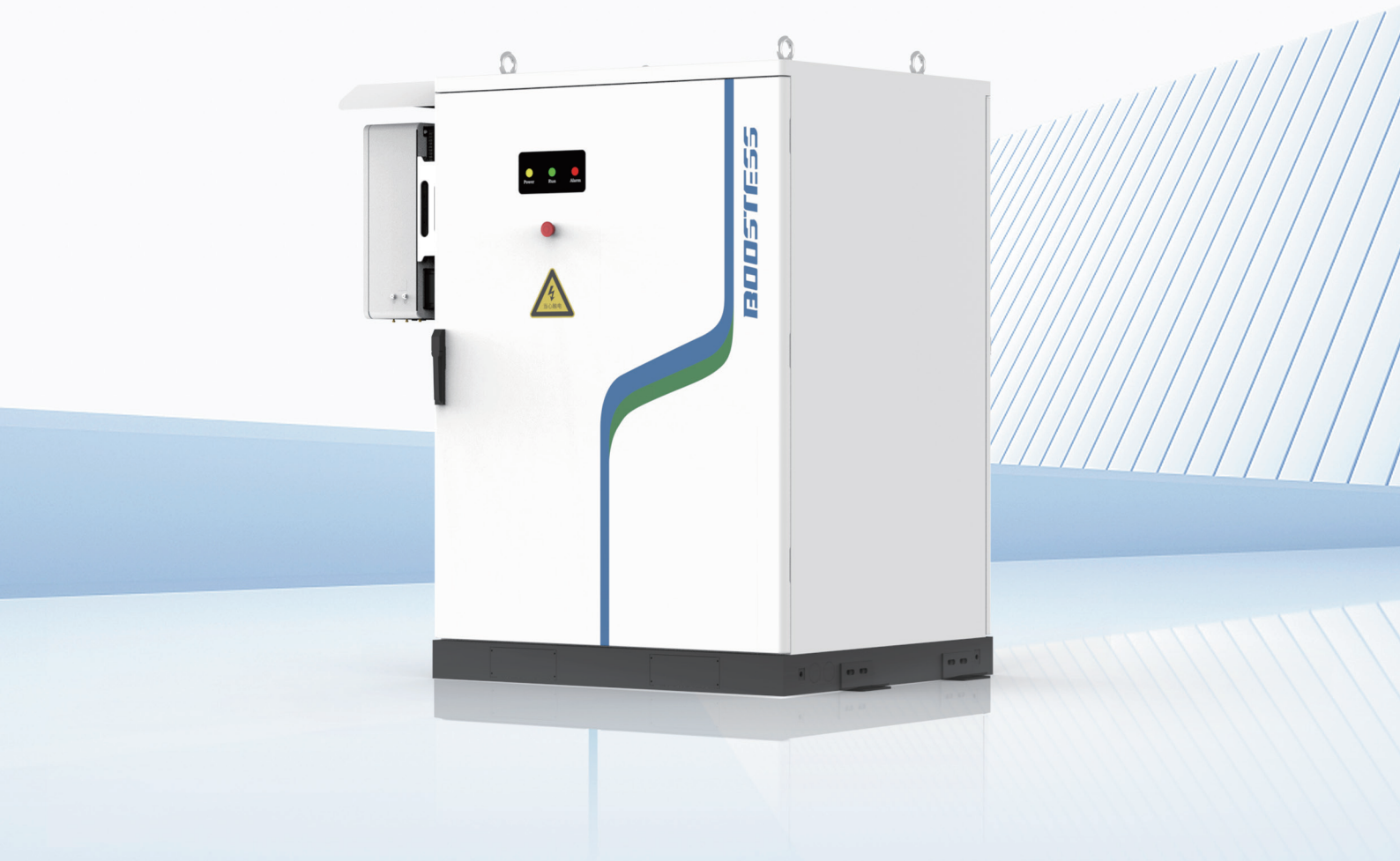
ENERGY CUBE

50kW / 100kWh



USER MANUAL

BOOSTESS

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1 Introduction

The user manual for this product will provide detailed product information and installation instructions for users of Zhejiang Boshi New Energy Technology Co., Ltd.'s Energy Cube Energy Storage 100kWh (1P112S) In the following text, "this manual" refers to the "Energy Cube Energy Storage System 100kWh (1P112S) User Manual," and "energy storage system" refers to the "Energy Cube Energy Storage System-100kWh (1P112S)." Please read this manual carefully before using this product.

This manual is intended for personnel involved in the installation, operation, maintenance, and other tasks related to the Energy Cube Energy Storage System. Readers are required to have a certain level of electrical, electrical wiring, and mechanical expertise. It is important to be familiar with the characteristics of electronic components and to have a thorough understanding of electrical and mechanical diagrams.

2 Safety Precautions

The Energy Cube Energy Storage System is designed and tested in strict accordance with relevant standards. Its installation, operation, and maintenance should comply with the safety regulations for power electronic equipment. Improper use or incorrect operation may endanger operators or on-site personnel and damage the energy storage system. To prevent such situations, the following safety precautions must be strictly followed during the operation and maintenance process。

2.1 Safety Identifier

To ensure personal and property safety while using this product, this manual utilizes the following safety and warning symbols. Please read them carefully。

Attention!	“Attention！ ”suggests potential risk，if unable to avoid it，equipment malfunction, property damage, or personal injury may be resulted！refully。
Description!	“Description！”Refers to the additional information to this user manual , as an emphasis or complement.
Warning!	“Warning！ ”suggests potential danger，if unable to avoid it,fatalities. And severe injuries may be caused.

Please pay attention to the danger warning identifier on the storage system cabinet .

Identifier Identifier Explanation ：

This symbol indicates that the energy storage system contains high voltage, and touching it may result in electric shock hazards.

Protective Earth Grounding Point.

2.2 Safety Warning

Warning!

There is a high voltage electric shock hazard inside the product!

a）When operating any action on the energy storage system, it is necessary to disconnect all internal switches to ensure that there is no current inside the energy storage system.

b）Ensure that the on-site electrical installation of the energy storage system complies with electrical installation standards. Proper grounding is required during the installation of the energy storage system.

c) All operations and wiring tasks must be carried out by personnel holding an electrical operator certificate.

2.3 Precautions

Attention!

a）Due to the high current involved in the operation of the energy storage system, it is important to ensure that all terminal blocks and bolts are securely tightened to ensure good contact.

b） Before operating the energy storage system, relevant personnel must carefully read and strictly comply with this provision!

c） During the installation, operation, and maintenance of the energy storage system, it is necessary to comply with relevant safety regulations and operating procedures. Failure to do so may result in personal injury or equipment damage.

d） It is strictly prohibited for personnel to wear items such as watches, bracelets, bangles, or rings that conduct electricity while performing operations.

Attention!

a） The warning labels on the energy storage system cabinet, both on the exterior and interior, contain important information for the safe operation of the energy storage system. It is strictly prohibited to intentionally tear or damage these labels.

b) During installation, routine maintenance, and repair operations of the energy storage system, clear identification should be placed near the secondary switch of the energy storage system to prevent accidental engagement of the switch, which may cause accidents.

c) After completing installation, routine maintenance, or repair operations, it is necessary to remove the cabinet door key and store it properly.

2.4 Escape route requirements

Attention!

To ensure that personnel can evacuate the site quickly in case of an accident, please adhere to the following requirements:

a) During the installation or any other operations involving the energy storage system, it is crucial to ensure that the escape routes are completely unobstructed.

b) It is strictly prohibited to store any objects or occupy the escape routes in any form.

2.5 Installation Requirements

Attention!

To ensure swift evacuation of personnel in the event of an emergency, please adhere to the following requirements:

a) During the installation or other related operations of the energy storage system, it is imperative to keep the escape routes completely unobstructed.

b) Prohibitions include storing miscellaneous items or any form of obstruction within the escape routes.

Attention!

To prevent the noise generated during the operation of the energy storage system and any potential emergencies from affecting residents' normal lives or causing safety accidents, the installation of the energy storage system should meet the following conditions:

a) The energy storage system should be located as far away from residential areas as possible. If necessary, appropriate soundproofing measures should be implemented.

b) It is strictly prohibited to store any combustible or flammable materials around the energy storage system.

c) The installation site for the energy storage system should meet the ventilation requirements of the equipment.

d) The installation ground should be dry, flat, free of standing water, capable of supporting the weight of the energy storage system, and level.

e) The installation location should meet the environmental requirements specified for the purchased energy storage system.

f) Adequate distance should be maintained between the energy storage system and its surroundings to ensure ventilation, cooling, installation, maintenance, and safe evacuation.

2.6 Others

Description!

a） Regular inspections and maintenance work should be conducted when the performance of the energy storage system is subpar.

b) When applying the energy storage system to other equipment related to personal safety, it is essential to communicate and confirm with the dealer beforehand.

3 Product Introduction

The energy storage system of Zhejiang Boshi New Energy Technology Co., Ltd.'s is suitable for various scenarios, including smart buildings, industrial parks, wind farms, residential users, and small to medium-sized commercial centers. It effectively performs peak shaving, load leveling, and backup power functions, aiming to enhance power supply reliability, reduce electricity costs, and improve the quality of electrical energy in the grid.

3.1 Product features

Storage system features are below：

＞ Flexible installation location and small foot print

＞ Precise management of battery grouping

＞ Intelligent control fully meets the requirements of the power grid.

＞ Modular design of battery modules allows for flexible combination of total capacity.

＞The protection system is rigorous and robust, ensuring safe operation under various working conditions.

3.2 Appearance Description

The dimensions, layout, and component description of the energy storage system are shown in Figure 1.

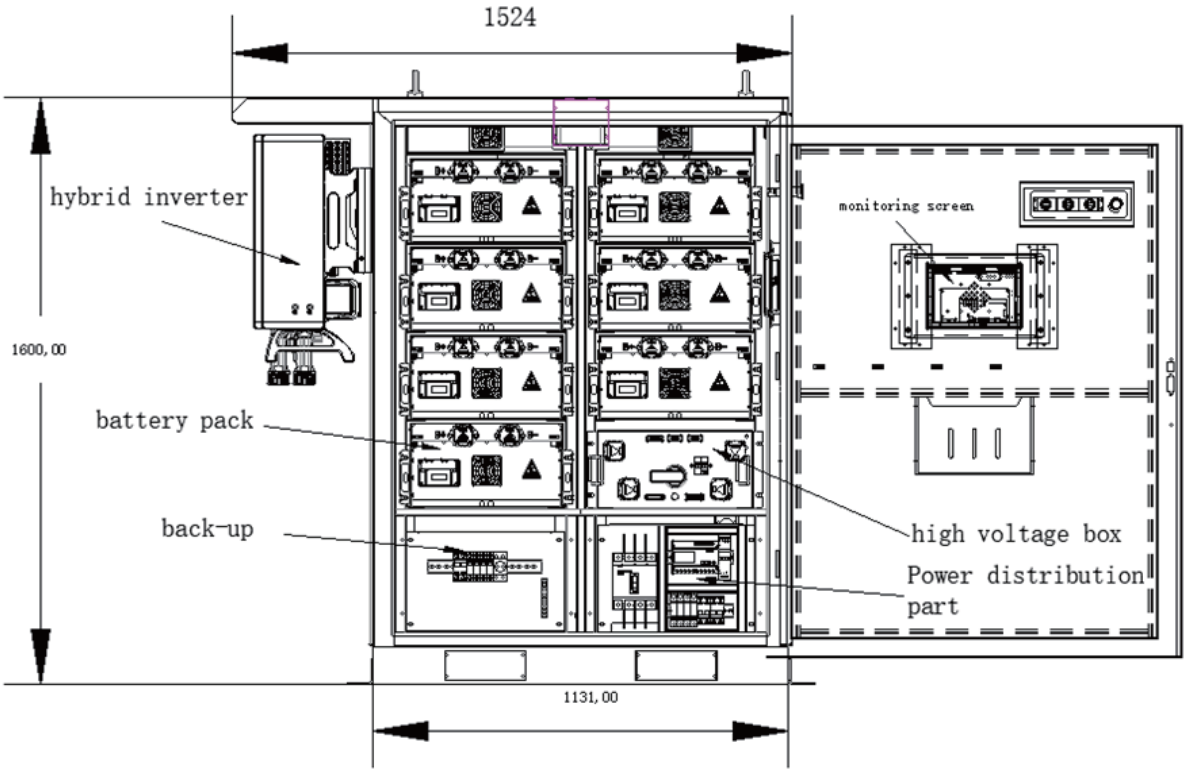
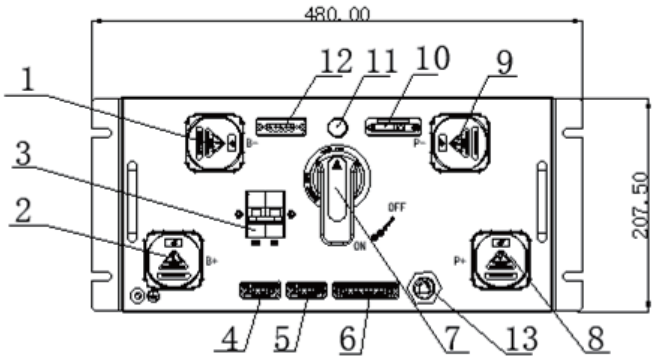


Fig 1 Exterior Layout Diagram

The dimensions, layout, and component description of High voltage Box are shown in Figure 2.



Number	Name	Remark
1	battery positive	
2	battery negative	
3	AC Switch	
4	220V power supply	for BMS
5	220V power supply	for Fan
6	communication port	
7	Breaker	
8	Positive Pole	
9	Negative Pole	
10	communication port	
11	Indicators	
12	communication port	
13	LAN Port	

Description of High voltage parts

3.3 Electrical structure description

Storage system mainly consists of batteries、 high voltage box、PCS、BMS、EMS. The Topological Graph of Storage System is below:

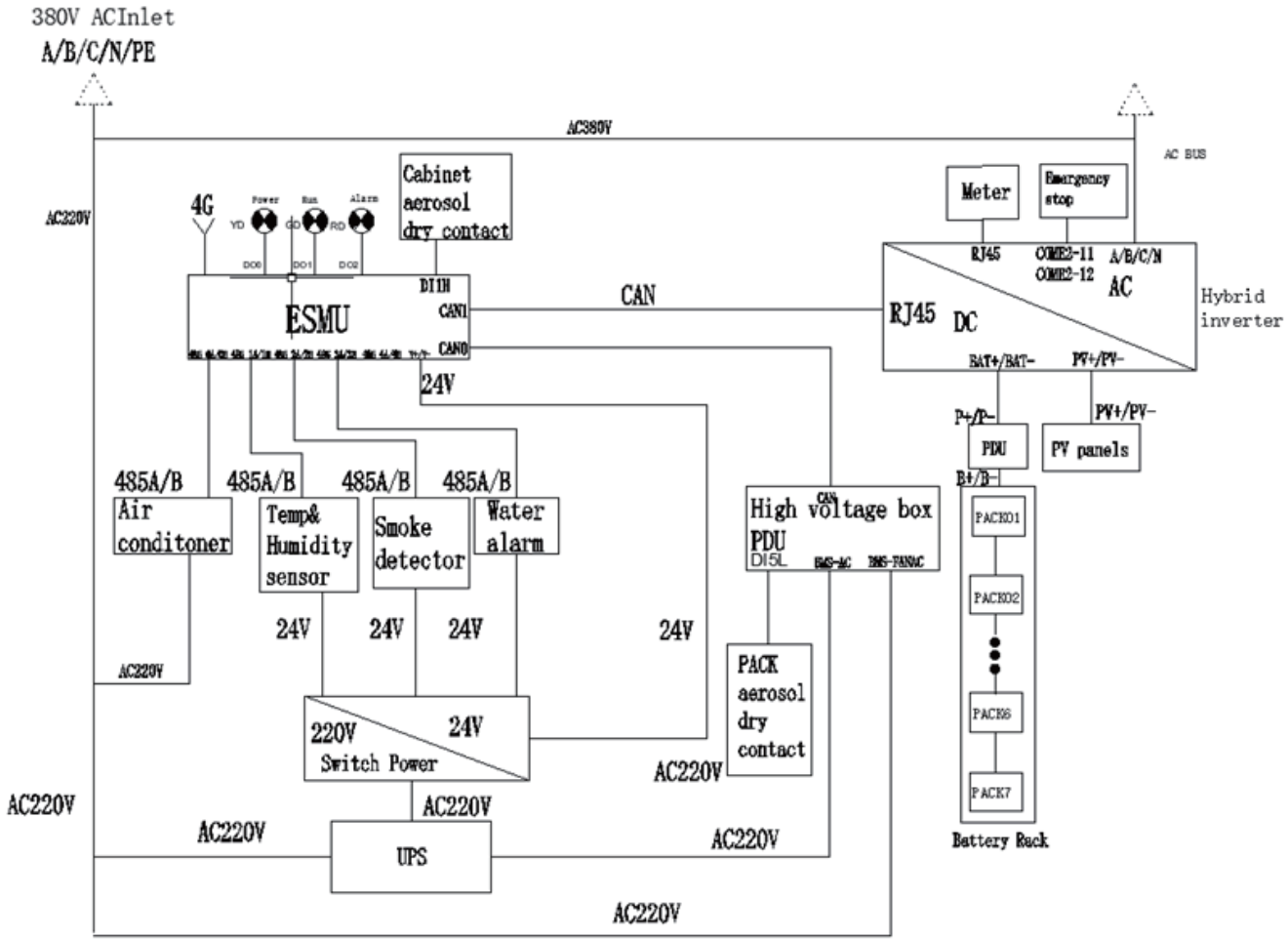


Fig 3 Storage system electrical Topological Graph

4 Installation Description

4.1Installation requirements

a）Foundation requirements

The energy storage system must be installed on a flat foundation with flame-retardant materials or a structure supported by channel steel. Align the embedded bolts with the holes at the bottom of the channel steel of the energy storage system. It is recommended that M12X100 expansion bolts be used to secure the energy storage system to the foundation.

b）The grounding system should be constructed by the user based on the geological conditions at the installation site and relevant regulations. Regardless of the grounding method used, the requirement is that the grounding resistance should not exceed 4Ω.

c）Wiring requirements

The cables used in the system are divided into power cables and communication cables. Power cables and communication cables should be placed in separate cable trenches to reduce interference from power cables on other cables.

d）Fixation and protection of connecting cables

To prevent loosening of wire terminals, which can result in poor contact or increased contact resistance leading to heat generation or even fire, it is important to ensure that the screws securing the wire terminals meet the corresponding torque requirements. To reduce stress on copper terminals, the cables should be properly secured at appropriate locations. Power cables carry high currents, so during installation and connection, care should be taken to avoid scratching the insulation of the cables to prevent short circuits, and they should be adequately secured in place.

e）：The recommended tools before installation and commissioning, like the tools needed for electrical connection、commissioning and machinery installation. Please see the installation tools in table 1:

Tools	Pictures	Main functions
Multimeter		Inspect electrical connection and parameter
Tramegger		Inspect insulation resistance
Cross Screwdriver		connect wires/tighten screws
Socket Spanner		Tighten Bolts
Monkey Wrench		Tighten Bolts
Torque Wrench		Inspect Torque
Crimping Pliers		Press Cold-pressed Terminal
Wire Stripper		Strip cables
Diagonal Cutting Pliers		Clip cables
Claw Hammer		Strike, install and dismantle parts
Heat-shrinkable T Bush		Electrical insulation

Tools	Pictures	Main functions
Heat Gun		Blow shrinkable tube
Gloves		Protect the hands of operators
Insulating Glove		Insulation
Hydraulic Clamp		Press OTTerminal
Cable Ties		Tie the cable
Impact Drill		Drill

4.2 Electrical Connection

4.2.1 Safety description

During the entire process of electrical connection and all maintenance and repair operations carried out on the energy storage system, the following safety guidelines must be followed:

a) Disconnect all external connections to the energy storage system.

b) Ensure that the energy storage system is not accidentally energized.

c) Use a multimeter to ensure that the energy storage system's internal components (excluding the batteries) are completely de-energized.

d) Implement necessary grounding connections.

e) When working near potentially energized components, use insulation materials for protection.

f) Ensure that all connecting cables have intact insulation before making electrical connections.

4.2.2 Wiring description

4.2.2.1 380V AC side wiring description

The AC side wiring is used to connect A (U), B (V), C (W), N, and PE. The energy storage system has reserved installation holes for the wiring (the specific number and size of wiring terminals depend on the purchased energy storage system). The incoming line position and the specific connection positions are shown in Figure 5.

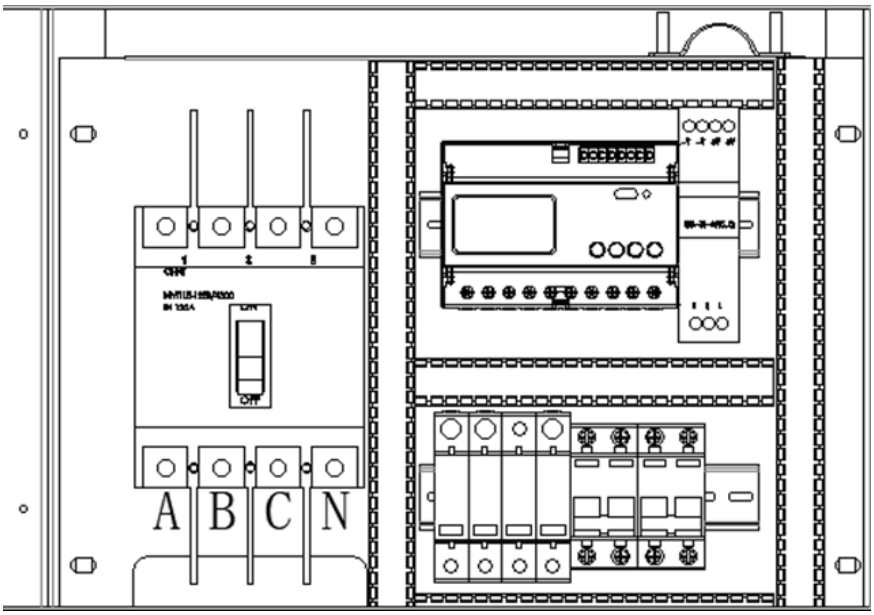


Fig 5 AC wiring location illustration

The AC side wiring steps are below

a） Confirm that all switches related to the equipment connected to the energy storage system are in the off state.

b) The AC output sequence of the energy storage system is from left to right: A (yellow), B (green), C (red), N (blue).

c) Connect the prepared wiring harness to the output terminals of the energy storage system using the following method: bolt + flat spacer+ spring spacer + wire terminal + copper busbar.

Attention!	1） When connecting the AC cables to the energy storage system, it is crucial to strictly follow the labeling on the copper busbar for A（yellow）, B(green), C(red), N, PE three-phase five-wire connection. A, B, C should be connected in the correct phase sequence! 2）Ensure a reliable connection! 3）The cables should have sufficient bending space and should not be forcefully pulled or stretched.

4.2.2.2 Ground cable connection description

The outer shell and internal components of the energy storage system that require grounding, such as surge protectors, should be reliably connected to the grounding copper busbar of the energy storage system. The grounding copper busbar of the energy storage system should be reliably connected to the equipotential connection device of the installation site or control room, and then connected to the ground or earth network through the equipotential connection device. When the grounding copper busbar of the energy storage system is reliably connected to the equipotential connection device of the installation site or control room, a grounding cable of at least 16mm2 should be used.

Before conducting the grounding wire connection, perform the following steps:

a) Confirm that all equipment connected to the energy storage system is in the off state.

b) Connect the prepared wiring harness to the internal grounding copper busbar of the energy storage system using the method of bolt + washer + wire nose + copper busbar.

c) The grounding of the energy storage system's outer shell should be performed based on the actual site conditions and can be achieved using cable connections.

Attention!

1）Grounding connections must comply with the grounding standards and regulations of the country or region where the project is located.
2）Grounding connections must be securely fastened and reliable.
3）After grounding is completed, measure the grounding resistance, which should not exceed 4Ω.
4）Ensure a reliable connection!
5）Cables should have sufficient bending space and should not be forcefully pulled or stretched.

4.2.2.3 Communication cable connection description

The energy storage system adopts CAN communication mode and uses a two-core shielded cable. To ensure communication quality, the shielding layer of the two-core shielded cable needs to be properly connected. Generally, a single-point grounding is used, and the grounding point should be reasonably selected based on the site conditions. Typically, the grounding is done through the grounding of the cabinet shell in the central control room. Before connecting the communication wires, perform the necessary checks to meet the requirements of 4.2.1 (presumably a reference to specific standards or specifications), and then proceed with the communication wire connection.

Confirm that all equipment connected to the inverter is in the off state.

Attention!

1）When the communication distance exceeds 1200m, optical fiber communication should be used. The design of optical transceiver equipment and optical cable should be customized according to the project requirements.
2）Ensure a reliable connection!
3）Communication cables should have sufficient bending space and should not be forcefully pulled or stretched.

4.2.2.4 Cable instruction

The number and specifications of AC output cable specification are shown in Table 2. The specific wire diameter for connection should be based on actual on-site construction.

Table 2 Recommended connection cable

Application	Cable specification	Material	Quantity
AC side	50mm2	Copper	3
Neutral Wire	50mm2	Copper	1
Ground wire	25mm2	Copper	1

Based on Table 2, it is recommended to use copper cables with the appropriate cross-sectional area. For the AC output cables, which follow a three-phase five-wire configuration, ensure that each phase is connected securely and tightly. After completing the wiring, inspect the connections to ensure there are no loose connections.

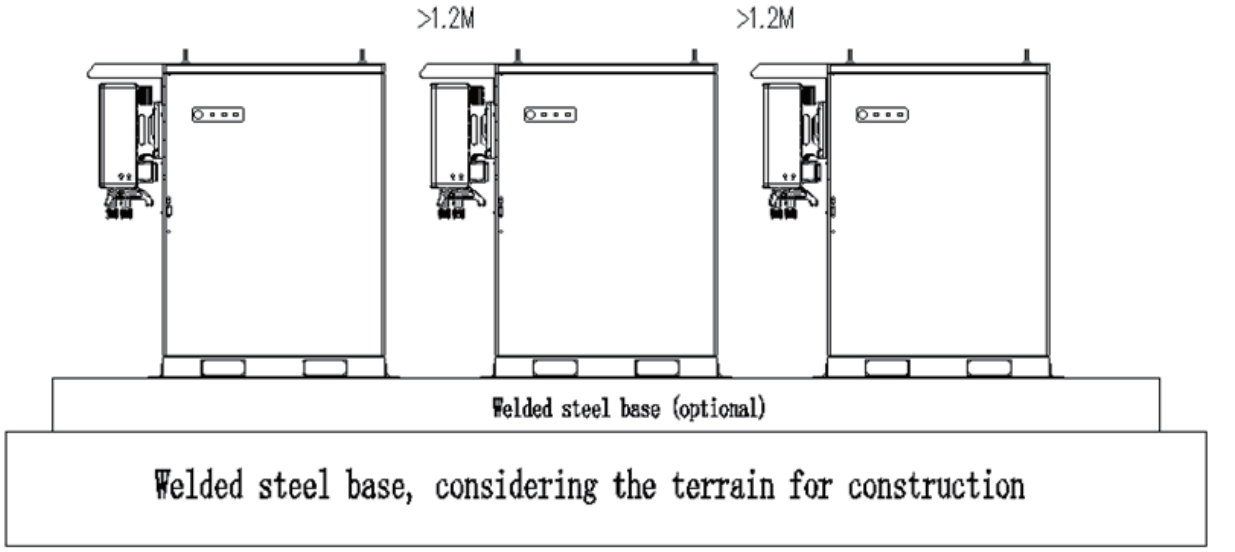
Use a single yellow-green wire to establish a reliable and secure connection between the grounding system terminal and the equipment grounding copper busbar. The shielding layer of the cable should also be grounded. After completing the wiring, inspect the connections to ensure they are properly secured and there are no loose connections.

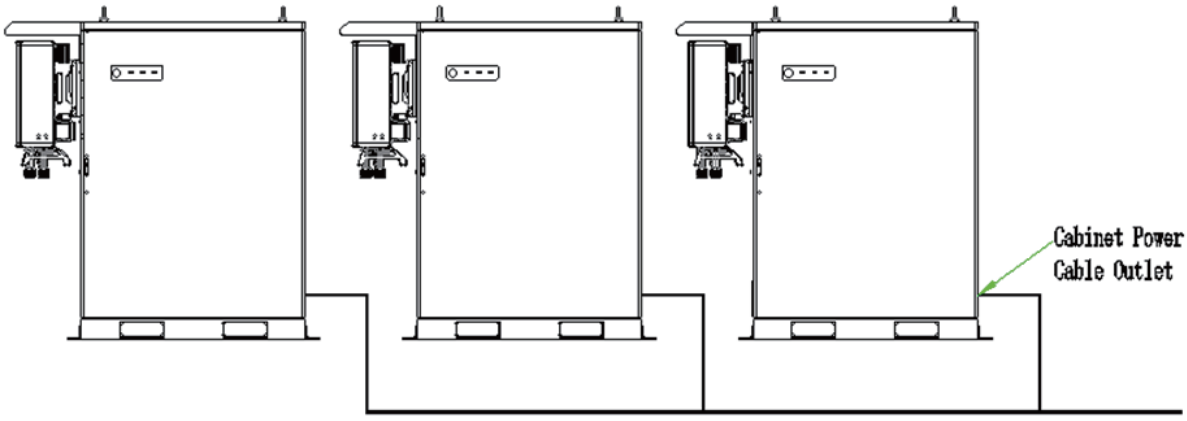
4.2.2.5 Parallel

All-in-one Energy Storage System can support a maximum of 10 cabinets in parallel. When selecting the installation site for energy storage cabinets, the following factors should be consideredWhen selecting the installation site for the energy storage cabinet, the following factors should be considered:

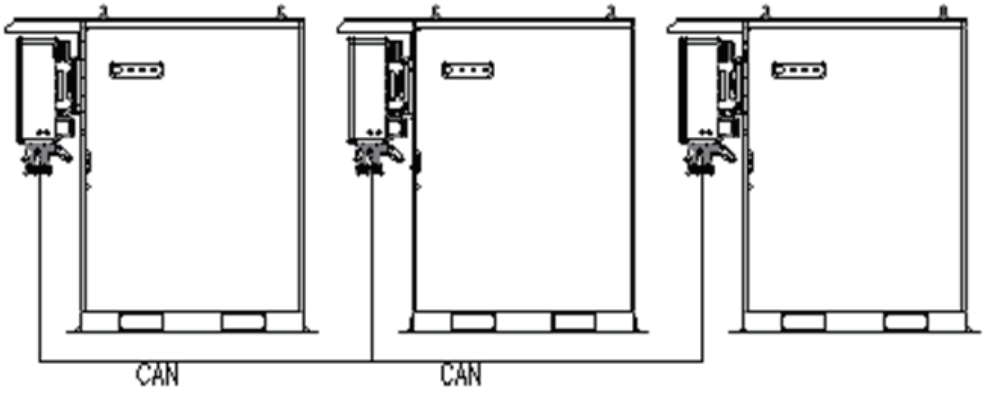
a) The ground strength of the installation site should be able to withstand the weight of forklifts and the energy storage cabinet.

b) The installation site should be suitable for the construction of the energy storage cabinet base.





Power Cable Outlet Diagram



Parallel System-CAN Communication Illustration

There should be a minimum distance of 1.2m maintained between the energy storage cabinets. Depending on the condition of the floor, it is recommended to construct a concrete base or select a steel welded base as an option. This will provide stability and support for the energy storage cabinets.

5 Power-on Operation Description

5.1 Power-on before electrifying

Before starting up the energy storage system, the following requirements must be met:

a) All internal components of the energy storage system should have clean, dry surfaces free from foreign objects.

b) Operational mechanisms, switches, and other movable components should be flexible, reliable, and accurate. For devices equipped with temperature displays, temperature controls, fans, and other devices, they should be inspected according to electrical performance requirements and equipment installation manuals.

c) The connections of the main circuit, control circuit, and grounding circuit should be securely fastened.

d) Electrical components and equipment should have tightened installation screws.

e) There should be no abnormality in the electrical components. If any issues are detected during inspection, they should be resolved immediately. If on-site resolution is not possible, promptly contact and notify our company.

f) The AC side wiring should adhere to the specified phase sequence requirements.

g) All switches inside the energy storage system should be in the off state.

h) Check the grounding status of the circuits, ensuring compliance with the insulation requirements for the array.

i) The grounding resistance should be ≤4Ω.

j) The DC voltage should not exceed or be lower than the allowed DC voltage.

Attention!

Please note that specific voltage limits and further details may vary depending on the specific energy storage system and its requirements.Attention!

1）If operating the equipment in high humidity conditions, it is necessary to inspect and dry the electrical components inside the equipment before power transmission.

2）The process of powering on the energy storage system must be carried out by professional electrical personnel!

5.2 Power-on

a) Switch off the AC breaker, Set the multimeter to the AC mode and use the probes to measure the line voltage, which should stabilize at 380V ±15%

b) Successively close the miniature circuit breaker on the AC side. Set the multimeter to the AC mode and use the probes to measure phase voltage, which should stabilize at 220V±15%.

c) Power environment monitoring enters self-check mode. The air conditioning starts and enters self-diagnosis mode. When the city power at 220V is connected, the system automatically powers up at 24V low voltage. Upon entering the high-voltage cabinet power-up sequence, when the BMS self-check detects no critical faults, close the respective relays. When the high-voltage cabinet power indicator light turns red, the high-voltage cabinet power-up process is complete.

d) When the yellow light on the cabinet is on, indicating the system's power supply is running normally. Green light on BMS system runs normally, Red light alarm which could be checked on the cabinet monitoring screen.

e) At this point, the power-on process of the system is complete. The energy storage system can be controlled for charging and discharging modes using the upper computer. The operation indicator light in the energy storage system displays green, indicating that the energy storage system is powered on and operating normally.

6 Maintenance

Correct maintenance is crucial for the safe and stable operation of the energy storage system, ensuring its longevity. To carry out maintenance safely and effectively, it is essential to adhere to relevant safety precautions, use necessary tools and testing equipment, and have qualified maintenance personnel perform the maintenance. Additionally, always pay attention to the following safety operating procedures.

a) It is imperative to always remember that even when the energy storage system is operational, there may still be hazardous voltages present within. Prior to conducting maintenance, use a multimeter to verify that the power is disconnected and in a safe state.
b) Refrain from wearing items such as rings, watches, or any other conductive objects while operating the energy storage system.
c) Follow the instructions outlined in this manual for safe operating procedures. If you have any queries, please contact our company.
Maintenance comprises both fault maintenance and routine maintenance. Fault maintenance primarily involves analyzing and identifying the causes of faults within the energy storage system while carrying out necessary repairs. The schedule and tasks for routine maintenance are detailed in the table below.

Table 6 Storage system maintenance projects

Numbe	Project	Technical Requirements	Period
1	Pcs Fan	Air blows out from the ventilation holes on the back panel of the PCS	1 year
2	Pcs Air Vents	No dust or other debris	1year
3	Filter Cleaning	Clean the dust adsorbed on the filter, blocked debris or replace it.	3 months
4	Dust Cleaning	Clean the cabinet, components and circuit boards etc.	1 year
5	Label Inspect	Signs such as safety warnings are clearly visible.	1 year
6	Wiring	The internal cables of the system are intact and do not fall off.	1 year
7	Fan Inspect	The fan runs normally.	1 year
8	Combustible Gas Sensor	5year life time, need periodic replacement .	5 year

Attention!

Inside the PCS (Power Conversion System), there may still be residual charge on the capacitors, which can pose a high-voltage risk to personal safety. Therefore, it is necessary to allow the energy storage system to remain idle for a sufficient amount of time (approximately 15 minutes) to allow for the complete discharge of the charges before performing any operations on the system. This waiting period ensures safety by minimizing the risk of accidental contact with high voltages.

7 Troubleshooting

In the event of abnormal operation or a fault shutdown of the energy storage system, you can contact our company's after-sales service technical engineers for inspection and fault diagnosis.

8 Packing list

Objects	Qauntity	Remark
Factory Inspection Report	*1	
Battery User Manual	*1	
Hybrid inverter user Manual	*1	
BMS System User Manual	*1	
Quality Certificate	*1	

9 Transportation and Storage

During transportation and handling, avoid exposure to severe mechanical impacts, direct sunlight, or rain. The equipment must not be inverted. Handle with care, avoiding dropping, rolling, or applying excessive pressure during loading and unloading.

10 Warranty

To ensure you receive comprehensive service during the warranty period, kindly cooperate with our after-sales service personnel by accurately and honestly filling out the repair-related information, such as issue descriptions, damage status, occurrence details, usage dates, and records. Please endeavor to provide complete details of the fault.

During the warranty period, the following situations are not covered under warranty:

a) Damage caused by accidents, improper operation, or failure to comply with requirements.

b) Damage resulting from the customer's unreasonable transportation or storage methods.

c) Damages due to lightning, fire, or other force majeure factors.

d) Damages caused by not following the operational instructions in the user manual.

e) Damages caused by failure to conduct inspections and maintenance as per the instructions in the user manual.

Note: This user manual may undergo modifications with product upgrades and updates.

Product Parameter

DC Parameter			
Battery Type	LFP	Operating Voltage Range	280V～408.8V
Combination Mode	1P112S	Charge/Discharge Current	100A/100A
Rated Capacity	280Ah	Cooling Mode	Air Cooling
Rated Energy	100kWh	Cycle Number	6000
Rated Voltage	358.4V	Fire Protection System	Aerosol Extinguishing
Rated Power	50kW	Detector Type	Temperature / Smoke Sensor / Water Leak
PV Parameter			
Maximum Input Power	75kW		
Maximum Dc Input Voltage	1000V		
Mppt Operating Voltage Range	200-850V		
Maximum Input Current	30A×4		
Rated Output Power	50kW		
Maximum Conversion Efficiency	98.8%		
Ac Parameter			
Rated Output Power	50kW		
Rated Voltage	3L/N/PE; 220/380V;230/400V;240/415V		
Grid Frequency	50/60Hz		
Maximum Output Current	83A		
Power Factor	0.8 Lead... 0.8 lag		
System Parameter			
Operating Environment	-20℃～50℃（Power derating 45℃+）		
Size (W*D*H mm)	1524*1240*1600		
Weight	About 1.4t		
Class Of Protection	IP54		
Allowable Relative Humidity	0-95%		
Allowable Altitude	≤2000m（Power derating 2000m + ）		
Certification Standard	IEC62619、EN62477-1、IEC 63056		

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V1.0