Product User Manual

Containerized Energy Storage System

Model: BESS-C1200

Version: 1.0

Foreword

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(3) The Company strictly complies with local regulatory requirements, and all products meet local regulatory standards.

(4) Please follow the instructions in this user manual for using and operating the energy storage system. Otherwise, it may affect the protection design of the energy storage system and void the warranty.

(5) Specifications in this document are subject to change without notice. We have made every effort to make this document complete, accurate, and up-to-date. However, some improvements may be required under certain circumstances without notice.

(6) For ease of reading, this manual contains numerous images. The images are for illustrative purposes only. For specific details about the product, please refer to the actual product received.

(7) Please keep this manual and other relevant documents properly near the equipment for easy access during installation, operation, maintenance, and inspection.

(8) All descriptions in this manual are based on the standard configuration of the outdoor energy storage cabinet. If users have special requirements, please inform the Company's staff when ordering.

We will endeavor to meet your needs. For specific product details, please refer to the actual product you receive.

(9) This manual cannot cover all possible situations during installation, operation, maintenance, and inspection. If you encounter situations not explained in the manual, please contact the Company promptly.

The Company assumes no responsibility for any losses arising from this document, including but not limited to omissions, printing errors, arithmetic errors, or listed errors in this document.

The Company reserves the final right of interpretation for all content in this user manual.

Version History

The latest version in the revision history contains updates from all previous document versions.

V1.0 2025.09.24 Released

General Description
Symbol Definitions

To ensure better personal and property safety and better use of this product during installation, this manual clarifies relevant information and uses standard industry symbols for emphasis. The following symbols are used in this product. Please read them carefully to facilitate better use of this manual.

DANGER

Indicates that failure to avoid will result in serious injury or death, or will cause a serious accident and injury.
Indicates a high risk level of injury.

WARNING

Indicates that failure to avoid could result in serious injury or death, or could cause a serious accident and injury.
Indicates a medium risk level of injury.

CAUTION

Indicates that failure to avoid could result in minor or moderate injury.
Indicates a low risk level of injury.

Abbreviation Definitions

Full Term	Abbreviation
Flexible printed circuit	FPC
Battery management system	BMS
Battery management unit	BMU
Begin of life	BOL
Current connection between cells	Bus- bar
Controller area network	CAN
State Of Charge	SOC
Battery Module	BM
Power Conversion System	PCS
End of life	EOL
Open circuit voltage	OCV
Switch Gear	S/G

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1. Safety Instructions

1.1 General Safety Responsibilities

DANGER

a. This energy storage system is a high-voltage system. It is strictly forbidden to install, use, or operate the energy storage system in severe weather conditions such as thunderstorms, rain, snow, or wind force 7 or above.
b. Do not perform operations such as installation, wiring, maintenance, or replacement of parts while energized; contact of power lines with conductors can instantly generate arcs or sparks, leading to fire or personal injury.
c. Only professionals familiar with local laws, regulations, standards, and electrical systems, who have received professional training and are knowledgeable about this product, are permitted to operate the energy storage system.
d. If obvious defects, damage, or missing parts are found in the electrical cabinet or battery box, do not use it and contact professional after-sales personnel.
e. Do not disassemble or modify any part of the battery box or electrical cabinet without official authorization from the product manufacturer.
f. Battery damage may cause electrolyte leakage; if electrolyte leaks, do not contact the leaked electrolyte or volatilized gases, take protective measures and immediately contact the after-sales service center for assistance. Do not place batteries near high temperature, high pressure, or heating equipment.
g. If a fire occurs, do not use batteries that have been flooded with water; contact the local battery recycler for disposal. In case of fire, if safe to do so, turn off the power to the equipment.

DANGER

a. If leaked substances are inhaled, evacuate the contaminated area and seek immediate medical help.
b. If contact with eyes occurs, rinse with clean water for at least 15 minutes. If skin contact occurs, wash the contacted area thoroughly with soap and water. If ingested, induce vomiting immediately and seek immediate medical assistance.
c. If battery replacement or addition is needed, contact the after-sales service center. Do not disassemble or move the battery system privately.
d. Grid connection requires permission from the relevant authorities in the country.
e. Compilation, decompilation, or other derivative work on the equipment is prohibited. Stealing the intellectual property of the equipment is prohibited.
f. When installing grounded equipment, the ground wire must be connected first. When removing equipment, remove the ground wire last.
g. For used batteries, do not dispose of them as general household waste to avoid environmental pollution. Please contact a battery recycling company for disposal, following local laws and regulations.

DANGER

a. Store and transport according to requirements to ensure the energy storage system is not damaged during transportation and storage.
b. Exercise caution and consider the weight when lifting batteries or electrical cabinets. Wear gloves when handling batteries.
c. Do not impact, pull, drag, or step on the equipment, and do not insert pointed objects into any part of the battery module.
d. Transportation must be carried out by trained professionals, and operations during the process must be recorded. Ensure the equipment is placed securely and cannot tilt; equipment tipping may cause equipment damage or personal injury. Ensure liquid carbon dioxide, Novac 1230, or FM-200 fire extinguishers are available near the equipment.
e. When extinguishing a fire, use fire extinguishers with the recommended materials above; do not use water or ABC dry powder fire extinguishers. Firefighters must wear protective clothing and self-contained breathing apparatus.
f. When the ambient temperature exceeds 150°C, there is a risk of battery explosion.
g. When installing and maintaining important equipment, use appropriate tools and take protective measures to prevent scratching the cabinet. If scratches occur, repair them promptly to prevent rust.
h. When performing high-voltage operations, use special insulated tools.
i. Cables used in high-temperature environments may cause insulation aging and damage. The distance between cables and heating components or the periphery of heat source areas should be at least 30mm.
j. Cables of the same type should be bundled together. Different types of cables should be laid at least 30mm apart and must not be entangled or cross-laid.

1.2 Manual Storage

The product manual is an indispensable part of product use. The manual contains important information on product transportation, installation, inspection, maintenance, etc.

Before performing operations such as transportation, installation, inspection, and maintenance on the product, be sure to read this manual carefully.
a. Strictly follow the descriptions in this manual for product transportation, installation, inspection, maintenance methods, and various precautions. Otherwise, it may lead to equipment damage, personal injury, or property loss.
b. Keep this manual properly, ensuring it is readily available to personnel during transport, installation, and operation.

1.3 Battery Protection

DANGER This product contains high voltage! Risk of electric shock!
The batteries in the system generate high voltage when connected. Accidental contact may result in electric shock or even life-threatening danger.
When performing operations such as installation, maintenance, and inspection on the equipment, ensure:
a. All energy storage battery connections are completely disconnected, and power remains off for 20 minutes.
b. Place clear warning signs at the disconnected energy storage battery connections to ensure they are not accidentally reconnected.

1.4 Ground Fault Protection

DANGER When a ground fault occurs or grounding is non-standard in the energy storage integration system, parts that are normally not energized may carry lethal high voltage. Accidental contact is extremely dangerous!
Before operation, ensure no ground faults occur in the system. Also, take relevant protective measures and install the grounding correctly according to local standards and specifications.

1.5 Live Measurement

DANGER High voltage exists in the equipment within the energy storage integration system. Accidental contact may pose a fatal electric shock risk. When performing live measurements, be sure to comply with the following requirements:
a. Take protective measures (e.g., wear insulating gloves, rubber shoes, etc.).
b. During measurement work, at least one professional must accompany to ensure personal safety.

1.6 Use of Measuring Equipment

DANGER To ensure that various electrical parameters meet requirements during electrical connection, commissioning, etc., of the energy storage integration system, relevant electrical measuring equipment needs to be used.
a. Select high-quality measuring equipment whose range, usable conditions, etc., meet the on-site requirements.
b. Ensure the measuring equipment is connected correctly and used correctly and standardly to avoid dangers such as electric shock.
c. If performing live measurements, take protective measures (e.g., wear insulating gloves, etc.) and perform them with at least one professional present.

1.7 Complete Power-off Operation

WARNING Operations on the energy storage integration system may only be performed after ensuring that the equipment and system within the energy storage integration system are completely de-energized.
a. Ensure that the de-energized equipment cannot be accidentally re-energized.
b. Use a multimeter to ensure the equipment interior is completely de-energized.
c. Ensure necessary and correct grounding.
d. Throughout the operation, ensure clear and unobstructed access.
e. Use insulating materials to cover nearby potentially live parts adjacent to the operation area.
f. Ensure the energy storage integration system is completely de-energized and confirm with a multimeter measurement.
g. After the energy storage integration system has completely shut down, wait at least 20 minutes before operating on the energy storage integration system.

1.8 Arc Flash Protection

To protect personnel safety and equipment, the contents described in this manual must be strictly followed when operating this product.
Improper operation may cause arc flash hazards, and even lead to fire, explosion, and other risks.

WARNING The following improper operations may cause arc flash, fire, explosion, or other hazards inside the machine. Always remember that in case of an accident, it must be handled by qualified professionals.

Improper operation regarding existing accidents may cause a wider range of failures or accidents.
a. Hot-plugging the DC side high-voltage fuses of various devices.
b. Touching uninsulated cable ends that may be live.
c. Contacting connection components, terminals, or other internal parts of the machine that may be live.
d. Loose power cable connections.
e. Metal parts such as screws accidentally falling into the power module.
f. Incorrect operation by untrained personnel, etc.

WARNING Before operating the equipment, the arc flash risk in the equipment operation area must be pre-assessed. If an arc flash risk exists, then:
a. Operators must have received relevant safety training in advance and can only work after passing the training.
b. Assess areas where electric shock may occur as much as possible.
c. Wear compliant protective clothing before operating in areas where electric shock may exist.

1.9 Electrostatic Protection

WARNING Contact or improper handling of printed circuit boards or other electrostatic discharge sensitive components can cause device damage.
a. Avoid unnecessary contact with circuit boards.
b. Follow electrostatic protection specifications, such as wearing an anti-static wrist strap.

1.10 Product Disposal
a. When the energy storage integrated system or internal individual equipment needs to be discarded, it must not be treated as conventional waste.
b. Some components of the internal machinery can be recycled and reused, while others can cause environmental pollution.
c. Please contact a locally certified professional recycling organization for proper disposal of the product and its internal components.

1.11 Sand and Moisture Protection

WARNING Do not open the doors of the energy storage integrated system cabinet in severe weather such as sandstorms, thunderstorms, strong winds, hail, or when the ambient relative humidity is greater than 95%. After severe weather ends, promptly address the surrounding environment.

1.12 Protection of Equipment Warning Labels

WARNING The warning labels on the product and the internal electrical equipment contain important information for their safe operation. Do not deliberately tear or damage them!
a. Ensure the equipment warning labels are always clear and legible.
b. If an equipment warning label is damaged or becomes illegible, replace it immediately.

1.13 Protection of Safety Warning Labels

WARNING During on-site transportation, installation, inspection, and maintenance of the energy storage integrated system, to prevent unauthorized personnel from approaching, misoperation, or accidents, please observe the following precautions:
a. Place conspicuous warning signs at the front and rear door switches of the energy storage integrated system to prevent accidental opening of the switches causing accidents.
b. Erect warning signs or safety warning tape near the on-site operation area to prevent unauthorized personnel from approaching.

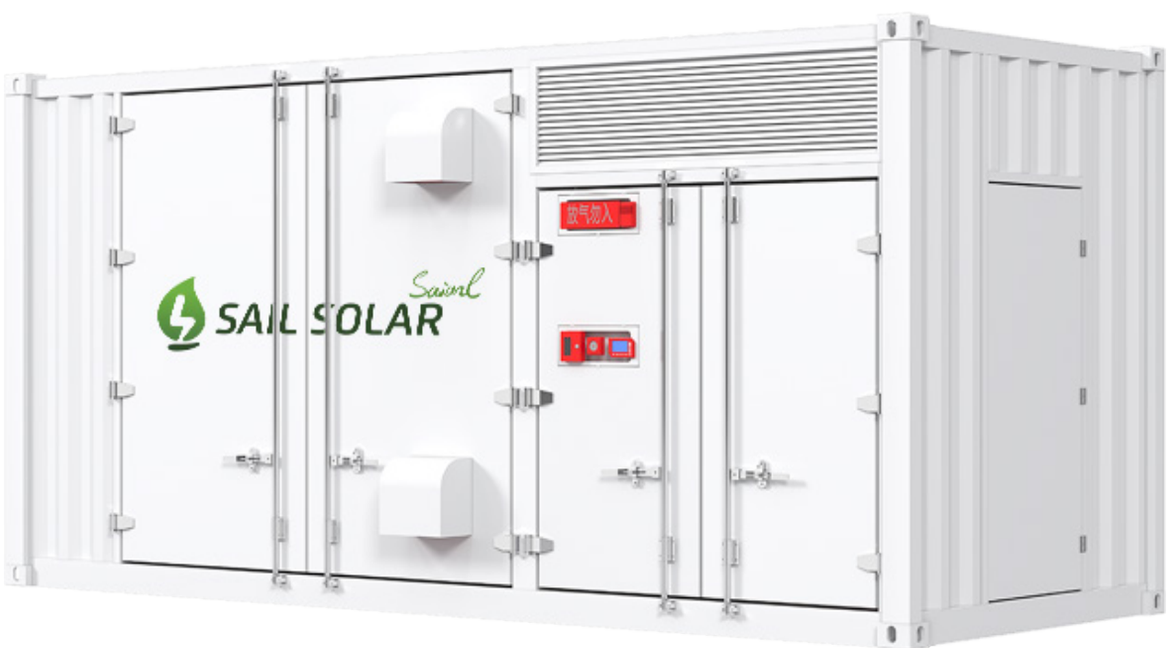
1.14 Daily Operation and Periodic Maintenance
During daily operation, ensure the doors of the energy storage integrated system and its internal equipment cabinets are closed and locked, and all keys are removed and kept safely by a designated person for subsequent use. This prevents unauthorized personnel from entering the machine interior causing accidents, or internal equipment being exposed to rain, animal intrusion, etc.
Additionally, perform regular inspections and maintenance on the energy storage integrated system and its internal equipment to ensure long-term reliable operation.
If performing related work when the energy storage integrated system is energized, be sure to implement insulation protection, and ensure at least two staff members are present on site simultaneously.

The installation location of the energy storage integrated system is often in remote field environments away from urban areas. Prepare corresponding field rescue facilities as needed to provide assistance when required.

WARNING The following improper operations may cause arc flash, fire, explosion, or other hazards inside the machine. Always remember that in case of an accident, it must be handled by qualified professionals.
Improper operation regarding existing accidents may cause a wider range of failures or accidents.
a. Hot-plugging the high-current side high-voltage fuses of equipment.
b. Touching uninsulated cable ends that may be live.
c. Contacting live connection busbars, terminals, or other internal parts of the machine.
d. Loose power cable connections.
e. Metal parts such as screws accidentally falling into the power module.
f. Incorrect operation by unqualified, untrained personnel, etc.

2.Overview

The Company warrants that the products are free from defects arising from inappropriate materials.



3. Product Introduction

The energy storage integrated system is mainly used for energy storage application scenarios such as villas, hospitals, and factory peak shaving, and can also be used as a backup power source at critical times. It can also be used in small photovoltaic plants connected to the grid, storing excess electricity to supply the load when photovoltaic output is insufficient.

3.1 Icon Description

B_	B+	P_	P+
Battery Negative Terminal	Battery Positive Terminal	PCS Negative Terminal	PCS Positive Terminal
DC-	DC+	DC-Link	ON/OFF
HV Box (Battery) Negative Terminal	HV Box (Battery) Positive Terminal	PV Terminal	Switch
QF2	AC	JXK-1	JX-1
Circuit Breaker	AC Power Terminal	Control Box Port	HV Box Port
PCS COM	Display COM	LV	HV
PCS Communication Port	Display Port	Low Voltage Light	High Voltage Light
EMERGENCY	485-1/CAN	Reserve COM	Warning
Emergency Stop Button	485/CAN Communication	Reserve Communication Port	Alarm
Ethernet	Ethernet Communication	⏚	Grounding
Grid Connection			
A	B	C	N
Phase A	Phase B	Phase C	Neutral Line
Load			
L1	L2	L3	N
Phase A	Phase B	Phase C	Neutral Line

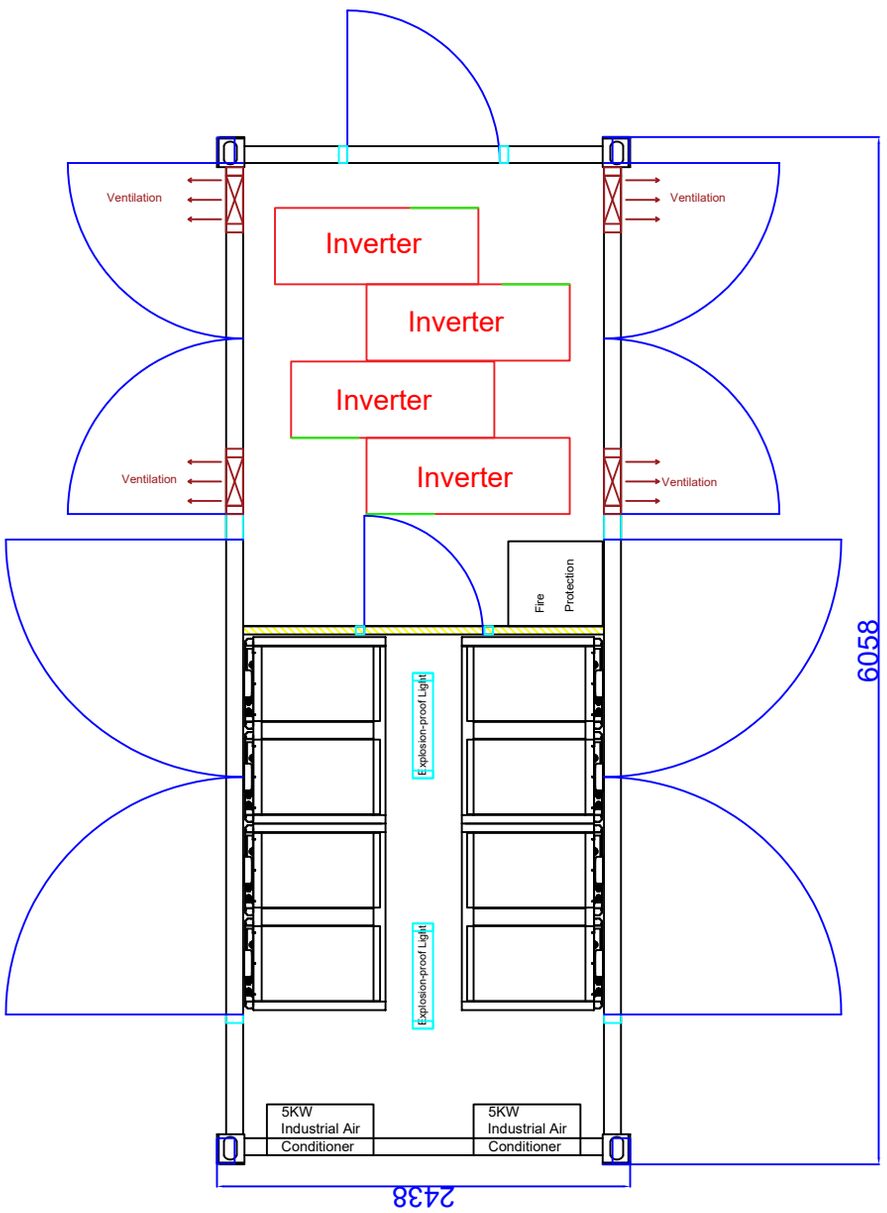
3.2 Label Definitions

						CE
Caution, Electric Shock Hazard	Caution, Safety	Caution, Fire Risk	Surface High Temperature	Do not place near flammable materials	After power off, component discharge has a delay, please wait 5 minutes for the equipment to fully discharge.	CE Certification
						
Do not short-circuit the battery	Do not disconnect or disassemble by non -professionals	Install the product out of reach of children	Recyclable	Read the manual carefully before installation and use	Do not dispose of this product with household waste	TUV Certification

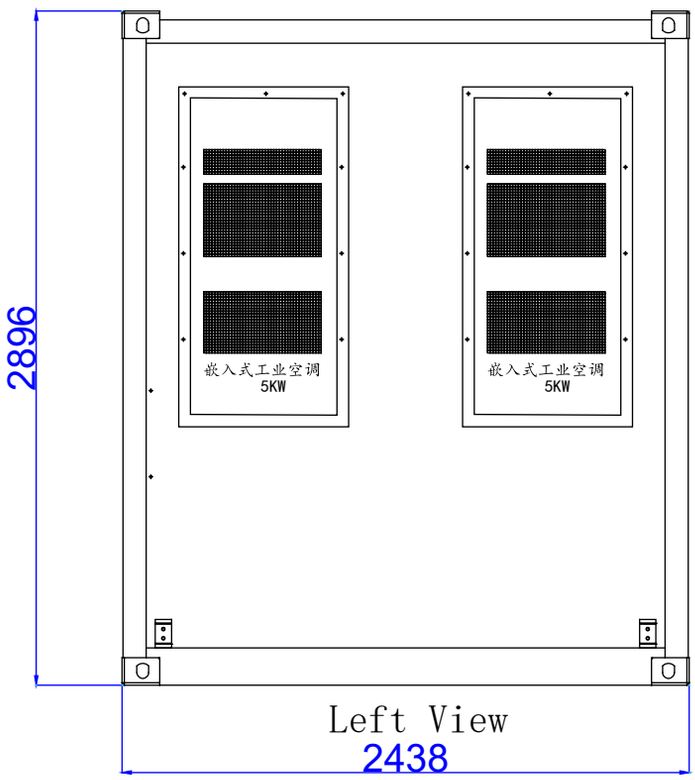
3.3 Product Function Introduction

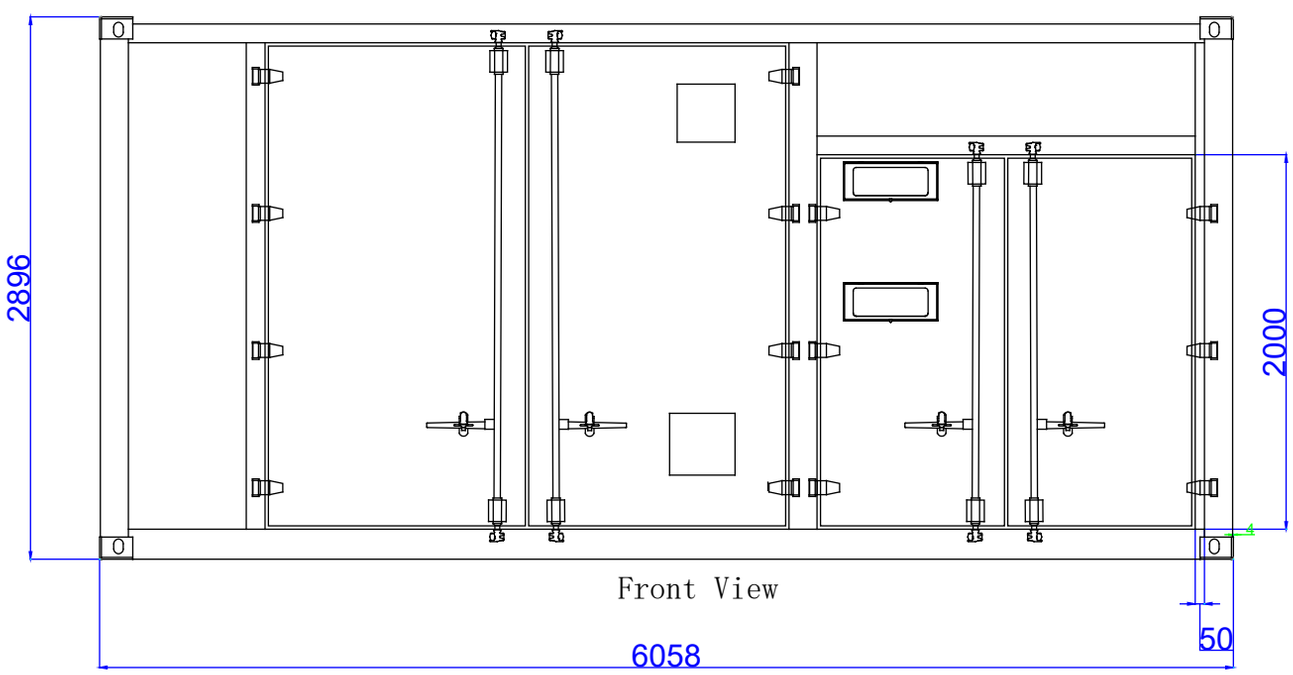
The energy storage integrated system product uses lithium iron phosphate batteries, featuring long lifespan, stable performance, and high charge/discharge efficiency. The system has automatic grid-tie/off-grid switching function (optional); where feeding power back to the grid is not allowed by the grid, an anti-backflow function can be optionally configured.

3.4 Containerized Energy Storage System Introduction



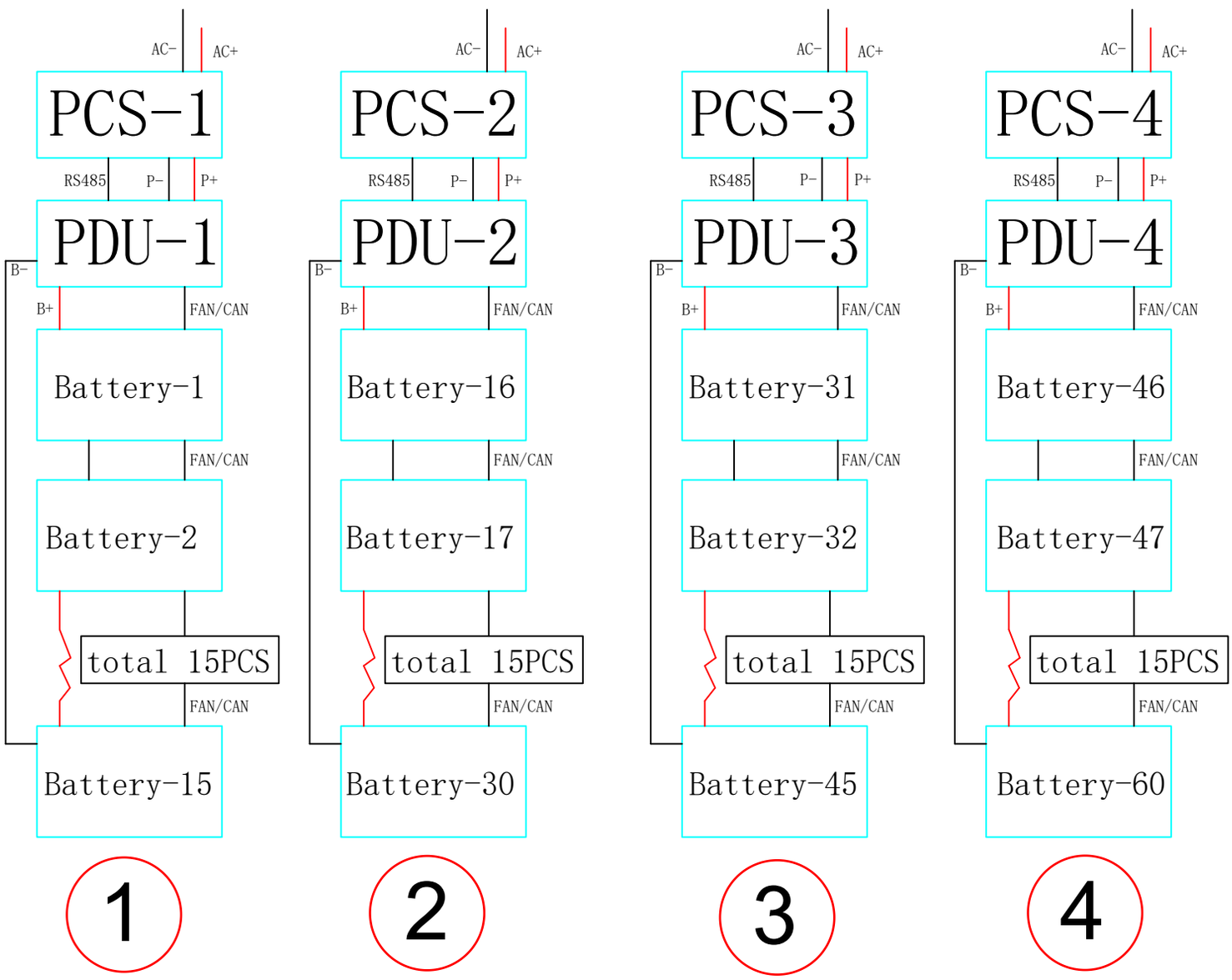
Interior Layout

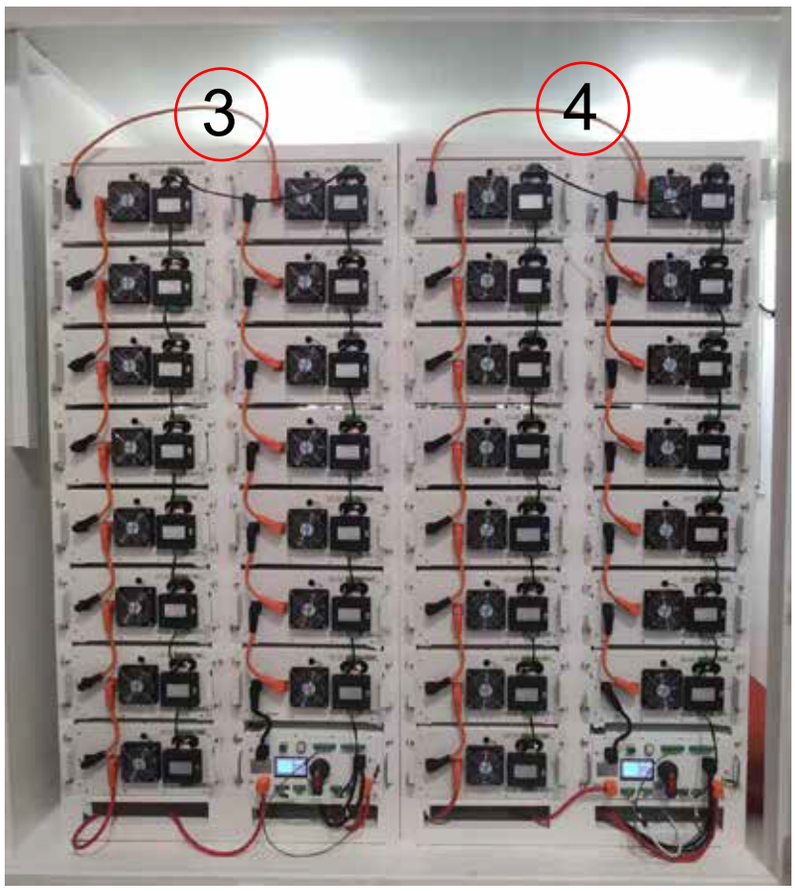

2896
嵌入式工业空调
5KW
嵌入式工业空调
5KW
Left View
2438


2896
2000
Front View
6058
50

Grounding Wire Location

3.5 Wiring Topology Diagram



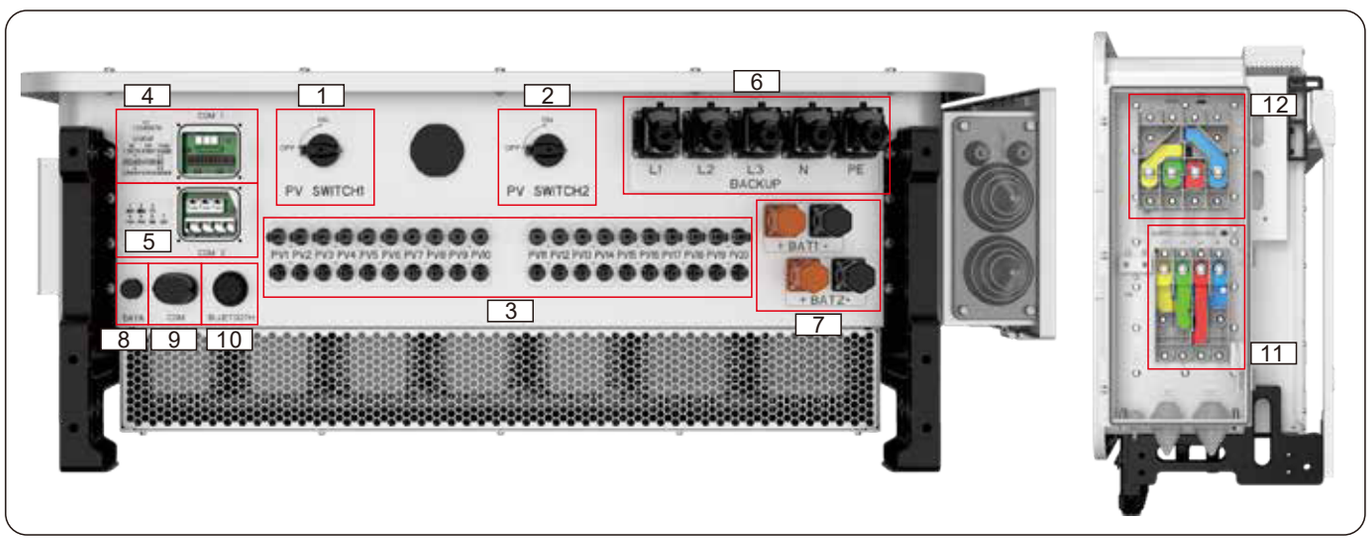


Clusters 3 and 4 battery packs to High Voltage Box Wiring physical diagram. The wiring method for Cluster 1 and 2 battery packs is the same as for Clusters 3 and 4.

Physical diagram of battery pack after installing the decorative panel

3.6 BESS-C2411 Containerized Energy Storage System

The PCS consists of a DC/AC bidirectional converter, control unit, etc. The PCS controller receives background control commands via communication and controls the converter to charge or discharge the battery based on the sign and magnitude of the power command, achieving regulation of active and reactive power to the grid. Simultaneously, the PCS can obtain battery pack status information through CAN interface communication with the BMS, dry contact transmission, etc., enabling protective charging and discharging of the battery to ensure safe battery operation.



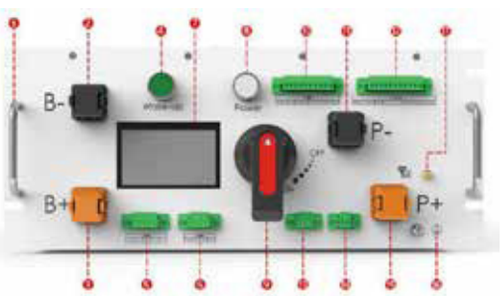
Name	Description
1. PV Switch1	PV switch of the PV1- PV10
2. PV Switch2	PV switch of the PV11- PV20
3. PV Module Input	Conduit of PV conductors should be connected here
4. COM1	Communication cables of terminal block should go through this port
5. COM2	Communication cables of terminal block should go through this port
6. BACKUP	Conduit of AC conductors to backup loads panel should be connected here
7. Battery Connection	Conduit of Battery conductors should be connected here
8. DATA	For Solis data logger connection
9. COM	For Solis data logger connection
10. BlueTooth	A antenna for Bluetooth signal.no need operation
11. SMARTLOAD/GEN/INV	Conduit of AC conductors to generator should be connected here
12. Grid	Conduit of AC conductors to the main service panel should be connected here

Please refer to the other operation manual for specific procedures.

3.7 Product Specifications

New battery 100% Depth of Discharge, all data measured at 25±2°C temperature range, 0.5C charge/discharge conditions; Available power may vary depending on the inverter. Rated charge/discharge current and power are affected by temperature and SOC status.

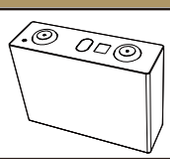
High Voltage Box



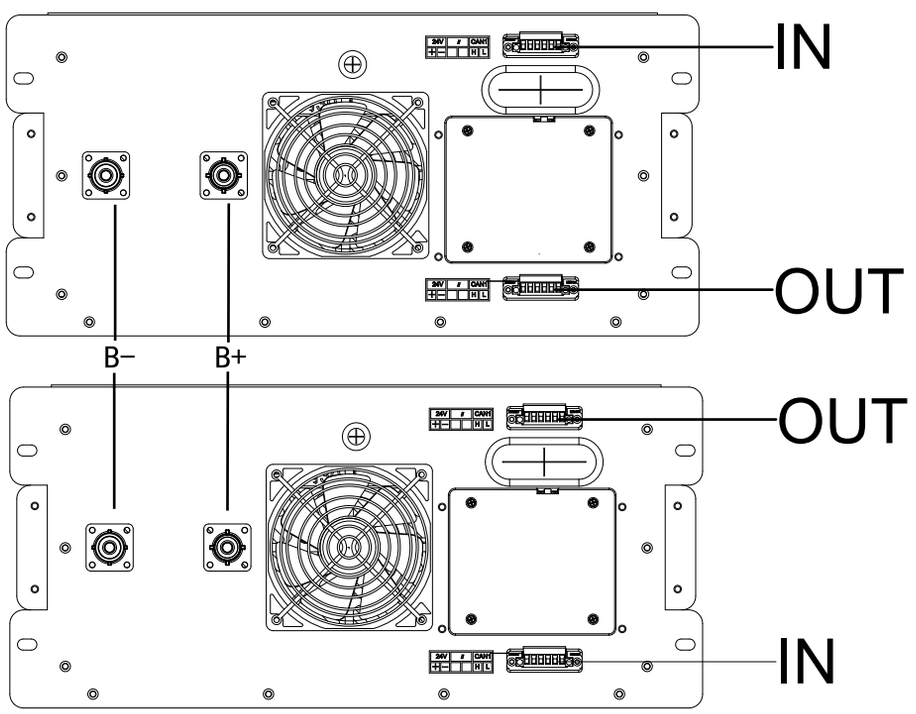
NO.	Name&Description	NO.	Name&Description
1	Handle	10	COMM2 port：PCS communication port: connect with PCS/Inverter
2	B-: Battery common negative connection position (black)	11	Connection position of PCS negative pole (black)
3	B+: Battery common positive connection position (orange)	12	COMM3 port
4	Wake-up switch	13	COMM5 Port: Providing 24VDC power for the cooling fan
5	COMM1 port: The product must be connected to the auxiliary power input AC200~240V-3A-50~60Hz when used	14	COMM6 port: communicative connection with the first battery module
6	COMM4 port: Host computer debugging port	15	Connection position of PCS positive pole (orange)
7	Battery Screen: Dispaly battery SOC, Voltage, Current and Temperature, Time, Fault code	16	Connection to the battery rack and the ground point
8	Power Indicator	17	Wireless Antenna
9	On/Off Switch		

Rated Voltage	768V	Rated Energy	241kWh	Rated Capacity	314Ah
Voltage Range	672V~864V	Standard Charge Current	157A		

Battery Cell



Rated Voltage	3.2V	Dimensions	204.47mm*174.7mm*71.65mm
Rated Capacity	314Ah	Charge/Discharge Current	≤0.5C
Rated Energy	1256Wh	Operating Temperature	Charge：0°C~55°CDischarge：-20°C~60°C
Cycle Life	6000@25° C, 0.5C/0.5C, 90%DOD, 70%EOL		

Battery Pack			
Schematic Diagram			
Battery Type	LFP	Rated Charge Current	157A
Dimensions	801*532*23 (H)	Rated Discharge Current	157A
Weight	≈115KG	Rated Voltage	51.2V
Cooling Method	Air Cooling	Rated Energy	16.07kWh
Voltage Range	44.8V~57.6V	Operating Humidity	5%~95% RH
Rated Capacity	314Ah	Operating Temperature	Charge:0°C~55°C, Discharge:-20°C~55°C

4. Fire Protection

4.1 System Configuration Overview

This project is a Hefeng Energy Storage Battery Container Project. This design protects 20 energy storage boxes.
Main system design principles:

The gas fire suppression system consists of perfluorohexanone fire suppression devices, piping, and nozzles, etc.

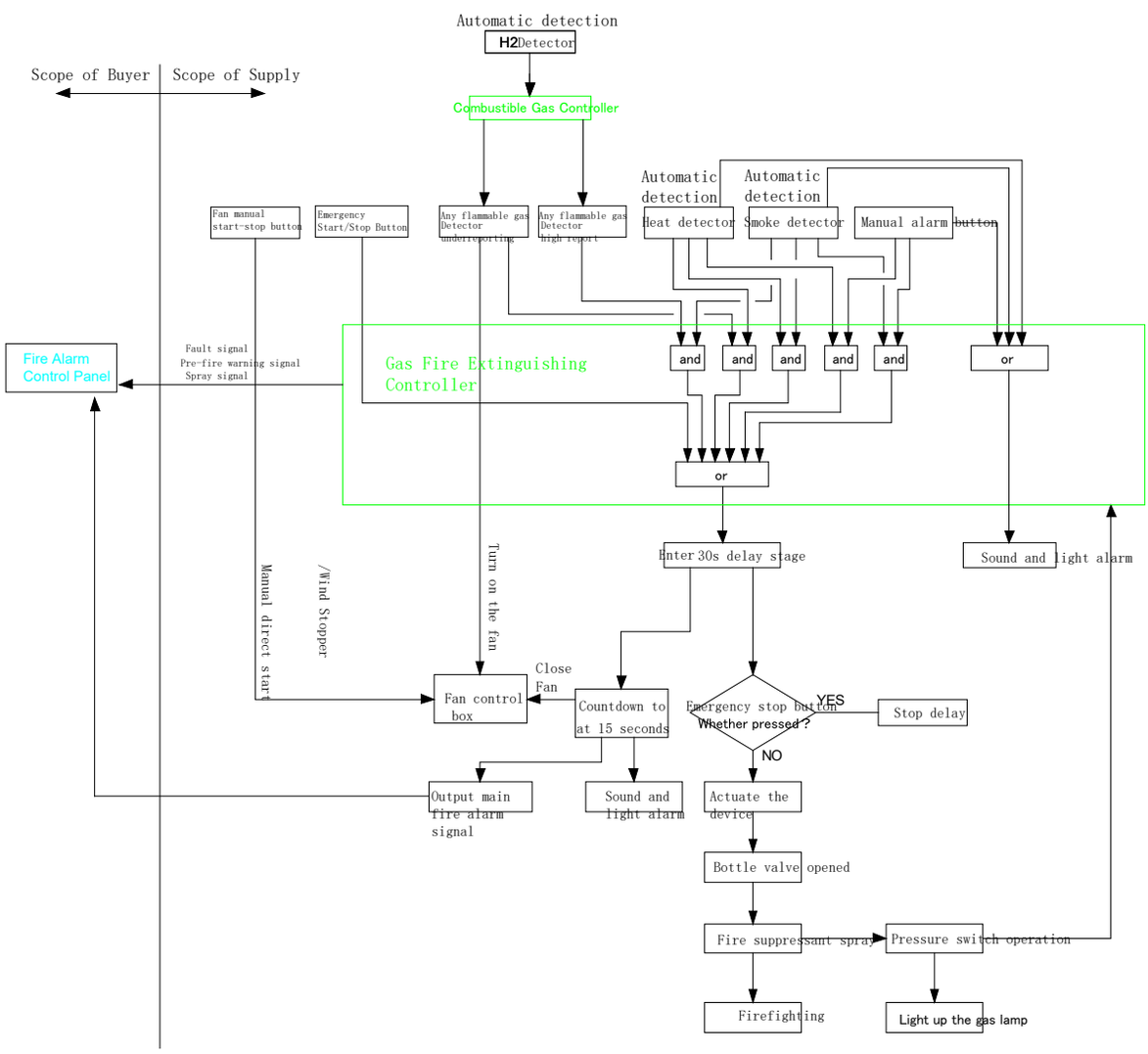
All equipment in the automatic fire alarm system adopts a bus topology.
The area includes an electrical fire controller, smoke detectors, heat detectors, and fire audible and visual alarms.
The area is equipped with emergency start/stop buttons, discharge indicator lights, fire alarms, and manual changeover boxes.
The combustible gas alarm system consists of a combustible gas controller, combustible gas detectors, etc.
The combustible gas alarm system can control the ventilation system (air exhaust volume meets the container air change requirement per minute; exhaust fans and electric dampers need to be closed before gas suppression).
The automatic fire alarm system and the combustible gas alarm system are two independent systems, wherein the gas fire suppression controller and the combustible gas controller can communicate via networking.
When the gas fire extinguishing system enters the pre-alarm state and activates the audible and visual alarm, promptly shut down the main power supply of the battery and inverter.

Design of Control System for Active Protection in Lithium Battery Energy Storage Containers

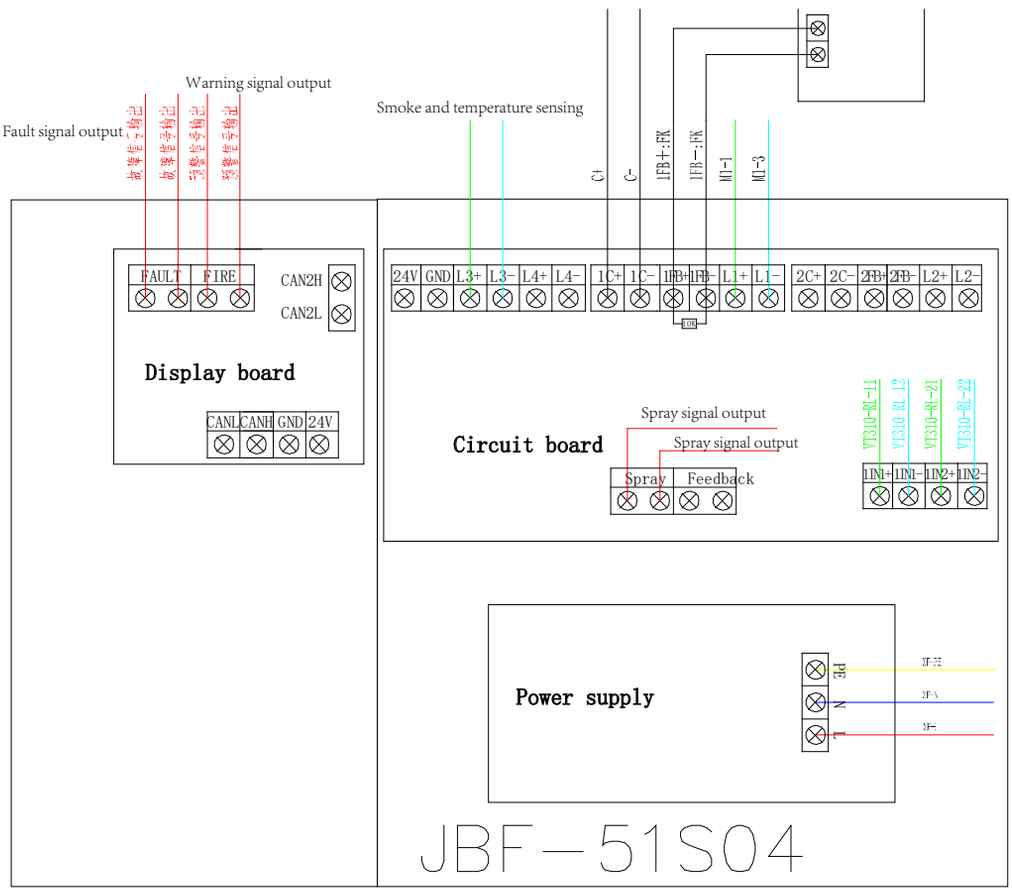
(I) Flammable Gas System Logic:
(1) When the concentration reading from any flammable gas detector reaches the first threshold (10% LEL), the gas fire extinguishing control panel, upon receiving this signal, shall place the system into a Pre-fire Alarm State. This state shall activate audible and visual alarms simultaneously, start the ventilation system, send a signal to the main fire control panel, and cut off the power supply to auxiliary equipment such as lighting and air conditioning.
(2) When the system enters the Main Fire Alarm State, the ventilation system shall be shut down, and the system shall enter the agent discharge delay stage.
(II) Fire Alarm System Extinguishing Logic:
(1) When the system is in Automatic Activation Mode:
a. If the gas fire extinguishing control panel receives an alarm from any one of the following - the battery compartment's induction detectors, perception detectors, or manual call points - the system shall enter the Pre-fire Alarm State. This signal (Pre-fire Alarm) shall be sent to the main fire control panel, and audible and visual alarms shall be activated.
b. The system shall enter the Main Fire Alarm State when the gas fire extinguishing control panel receives any of the following signal combinations:
* Combination of a first threshold signal from a flammable gas detector AND a signal from an induction detector.
* Combination of a second threshold signal from a flammable gas detector AND a signal from a perception detector.
* Any combination of two signals from among the induction detectors, perception detectors, and manual call points.
Upon entering the Main Fire Alarm State, the system shall perform the following actions:
* Activate external audible and visual alarms to alert on-duty personnel of the fire situation.
* The gas fire extinguishing control panel shall send the information to the main fire control panel system, which will then cut off the power to auxiliary electrical equipment (e.g., air conditioning) and simultaneously shut down the exhaust/ventilation systems.
* The gas fire extinguishing control panel shall send an extinguishing command. After a 30-second delay, it will activate the container valve of the battery compartment's fire suppression unit, releasing the entire charge of Perfluoro (2-methyl-3-pentanone) agent.
* Upon receiving the extinguishing agent discharge feedback signal, the gas fire extinguishing control panel shall activate the "Agent Released" indicator, ensuring rapid suppression of open flames after discharge.
(2) During Emergency Manual Activation Mode:
a. When personnel enter the battery compartment for maintenance, the system shall be switched to Manual Activation Mode. In this mode, equipment within the system will not activate automatically.
b. If personnel discover a fire, they can press the emergency start button for manual activation. Upon receiving the start signal, the gas fire extinguishing control panel shall place the system into the Main Fire Alarm State. The subsequent actions are the same as those in the Automatic Activation Mode.

This Gas Fire Suppression System:
Design Principle: This system has automatic and manual control modes. The protected area is equipped with two detection circuits. When the first detector sends a fire signal, an alarm is issued (audible and visual alarm), indicating the location of the fire and alerting staff. When the second detector sends a fire signal, the automatic fire suppression controller begins the delay stage (0~30s adjustable). The audible and visual alarm sounds and linkage devices activate (close ventilation and air conditioning, fire shutters, etc.). This stage is for evacuation. After the delay, a suppression command is issued, activating the electromagnetic drive device of the agent cylinder group. After piercing the container's working diaphragm, the perfluorohexanone gas in the storage cylinder is discharged through the piping and nozzles into the fire area for suppression. Simultaneously, the alarm controller receives the feedback signal from the pressure signal generator, and the spray indicator light on the control panel illuminates. If the alarm controller is in manual mode, it issues an alarm signal but does not output an action signal. After the on-duty personnel confirm the fire alarm, they can press the emergency start button on the alarm control panel or the emergency start/stop button at the protected area entrance to activate the system to spray perfluorohexanone agent.

4.2 Fire Protection Layout Diagram



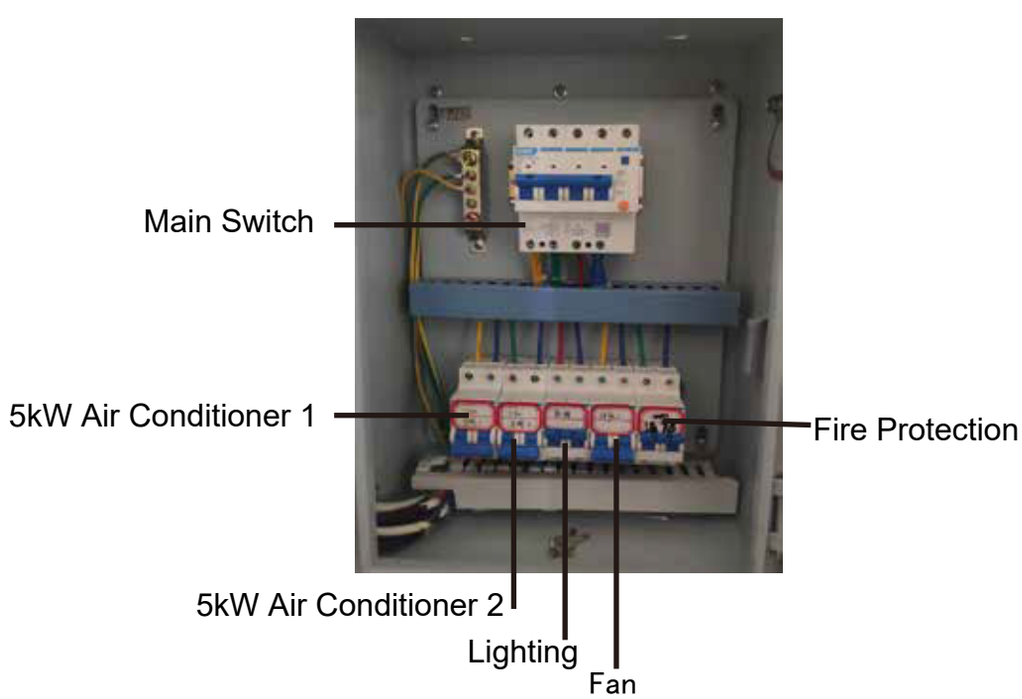
Fire Alarm System Logic Diagram

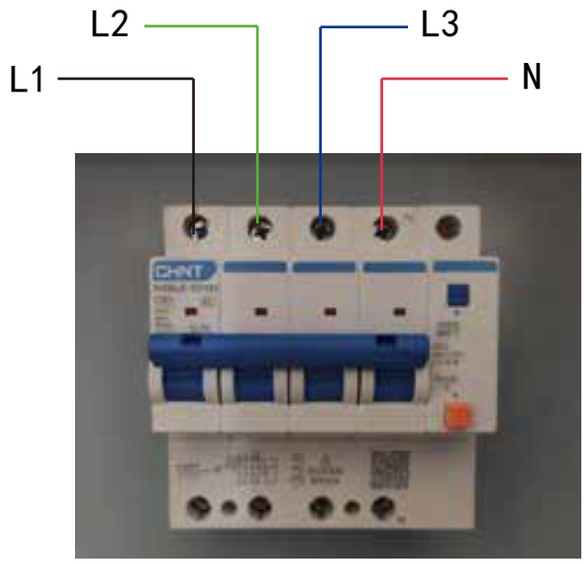


Gas Fire Suppression System Schematic Diagram

Schematic Diagram of Fire Protection System Operation

Before operating this fire protection system, it is necessary to energize the system.
The main switch inside the electric control box requires wiring. The wiring diagram is shown below:





The main switch has two power supply methods; one can be selected:

1.Directly connected to the mains power supply for operation.

2.Connect the circuit to the load output terminal of the inverter.

After the wiring harness of the main switch in the electric control box is connected, turn on the main switch, then turn on the fire protection control switch.

Use the key to open the fire protection system control box, toggle the main power switch and standby power switch to the "ON" position, then close the fire protection system control box. Wait for two minutes while the fire protection system starts operating. Please refer to the following images:

Internal View of Fire Protection System Control Box

Operational Panel Diagram of Fire Protection System Control Box

5. Installation

5.1 Installation Precautions

The energy storage integrated system is a high-voltage energy storage device. Operation and use by non-professionals or improper operation may cause electric shock, combustion, explosion, or other serious consequences.

When installing the energy storage integrated system, the user should first check whether the connection boxes, main control box, and related circuits are clear, including whether the contacts at each connection point are good, to avoid introducing open or short circuit faults.

When installing the energy storage integrated system, the user should first check that the grounding equipment is good and effective.

When installing the energy storage integrated system, do not reverse or misconnect the AC L/N poles of the power supply lines or the DC positive/negative poles, to avoid causing short circuits.

Energy storage integrated system installation requirements:

The energy storage integrated system must be installed on ground with sufficient load-bearing capacity and flatness; if the ground lacks sufficient support and flatness, it must be ensured by other means (e.g., constructing a foundation).

Sufficient door opening space needs to be reserved for the battery outdoor cabinet installation.

Do not place any items on top of the control cabinet.

Do not place in locations containing corrosive gases or liquids.

Do not install in places accessible to children.

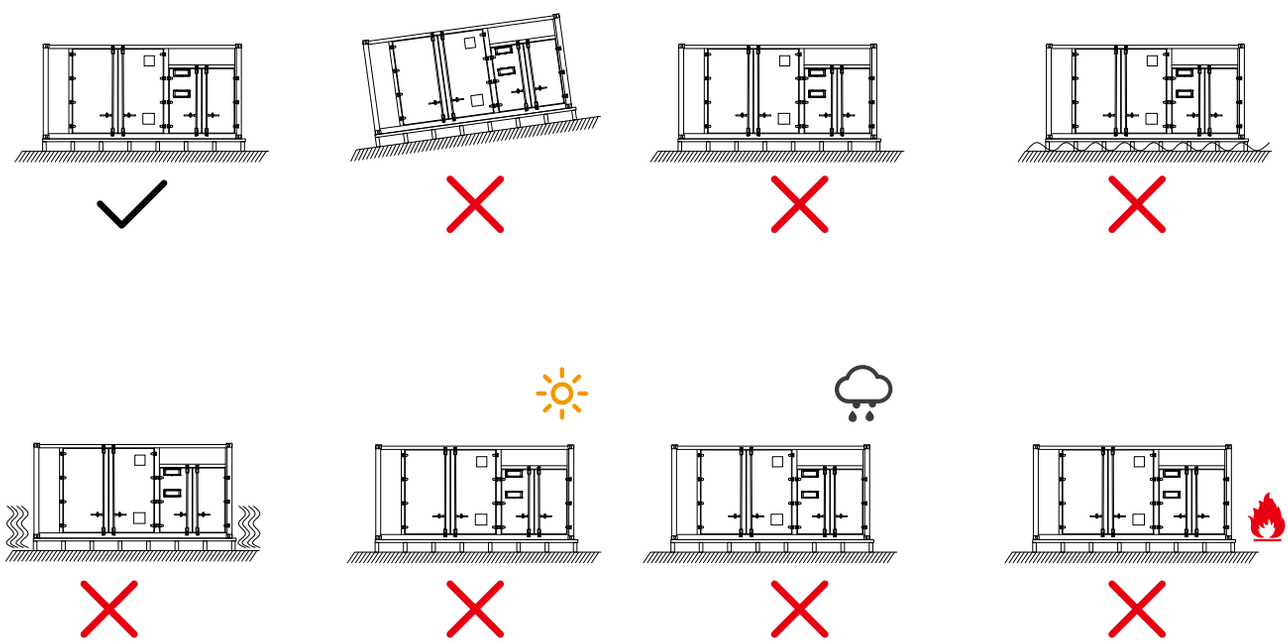
Do not place flammable, explosive, corrosive, or other hazardous materials around the equipment. The installation and maintenance of the energy storage integrated system must be performed by professional technical personnel, and relevant safety regulations must be strictly followed during use. Unauthorized installation, repair, or misuse beyond the scope by non-professionals is strictly prohibited.

Avoid placing in locations exposed to direct sunlight, rain, or dampness.

Avoid installing near high-temperature heat sources or low-temperature cold sources (ambient temperature -20~40°C is best).

Avoid installing in environments with strong interference.

Avoid installing in areas prone to water accumulation.



5.2 Operational Safety Requirements

The energy storage integrated system is a high-voltage energy storage device. Operation and use by non-professionals or improper operation may cause electric shock, combustion, explosion, or other serious consequences.

To perform system installation safely and effectively, installers must be familiar with the content of this document and all warnings, and must be professionally trained and qualified before starting work.

(1) This product is high-voltage equipment. When operating and maintaining this product, take personal protective measures and operate according to high-voltage standard operating procedures. If direct handling of batteries is required, wear insulated rubber gloves.

(2) For child safety, place corresponding warning signs around the energy storage integrated system.

(3) When touching the battery system, avoid contact with exposed metal parts.

(4) To prevent static electricity accumulation, maintenance personnel should discharge personal static electricity before operating the battery.

(5) Do not place tools, metal parts, etc., on top of or inside the energy storage integrated system.

(6) At all times, do not touch all connection ports with hands or other metal objects to avoid electric shock or short circuit.

(7) Do not step on or sit on the battery system.

(8) Do not directly short-circuit the positive and negative terminals of the battery, as this may cause battery leakage, heating, and rupture.

(9) Do not modify the battery without authorization. To prevent danger, a protection system is installed in the battery. If the protection system is damaged, charge/discharge may become uncontrollable, or the charge/discharge current may exceed the set boundary values, leading to battery leakage, heating, and rupture.

(10) Do not cover the battery system and any air inlets/outlets during charging and discharging. Otherwise, generated heat will accumulate, battery performance will degrade, and liquid leakage may occur.

The installation and maintenance of the energy storage integrated system must be performed by professional technical personnel, and relevant safety regulations must be strictly followed during use. Unauthorized installation, repair, or misuse beyond the scope by non-professionals is strictly prohibited.

5.3 Foundation Construction

5.3.1 Installation Site Selection

Operating temperature: -20~55°C;

Storage temperature: -20~45°C;

Relative humidity: 0~95%RH, non-condensing;

Altitude: ≤2000m;

Verticality: No vibration and vertical inclination not exceeding 5°;

Pollution degree: Level II

Site environment: Surrounding environment should be dry, well-ventilated, and away from flammable and explosive areas.

Soil requirements: The soil at the installation site needs to have a certain degree of compactness. It is recommended that the relative density of the soil at the installation site is ≥98%. If the soil is loose, measures must be taken to ensure foundation stability.

CAUTION Installation is strictly prohibited in working environments with metallic conductive dust.

5.3.2 Foundation Construction Requirements

CAUTION The energy storage integrated system is heavy overall. Before constructing the foundation, a detailed investigation of various conditions at the installation site (mainly referring to geological conditions and environmental climate conditions, etc.) should be conducted first. Only based on the foundation conditions can the foundation design and construction work begin.

Unreasonable foundation construction plans can cause significant difficulties or troubles for the placement, door opening/closing, and later operation of the energy storage integrated system. Therefore, the installation foundation for the energy storage integrated system must be designed and constructed in advance according to certain standards to meet requirements for mechanical support, cable routing, and later maintenance and inspection.

When constructing the foundation, at least the following requirements should be met:

(1) The foundation part of the foundation must have support.

(2) The foundation provides effective load-bearing support for the multifunctional integrated system.

(3) Elevate the energy storage integrated system to prevent rainwater erosion of the system base and interior. It is recommended that the foundation is about 300mm above the level ground of the installation site.

(4) Corresponding drainage measures should be constructed based on local geological conditions.

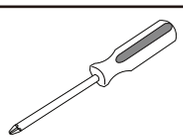
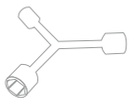
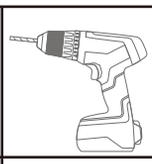
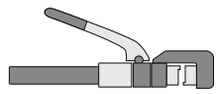
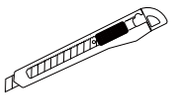
(5) Construct a concrete foundation with sufficient cross-sectional area and height. The foundation height is determined by the construction party based on the site geology.
(6) Cable routing should be considered during foundation construction. Debris excavated during foundation construction should be cleared immediately to avoid affecting the subsequent hoisting of the energy storage integrated system.
(7) The maintenance platform is consolidated with the foundation structure, facilitating later maintenance.
(8) According to the position and size of the cable entry and exit points of the battery outdoor cabinet, sufficient space for AC/DC side cable trenches should be reserved during foundation construction, and cable conduits should be pre-embedded.
(9) Determine the specification and quantity of penetration pipes based on the cable model and the number of incoming/outgoing lines.
(10) Temporarily seal both ends of all embedded pipes to prevent impurities from entering; otherwise, later cable pulling will be inconvenient.
(11) After connecting all cables, seal the cable entry and exit points and joints with fire-resistant putty or other suitable materials to prevent pests from entering.
(12) Pre-embed the grounding unit according to the relevant standards of the project's country/region.

5.3.3 Other Protective Measures

WARNING A drainage system should be constructed at the installation site to prevent the bottom of the energy storage integrated system or the equipment inside the cabinet from being flooded during seasons with abundant rainfall or heavy precipitation.

CAUTION Do not plant trees within close range around the installation site. This prevents branches from breaking in strong winds or fallen leaves from blocking the doors or air inlets/outlets of the energy storage integrated system cabinet.

5.4 Tools Required

					
Phillips Screwdriver	Socket Wrench	Heat Gun	Electric Drill	Lifting Rings ×4	Wire Stripping/ Crimping Pliers
					
Forklift (⩾5t)	Utility Knife	Marker Pen	Heat Shrink Tubing	Multimeter	

5.5 Safety Protection Equipment

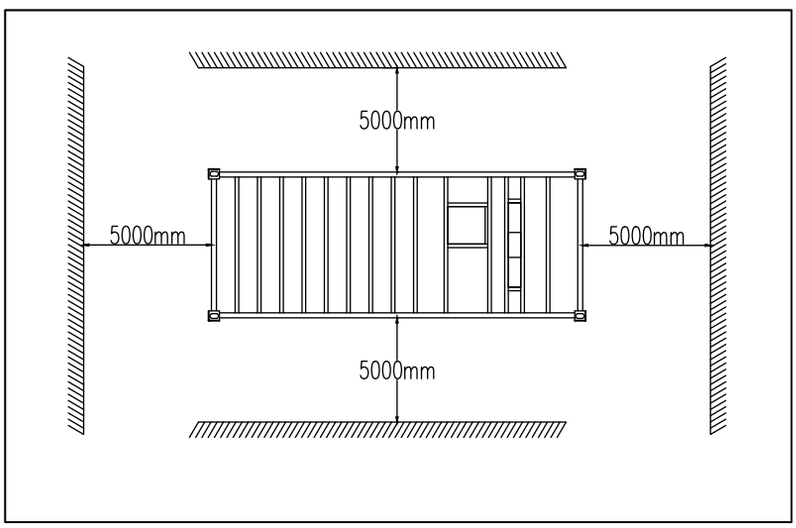
				
Anti-static Gloves	Safety Goggles	Dust Mask	Safety Shoes	Safety Helmet

5.6 Product Installation

5.6.1 Containerized Energy Storage Installation

After confirming that the foundation construction meets requirements and is sufficiently dry,sturdy, and level, hoist the energy storage integrated system onto the foundation. Weld the energy storage integrated system to the foundation using angle iron. The installation and maintenance of the energy storage integrated system must be performed by professional technical personnel, and relevant safety regulations must be strictly followed during use. Unauthorized installation, repair, or misuse beyond the scope by non-professionals is strictly prohibited.

CAUTION For specific hoisting operation steps and precautions, refer to the lifting and transportation requirements.



Recommended Installation Space for Equipment

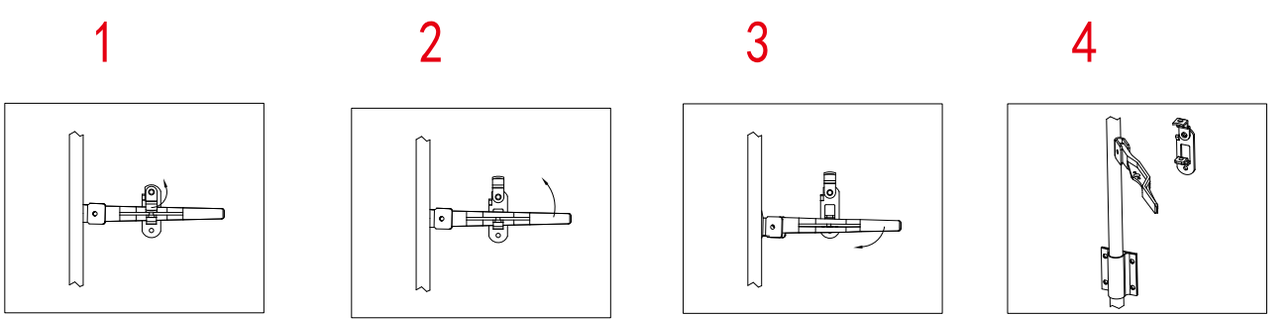
Remove Protective Film

Before leaving the factory, protective films are installed on the air inlets and outlets of the energy storage integrated system. Please remove these protective films before starting up the energy storage integrated system.

During system operation, always ensure that the air conditioner drain outlet is not blocked and drains smoothly.

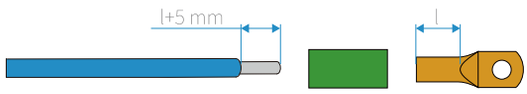
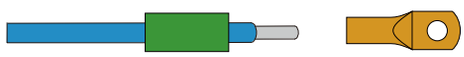
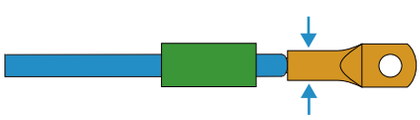
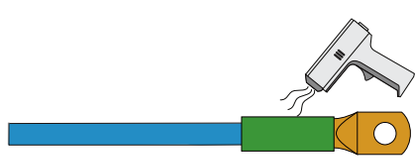
5.6.2 Opening the Cabinet Door

Open the doors before internal installation, paying attention to keeping the keys safe for future maintenance. To close the cabinet doors, perform the reverse operation, which will not be explained in detail later.



5.6.3 Making Cable Terminals

If using multi-core cables, it is recommended to add cable protection fingers at the bifurcation to prevent the outer insulation from cracking.

1  Strip the insulation from the cable end. The length of insulation stripped should be approximately the depth of the cable lug's crimping barrel plus 5mm.	2  Select a heat shrink tube that matches the cable size relatively well. The length should exceed the crimping barrel of the cable lug by 2cm.
3  Crimp the cable lug. 1 Place the exposed copper core of the stripped wire end into the crimping barrel of the cable lug. 2 Use a terminal crimping machine to crimp the cable lug tightly. The number of crimps should be more than two.	4  Slide the heat shrink tube over the cable lug, ensuring it completely covers the crimping barrel of the lug. Use a heat gun to shrink the tube tightly.

5.7 Electrical Connection

CAUTION

Before delivery, the cable connections between internal devices of the energy storage integrated system are completed. Do not disassemble without authorization. Before powering on, check if the connections are secure. If loose or fallen, contact customer service.

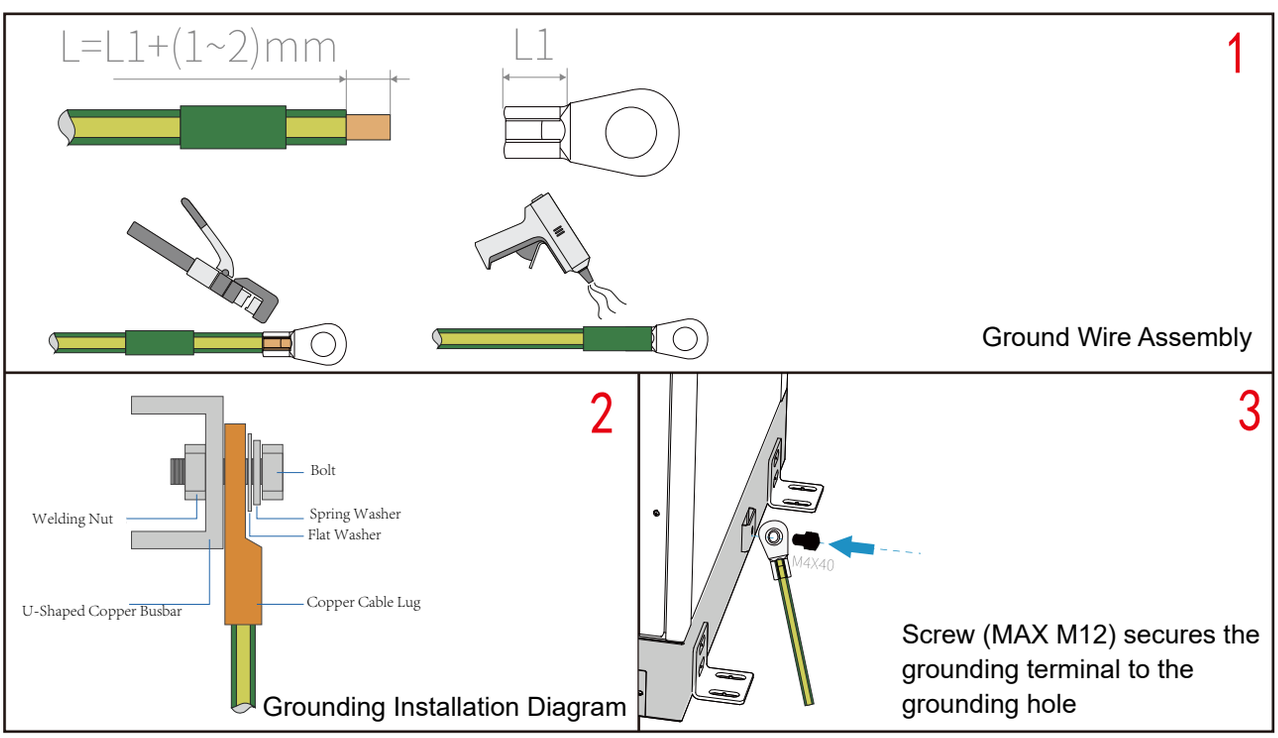
WARNING

(1) Incorrect wiring sequence may cause fire and combustion. Pay attention to the connection sequence of wiring components.
(2) Before performing electrical wiring, it is recommended to clean the terminals. Do not touch them directly with hands after cleaning.
(3) Check if the cables are damaged. If found, replace immediately with cables of the same specification and model.
(4) Check if the cable connection points are tightened properly. Ensure all terminals are fastened.
(5) During connection, ensure the fasteners are tight. Insufficient connection or oxidized contact surfaces can also cause excessive heat, potentially leading to fire.
(6) Select screws of appropriate length; they should protrude slightly from the mounting hole. If too long, they may affect the equipment's insulation performance or even cause a short circuit.
(7) After installation is complete, check the connection point between the cable lug and the busbar to see if part of the heat shrink tube is pinched. If pinched, remove it promptly; otherwise, it may lead to poor contact or even damage the equipment.

DANGER Throughout the entire process of electrical connection, and all other operations performed on equipment such as the energy storage integrated system, the following five safety rules must be observed:
(1) Disconnect all external connections of the energy storage integrated system, as well as connections to internal power supplies.
(2) Ensure that each disconnection point cannot be accidentally re-energized.
(3) Use a multimeter to ensure the equipment interior is completely de-energized.
(4) Implement necessary grounding.
(5) Use insulating material to cover nearby potentially live parts adjacent to the operation area.

DANGER
Strictly complete the electrical connections in the following order:
01 Grounding → 02 Battery BMS/Information Wiring → 03 Battery Fan Wiring → 04 Fire Protection Wiring → 05 Battery Power Cables → 06 Load → 07 Grid Connection

5.7.1 Grounding

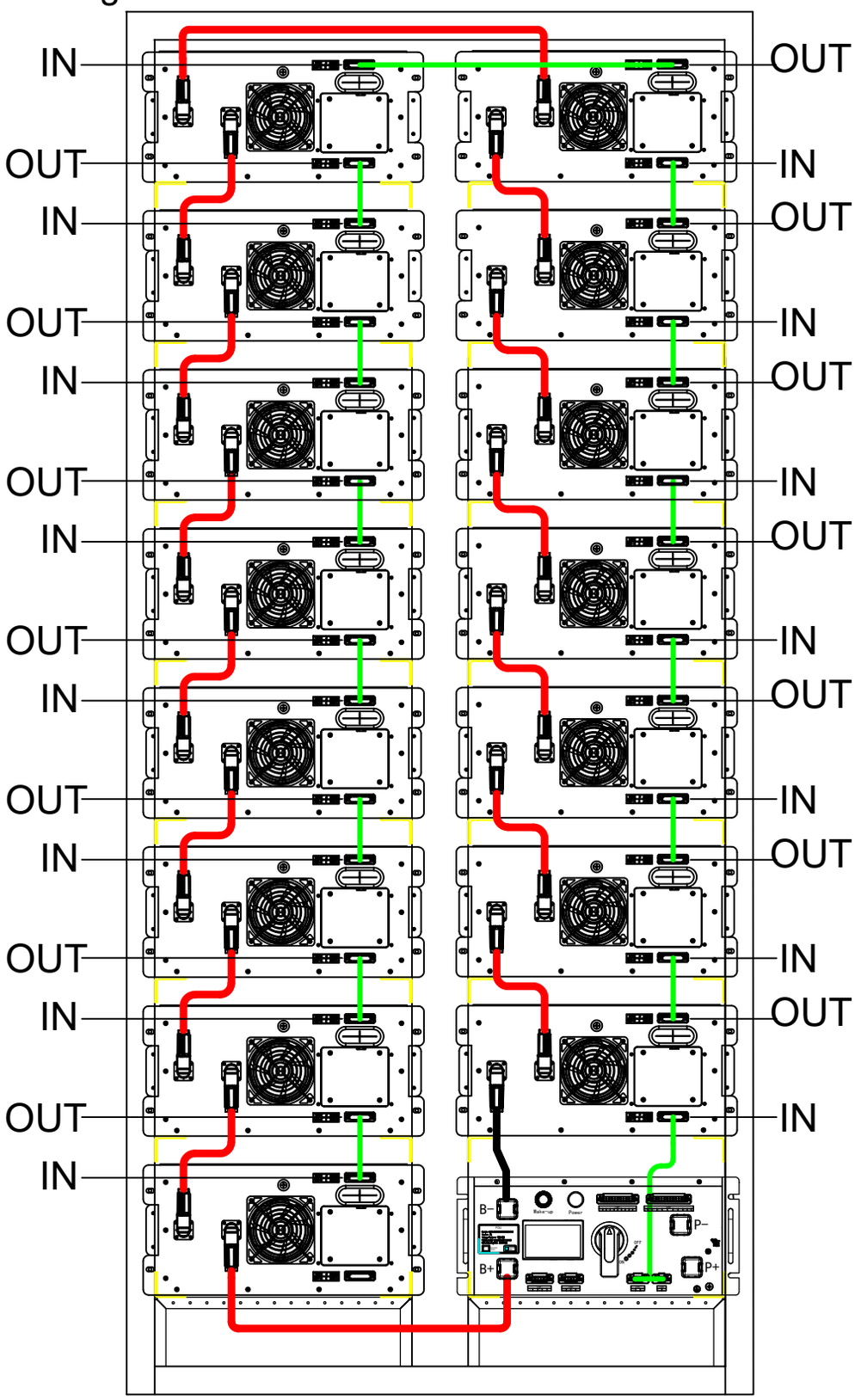


During grounding, please note:
(1) The grounding connection between the equipment and the grounding electrode must be reliably fixed.
(2) Measure the grounding resistance after grounding; the grounding resistance should be no greater than 0.1Ω.

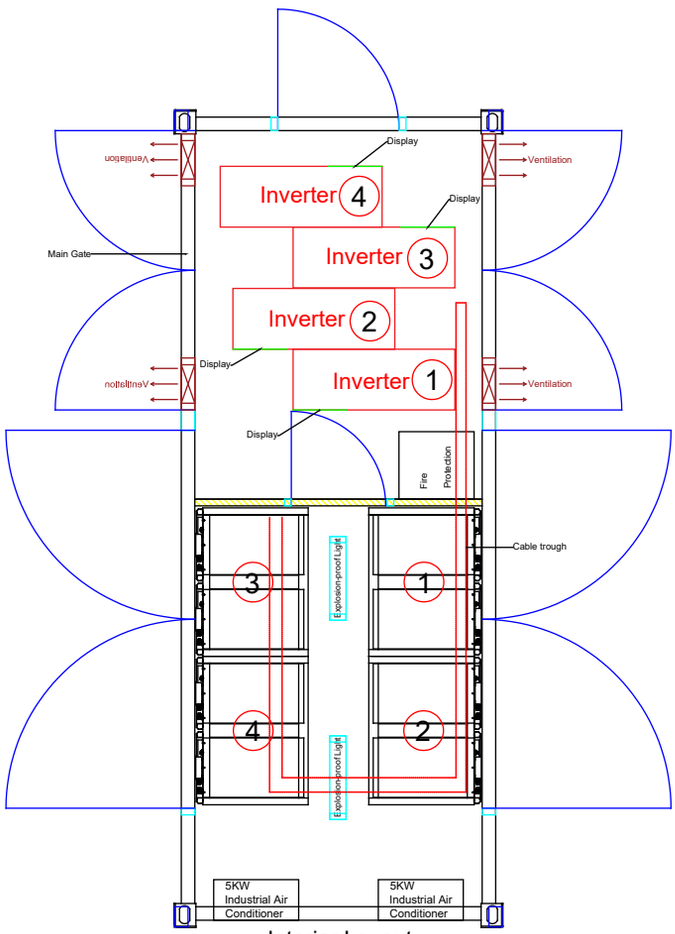
5.7.2 Battery Wiring
Electrical connections include three parts:
(1) Power cable connections between batteries and between batteries and switchgear.
(2) Communication cable connections between batteries.
(3) External cable connections.

WARNING Strictly connect the battery modules according to polarity, otherwise it will cause a battery short circuit.

Battery Wiring



Containerized Energy Storage Interior
Battery and Inverter Distribution Correspondence Diagram



Interior Layout

The battery packs are divided into four clusters. Each cluster of battery packs is divided into 15 battery packs and 1 high voltage box. The labels corresponding to the four battery clusters are 1-4. The containerized energy storage interior is equipped with four inverters, also labeled 1-4 accordingly. The label of each battery cluster corresponds to the inverter label, i.e., 1 to 1, 2 to 2, 3 to 3, 4 to 4 for connection. The cable length between battery clusters labeled 1 and 2 and their inverters is 5M. The cable length between battery clusters labeled 3 and 4 and their inverters is 10M. To ensure accurate cable connection, strictly use the specified lengths as per the notes.

The cables used for connection between the battery packs and the inverters are all placed through the cable trays shown in the figure to ensure neat wiring and avoid clutter.

5.7.3 Wiring and Waterproofing Treatment

(1) When overhead wiring is required for the equipment, should be adopted. If underfloor wiring is required, cables should run in concealed trenches. The principle of electrical connection is safety, reliability, and standardization.

(2) Joints are not allowed in the middle of cables.

(3) When high-voltage cables and low-voltage cables are arranged side by side, the distance between high-voltage cables and low-voltage wire harnesses should be greater than 200mm. The interval between high-voltage cables should be greater than 2 times the diameter of the high-voltage cable to ensure heat dissipation between cables.

(4) According to the design of the cable entry/exit holes of the energy storage integrated system, cables must be laid in the space below the energy storage integrated system and introduced into each device through the cable entry/exit holes at the bottom of the cabinet. Simultaneously, suitable cables should be selected according to the requirements of the internal devices of the energy storage integrated system.

(5) Terminals, connection points, and other unnecessary exposed parts of the wiring must have adequate insulation treatment.

(6) After confirming all wiring is correct and secure, use bricks or fire-resistant putty to seal the gaps at the cable entry/exit holes on the side of the battery outdoor cabinet. Also, perform waterproofing treatment on the installation foundation of the energy storage integrated system.

(4) Connection to the grid can only be made after obtaining public grid approval and following all relevant safety instructions.

(5) The AC output must ensure proper internal grounding of the equipment.

(6) DC and AC circuits are isolated from the enclosure. If required by relevant national electrical codes, the installer needs to perform system grounding connection.

5.7.4 Completing Electrical Connection

CAUTION After all electrical connections are completed, conduct a comprehensive and careful inspection of the wiring.
(1) It is necessary to check the connection status of all cables. Ensure all connections are correct and tight.
(2) Effective protection for the cable entry/exit holes of the energy storage integrated system is required, such as using fire-resistant putty to seal gaps between cables.
If waterproof terminals are used for sealing, check if the waterproof terminals are tight. Seal any unused terminals.
(3) Firmly restore all protective mesh covers.
(4) Perform waterproofing treatment on the foundation at the bottom of the outer cabinet of the energy storage integrated system.

Wiring Physical Diagram

High Voltage Box Panel Wiring Diagram

High Voltage Box B+ to Battery Pack Wiring Diagram

Connection Diagram for Two Battery Packs

High Voltage Box B- to Battery Pack Wiring Diagram

Communication Cable Connection Diagram

Diagram for Two Battery Packs Power Cable

6.Operation Methods

6.1 PCS Appearance Introduction

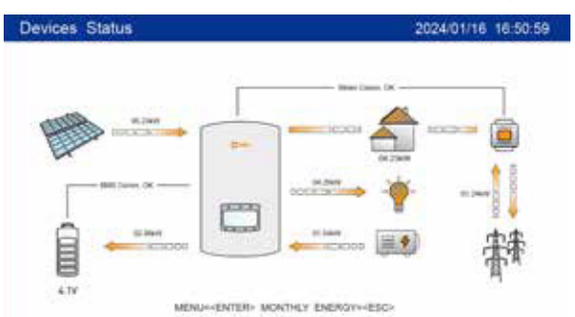
Designed specifically for commercial hybrid energy systems.
This inverter can operate in maximum self-consumption mode and provide backup power when the grid fails and PV generation is insufficient to meet load demand.

Figure 1.1 Front side view

6.2 Operation Steps

Step 1: Enter Home page

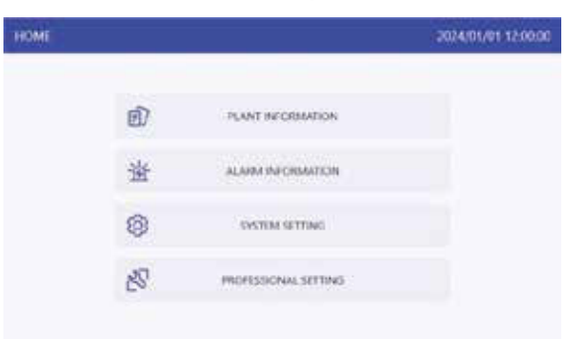
After quick setting, press “ENTER”, the screen displays the home page.



The screen will be automatically turn off after being idle for a few minutes to save power, click any operation button（ESC”/”UP”/”DOWN”/ “ENTER”）to restart the screen, then press “Enter” into the main operation interface.

Step 2: Enter “SYSTEM SETTING” interface

Press“Down” button, then press “ENTER” into the “SYSTEM SETTING” interface.



Step 3: Set “Storage Mode”

Use “UP” or “DOWN” key to select the desired mode, then press “ENTER”.

The Mode description please refer to 5.4.1.

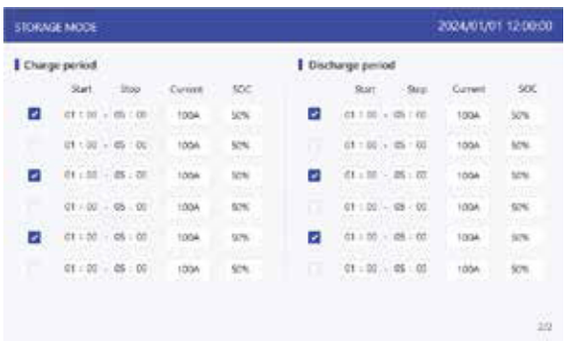
Settings	Description
Battery reserve	Range: 5~95%, default: 80%, settable. When battery SOC ＜ set battery reserve SOC, battery will stop discharging.
Allow grid charging	Allow grid charging the battery when it enables. Notice: if “Allow Grid Charging” is turned on, the inverter will use grid power to charge the battery only under two circumstances: The battery drains to the Force Charge SOC. When PV power output can’t meet the set current value during the charge periods.
Max export power	Default: 1.1 times of rated power. Notice: if feed-in is not allowed, set Max export power to 0.
Export calibration	Range : -500w-500w, default 20w, settable. To compensate the deviation of CT/Meter in practical application.
Grid peak shaving	Default enable, default 2 times of rated power. Limit the power drawn from the grid to prevent from exceeding regulatory requirements or the power line capacity. It works only when the “battery reserve” turned on.

Table 3 Description of storage mode settings

Step 4: Set “Time of use” under each mode (Skip this step if no need)

Time of Use is for manual control of the battery charging/discharging. It is for customizing when the battery is allowed to charge and discharge power and at what rate, established by a current(amperage)setting.

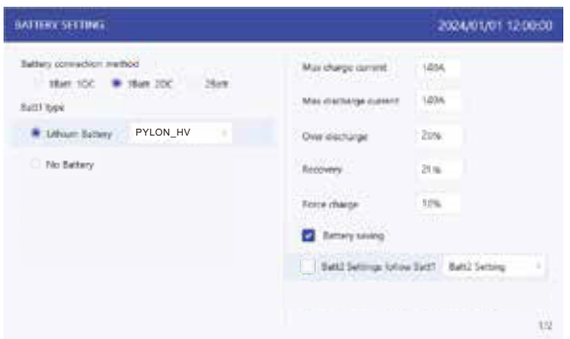
1. Charge period: battery charges with set current value until the charging cut-off voltage (settable), checking the box to control whether enable this charging period.
2. Discharge period: battery discharges with set current value until the discharging cut-off voltage (settable), checking the box to control whether enable this discharging period.



NOTE:

The set current value is the maximum current for charging/discharging the battery. However, the actual charging and discharging current may not reach this value due to the influence of other factors, such as the maximum charging/ discharging power limitation of the inverter, the battery BMS limitation, etc.

Step 5: Set “Battery Setting”



Settings	Description
Max charge current	Max charge current, settable.
Max discharge current	Max discharge current, settable.
Over discharge	Range: 5~40%, default 20%, when battery SOC ＜ over discharge, it will stop discharging.
Recovery	Range: set Over discharge value +1% ~ set Over discharge value +20%; The battery can discharge when the SOC/Voltage reaches the set value. Avoid repeated changes in the charging and discharging status of the battery.
Force charge	The battery will be charged to the over discharge SOC/Voltage when it reaches this setting.
Max charge SOC	The maximum SOC/Voltage that the battery can be charged to. Default 100%.

Table 4 Description of battery mode settings

NOTICE:

Force charge SOC ＜ Over discharge SOC ＜ Recovery SOC, otherwise the setting might be error.

Step 6: Set "Grid Port"

(Skip this step if grid code is already set in quick setting)

Select grid code that meet the local regulations.

Three level of Over-voltage / under-voltage / Over-frequency / under-frequency are default based on grid code, there is no need to set the parameters in manual.

Step 7: Set "Smart Port"

(Skip this step if the system is not connected to generators)

When it is connected to Generator, select "Gunset input";

When it is connected to smart load like heat pump，select "Smart load output"

When it is connected to Grid-tied inverter，select "AC coupled"

Genset

The user need to input the "Genset rated power" by manual.

OFF: Generator stops charging SOC, settable, range:35~100%;

ON: Generator start charging SOC; settable, range:1~95%;

AC coupled:

Max Freq: Grid-tied inverter stops charging frequency, settable,

If grid Level 1 over-frequency threshold <55Hz,

Range: Level 1 over-frequency threshold~ Level 1 over-frequency threshold+ 0.1Hz~54Hz;

If grid Level 1 over-frequency threshold <65Hz,

Range: Level 1 over-frequency threshold~ Level 1 over-frequency threshold+ 0.1Hz~65Hz;

Step 8: Set parallel system

Set Master and Slave machine,

Set Master ID as: 1

Slave machine ID as: 2

.Slave machine ID as: 3

..... and so on.

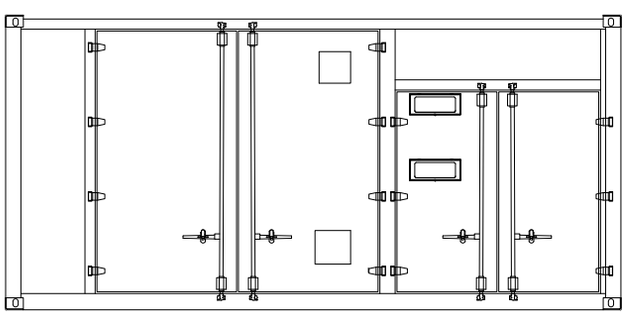
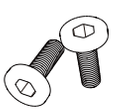
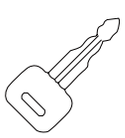
7.Packaging, Transportation and Storage

7.1 Items in the Package

The energy storage integrated system has undergone strict testing and inspection, but it may still be damaged during transportation, so please inspect it carefully.

If any transport damage or missing items are found, report it immediately to the carrier and your local distributor.

Packing List

Containerized Energy Storage Cabinet (with battery)*1	**Screws*N**	User Manual*1
		
	Keys*N (1 keys per door)	
		

Wire Harness List

	Parts List					Parts List			
	Name	Specification	Quantity	Remarks		Name	Specification	Quantity	Remarks
Group 1	B+ Cable	2AWG/1200mm	1	Not installed, in parts case	Group 2	B+ Cable	2AWG/1200mm	1	Not installed, in parts case
	B- Cable	2AWG/200mm	1	Not installed, in parts case		B- Cable	2AWG/200mm	1	Not installed, in parts case
	Jumper Cable	2AWG/1000mm	1	Not installed, in parts case		Jumper Cable	2AWG/1000mm	1	Not installed, in parts case
	Series Cable	2AWG/320mm	13	Not installed, in parts case		Series Cable	2AWG/320mm	13	Not installed, in parts case
	Inverter Cable	25mm²/4000mm	4	Installed, not connected		Inverter Cable	25mm²/5000mm	4	Installed, not connected
	Communication Cable	200mm/6P	14	Installed, connected		Communication Cable	200mm/6P	14	Installed, connected
	Ethernet Cable	4000mm	1	Installed, connected		Ethernet Cable	5000mm	1	Installed, connected
	Mains Cable	3X1.0/4000mm	1	Installed, connected		Mains Cable	3X1.0/5000mm	1	Installed, connected
	Jumper Comm Cable	800mm/6P	1	Installed, connected		Jumper Comm Cable	800mm/6P	1	Installed, connected

	Parts List					Parts List			
	Name	Specification	Quantity	Remarks		Name	Specification	Quantity	Remarks
Group 3	B+ Cable	2AWG/1200mm	1	Not installed, in parts case	Group 4	B+ Cable	2AWG/1200mm	1	Not installed, in parts case
	B- Cable	2AWG/200mm	1	Not installed, in parts case		B- Cable	2AWG/200mm	1	Not installed, in parts case
	Jumper Cable	2AWG/1000mm	1	Not installed, in parts case		Jumper Cable	2AWG/1000mm	1	Not installed, in parts case
	Series Cable	2AWG/320mm	13	Not installed, in parts case		Series Cable	2AWG/320mm	13	Not installed, in parts case
	Inverter Cable	25mm²/10000mm	4	Installed, not connected		Inverter Cable	25mm²/10000mm	4	Installed, not connected
	Communication Cable	200mm/6P	14	Installed, connected		Communication Cable	200mm/6P	14	Installed, connected
	Ethernet Cable	10000mm	1	Installed, connected		Ethernet Cable	10000mm	1	Installed, connected
	Mains Cable	3X1.0/10000mm	1	Installed, connected		Mains Cable	3X1.0/10000mm	1	Installed, connected
	Jumper Comm Cable	800mm/6P	1	Installed, connected		Jumper Comm Cable	800mm/6P	1	Installed, connected

The parts case contains the following items:

B- Cable

B+Cable

Jumper Cable

Series Cable

7.2 Storage Requirements

If the equipment is not installed and used immediately, confirm that the storage environment meets the following conditions:

a. Check the exterior and interior to ensure no abnormalities.

b. If not installed within five days after unpacking, it is recommended to store the equipment properly.

c. For long-term storage, the battery charge is recommended to be maintained at 25%~60% SOC. Perform a charge-discharge cycle every 3 months of storage.

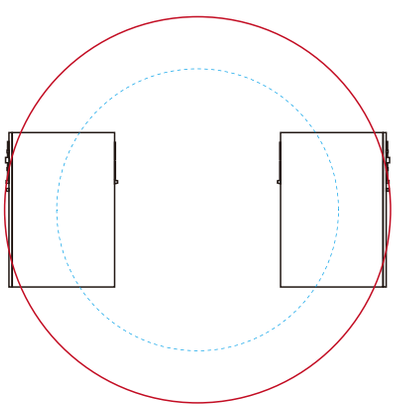
d. Storage temperature range: Storage at -20°C~45°C should not exceed 3 months; Storage at 0°~35°C should not exceed 1 year.

e. Humidity range: 0~95%RH non-condensing. Do not install if the battery interface shows signs of moisture or condensation.

f. The equipment should be stored in a cool place, avoiding direct sunlight, prohibited from rain. Storage should be away from flammable, explosive, corrosive, and other hazardous materials.

7.3 Lifting and Transportation
7.3.1 Lifting Precautions
WARNING

Preparation before work:
Check if the lifting equipment and tools are in good condition, including the crane, slings, hooks, etc.
Check the weight, dimensions, and center of gravity of the container to ensure they meet lifting requirements.
Clear the lifting site to ensure no obstacles or personnel.
Determine the lifting plan and operators, clarifying responsibilities and tasks.
Lifting operation:
Drive the crane to a suitable position, adjust the angle and length of the crane boom.
Hang the slings on the lifting points of the container, ensuring the position and angle of the slings are correct.
Slowly lift the container, check if the container is balanced and stable.
Move the container according to the predetermined route and speed, avoiding collisions and swinging.
Place the container in the designated position, slowly lower the container until it contacts the ground.
Safety precautions:
Operators must hold corresponding operation certificates and be familiar with the operation methods and safety
precautions of the lifting equipment.
During the lifting process, operators should maintain concentration and must not leave their posts without authorization.
Standing under or passing under lifted loads is prohibited to ensure personnel safety.
In case of severe weather or other unsafe factors, lifting operations should be stopped.
Regularly inspect and maintain lifting equipment and tools to ensure they are in good working condition.



DANGER

Schematic diagram of crane operation during the lifting process of the energy storage integrated system.
The inner blue dotted line indicates the crane operating range.
When the crane is working, entry into the area within the red solid line is strictly prohibited!

7.3.2 Fastening of Connecting Parts
Slings with hooks or U-shaped hooks can be used for lifting the energy storage integrated system. Correctly connect the lifting device and the energy storage integrated system.

WARNING The cross pin must be tightened and secured with a safety lock.

WARNING Hook from the inside out; hooking from the outside in is not allowed.

7.3.3 Lifting Operation

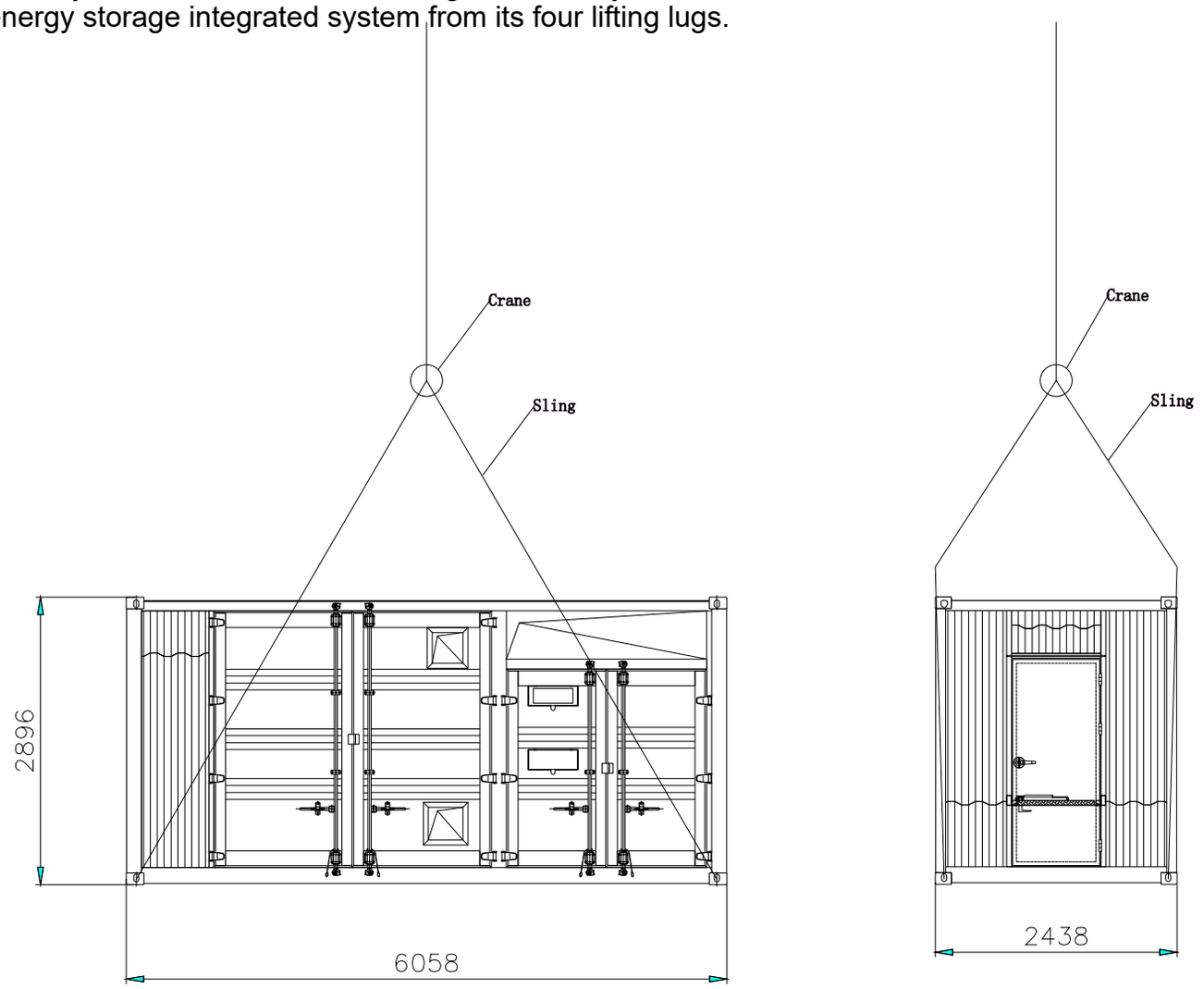
During the lifting process of the energy storage integrated system, each operation step should be performed according to the following requirements:

(1) The energy storage integrated system should be lifted vertically. During lifting, dragging on the ground or the top of the lower cabinet must not occur. Do not drag the energy storage integrated system on any surface.

(2) Pause after the energy storage integrated system is lifted 300mm from the support surface. Check the connection between the lifting tackle and the energy storage integrated system. Only after confirming the connection is secure, proceed with lifting.

(3) When the energy storage integrated system is in position, lower it gently and land it smoothly. It is strictly forbidden to place the energy storage integrated system anywhere other than the vertical landing point by swinging the lifting tackle.

(4) The site where the energy storage integrated system is placed should be firm, level, well-drained, and free of obstacles or protrusions; on the site, the energy storage integrated system should be fixed by the four bottom corner fittings. Limited by site conditions, use non-vertical force to lift the energy storage integrated system from its four lifting lugs.



Schematic Diagram of Energy Storage Integrated System Lifting

WARNING

(1) Lifting the energy storage integrated system through the bottom fork pockets is strictly prohibited.

(2) During lifting and transportation, all safety operation standards and specifications of the project's country/region must be strictly observed.

(3) The company assumes no responsibility for personal injury or property damage caused by violation of relevant requirements or other safety regulations.


SAIL SOLAR

8.Maintenance Guide

8.1 Maintenance Precautions

(1) To perform system upkeep and maintenance safely and effectively, maintenance personnel must be professionally trained and qualified before starting work. When performing maintenance work, staff must abide by relevant safety precautions and use necessary tools and protective equipment.
(2) When operating and maintaining the system, do not wear metal accessories such as gold/silver jewelry and gloves.
(3) During maintenance, use insulated tools and wear insulated gloves and insulated shoes.
(4) Before maintenance work ends, promptly clean up tools and materials. Do not place metal items and tool parts inside or on top of the equipment.
(5) When connecting or disconnecting system cables, ensure all switches are in the off state, and pay attention to normal fault protection.
(6) If system operators/maintainers have any questions about equipment operation/maintenance, stop the operation and contact the manufacturer for consultation. Do not operate without authorization.

CAUTION It must always be remembered that even if the battery cabinet is not operating, dangerous voltages exist inside the battery cabinet. After disconnecting all air switches of the battery boxes, ensure the energy storage integrated system is completely isolated from all DC and AC power sources for at least 20 minutes. Then use a voltmeter to check, ensure all power is disconnected and it is in a safe state before proceeding with maintenance work.

8.2 Periodic Maintenance

To ensure the good operation of the equipment within the energy storage integrated system, it should be maintained regularly. The maintenance periods given in this section are reference values. The actual maintenance period should be reasonably determined based on the actual environmental conditions of the project site. If the operating environment of the energy storage integrated system is relatively harsh, such as in desert areas, the corresponding maintenance cycle should be shortened. Especially for internal and external cleaning, anti-corrosion, and anti-rust work, it should be more frequent.
If the system is installed in a desert area, it is recommended to carefully inspect the inside and outside of the energy storage integrated system after each sandstorm and perform thorough cleaning.

WARNING It is necessary to regularly check whether the module cooling fans and fans inside the energy storage integrated system are operating normally, while also observing if there is any friction noise during operation. If so, it may be caused by dust ingress. Stop the energy storage integrated system and remove the dust.
After the energy storage integrated system is completely powered off, wait at least 20 minutes to allow internal capacitors to discharge. Before removing dust, use a multimeter to measure and confirm that the machine interior is completely de-energized to avoid electric shock.

WARNING Most maintenance work requires removing the protective mesh covers inside the machine. After all maintenance work is completed, be sure to restore all removed protective mesh covers to their original state. It is recommended to replace them with new screws of the same model to ensure all screws are tightened properly.

WARNING When performing routine maintenance and inspection on the internal equipment of the energy storage integrated system, if any non-conformities are found, correct them immediately. If in doubt, please contact the company immediately.

8.2.1 Maintenance Tasks (Every Two Years)

(1) System Status and Cleaning

Check if the internal equipment of the energy storage integrated system is damaged or deformed.

Check if there is abnormal noise during the operation of internal equipment.

Check if the temperature inside the energy storage integrated system cabinet is too high.

Check if the internal temperature and dust level of the energy storage integrated system are within the normal range. Clean promptly if necessary.

Check if the air inlets and outlets of the energy storage integrated system are blocked.
(2) Warning Labels

Check if warning labels and tags are clear, visible, and free from contamination or damage. Replace promptly if necessary.
(3) Cable Shield Grounding

Check if the cable shield is in good contact with the insulating sleeve; check if the grounding busbar is fixed in place.
(4) Lightning Protection Equipment and Fuses

Check if lightning protection equipment and fuses, etc., are properly fastened.
(5) Corrosion Status

Check for oxidation or rust inside the energy storage integrated system.

8.2.2 Maintenance Tasks (Annually)
(1) Cabinet Exterior

Check if there are flammable objects on top of the energy storage integrated system.

Check if the welding points between the energy storage integrated system and the foundation steel plate are firm, and check for damage, paint peeling, oxidation, etc.
(2) Presence of Rust.

Check if the energy storage integrated system has damage, paint peeling, oxidation, etc.

Check if the cabinet door locks, etc., can open and close flexibly.

Check if seals, etc., are fixed properly.
(3) Cabinet Interior

Check for foreign objects, dust, dirt, and condensation water inside the energy storage integrated system. Check the temperature and dust on the heat sinks at the air inlets and outlets. If necessary, use a vacuum cleaner to clean the heat dissipation modules.
(4) Wiring and Cable Arrangement

Check the internal equipment of the energy storage integrated system is completely powered off before starting inspection work! During inspection, if any non-conformities are found, correct them immediately.

Check if the cable arrangement is standardized and if there are any short circuits, etc. Correct immediately if abnormal.

Check if all cable entry/exit holes of the energy storage integrated system are well sealed.

Check for water seepage or dampness inside the energy storage integrated system.

Check if power cable connections are loose; re-tighten according to the previously specified torque.

Check if power cables and control cables are damaged, especially whether the sheath in contact with metal surfaces has cuts.

Check if the insulation wrapping tape on power cable terminals has fallen off.

Check if the grounding connection is correct; the grounding resistance value must not exceed 4Ω.

Check if the internal equipotential bonding of the energy storage integrated system is correct.
(5) Fans

Check the operating status of the fans.

Check if the fans are blocked. Check for abnormal noise during operation.
(6) Air Conditioner

Check if the air conditioning cooling is normal and if the internal temperature of the energy storage integrated system meets requirements.
(7) Screws

Check for dropped screws, etc., inside the energy storage integrated system.

8.2.3 Maintenance Tasks (Every Six Months to One Year)
(1) Safety Functions

Check the emergency stop button and the LCD stop function.

Simulate a shutdown.

Check the equipment warning labels and other device labels. If blurred or damaged, replace them promptly.
(2) Internal Component Inspection

Check the cleanliness of circuit boards and components.

Check the temperature and dust on heat sinks. If necessary, use a vacuum cleaner to clean the heat dissipation modules.

Replace the air filter if necessary.
Note: Ventilation of the air intake must be checked. Otherwise, if the modules cannot be effectively cooled, they will fail due to overheating.
(3) Component Maintenance

Perform routine inspection (every six months) on the rust condition of all metal components.

Contactors (auxiliary switches and micro-switches) ensure their mechanical operation is good.

Check operating parameters (especially voltage and insulation, etc.).

CAUTION The above are only recommended routine maintenance cycles for the product. The actual maintenance cycle should be reasonably determined based on the specific installation environment of the product.
Factors such as power station scale, location, and site environment will affect the product's maintenance cycle. If the operating environment is harsh or faults occur, it is very necessary to shorten the maintenance cycle and increase the maintenance frequency.

8.2.4 System Cleaning
Cleaning around and inside the energy storage integrated system is an important part of maintenance work. Due to the influence of temperature, humidity, dust in the environment where the energy storage integrated system is located, and internal equipment vibration, dust will accumulate inside, blocking air inlets/outlets or entering internal equipment, leading to potential faults in internal equipment, shortening equipment service life, or reducing power generation, etc.
During normal equipment operation, regular inspection and cleaning should be carried out to ensure the internal equipment operates in a relatively good environment to a certain extent.
(1) Cleaning Cycle
The cleaning cycle of the energy storage integrated system should be reasonably determined based on its operating environment, such as climate conditions, to ensure good cleanliness inside and outside the energy storage integrated system. If the operating environment is harsh, such as in desert areas, the maintenance cycle should be shortened.
(2) Internal Cleaning
For dust inside the energy storage integrated system, it is not recommended to sweep directly with a broom, as it easily raises dust. It is recommended to use a vacuum cleaner to adsorb the dust.
(3) Foundation Interior Cleaning
Users should regularly enter the foundation interior to check the cleanliness status. If necessary, use a vacuum cleaner for cleaning.
(4) Door Lock, Hinge Check
After cleaning work is completed, check if the door locks and hinges of the energy storage integrated system can be used normally and are in good condition. If necessary, appropriately lubricate the door lock keyholes, hinges, etc.
(5) Seal Check
Seals in good condition are an important guarantee for effectively preventing water seepage inside the energy storage integrated system. Check them carefully. If damaged, replace them immediately.

8.3 Battery Protection
Under any of the following conditions, the battery will limit charge/discharge current for protection purposes:
(1) Battery SOC is lower than I-DOD (Depth of Discharge).
(2) Battery over-temperature protection.
(3) Lithium battery BMS limitation.
(4) Battery voltage is lower than the discharge voltage.
(5) Lithium battery communication abnormality.
When charge/discharge current limiting protection occurs:
(1) In different modes, battery charge/discharge operation may be abnormal.
(2) In off-grid mode, the off-grid power supply will shut down.

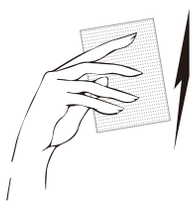
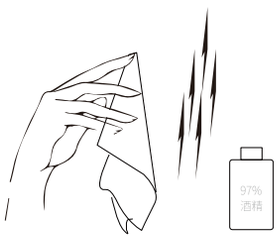
Note
If the battery charges very little or not at all for several consecutive days, the battery may continue to self-consume energy to maintain communication with the inverter.
If the battery's SOC reaches a certain level, the inverter will prompt the SOC to increase. This protection mechanism prevents the battery SOC from dropping to 0%.

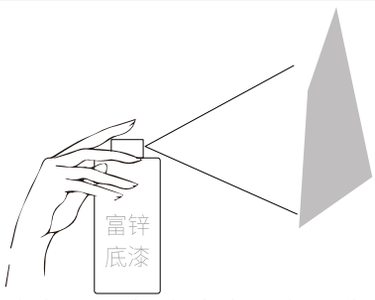
8.4 Replacing Electronic and Electrical Components
(1) When replacing electronic and electrical components of the energy storage integrated system, be sure to replace them with component products of the same model from the same manufacturer! The component model can be obtained from the energy storage integrated system label or the product's own label. If unable to install/remove, please contact the company.
(2) If replacement with products from other manufacturers or different models from the same manufacturer is required on site, it must be analyzed and confirmed by the company in advance. Otherwise, the company assumes no responsibility for personal injury or property damage caused thereby.
(3) Strictly follow the content described in this section to replace electronic components. The company assumes no responsibility for any losses caused by failure to follow the operations described in this section.
(4) Only professional technical personnel can perform the operations described in this section.

8.5 Fire Extinguishing Equipment
(1) Please comply with the fire regulations and ordinances of the project's country/region. Regularly inspect and maintain firefighting equipment to ensure all functional indicators are normal.
(2) This system uses a new type of fire extinguishing device. Its tube body is made of special molecular material and contains clean extinguishing agent inside. When the tube surface is heated, the tube bursts and forms a natural nozzle to release the extinguishing agent, thereby suppressing the fire.
(3) The surface of the tube body is very sensitive to heat. When heated, the device reacts quickly to release the extinguishing agent, allowing timely fire suppression.

WARNING Suffocation hazard! The automatic fire extinguishing of the equipment will generate a large amount of gas. Do not approach the energy storage integrated system during the fire extinguishing process.

8.6 Paint Touch-up Measures
Check the appearance damage of the energy storage integrated system:
(1) Surface dirt caused by water and dust can be cleaned.
Use a cloth (or other scrubbing tool) dipped in water to scrub the dirty areas on the surface.
If water cannot remove the stains, it is recommended to scrub with 97% alcohol until the surface cleanliness reaches an acceptable range (you can also try using locally common non-corrosive cleaners).
(2) Topcoat damaged, surface marks cannot be cleaned off.

<table>
<tr>
<td> 
Use sandpaper to sand the areas where the surface paint has burrs or is peeling, making the surface smooth.</td>
<td> 

Use a cloth dipped in water or 97% alcohol to scrub the damaged area, removing surface stains.</td>
</tr>
<tr>
<td> 

After the surface is dry, spray the pipe body coating on the areas where the base material is exposed for protection.
Spraying should completely cover the exposed base material.</td>
<td> 

After the surface is dry, use a soft brush to touch up the paint on the areas where the paint has peeled off. Try to keep the paint application even and consistent.</td>
</tr>
</table>

WARNING Check if the protective coating sprayed on the energy storage integrated system enclosure has fallen off, peeled, etc. If found, repair it promptly.
This product requires periodic maintenance. It is recommended to respray the entire exterior of the energy storage integrated system with a dedicated protective coating every 5 years.

8.7 Accident Handling

After system abnormalities or accidents occur, correct and effective handling measures should be taken promptly to eliminate further damage and loss expansion:

(1) Overheating:

When the battery pack temperature exceeds the safe operating upper limit, the management system will issue a warning and require immediate cessation of use. In this case, stop use immediately and notify relevant technical personnel for a comprehensive inspection. Use can only continue after the fault is排除 resolved.

(2) Electric Leakage:

If electric leakage is detected in the system during use, relevant personnel must be evacuated immediately, and relevant technical personnel must be notified to come to the site for handling. Use can only continue after the fault is resolved. It is strictly forbidden for the system to operate with faults or to force continued use.

(3) Short Circuit:

For system short circuits caused by various reasons, relevant personnel must be evacuated immediately, cut off relevant power sources and electrical equipment (if possible), immediately disconnect the battery from the system, and immediately notify relevant technical personnel to come to the site for repair and fault resolution. Equipment and components that have been severely short-circuited must undergo comprehensive inspection by the manufacturer before deciding whether they can continue to be used.

(4) Collision:

Due to various reasons, if there is collision, deformation, or foreign object penetration, immediately disconnect the system's power connection lines and notify professional technical personnel to come to the site for handling. In special circumstances, the customer or business department responsible person should be responsible for on-site handling before disassembly work can proceed.

(5) Fire

Step 1: Evacuate on-site personnel to a safe area, cordon off a safety isolation zone, and call the emergency number based on the situation.

Step 2: If personal safety can be ensured, perform the following operations if conditions permit:

If there is emergency smoking or fire, use a carbon dioxide or dry powder fire extinguisher to put out the fire.

If the battery catches fire, use a high-pressure water gun to extinguish it from a distance.

If smoke is accidentally inhaled, transfer to fresh air and seek medical attention as soon as possible.

Step 3: Notify the system manufacturer to obtain further handling instructions.

(6) Flooding

Step 1: Regardless of whether the system is powered on, urgently evacuate on-site personnel to a safe area and cordon off a safety isolation zone.

Step 2: Notify the system supplier for inspection after the water recedes.

Step 3: Do not start the system before receiving the system safety assessment result from the system manufacturer.

(7) Other Accidents:

If the system requires repair or removal of equipment or components due to other accidents, disconnect the battery lines first to ensure personnel are not electrocuted. Perform disassembly ensuring no short circuit can occur, and ensure the process avoids secondary damage such as collision, falling, inversion, etc.

DANGER

(1) If problems that may affect the battery or energy storage integrated system are found, contact after-sales personnel. Unauthorized disassembly is prohibited.

(2) If exposed internal filaments of conductive wires are found, do not touch. High voltage hazard. Contact after-sales personnel. Unauthorized disassembly is prohibited.

(3) If other emergencies occur, contact after-sales personnel immediately. Operate under the guidance of after-sales personnel, or wait for after-sales personnel to operate on site.

9.After-Sales Service

The company provides customers with comprehensive technical support and after-sales service.
The free warranty service period refers to the contract.
The following situations are not covered by the company's free warranty service:
(1) System damage or faults caused thereby due to not operating according to the user manual.
(2) Damage or faults caused thereby due to not wiring and supplying power according to relevant electrical safety specifications, or due to poor on-site environment.
(3) System damage or faults caused thereby due to user's unauthorized modification.
(4) System damage or faults caused thereby due to force majeure natural factors such as typhoons, earthquakes, floods, fires, or harsh environments (high temperature, low temperature, high humidity, acid rain, etc.).
(5) After a fault occurs, the user does not maintain the initial fault state and handles it themselves without timely notification to the manufacturer, making it impossible to conduct a realistic fault assessment.

If you have any questions about this product, please contact us. In order to provide you with faster and better service, we need your assistance in providing the following information:
(1) Equipment Model
(2) Equipment Serial Number (SN)
(3) Fault Code/Name
(4) Brief Description of Fault Phenomenon

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