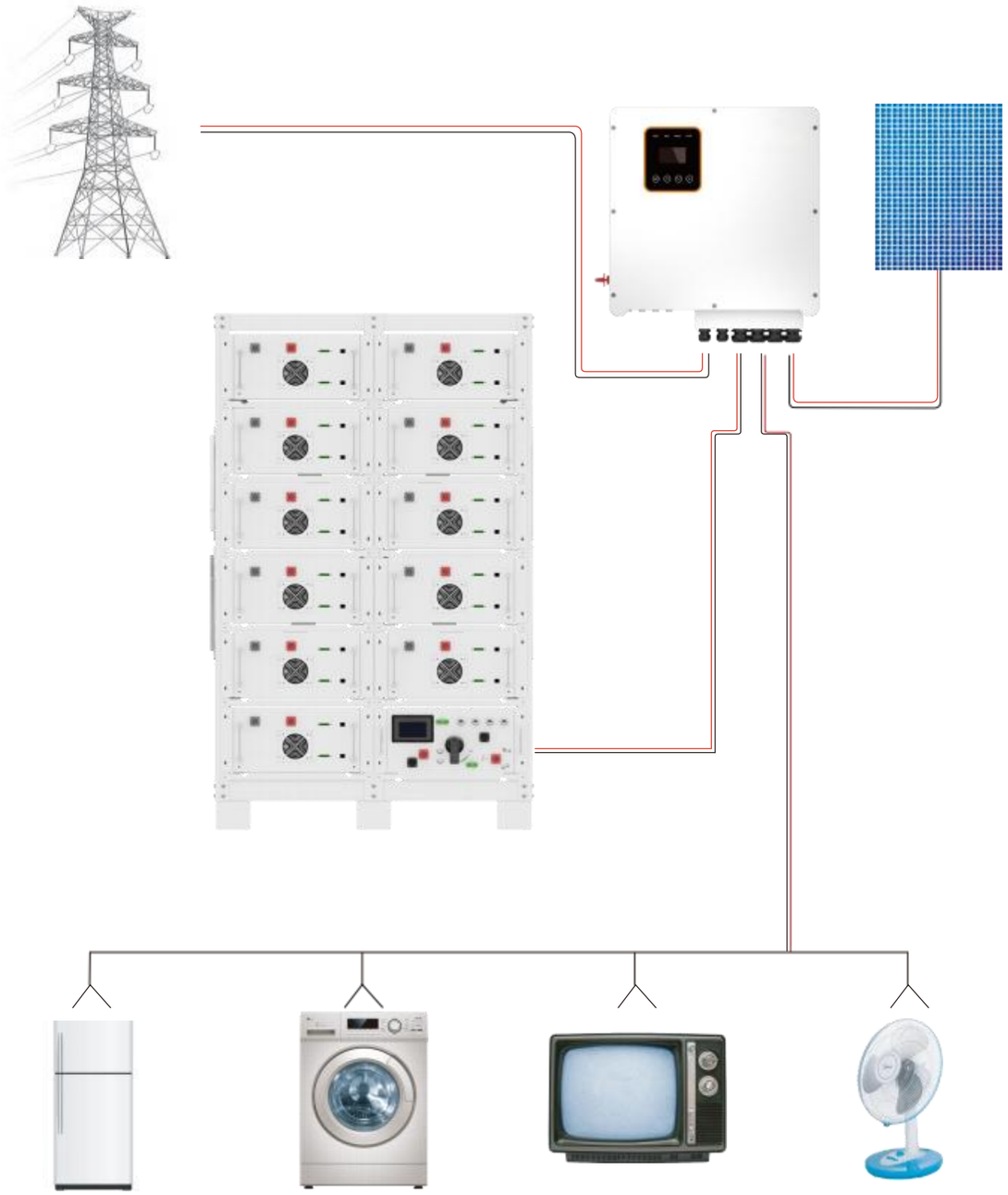


High-voltage Energy Storage Batteries

User manual

Important safety instructions

Please keep this manual for future reference
This manual contains all safety, installation and operating instructions for the High voltage energy storage batteries.
Please read all instructions and precautions in the manual carefully before installation and use.

Contents

1. Instructions for use

Thank you very much for choosing the high voltage energy storage system series developed and produced by our company. Please read and understand all contents of this manual carefully before installing and using the product. If you have any suggestions during use, please feel free to give us feedback.

1.1 Usage Guidelines

This installation and operation manual is intended for modular battery energy storage systems. Please read this installation and operation manual carefully to ensure the reliable installation, commissioning and maintenance of the equipment. Installation, commissioning, and maintenance must be carried out by qualified authorized personnel. Keep this installation and operation manual and other applicable documents near the battery storage system so that all personnel involved in installation or maintenance can refer to this installation and operation manual at any time.

This installation and operation manual is only available in countries that meet certification requirements. Please comply with applicable local laws, regulations and standards. The standards and legal provisions of other countries may not be consistent with the provisions and norms of this manual. In this case, please contact our after sales.

1.2 Instructions for system composition

Components	Quantity	Specifications
6U battery module	11	51.2V 200/280Ah
PDU	1	200V-1000V/200A
Cabinet	1	1101×811×1800mm

1.3 General safety information

1. Improper use can result in death. The operator of the device must read this manual and follow all safety information.
2. The operator of this equipment must follow the specifications in this manual.
3. This manual cannot describe all possible situations. Therefore, always give priority to applicable standards and relevant occupational health and safety (OH&S) regulations.
4. In addition, installation may involve safety hazards if:

Installation is not correct.

Installation by someone who has not received relevant training or instruction.

Failure to follow the warnings and safety information in this manual.

Danger! Failure to follow safety messages can lead to life-threatening situations.

1.4 Disclaimer

No liability for personal injury, property damage, product damage, or subsequent loss is accepted under the following circumstances.

1. Failure to comply with the provisions of this manual.
2. Improper use of this product.
3. Unauthorized or unqualified personnel repair the product, remove the frame and perform other operations.
4. Use of unapproved spare parts.
5. Unauthorized modifications or technical changes to the product.

1.5 Proper use

1. Battery energy storage systems can only be installed and operated indoors. The operating temperature ranges from -20°C to 65 °C, and the maximum humidity is 85%. The battery module should not be exposed to sunlight or placed directly next to a heat source.
3. When installing the battery storage system, ensure that it is located on a sufficiently dry and flat surface, and has sufficient carrying capacity. The elevation of the installation site shall not exceed 2000 meters without the written approval of the manufacturer. The output power of the battery decreases with increasing altitude.
4. In areas where flooding is possible, care must be taken to ensure that the battery module is installed at the right height and to prevent contact with water.
5. The battery storage system must be installed in a fireproof room. The room must have no fire source, and must be equipped with independent fire prevention devices.
6. Following the specifications in this manual is also part of proper use. The use of this battery storage system is prohibited under the following circumstances:

① Mobile use on land or in the air (use on water only with the written consent of the manufacturer).
② For use in medical devices.
③ Used as a UPS system.
④ In other disputed cases, the manufacturer's written consent is required.

1.6 Operator requirements

All operation shall comply with applicable local regulations and standards. Installation of this system should only be done by electricians with the following qualifications:

1. Trained to deal with the hazards and risks associated with the installation and operation of electrical equipment, systems and batteries.
2. Trained in the installation and commissioning of electrical equipment.
3. Understand and comply with technical connection conditions, standards, guidelines, regulations and applicable laws.
4. Knowledge of handling lithium-ion batteries (transport, storage, disposal, hazardous sources).
5. Understand and comply with this document and other applicable documents.

2. Safety

2.1 Safety rules

In order to avoid property damage and personal injury, the following rules should be followed when working with dangerous live parts of lithium battery energy storage systems:

1. The device is working properly.
2 Make sure it doesn't restart.
3 Make sure there is no voltage.
4 Ensure ground protection and short circuit protection.
5. Cover or shield adjacent live parts.

2.2 Safety information

Be aware that damaged or short-circuited parts may cause electrocution and death hazards. Connecting battery terminals may cause a short circuit, which can cause current to flow. This type of short circuit must be avoided under all circumstances. Therefore, follow these instructions:

1. Use insulating tools and gloves.
2. Do not place any tools or metal parts on the battery pack module, high voltage PDU or inverter.
3. When operating the battery, be sure to remove the watch, ring and other metal objects.
4. Do not install or operate this system in explosive or high humidity areas.
5. When operating the energy storage system, first turn off the charge controller, then turn off the battery, and make sure the charge controller and battery do not turn on again. Improper use of battery energy storage systems can result in death. Use of battery energy storage systems beyond their intended use is not allowed, as this may pose significant risks. Improper operation of battery energy storage systems can result in life-threatening risks, serious injury or even death.

Attention! Warning! Improper use may damage the battery unit.

1. Do not expose the battery module to rain or immerse it in liquid.
2. Do not expose the battery module to corrosive environments such as ammonia and salt.
3. The battery energy storage system should be debugged within three months after delivery.

3. Transportation

3.1 Regulations for battery pack transportation

Must comply with the relevant laws and regulations of the corresponding country on the transportation of lithium ion batteries on the road.

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

Dangerous goods transport vehicles shall comply with the relevant regulations for road transport and be equipped with two tested carbon dioxide fire extinguishers.

It is forbidden for freight forwarders to open the outer packaging of battery modules. Only use approved lifting equipment to move the battery tank system. Use only the lifting lugs at the top of the battery cabinet as connection points. When lifting, the sling must be at an Angle of at least 60°.

Improper vehicle transport can cause personal injury. Improper transportation or improper transportation locking can cause the load to slip or overturn, which can result in injury. The battery pack should be placed vertically to prevent it from sliding inside the vehicle and secured with a holding strap.

Tilting the battery holder can cause personal injury. Battery holders can weigh up to 1500kg maximum. When tilted, they can tip over, causing personal injury and damage. Make sure that the battery holder is on a stable surface and that it will not tilt due to load.

Battery storage systems can be damaged if not transported properly. Battery modules can only be transported vertically. Be aware that these parts can be top-heavy. Failure to follow this instruction may result in damage to the part.

The battery storage cabinet installed with the battery module may be damaged during shipping. Battery storage cabinet are not designed to be shipped with an already installed battery module. Make sure the battery module, PDU, inverter, and battery cabinet are shipped separately. Do not move the battery holder or use lifting equipment to lift the battery holder after installing the battery module.

If possible, do not remove the shipping packaging until you arrive at the installation site. Check the shipping packaging for damage before removing the shipping protector. Otherwise, shipping damage cannot be ruled out.

Improper transportation of battery modules may result in personal injury. A Cell battery module can weigh up to 120kg. If it falls or slips, it could cause personal injury and possibly damage the battery module. Proper transport and lifting equipment must be used to ensure safe transport.

Wear safety shoes, and when transporting battery cabinet and battery modules, the parts may be crushed due to excessive weight. Therefore, all personnel involved in the transport must wear safety shoes with toe tips. Follow the safety regulations for the end customer's on-site transportation, especially during loading and unloading.

There is an increased risk of injury during transportation and installation of unpacked battery storage cabinets, especially on sharp metal plates. For this reason, protective gloves must be worn by all those involved in the transportation and installation.

The components of the energy storage system are heavy. We recommend having at least 2-3 people together to install the battery holder. Lifting gear helps with heavy parts, while pulleys or carts help with lighter parts. Be careful not to damage the box. The number of stacked battery modules should not be too heavy.

3.2 Moving the battery modules

The battery module can only be laid flat. Be aware that battery holders can be top-heavy.

4. Tools preparation

4.1 Necessary Installation Tools

 Multimeter + Current clamp	 Insulated Screwdriver Set	 Insulated Allen Key Set from 2 mm to 8 mm	 Drill+Hammer
 Electrician Scissors	 Insulated Torque Wrench Set	 Lifting Strap + Mechanical Lifter	 RS485/CAN/USB +Screw Terminal (insulated)

4.2 Personal Protective Equipment +1000 Vdc Insulated Tools






Auxiliary tools and materials

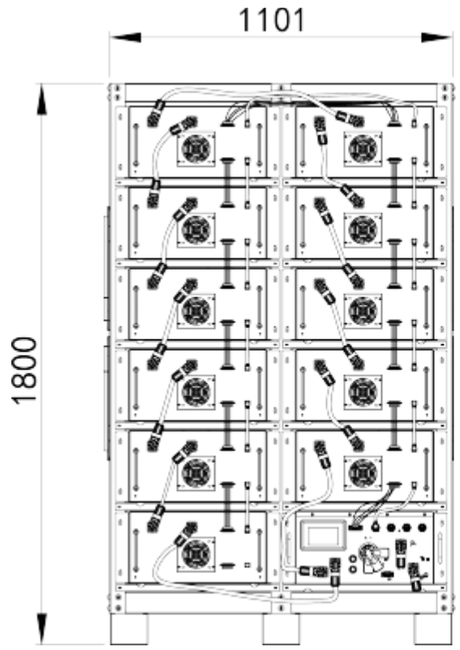
Tools	Effect
Cross screwdriver	Caulk plate secure
10mm hex socket	Secure the expansion screws
6mm hex wrench	M6*14 hex head screws
Materials	**Action**
Fastening material (M6*14 hex socket screws,M4X12 cross countersunk head screws)	1. Assemble the battery holder and attach it to the wall or connect two battery holders. 2. Assemble the battery module, high voltage PDU and fix it to the cabinet. 3. The curtain plate is fixed.

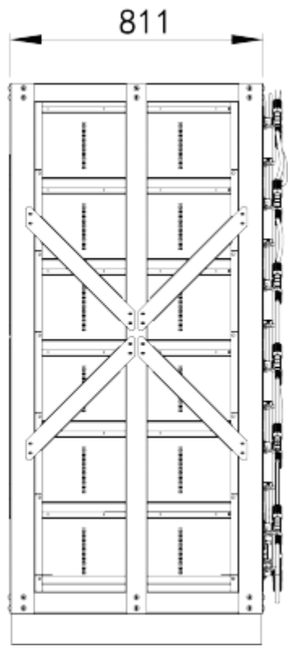
5. Installation precautions

Warnings! Electrostatic overload may cause damage to equipment

1. The total weight of the Lithium iron phosphate battery system can be up to 1500 kg. Make sure the installation site has sufficient carrying capacity.
2. When selecting the installation location, transport routes and necessary site cleaning should be considered.

5.1 Battery energy storage system instructions





The energy storage system is a high-voltage lithium-ion battery system. It provides a reliable backup power for supermarkets, banks, schools, farms and small businesses to smooth load curves and achieve peak load transfer. It also improves the stability of the renewable energy system and promotes the application of renewable energy. It has the characteristics of high integration, good reliability, long cycle life, wide range and wide operating temperature range.

Modular design of battery energy storage system. The 200Ah battery module has an energy of 10.24kwh, and the 280Ah battery module has an energy of 14.33Kwh, supporting 11 battery modules in series with a total energy of 112.64kwh or 157.69Kwh respectively.

More capacity requirement, please contact supplier.

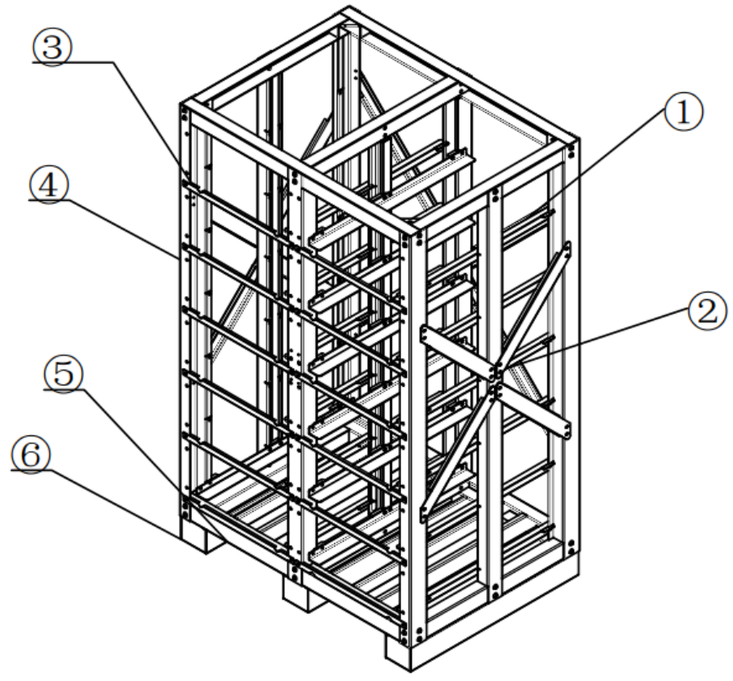
5.2 System Parameters

Model	HVM176S280BL-U	HVM176S200BL-U
Module presentation		
Energy Capacity	280Ah	200Ah
Standard Voltage	563.2V	563.2V
Rated energy	157.69kwh	112.64kwh
Product Dimensions	1101×811×1800mm	1101×811×1800mm
Net Weight	1400KG	1150kg
Standard Charge Current	56A	40A
Maximum discharge current	200A	200A

Operating temperature	**Altitude**	**Level of protection**
Charge: 0 ~ 55℃ Discharge: -15 ~ 65℃	≤2000m	IP20

5.3 Cabinet description

5.3.1 Cabinet parts description



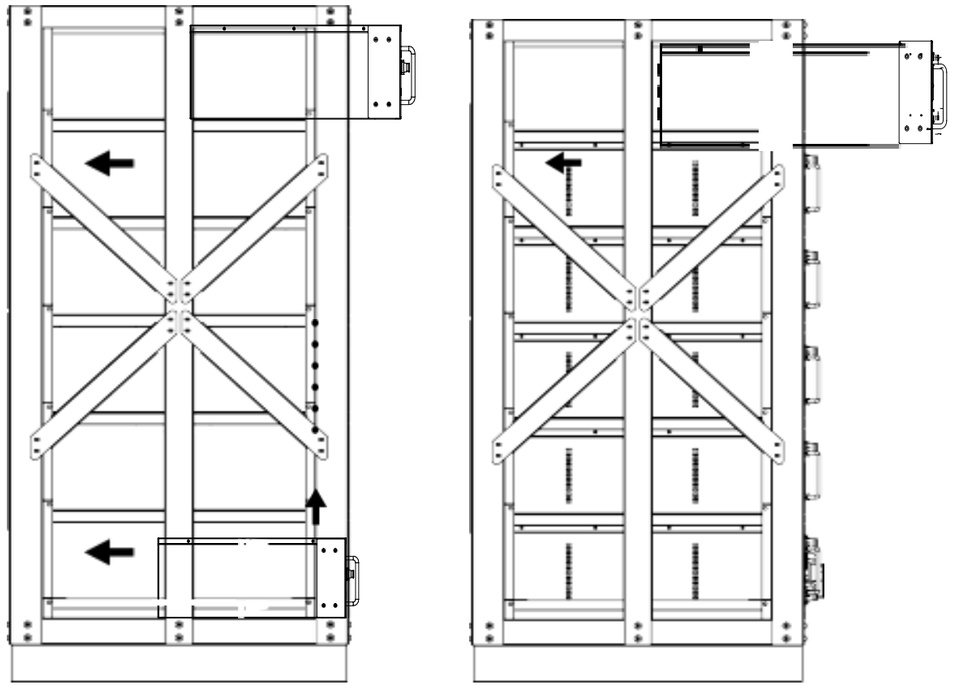
ID	**First name**	**Quantity**	**Notes**
1	Layer pallet	24	module is 120kg
2	Side stiffener	8	Increased frame stability
3	Seam board	10	
4	front post	6	
5	Left and right - long beam	8	
6	Bearing plate	1	

5.4 Installing the module to the cabine

Insufficient or no grounding can result in electric shock. Faulty, under-grounded, or ungrounded equipment can result in damage to the equipment and a life-threatening electric shock.

Note: Turn the manual switch on the high voltage PDU to the off position before installing the battery.

Insert the high voltage PDU into the first layer on the right. Then insert the battery modules from bottom to top. The second row on the left puts six modules from top to bottom. The last battery module is at the lowest level on the left side of the high voltage PDU.

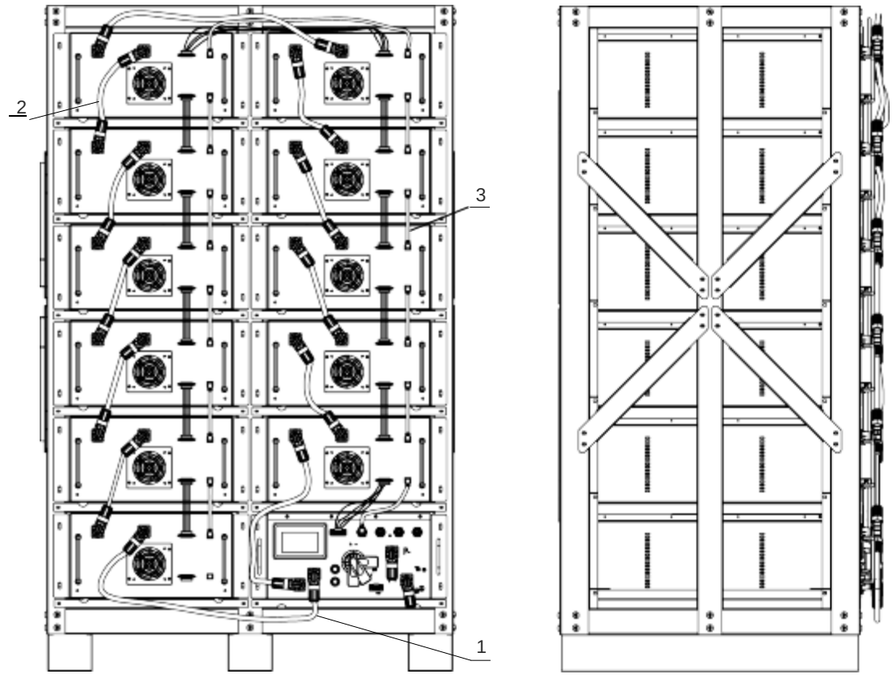


After inserting the battery module and high voltage PDU into the cabinet, secure the battery module and high voltage PDU to the rack using M6*14 outer hex combination screws.

5.5 Install the wiring harness

Wiring harness installation steps:

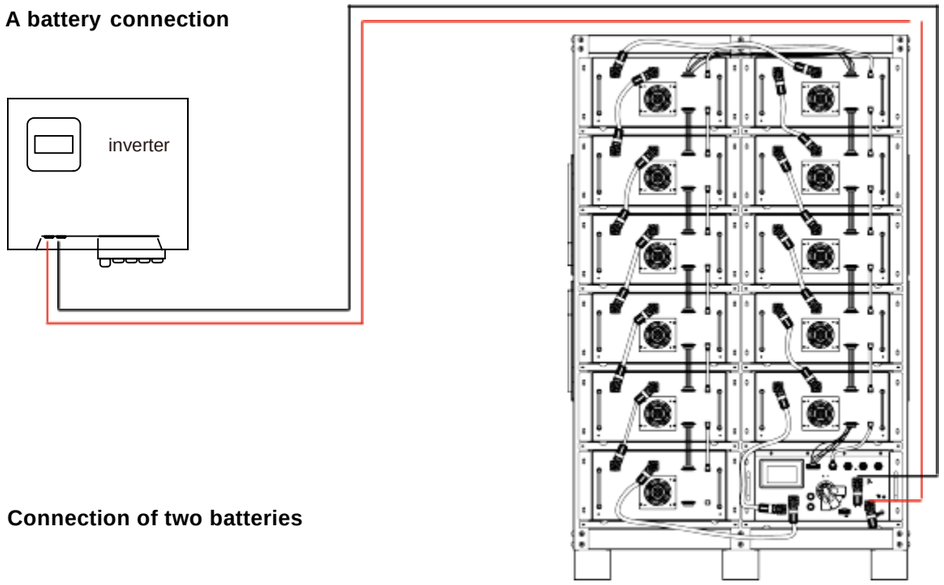
1. Complete the installation of the battery pack and the high-voltage control box and rack.
2. Install 11 “CAN communication harnesses” to the output and input communication ports of the battery pack and high-voltage control box in turn.
3. Connect 11 battery packs in series with wiring harnesses, and connect the battery packs and high-voltage control boxes in series in turn.
4. Connect the negative pole of the bottom battery pack to the negative pole of the control box with the B- wire harness,note that the wiring harness needs to be threaded from the back to the front.



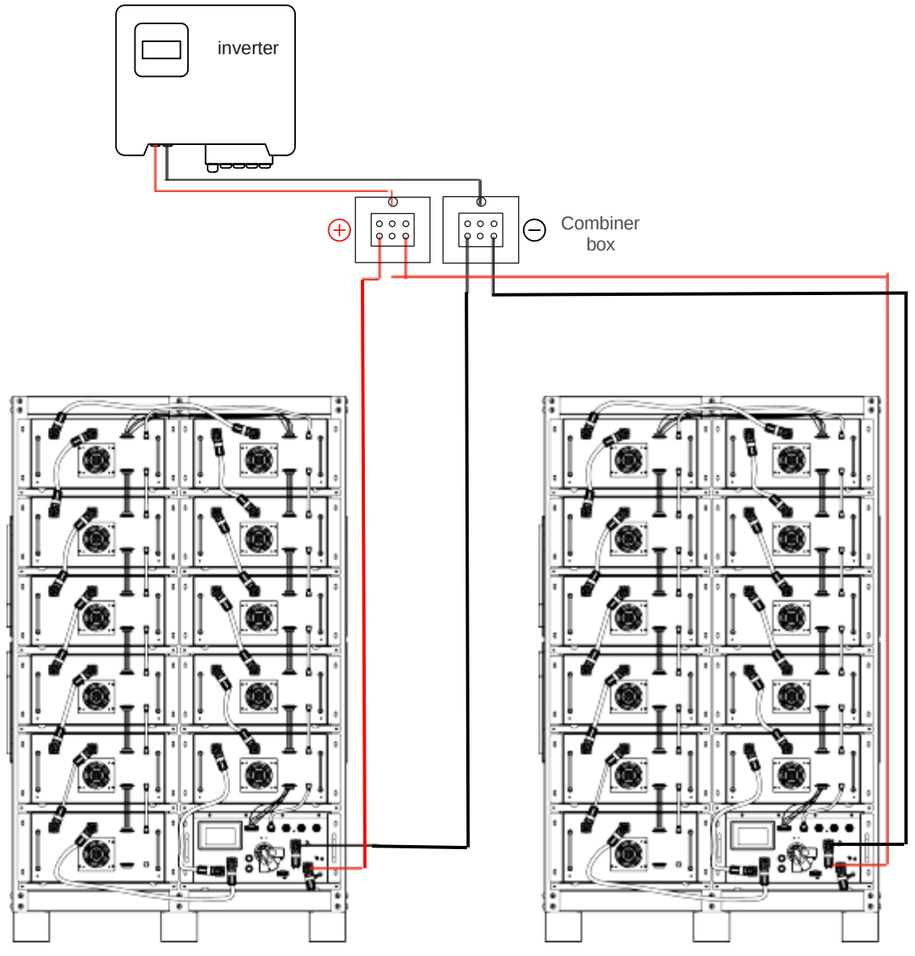
Serial Number	Name	Quantity
1	B- Harness	1
2	Battery series harness	11
3	CAN communication harness	11

5.6 Schematic diagram of the connection

A battery connection

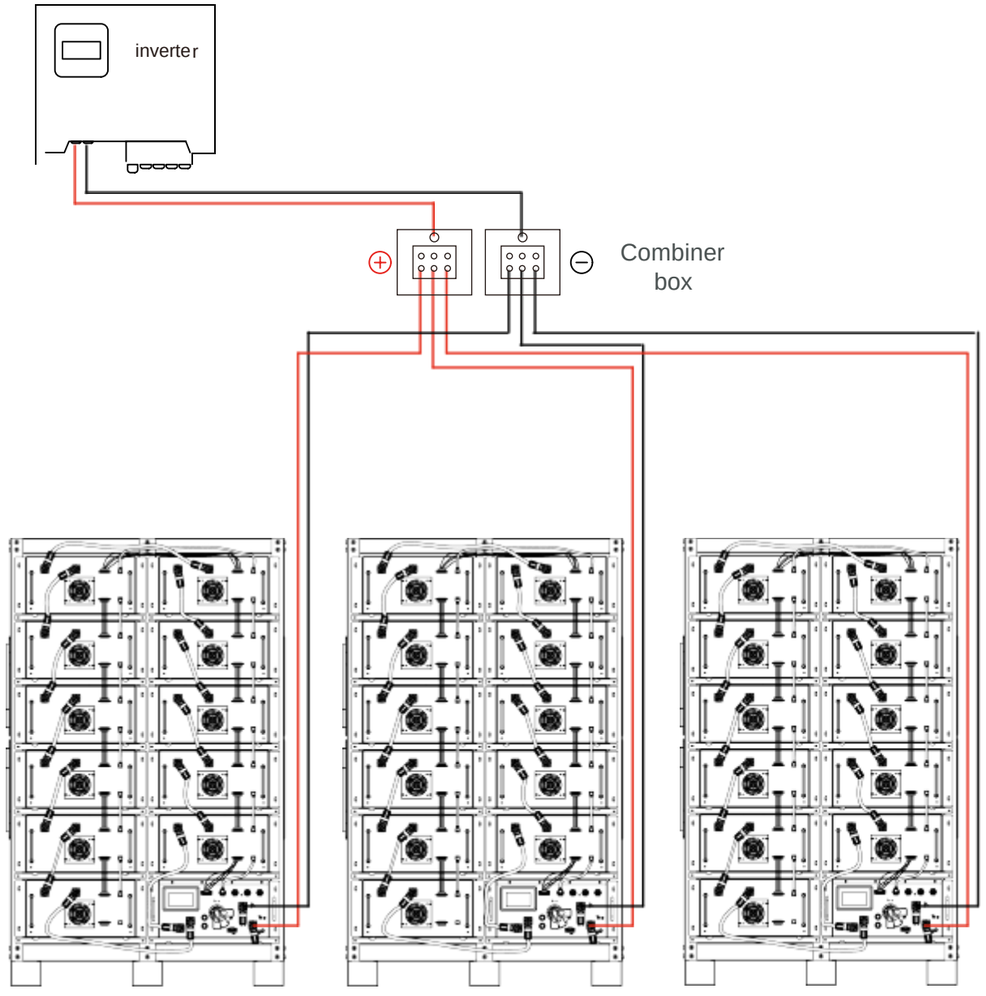


Connection of two batteries



Connection of three batteries

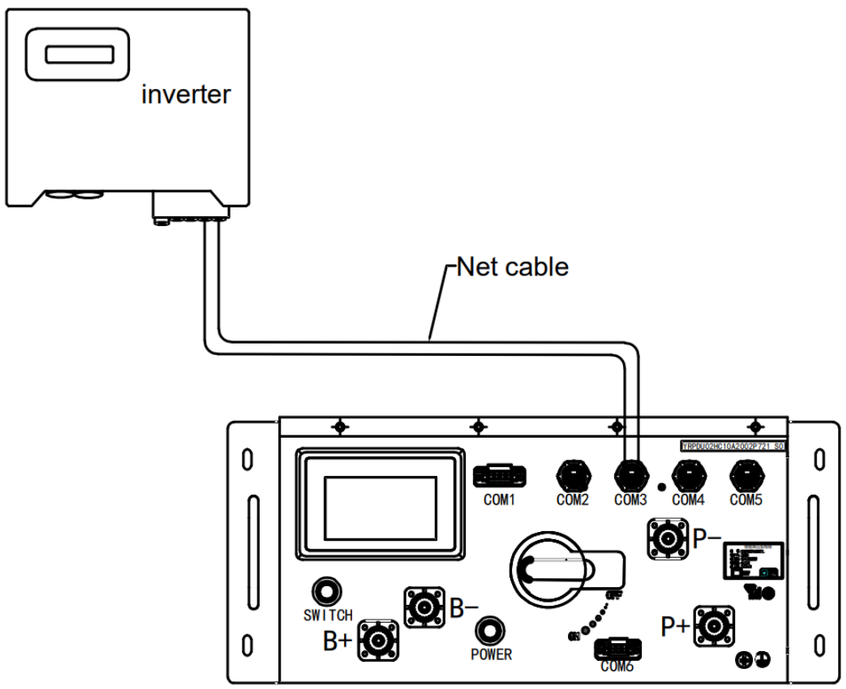
Note: Up to ten products can be connected at the same time.



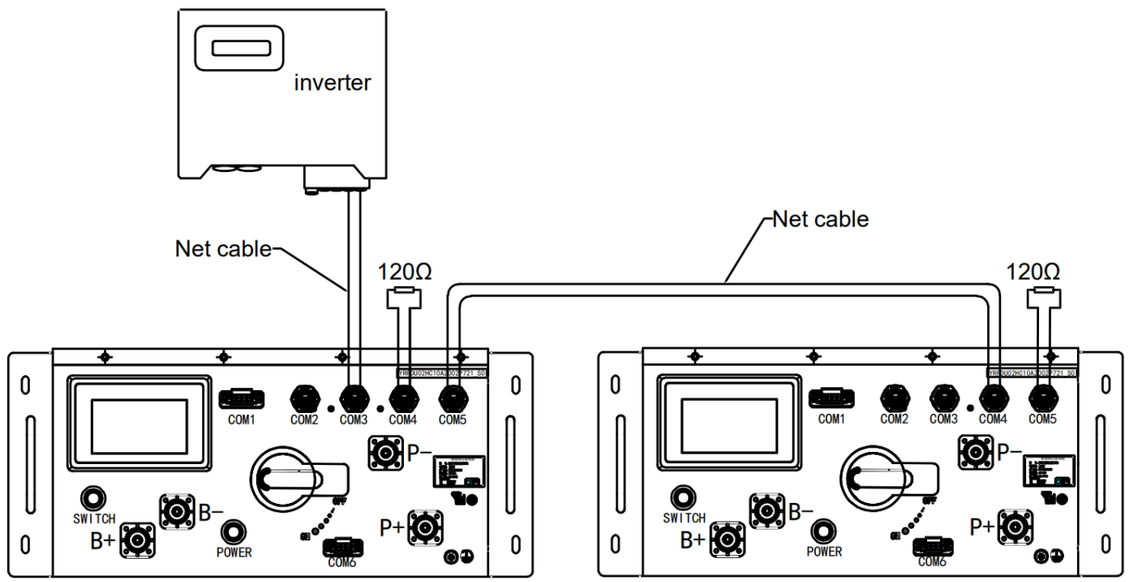
Note: When multiple clusters are connected in parallel, the connection method, wire diameter and length from the battery cluster to the combiner box should remain the same to ensure balanced current in each cluster

5.7 Schematic diagram of the communication connection

A battery BMS connection

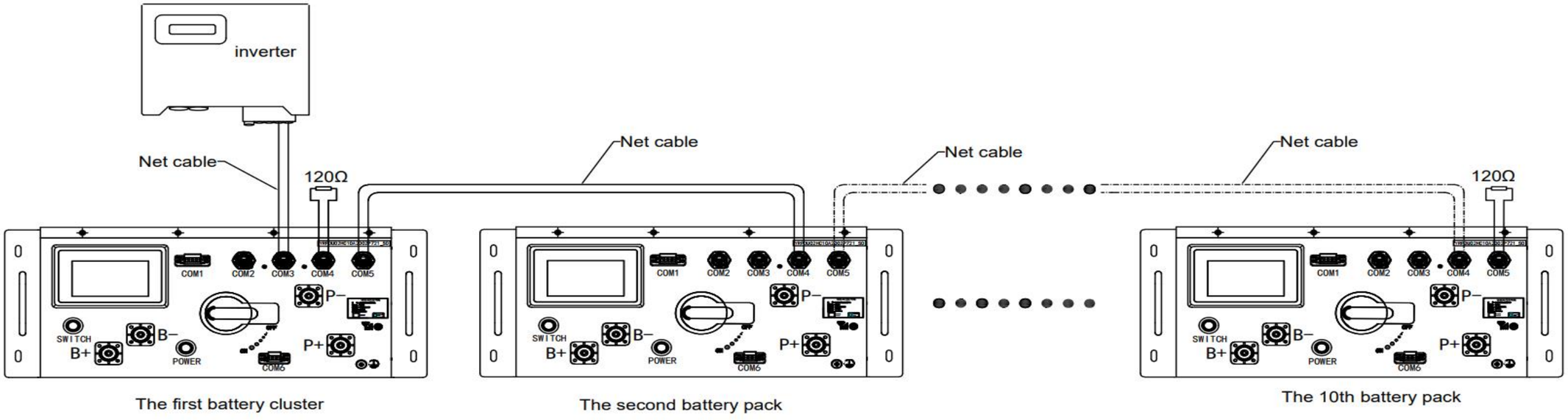


Connection of two battery BMS

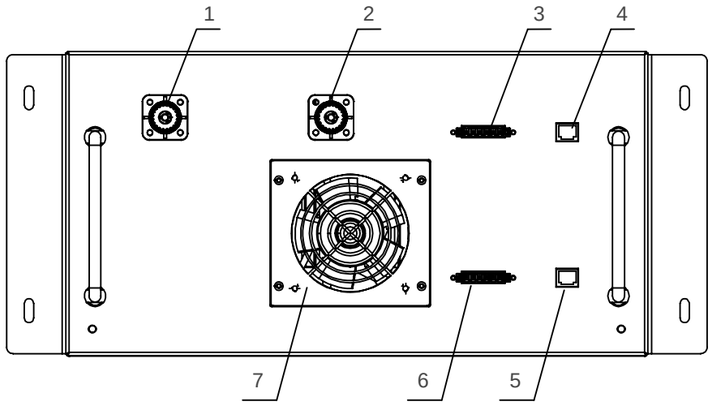


Connection of four battery BMS

Note: Up to 10 products can be connected at the same time



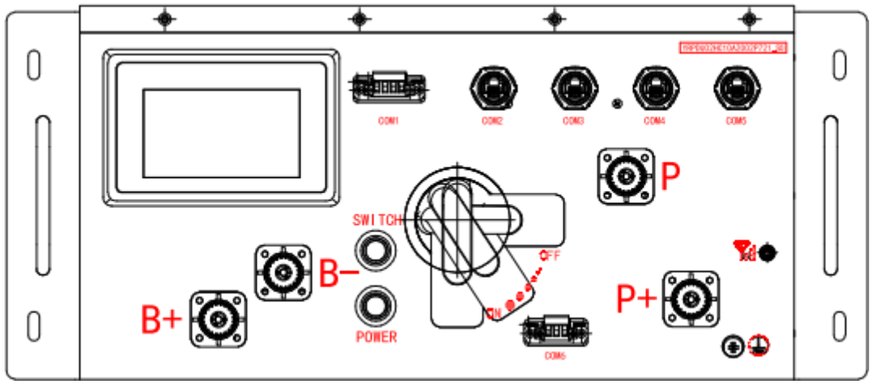
5.8 Battery module description



Description of battery module (SC16S100BL-UH) ports		
ID	**Name**	**Instructions**
1	B+	Battery pack positive (orange)
2	B-	Battery pack negative (black)
3	Fan power supply	Fan control power supply
4	Communication parallel output	Connection port for battery module communication and power output
5	Communication parallel input	Connection port for battery module communication and power input
6	Fan power supply	Fan control power supply
7	fan	Cooling unit

Battery module parameters			
ID	**item**	**Specifications/Parameters**	**remark**
1	Battery type	LiFePO4	
2	Rated voltage	51.2V	
3	Rated capacity	200/280Ah	0.2 C
4	energy	10.24/14.336Kwh	
5	Standard charge and discharge ratio	0.2C	
6	Maximum charge and discharge current	200A	
7	Class of protection	IP20	
8	Size (WxDxH)	780x440x230mm	
9	Battery weight	~112kg	

5.9 High-pressure main control box description



Main control box parameters			
ID	**item**	**Specifications/Parameters**	**remark**
1	Applicable platform	200～1000V	
2	Supply voltage	6～36V	
3	Power dissipation	run 200mA@12V	
		Power Off 100uA@12V	
4	Current detection accuracy	±0.5%FSR	
5	High pressure acquisition accuracy	±0.5% or 0.5V	
6	Insulation detection accuracy	±10% or 10KΩ	
7	SOC estimation accuracy	≤5%	
8	Class of protection	IP20	
9	Support protocols and standards	CCP/UDS/OBD-ii/GB/T3296	
10	Dimension(WxDxH)	510x440x230mm	
11	Main control box weight	~25kg	

Definition of High Voltage Power Input/Output Interface

interface definition	function declaratio	Note
BAT+	Battery cluster input positive end	Connect the positive end of the battery family with an M8 bolt
BAT-	Battery cluster input negative end	Connect the negative end of the battery cluster with M8 bolts
P+	Battery Positive input terminal	Connect the PCS front end with M8 bolts
P-	Battery negative input terminal	Connect the PCS negative end with M8 bolts

Port definition

ID	I/O	COM	definition	function declaration
1	I	COM1(4P)	FAN+	Fan Output: 24V+(6W rated)
2	/		FAN-	Fan Output: 24V- (6W rated)
3	I		FAN+	Fan Output: 24V+(6W rated)
4	/		FAN-	Fan Output: 24V- (6W rated)
1	I/O	COM2(8P)	SPI_L	Intranet daisy chain communication H
2	I/O		SIL_H	Intranet daisy chain communication L
3	I/O		NC	/
4	I/O		NC	/
5	I/O		NC	/
6	I/O		NC	/
7	I/O		NC	/
8	I/O		NC	/
1	I/O	COM6(3P)	N	N
2	I/O		PE	PE
3	I/O		L	L

1	I/O	COM3(8P)	PCS-485A	Local 485 communication
2	I/O		PCS-485B	Local 485 communication
3	I/O		PCS-485G	Local 485 communication ground
4	I/O		CAN0_H	Local CAN communication
5	I/O		CAN0_L	Local CAN communication
6	I/O		CAN1_G	Local CAN communication ground
7	I/O		CAN1_H	Local CAN communication
8	I/O		CAN1_L	Local CAN communication
1	I/O	COM4(8P)	RS485-A	Local 485 communication
2	I/O		RS485-B	Local 485 communication
3	I/O		CAN0_G	Local CAN communication ground
4	I/O		CAN0_H	Local CAN communication
5	I/O		CAN0_L	Local CAN communication
6	I/O		COM_DI	Local communication code input
7	I/O		GND	GND
8	I/O		GND	GND
1	I/O	COM5(8P)	RS485-A	Local 485 communication
2	I/O		RS485-B	Local 485 communication
3	I/O		CAN0_G	Local CAN communication ground
4	I/O		CAN0_H	Local CAN communication
5	I/O		CAN0_L	Local CAN communication
6	I/O		COM_DO	Local communication code output
7	I/O		GND	GND
8	I/O		GND	GND

5.10 Screen instructions

1. Main interface

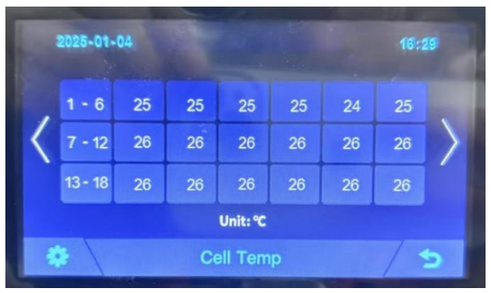
After power-on/hibernation activation, the main screen of the system will be displayed, as shown in the following figure:

2. Option page surface

If you need to change the home screen information, set the following parameters.

3. Temperature Info Page

When selecting the "Temperature Information" item, click to enter the "Battery Temperature Status" page, as shown below:



4. Battery voltage information page

When selecting "Cell Voltage", click to enter the "Battery Voltage status" page, as shown below:

5. Key description

1. Each page can be accessed by clicking "Next" or "Back to Previous Page" to operate the interface.
2. Click "Back to Home" to return to the main interface.
3. In the dormant state, touch anywhere on the screen to activate the display.

6. Sleep/Shutdown

For example, in 2 above, you can set the hibernation period of the display to 10 minutes, 30 minutes, 1 hour, and keep the screen on the options screen.

6. Maintain and upgrade

Note: All maintenance work should comply with applicable local regulations and standards.

6.1 System maintenance

All plug connections must be checked to ensure safe operation. If necessary, the relevant operator should press them back into place at least once a year.

The following inspections or maintenance must be performed annually.

1. Visual inspection in general .
2. Check all tight electrical connections and must re-tighten loose connections.
3. Use monitoring software to check the SOC, SOH, battery voltage and temperature of the battery module for abnormalities.
4. Shut down and restart the battery system once a year.

Note: If the system is installed in a contaminated environment, it must be maintained and cleaned for a short time. Clean the battery holder with a dry cloth to ensure that no moisture is in contact with the battery connection, and do not use solvents.

6.2 System upgrade

Please contact the manufacturer to provide the relevant upgrade documentation and complete the upgrade under their guidance.

7. Store of the batteries

1. In order to ensure the lifespan of the battery, the storage temperature should be maintained between 0 ° C ~35 ° C.
2. The battery should be cycled at least every 3-6 months.
3. In order to minimize self-discharge during storage for longtime, please disconnect the battery connection of the high voltage control box from the DC connection harness.

8. Disposal of waste batteries

Note: Comply with the relevant regulations of waste battery disposal. Stop using damaged batteries immediately. Contact your installer or sales partner before disposing of it. Make sure the battery is not exposed to moisture or direct sunlight.

1. Do not dispose of the battery as household waste! You have a legal obligation to return used and rechargeable batteries.
2. Used batteries may contain contaminants that, if stored or disposed of improperly, may do harm to the environment or health.
3. Batteries also contain iron, lithium and other important raw materials that can be recycled.

9. Maintenance and conservation

Item	Problem description	Description/ possible causes	Solution
1	The main control cannot be turned on.	1, the main control internal electrical circuit connection error; 2. The battery input is abnormal	1, check the button switch, DC power supply and MCU power supply line is normal; 2, check whether the battery voltage is normal;
2	The touch screen cannot access the main interface	The internal communication connection of the slave or master controller is incorrect	Check the sequence of the communication lines of the slave master and slave controller and the power supply of the slave controller
3	Turn it off about 1 minute after turning it on	Low voltage battery undervoltage protection	1. Check whether battery module BMU parameters are correctly set. 2. Whether the actual voltage of the battery module is normal; 3, whether the communication is normal;
4	The communication with the inverter fails	1. The physical connection is incorrect 2. Protocols do not match 3, the communication signal is interfered	1. Check the connection line according to the inverter communication pin definition; 2, select the inverter matching protocol; 3, eliminate interference sources around the communication line or do shielding treatment of the communication line;
5			

In order to maintain the best and long-term performance, the following items are recommended to be inspected twice a year.

1. Confirm that the surrounding air flow will not be blocked, and remove any dirts and debris on the cooling hole.
2. Check all exposed wires, shabby and damage, please place or repair them if necessary.
3. If it is not be used for a long time, it is recommended to charge it every three months.

Danger of electric shock! Make sure that the power supply has been disconnected during the above operations, and then carry out corresponding inspection and operation.

10. Product Warranty Record Card

Dear Users,

Hello! Thank you very much for purchasing our company's products, in order to better serve you, please read carefully, fill in and after purchasing the products Keep this warranty card to avoid your worries, the company hereby makes a warranty service commitment, and provides specifications accordingly After-sales service.

Exclusion of warranty liability:

1. Damage caused by man-made reasons or other natural disasters;
2. Failure caused by incorrect operation, installation or use in an environment other than the use specified by the product;
3. Damage caused by unauthorized disassembly and modification;

Contact: _____ Numbering: _____

Contact Number: _____ Fax: _____

Purchase Date: _____

Address: _____

Maintenance records			
Drop-in date	**Repair content**	**Maintenance people**	**Remark**