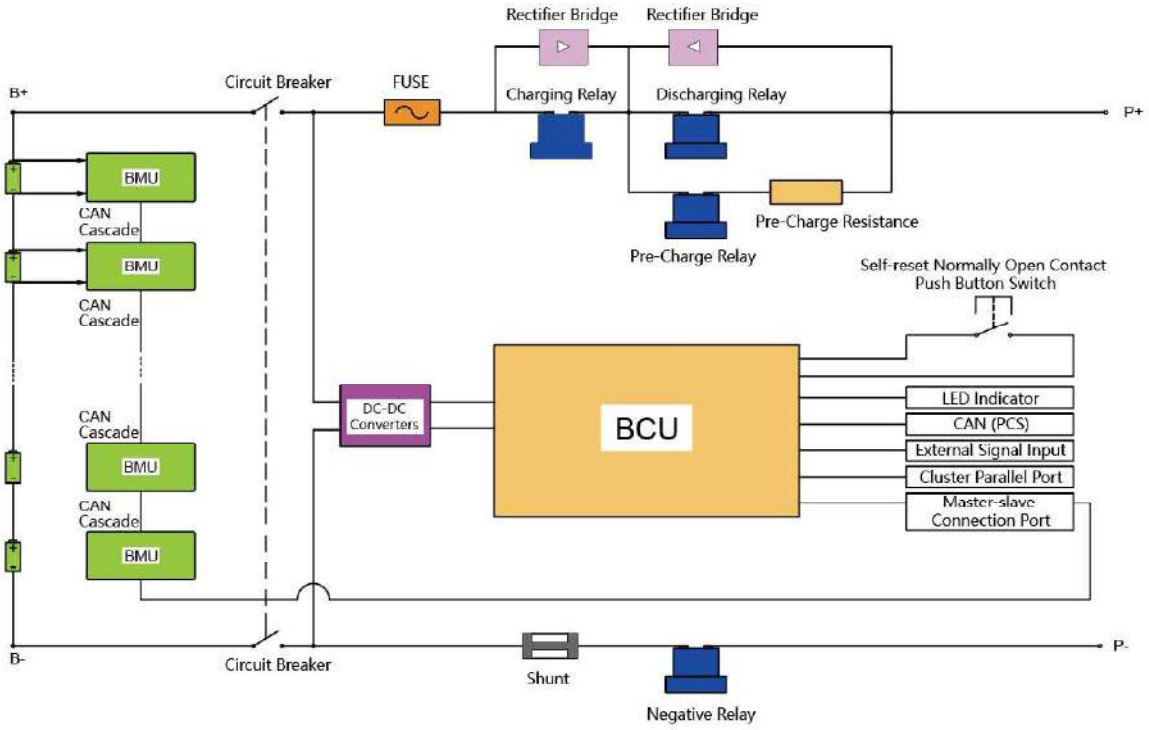
Temperature Interface



Parameter Viewing Interface

*** Special note:** This display screen is only used to view and read the entire system information. If special settings are required, please contact the dealer or manufacturer for assistance.

2.2.6 System Diagram



3. Overview and Application Of The Whole System

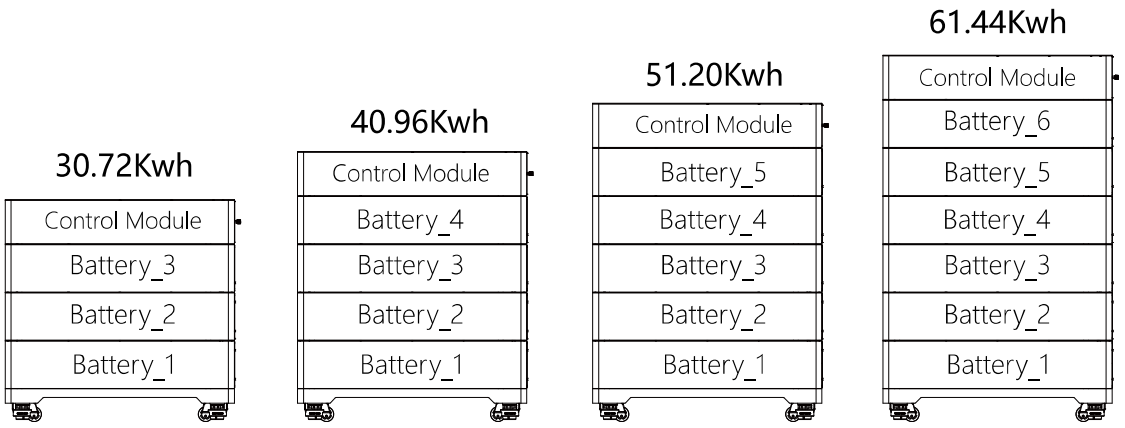
3.1 Product Overview

Intended usage

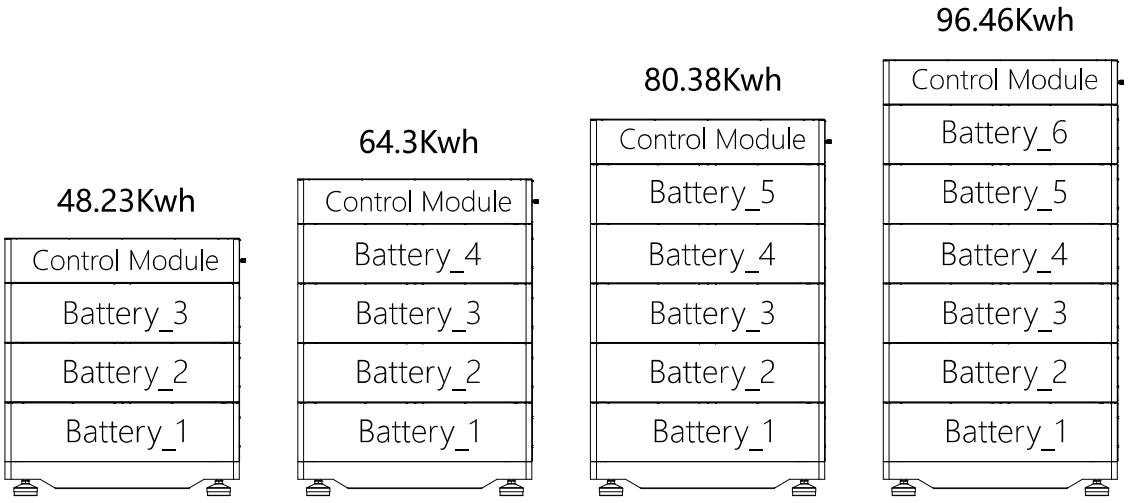
The battery system, which consists of a power control unit (BCU for short) and battery modules can store and release the electric energy according to the requirements of the solar energy storage system. The input and output ports of the energy storage system are high voltage direct current ports.

Usable energy description

The battery system supports capacity expansion. A maximum of 6 battery modules can be used to extend the usable energy of the battery system.

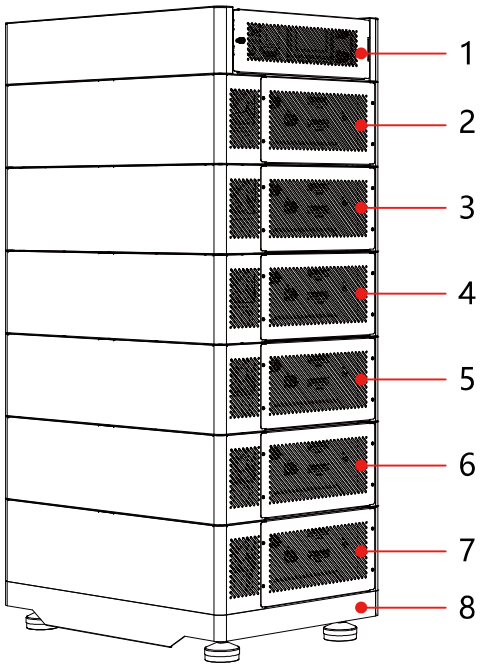


HV32-10（3~6 Battery Module）



HV32-15（3~6 Battery Module）

3.2 Battery system appearance

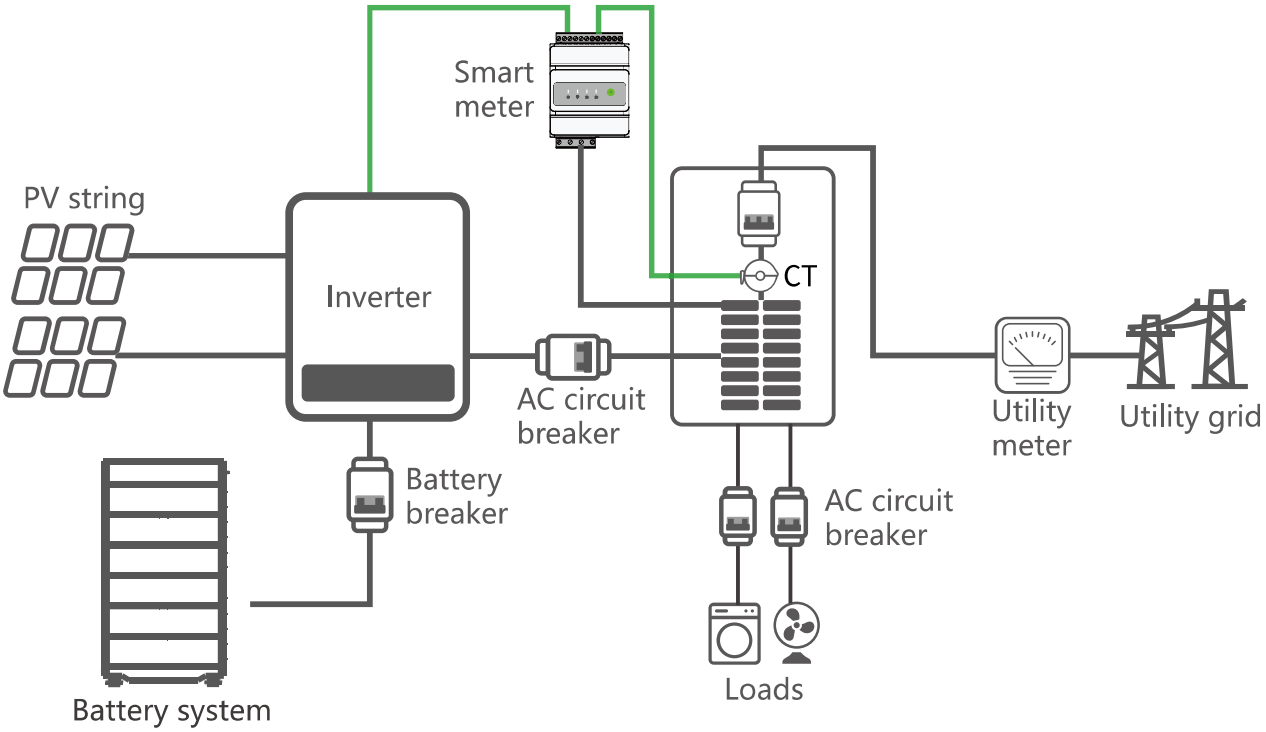


NOTICE!(AVIS)

- Ensure that the BCU is installed above the battery modules. Do not install any battery modules above the BCU.
- This manual will show you the installation and electrical connection of 6 battery modules

NO.	Parts
1	BCU (Control Module)
2,3,4,5,6,7	Battery Module
8	Base

3.3 Application Scenarios



4. Installation

4.1 Tools

The following tools are required to install the battery pack:

 Wire Cutter	 Crimping Modular Plier	 Cable Ties
 Screw Driver Set	 Electric Screw Driver	 600VDC Multimeter
 Adjustable Wrench	 Sleeve Piece	

NOTE

Use properly insulated tools to prevent accidental electric shock or short circuits.
If insulated tools are not available, cover the entire exposed metal surfaces with available insulated alternatives, except their tips, with electrical tape.

*** The tool sets mentioned above are not standard and need to be purchased separately.**

4.2 Safety Gear

It is recommended to wear the following safety gear when dealing with the battery pack.

Insulated gloves

Safety goggles

Safety shoes

*** The above safety protection kits are not standard and need to be purchased separately.**

4.3 System Working Environments Checking

4.3.1 Cleaning

Before installation and system power on, the dust and iron scurf must be removed to keep a clean environment.
The system cannot be installed in desert area without an enclosure to prevent from sand.

Danger: Battery module has active DC power at terminal all the time), must be careful to handle the modules.

4.3.2 Ventilation

The system working temperature range: 0℃ ~ 50℃;
Optimum temperature: 18℃~28℃

There is no mandatory ventilation requirements for battery module, but please avoid of installation in confined area. The aeration shall avoid of high salinity, humidity or temperature.

Caution: Please avoid frost or direct sunlight. Out of the working temperature range will cause the battery system over / low temperature alarm or protection which further lead to the cycle life reduction. According to the environment, the cooling system or heating system should be installed if it is necessary.

4.3.3 Fire-extinguisher System

It must be equipped with fire-extinguisher system for safety purpose.
The fire system needs to be regularly checked to be in normal condition.
Refer to the using and maintenance requirements please follow local fire equipment guidance.

4.3.4 Grounding System

Before the battery installation must make sure the grounding point of the basement is stable and reliable. If the battery system is installed in an independent equipment cabin (e.g. container), must make sure the grounding of the cabin is stable and reliable. The resistance of the grounding system must ≤100mΩ

4.3.5 Clearance

Minimum clearance to heat source is more than 2 meters.
Minimum clearance to battery module(rack) is more than 0.5 meters.

4.4 Handling and Placement

Warning: The battery pile's power terminals are high voltage DC. it must be installed in a restricted access area;

Warning: The system is a high voltage DC system, operated by qualified and authorized personnel only.

4.4.1 Handling and placement of the battery module

A single battery module weighs 85-120kg and must be moved with the aid of a carrying tool or by more than 4 people.

4.4.2 Handling and placement of the base

The base is not too heavy and can be carried by one person.

4.4.3 Selection of installation sites

A. The system working temperature range: 0℃~50℃; Optimum temperature. 18℃~ 28℃, Do not place the battery system in direct sun light. it is suggested to build sunshade equipment. in cold area the heating system is required.

B. The system must not be immersed in water. Cannot be placed the battery base in rain or other water sources. As a suggestion, the base's height shall >300mm above the ground.

C. The base's weight capacity should support the weight of whole battery system (340~800kg).

D. The system bust be installed on fixed ground

4.5 Packing List (Supporting Materials)

①

Material Name	Cables in Series Between Batteries				
Number of Battery Modules	3	4	5	6	7
Specifications	6AWG ≈20cm	6AWG ≈20cm	6AWG ≈20cm	6AWG ≈20cm	6AWG ≈20cm
Quantity	2 pcs	3 pcs	4 pcs	5 pcs	6 pcs

②

Material Name	Battery Main B+ to Control Box B+ Cable				
Number of Battery Modules	3	4	5	6	7
Specifications	6AWG ≈28cm	6AWG ≈28cm	6AWG ≈28cm	6AWG ≈28cm	6AWG ≈28cm
Quantity	1 pc	1 pc	1 pc	1 pc	1 pc

③

Material Name	Battery Main B- to Control Box B- Cable				
Number of Battery Modules	3	4	5	6	7
Specifications	6AWG ≈60cm	6AWG ≈80cm	6AWG ≈100cm	6AWG ≈120cm	6AWG ≈140cm
Quantity	1 pc	1 pc	1 pc	1 pc	1 pc

④

Material Name	Control Box Link Port Out to Battery Link Port In Line				
Number of Battery Modules	3	4	5	6	7
Specifications	9pin ≈25cm	9pin ≈25cm	9pin ≈25cm	9pin ≈25cm	9pin ≈25cm
Quantity	1 pc	1 pc	1 pc	1 pc	1 pc

⑤

Material Name	Battery and Battery Cascade Communication Line				
Number of Battery Modules	3	4	5	6	7
Specifications	6AWG ≈20cm	6AWG ≈20cm	6AWG ≈20cm	6AWG ≈20cm	6AWG ≈20cm
Quantity	2 pcs	3 pcs	4 pcs	5 pcs	6 pcs

⑥

⑦

Material Name	System and PCS Communication Line & CAN Resistor				
Number of Battery Modules	3	4	5	6	7
Specifications	8pin→RJ45 Communication Line : ≈200cm CAN Resistor : 120Ω				
Quantity	Each 1pc				

⑧

Material Name	Battery and Battery Ground Connection Wire				
Number of Battery Modules	3	4	5	6	7
Specifications	1.5mm² ≈30cm	1.5mm² ≈30cm	1.5mm² ≈30cm	1.5mm² ≈30cm	1.5mm² ≈30cm
Quantity	2 pcs	3 pcs	4 pcs	5 pcs	6 pcs

⑨

⑩

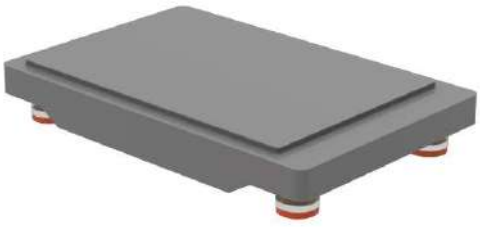
Material Name	Battery to Control Box & Control Box to Ground Wire				
Number of Battery Modules	3	4	5	6	7
Specifications	Battery to Control Box Ground Wire: 1.5mm²/≈50cm Control Box to Ground Wire: 1.5mm²/≈150cm				
Quantity	Each 1pc				

⑪  ⑫ 

Material Name	P+ Output Cable Plug & P- Output Cable Plug				
Number of Battery Modules	3	4	5	6	7
Specifications	GRD006F-25-RD GRD006F-25-BK				
Quantity	Each 1pc				

Material Name	High Voltage Controller Box (BCU)				
Number of Battery Modules	3	4	5	6	7
Specifications	According to the system matching, each system must be equipped with a high-voltage controller box				
Quantity	1pc				

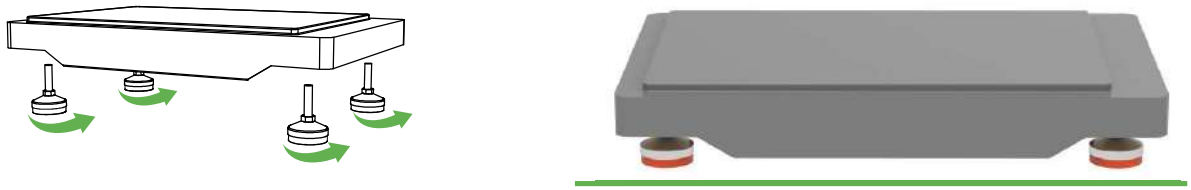
Material Name	High Voltage Battery (HV32-10 / HV32-15)				
Number of Battery Modules	3	4	5	6	7
Specifications	307.2V System	409.6V System	512V System	614.4V System	716.8V System
Quantity	3	4	5	6	7



Material Name	Base				
Number of Battery Modules	3	4	5	6	7
Specifications	4xD80-M12 foot cup load bearing base / ≤1000Kg				
Quantity	1pc				

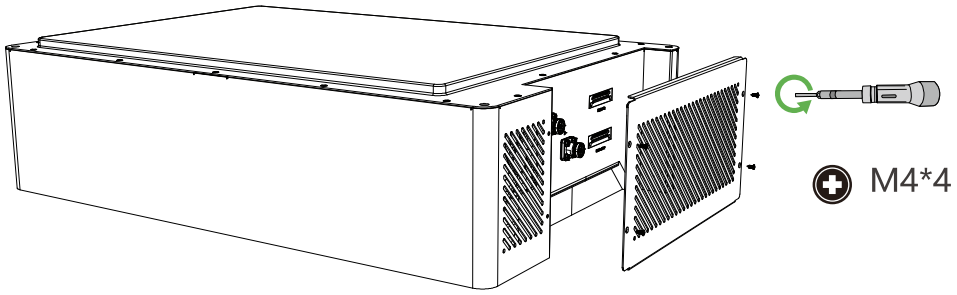
4.6 Preparation Before Installation

4.6.1 Unpack the package, take out the base, and place it on a flat surface against a wall.Adjust the 4 feet of the base to ensure that the base is stable and does not shake.



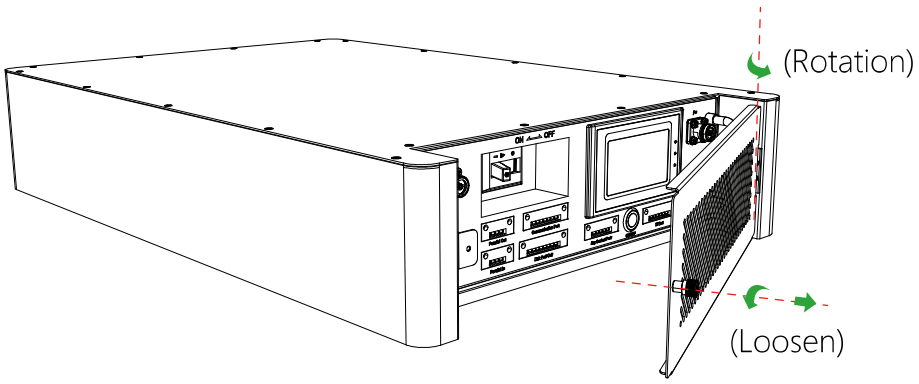
(Adjust until the base is stable)

4.6.2 Unpack the battery module, take out the module, and remove the battery protection cover with an M4 cross screwdriver.



(Remove the battery cover)

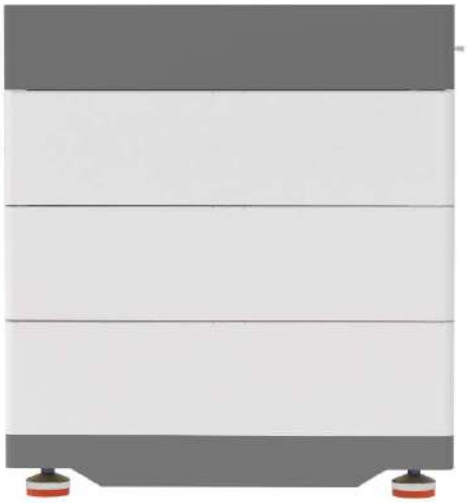
4.6.3 Similarly, open the high-voltage control box package, take out the high-voltage control box, unscrew the captive screws on the right side of the protective cover, and then proceed with panel installation, wiring, and operation.



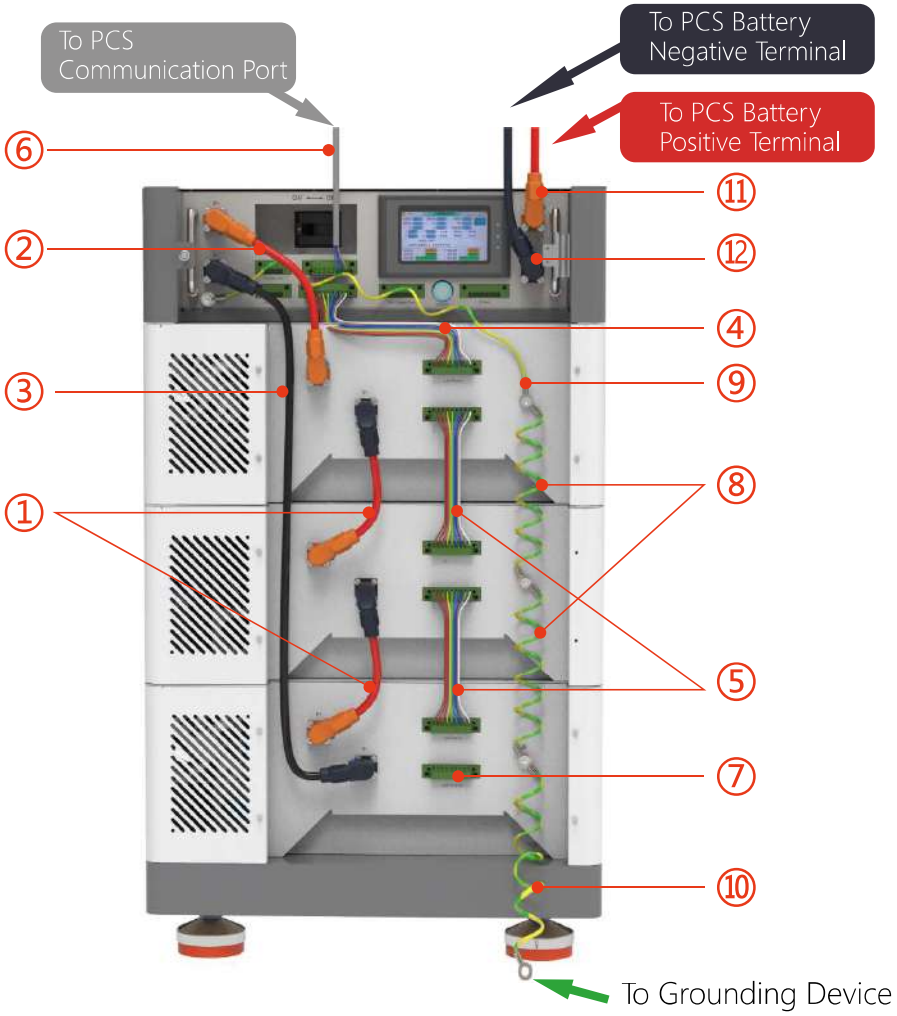
(Open the protective cover of the high voltage controller box)

4.7 Installation and Wiring

4.7.1 Wiring diagram of three battery modules



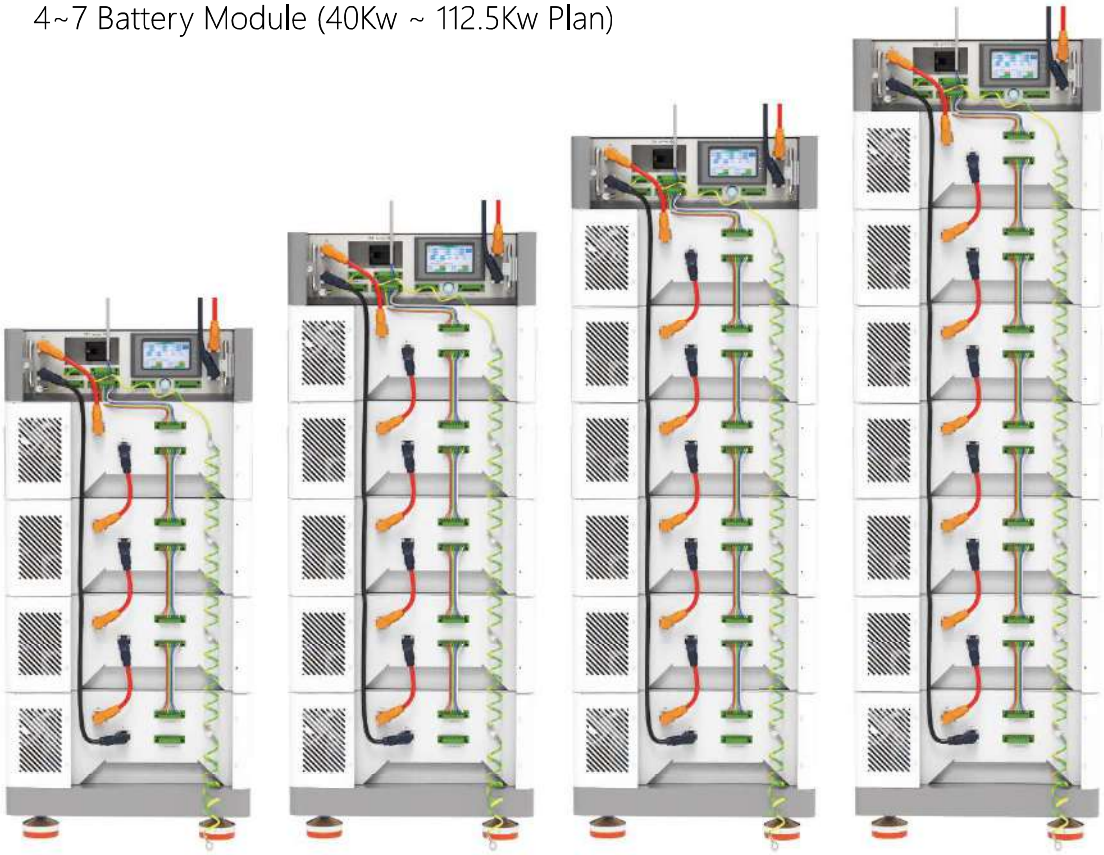
Stack the battery base → battery module → high-voltage controller box stably as shown in the figure.



(Please check the corresponding numbers in (4.5 Packing List) for wiring.)

4.7.2 More Battery Module Wiring Diagrams

4~7 Battery Module (40Kw ~ 112.5Kw Plan)



More Battery Module Wiring Diagrams

(Please refer to the wiring sequence of 3 modules and add battery packs to extend the connection.)

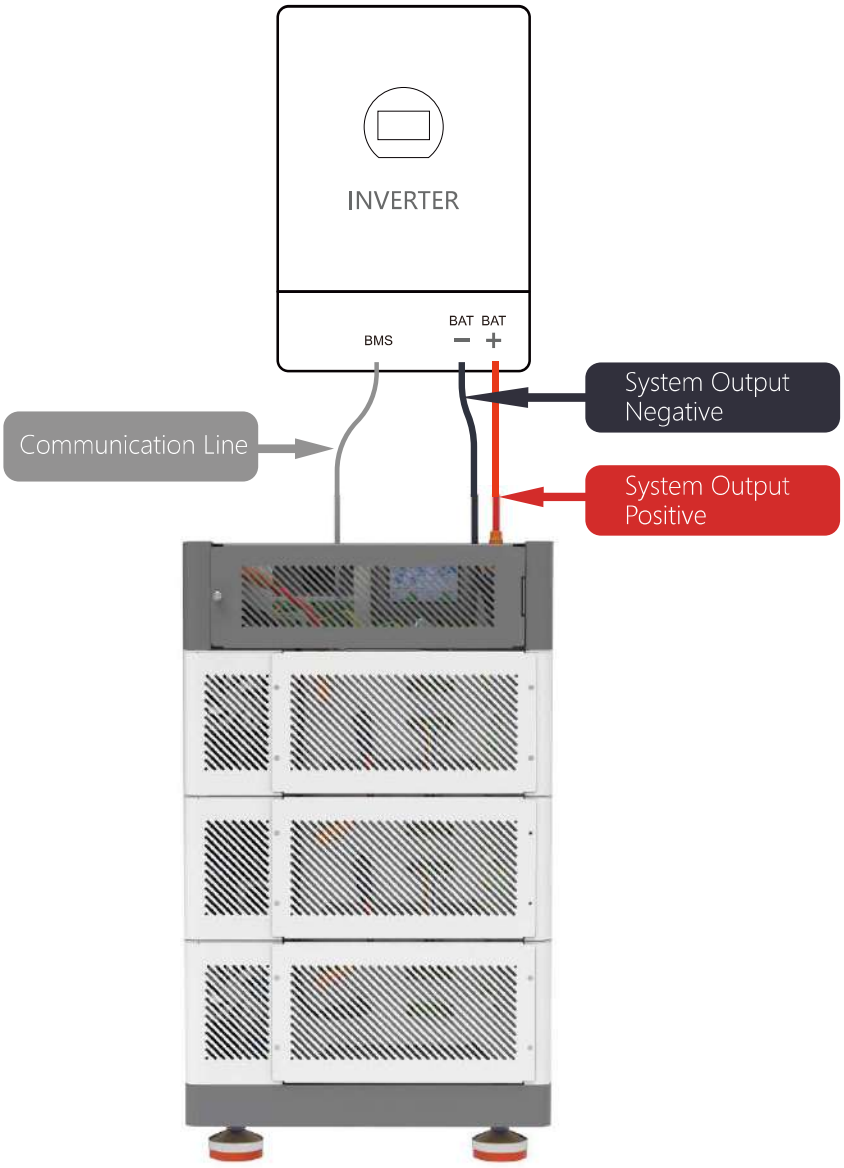
⚠ DANGER(DANGER)

* This system is a DC high voltage system. Please install the battery protection cover and high voltage control box protection cover in time after installation to avoid danger caused by contact.

NOTICE!(AVIS)

- The high-voltage system is an integrated supporting product. We will do the corresponding matching and debugging before shipment. In order to ensure the smooth operation of the entire system, it is not allowed to increase or reduce module operations without permission.
- The high-voltage system supports a maximum of 7 battery modules in series, with a maximum voltage of less than 800Vdc
- Ensure that the usable energy of each battery system is the same.
- Each system is equipped with a terminal resistor (see accessory No. ⑦), and the entire system must install this accessory on the "Link Port Out" port of the last battery module.
- The system has reserved ports for cluster parallel operation. If you need to perform cluster parallel operation, please contact the dealer or manufacturer and we will provide more professional technical support.

4.8 Connect to Inverter or PCS



DANGER(DANGER)

* When connecting the inverter/PCS or other loads, please turn off the switch of the high-voltage system before connecting the cables.

NOTICE!(AVIS)

· The system supports CAN/RS485 communication. If it cannot communicate with the inverter you are using, please contact the dealer or manufacturer and provide the corresponding communication protocol of the inverter. We can add it to the system.

5. System Operation

5.1 Check Before Power ON

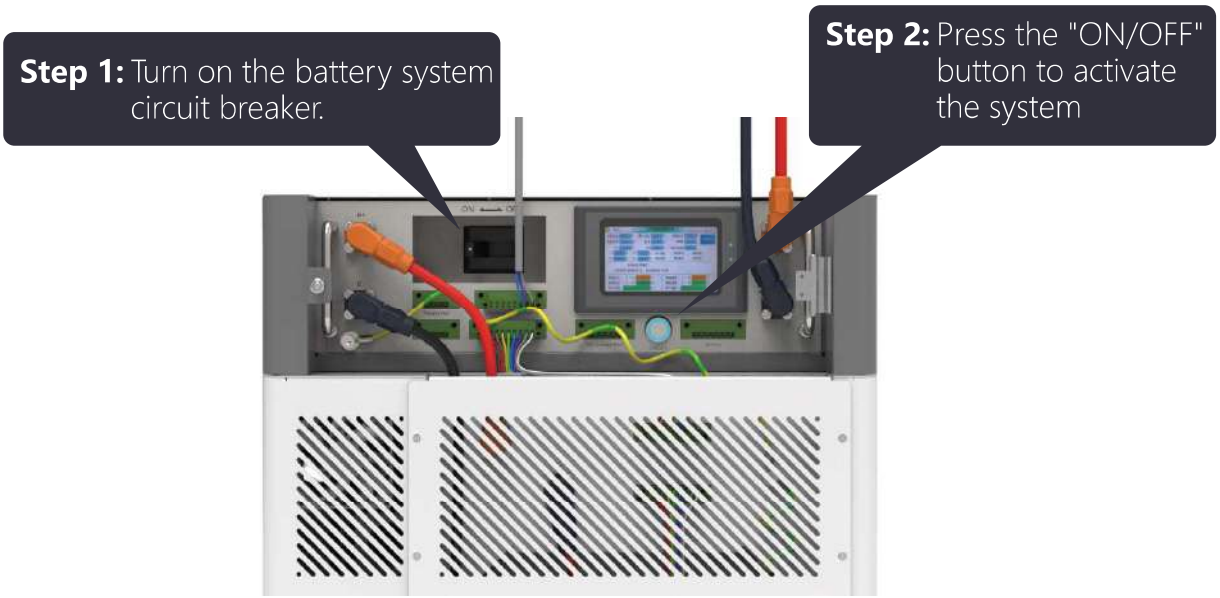
Check the following items before power on to avoid the battery system being damaged.

NO.	Check Item
1	The equipment is firmly installed in a clean place where is well-ventilated and easy to operate.
2	The PE cable, power cable, communication cable, and terminal resistor are connected correctly and securely.
3	Cable ties are intact, routed properly and evenly.
4	Unused ports and terminals are sealed.

5.2 **Power ON the Battery System**

NOTICE!(AVIS)

- Install the circuit breaker between the inverter and the battery and the circuit breaker between the two battery systems in compliance with local laws and requlations.
- Strictly follow the power on requirements to avoid damaging the system.
- To ensure effective protection, the battery system cover should remain closed.
- If the high voltage control box is not operated, secure the cover with screws.



NOTICE!(AVIS)

- After waiting for the system computer (industrial control screen) to start up, you can view the parameter information and operation status of the entire system.
- At this point, the entire system is running

6. Maintenance

6.1 Power OFF the Battery System

DANGER(DANGER)

INSTRUCTIONS PERTAINING TO A RISK OF FIRE OR ELECTRIC SHOCK

* Power off the battery system before operations and maintenance. Otherwise, the equipment may be damaged or electric shocks may occur.
* Push the air switch to restart the battery.

Follow the steps below to power off the battery system to prevent the system from being damaged.

Method One:

Step 1: Turn off the inverter in the system following the instructions in the user manual of the inverter.

Step 2: Press and hold the ON/OFF button for more than 15 seconds, the industrial control screen and indicator light will go out, and the system will be shut down.

Method Two:

Step 1: Turn off the inverter in the system following the instructions in the user manual of the inverter.

Step 2: Directly turn off the circuit breaker of the high-voltage control box, and the industrial control screen and indicator light will go out, which means the system is shut down.

6.2 Routine Maintenance

WARNING(AVERTISSEMENT)

* Contact the after-sales service for help if you find any problems that may influence the battery or the hybrid inverter. Disassemble without permission is strictly forbidden.
* Contact after-sale service for help if the copper conductor is exposed, Do not touch or disassemble privately because the high voltage danger exists.
* In case of other emergencies, contact the after-sales service as soon as possible. Operate following the instructions or wait for the after-sales service personnel.