

Energy storage integrated cabinet

EcoPower-Cube-L215A

User Manual

V1.1

2024/02/28

Manual Revision Tracking

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Declaration

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Basic Information

Manufacturer: CSE ENERGY&TECHNOLOGY CO., LTD.

Address: NO. 777, SIZHUAN ROAD, SHANGHAI, CHINA

Importer: XXX

Address: XXX

Foreword

Manual Description

Thank you for purchasing our EcoPower-Cube-L215A system product!

This manual introduces the main features, performance indicators, external structure, and system principles of the energy storage outdoor cabinet system product. It also provides installation instructions, usage & operation instructions, maintenance management, and transportation & storage information.

Please keep all accompanying materials safe for future reference after reading.

The illustrations in this manual are for illustrative purposes only. Please refer to the actual product received for specifics.

Symbol Usage

To ensure personal and property safety during the installation of this product, or to use this product efficiently and optimally, relevant information is provided in this manual, highlighted with appropriate symbols. Below are the symbols that may be used in this manual. Please read them carefully to better utilize this manual.



"DANGER" indicates a high potential hazard. Failure to avoid it will result in serious accidents, such as injury or death to personnel.



"WARNING" indicates a moderate potential hazard. If not avoided, it may result in serious accidents, such as injury or death to personnel.



"NOTICE" indicates a potential risk. If not avoided, it may result in the equipment not operating properly or cause property damage.



"CLARIFICATION" is additional information in the manual, emphasizing and supplementing the content. It may also provide tips or tricks for optimizing the use of the product, helping you solve a problem or save time.

Acronyms and Abbreviations

DSP	Digital Signal Processor
EPO	Emergency Power Off
RS485	Recommend Standard 485
PCS	Power Conversion System
BMS	Battery Management System
EMS	Energy Management System
AC	Alternating Current
Ah	Amp-hour
DC	Direct Current
FSS	Fire Suppression System
HMI	Human Machine Interface
HVAC	Heating & Ventilation and Air Conditioning
IP	Ingress Protection
kVA	Kilo Volt Ampere
kW	Kilowatt
SOC	State of Charge
SOH	State of Health
UPS	Uninterruptable Power Supply

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1 Safety Instructions

This chapter introduces safety precautions. Before performing any operations related to the energy storage product, please carefully read the manual's content and follow the operation and installation instructions as indicated in the document. Fully comply with all danger, warning, and safety information to avoid endangering personal safety or damaging equipment due to unsafe operations.

1.1 Safety Precautions



WARNING

Before operating, please carefully read the precautions and operational instructions in this section to avoid accidental incidents. The "DANGER," "WARNING," and "NOTICE" items in the manual do not represent all the safety items that should be followed; they are only supplemental to the safety precautions in various operations.



CLARIFICATION

CSE assumes no responsibility for any liability caused by violating general safety operation requirements or violating the safety standards of design, production, and equipment use.

1.1.1 Safety Operation Instructions



NOTICE

The battery voltage of this equipment is dangerously high, and improper operation can endanger life safety. Please read this manual carefully before installation and operation, and pay attention to various warning signs and statements on the equipment. Unauthorized professional maintenance personnel should not remove the casing of the power equipment.



DANGER

It is prohibited to touch the terminals or conductors on the equipment, as this may cause fatal danger!



DANGER

Damaged equipment or equipment malfunctions may cause electric shock hazard or fire! Before operating the equipment, visually inspect the equipment for damage or other dangers. Check whether other external devices or circuit connections are safe.



DANGER

Before inspection or maintenance, if the battery side has just been powered off, you must wait 20 minutes to ensure that the machine is fully discharged internally before operating the machine.

 **WARNING**

During equipment maintenance, ensure that the connection between the inverter and the battery pack is completely disconnected, and warning signs are placed at the disconnection to ensure no accidental reconnection.

 **NOTICE**

This product may cause direct current in the external protective grounding conductor. If a Residual Current Device (RCD) or Residual Current Monitor (RCM) is used as protection in the case of direct or indirect contact, then a Type-B RCD or RCM can only be used at the product's power input end.

 **WARNING**

Do not insert fingers or tools into operating fans to avoid endangering personal safety or damaging equipment.

 **NOTICE**

It is not allowed for liquids or other foreign objects to enter the energy storage cabinet.

 **NOTICE**






This product is a Class A device, which may produce radio interference when used for residential electricity. In this case, the user must take practical measures to mitigate the interference.

1.1.2 Safety Operation Instructions

 **WARNING**

The warning signs on and inside the energy storage cabinet contain important information related to the safe operation of the equipment. It is strictly forbidden to tear or damage them intentionally!

Always pay attention to the danger warning signs on the cabinet. The explanations of the signs on the cabinet are as shown as below.

Sign	Explanation
	Contains dangerous voltages that could endanger personal safety, beware of electric shock
	Please refer to the user manual when using
	Do not dispose of with regular waste, must be recycled through special means
	Caution
	External grounding mark, requires solid grounding to ensure operator safety

1.1.3 Electrostatic Protection



Static electricity generated by the human body can damage sensitive components on printed circuit boards. Before touching sensitive components, one must wear an antistatic wristband and ensure the other end of the strap is properly grounded.

1.1.4 Grounding Requirements

High risk of leakage current! Grounding must be done before making electrical connections. The grounding terminal must be securely connected to the ground.

- When installing the equipment, grounding must be done first; when removing the equipment, the ground wire must be removed last;
- It is prohibited to damage the grounding conductor;
- The equipment should be permanently connected to the protective ground. Before operating the equipment, check the electrical connections of the equipment to ensure it is reliably grounded.

1.1.5 Moisture Protection



Moisture intrusion may damage the energy storage cabinet!

To ensure the normal use of the energy storage system, please follow these instructions:

- Do not open the energy storage cabinet door when the air humidity is >95%;
- Avoid opening the energy storage cabinet door for maintenance or inspection under rainy or humid weather conditions.

1.1.6 Safety Warning Signage

To avoid accidents caused by unauthorized persons approaching or mishandling the energy storage cabinet, please follow the relevant standards during installation, routine maintenance, or inspection.

- Place warning signs at the battery input end of the energy storage cabinet to prevent accidents caused by incorrect closing.
- Place warning signs or safety tapes in the operating area to prevent unauthorized personnel from entering, causing personal injury or equipment damage.
- After maintenance or inspection, be sure to remove the inverter door key and keep it properly stored.

1.1.7 Live Line Measurement



NOTICE

Dangerous high voltage exists within the equipment, and accidental contact may lead to fatal electric shock. Therefore, protective measures must be taken (such as wearing insulated gloves) during live line measurements.

Measurement equipment must meet the following requirements:

- The range and usable conditions of the measurement equipment must meet the site requirements;
- Ensure the measurement equipment is connected correctly and standardly to avoid hazards such as electric arcs.

1.2 Operational and Maintenance Requirements



NOTICE

The operation and wiring of the energy storage cabinet must be performed by professionally qualified personnel to ensure all electrical installations comply with electrical installation standards.

Personnel responsible for installing and maintaining the equipment must undergo rigorous training, understand various safety precautions, and master the correct operating methods before they can install, operate, and maintain the equipment.



DANGER

It is strictly forbidden to install or remove power cables while the power is on. Before installing or removing power cables, the power switch must be turned off. Before connecting cables, please ensure the connection cables, cable labels, and actual installation match.



WARNING

Direct or indirect contact through wet objects with high voltage or mains electricity poses a fatal risk.

- Operators should be fully familiar with the composition and working principle of the entire energy storage system;
- Operators must be familiar with the relevant standards of the project's country and region;
- Individuals under the age of 14 and over the age of 70 are prohibited from operating the energy storage cabinet.

1.3 Environmental Requirements for Use

The operating environment can significantly affect the lifespan and reliability of the equipment. Therefore, please avoid using the equipment in the following environments for extended periods:

- Locations with temperatures and humidity levels beyond the specified technical indicators.
- Places exposed to direct sunlight or rain.
- Locations subject to vibration or prone to impacts.
- Areas with dust, corrosive substances, salt, and flammable gases.
- Poorly ventilated or enclosed spaces.
- Locations near residential areas.

2 Product Description

This chapter covers the features, appearance, operation panel, working principle, and working modes of the energy storage outdoor cabinet product.

2.1 Product Introduction

This product adopts an integrated design concept, incorporating high-performance battery cells, a Battery Management System (BMS), a high-performance Power Conversion System (PCS), a fire suppression system, and a liquid cooling system into a single standardized outdoor cabinet, creating an integrated, plug-and-play energy storage unit product. This truly achieves the transition of energy storage systems from engineering to productization.

Based on the energy storage integrated unit, it is designed layer by layer and divided into the equipment layer, connection layer, and data management layer. The core products include the energy storage integrated unit, Energy Chain, and CSE Cloud. Through this solution, it is possible to achieve a modular, efficient, and safe design from small energy storage units of hundreds of kWh to large energy storage stations of GWh, solving common industry problems such as low system safety, high parallel loss rate, and short system lifespan, and defining a new standard for energy storage system integration.

This manual is applicable to the EcoPower-Cube-L215A energy storage system. The model interpretation is as follows:

EcoPower 箬: Economical and environmental energy

Cube 箬: Energy storage system unit

L 箬: Liquid cooling

215 箬: Battery storage energy capacity (the specific capacity is subject to the actual device)

2.1.1 Product Features

a) Meeting Basic Customer Requirements

The EcoPower-Cube-L215A energy storage system has optimized control performance and enhanced system reliability. It is suitable for various application scenarios, featuring a modular design for easy installation and maintenance. The main performance characteristics are as follows:

➤ Safety Assurance

Intelligent temperature control system ensures optimal environmental temperatures.

Full-lifecycle-data black box function.

Intelligent pack-level fire suppression & proactive early warning.

➤ Efficient Operation

Ultra-low power consumption standby mode.

High safety Lithium Ferro Phosphate (LFP) battery cells.

System cycle efficiency 85%.

➤ Flexible Configuration

Modular design.

Supports multi-unit parallel connection (up to 32 units).

One-stop turnkey product.

➤ Intelligent and User-Friendly

One-button start, unattended operation, automatic running.

Built-in Energy Management System (EMS) with multiple operating mode options.

Remote operation and maintenance with cloud-based coordination and optimization.

b) Convenient operation, user-centric.

➤ Easy to operate for daily management and maintenance.

➤ Various communication methods to meet customer demands for high-speed communications. Dispatch communication uses RS485 and ethernet, while BMS communication interfaces use RS485 and CAN.

2.1.2 Applications of the Energy Storage System

CSE offers high-safety, high-reliability commercial and industrial energy storage system solutions, providing one-stop integration of battery packs, Power Conversion System (PCS), control systems, fire suppression systems, temperature control systems, and monitoring systems. These components work efficiently under

the coordination of the control system to absorb and release energy. System application scenarios are as below:

a) Combined Application of Distributed Photovoltaic and Energy Storage System:

- Photovoltaic (PV) and storage cooperation, AC-side coupling, comprehensive energy efficiency management, flexible configuration, and strong spatial adaptability.
- Suitable for scenarios where user electricity loads are dispersed, and space is limited, such as PV and storage charging stations, small factories, etc.
- Peak-valley arbitrage, load tracking demand management, improving power quality, enhancing grid supply stability, emergency power supply, real-time control, and dispatch.

b) Independent Application of the Energy Storage System:

- EcoPower-Cube-L215A connects to the 400V user-side busbar, offering comprehensive energy efficiency management, flexible configuration, and strong spatial adaptability.
- Applicable to scenarios with dispersed user electricity loads and limited site space, such as commercial centers, office buildings, industrial parks, etc.
- Peak-valley arbitrage, load tracking demand management, improving power quality, enhancing grid supply stability, emergency power supply, real-time control, and dispatch.

c) Microgrid Energy Storage System Application:

- Integration of PV, storage, and diesel for full utilization of generated power, with manual grid-connected and off-grid switching capabilities.
- Reduces energy costs and improves power supply reliability.
- Predicts PV generation and loads to ensure the safe and economic operation of the microgrid system.
- Suitable for medium to large islands, mining areas, oil fields, remote areas without electricity, etc.
- The PV, storage, and diesel systems supply power to each other, with the microgrid being managed by an Energy Management System (EMS).
- In off-grid mode, the energy storage or diesel generator system provides voltage support for the microgrid.

2.1.3 Composition of the Energy Storage System

A single integrated energy storage system primarily consists of a lithium battery energy storage unit, energy storage inverter, Battery Management System (BMS), Energy Management System (EMS), and a liquid cooling temperature control system. The entire system is controlled and managed by the BMS and EMS, which coordinate the operation of LFP batteries, PCS, and other components to absorb and release energy in commercial and industrial energy storage systems, providing a comprehensive solution for energy storage and release.

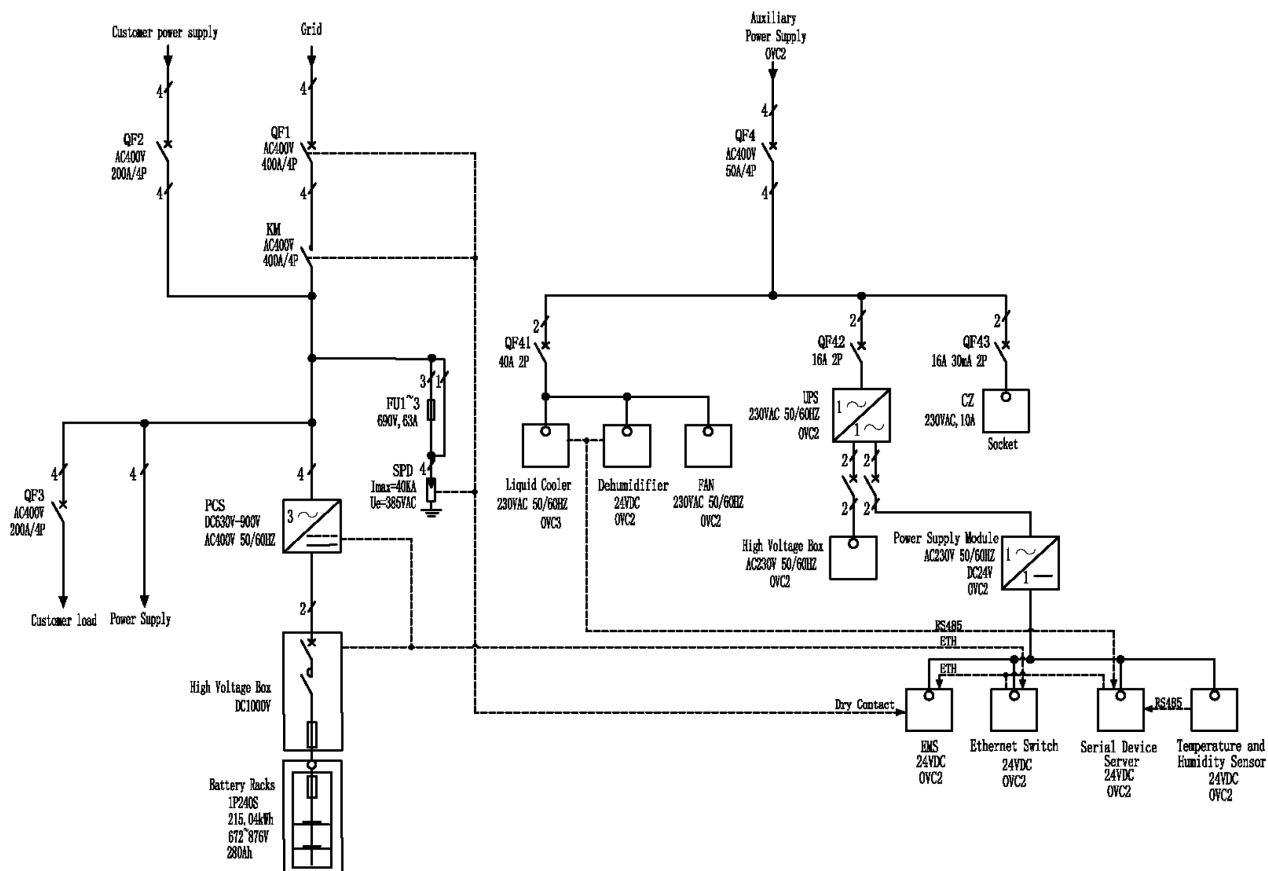


Figure 1: System Primary Diagram

2.1.4 Technical Specifications

Category	Item	Technical Specifications
Battery Parameters	Battery Type	Lithium Iron Phosphate (LFP)
	Cell Capacity	3.2V/280Ah
	System Battery Configuration	1P240S
	Battery Rated Capacity	215.04kWh
	Battery Rated Voltage	DC768V
	Battery Voltage Range	DC672~ 852V
	Maximum Charging Current	170A
	Maximum Discharging Current	170A
	Rated Charge/Discharge Rate	0.5C
AC Parameters (On-Grid)	Rated Power	100kW
	Maximum Power	110kW
	Rated Current	145A

	Maximum Current	160A
	AC Side Rated Voltage	230/400V AC
	AC Connection Mode	3P+N+PE
	Rated Grid Frequency	50Hz/60Hz
	Charge/Discharge Switching Time	<100ms
	Power Factor Range	-0.99~+0.99
AC Parameters (Off-Grid)	Rated Power	100kW
	Maximum Power	110kW
	Rated Voltage	230/400V AC
	Rated Frequency	50Hz/60Hz
System Parameters	Maximum Efficiency	>90%
	Lifecycle	≥8000
	Protection Level	IP54
	Pollution Protection Level	Class I
	Corrosion Grade	C3
	Operating Temperature Range	Discharge between -15°C and 52°C Charging between 3°C and 52°C Derating above 45°C
	Storage Environment	-20°C~45°C (within 1 month) 0°C~35°C (within 1 year) Storage Environment Humidity < 85% RH (no condensation)
	Operating Altitude	Up to 2000m (derating required above 2000m)
	PCS Cabinet Size (W*D*H)	1300*1400*2300mm
	Weight	2600kg±50kg
	Battery Compartment Cooling Method	Liquid Cooling
	Communication Method	Ethernet
	EMS Certification	EN 55032: 2015+A11:2020 EN 55035: 2017+A11:2020 EN 61000-3-3: 2013+A1: 2019 EN IEC 61000-3-2: 2019+A1:2021 EN 301 489-1, EN 301489-52, EN 301908-1, EN 301908-13
	EMC Certification	EN 61000-6-2/-4
	Safety Certification	IEC 62619, IEC 63056, IEC 62477-1, IEC 60730-1
Transport Certification	UN38.3	
Grid Connection Certification	CEI021, CEI016, EN50549, VDE4105, AS/N 4777.2	

2.1.5 Machine Configuration

No.	Item	Specification/Model	Quantity	Unit	Remarks
1	Outdoor Energy Storage Integrated Machine	100kW/215.04kWh	1	Set	Includes items 1.1 to 1.7 as a single integrated unit
1.1	Integrated Machine Cabinet	1300*1400*2300mm	1	Unit	Cabinet is already equipped with distribution components, etc.
1.2	Energy Storage Inverter	100kW	1	Unit	
1.3	EMS Controller*	Main Unit (24VDC; RF output power :23 ±2dBm)	1	Set	Includes EMS software
1.4	High Voltage Box	1000V/250A	1	Unit	Includes BMS system
1.5	Battery PACK	3.2V/280Ah, 1P48S	5	Pieces	Includes power harness
1.6	Fire Suppression System	Aerosol, Pack-level fire suppression	1	Set	
1.7	Liquid Cooling Machine	8kW	1	Unit	
2	Cloud Management Platform	Microgrid Energy Cloud	1	Set	

*Frequency range of EMS controller are as below:

LTE Band 1: 1920 MHz-1980 MHz(TX);2110 MHz-2170 MHz (RX)

LTE Band 3: 1710 MHz-1785 MHz(TX);1805 MHz-1880 MHz (RX)

LTE Band 7: 2500 MHz-2570 MHz(TX);2620 MHz-2690 MHz (RX)

LTE Band 8: 880 MHz-915 MHz(TX);925 MHz-960 MHz (RX)

LTE Band 20: 832 MHz-862 MHz(TX);791 MHz-821 MHz (RX)

LTE Band 28: 703 MHz_748 MHz(TX);758 MHz-803 MHz (RX)

LTE Band 38: 2570 MHz-2620 MHz(TX);2570 MHz-2620 MHz (RX)

LTE Band 40: 2300 MHz-2400 MHz(TX);2300 MHz-2400 MHz (RX)

2.2 Internal Layout of Equipment

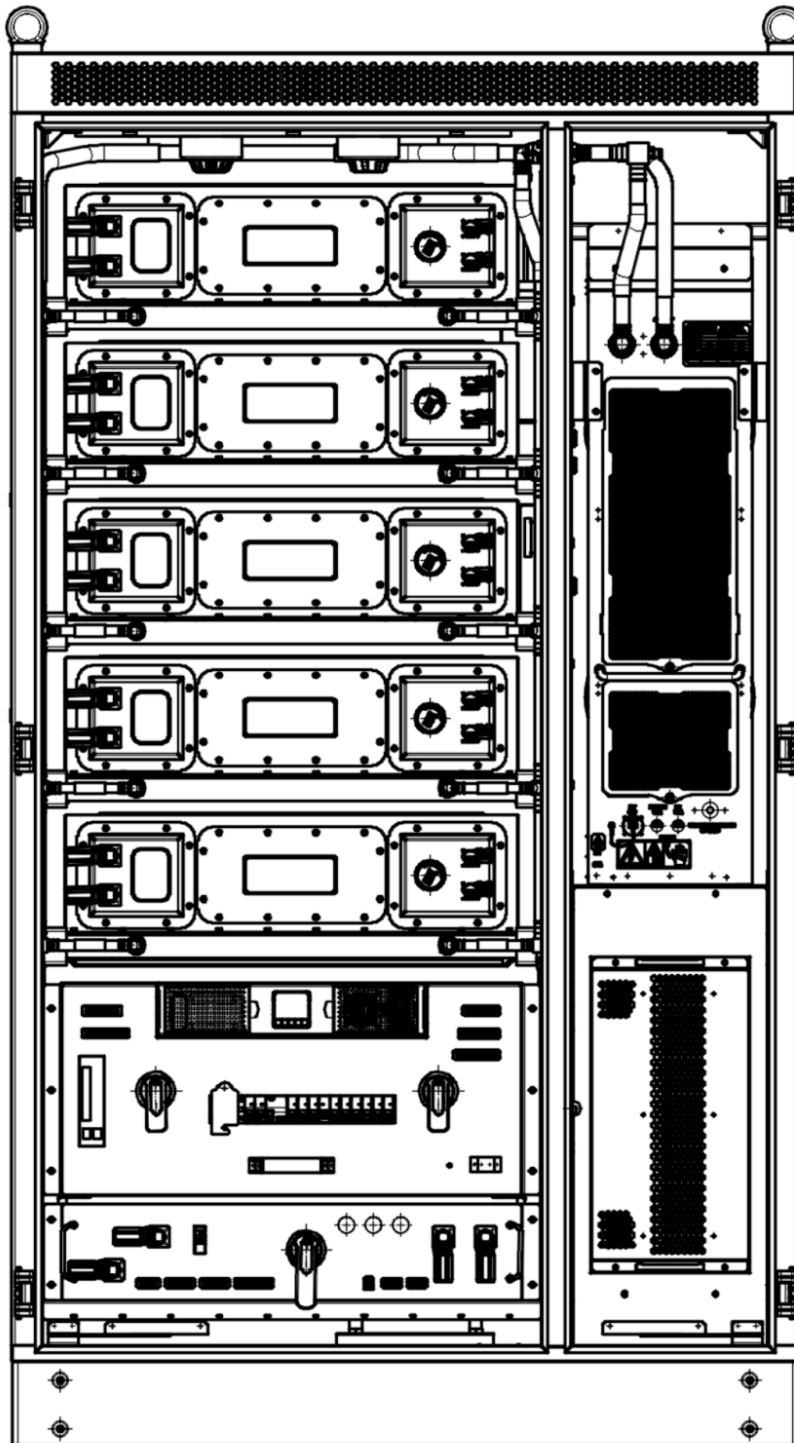


Figure 2: Front Internal Layout of EcoPower-Cube-L215A

The main components of the energy storage system cabinet are listed in the table below:

No.	Item	Description
1	Battery Box	280AH Lithium Iron Phosphate (LFP) cells, 1P240S configuration, total energy 215.04kWh
2	High Voltage Box	1000V/250A
3	Battery Management System	Includes BMU, BCU, and supporting harness
4	Energy Storage Inverter	100kW PCS
5	Energy Management System	Control main unit, station control system software
6	Liquid Cooling System	8kW liquid cooling machine and supporting liquid cooling pipeline
7	Fire Suppression System	Aerosol pack-level fire suppression
8	Cabinet	Cabinet is already equipped with distribution components, etc.

2.2.1 Energy Storage Inverter

The energy storage inverter is a modular inverter product specifically designed for small size energy storage systems, with a rated power of 100kW. It uses advanced digital control technology to optimize control functions and enhance system reliability. It is suitable for charging and discharging conditions of various batteries. The modular structure design makes installation and maintenance convenient. Advanced control strategies are implemented for battery charging and discharging management, control of charging and discharging power of the battery energy storage system, etc. It also features comprehensive protection functions, such as islanding protection, DC overvoltage, AC under/overvoltage protection, etc., to meet system requirements.

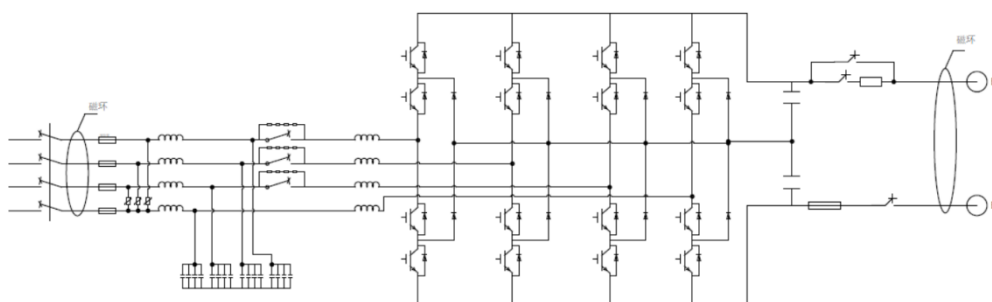


Figure 3: PCS Module Topology Diagram



Figure 4: Schematic Diagram of the PCS Module

➤ PCS Technical Specifications

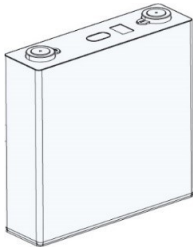
Category	Item	Technical Specifications
DC Parameters	Number of Paths	1
	DC Voltage Range	600V ~ 950V
	Maximum DC Current	192A
	Rated DC Power	100kW
	Voltage Stability Accuracy	$\leq \pm 2\%$
	Current Stability Accuracy	$\leq \pm 5\%$
	Over-voltage Protection	Available
	Over-current Protection	Available
AC Parameters (On-Grid)	Rated Output Power	100kW
	Overload Capacity	1.1 times long-term, 1.2 times for 1 minute
	Rated Voltage	400VAC
	Rated Output Current	145A
	AC Connection Method	Three-phase four-wire
	Isolation Mode	Non-isolated
	Grid Voltage Range	400V(-20% ~ +15%)
	Grid Frequency Range	50Hz/60Hz ± 2.5 Hz
	Total Harmonic Distortion of Current	$\leq 3\%$ (full load)
	Power Factor	-0.99 ~ +0.99
	DC Component of Current	$\leq 0.5\%$
	Charge/Discharge Switching Time	<100ms
AC Parameters (Off-Grid)	AC Off-Grid Voltage	AC400V
	AC Voltage Range	AC400V $\pm 3\%$
	AC Off-Grid Frequency	50Hz/60Hz

	THDU in Off-Grid Output	≤3% (linear load)
	Unbalanced Load Capacity	100%
Other Parameters	Maximum Conversion Efficiency	≥98%
	Allowable Environmental Temperature	-25°C ~ 60°C (derating above 45°C)
	Allowable Relative Humidity	≤95%
	Noise Level	≤75dB
	Protection Level	IP20
	Altitude	< 3000m (derating above 2000m)
	Dimensions	W480mm×H260mm×D720mm
	Structure and Cooling of PCS Module	Front panel with primary and secondary terminals, front intake and rear exhaust
	Ventilation Volume of PCS Module	467(CFM)
	Minimum Effective Area of Inlet	43232(mm ²)
	Minimum Effective Area of Outlet	69171(mm ²)
	Weight	70KG
	Cooling Method	Forced air cooling
	Networking Mode for Multiple Modules	DC side parallel / AC side parallel
	Emergency Stop Function	Module's IO receives emergency stop switch command
	Human-Machine Interaction	Requires external 7-inch configuration screen
	BMS Communication Interface	CAN
	EMS Communication Interface	Net Gape
	Module-to-Module Communication	Fiber optic
Communication with Screen	Net Gape	

2.2.2 Battery Module

The energy storage system utilizes Lithium Iron Phosphate (LFP) batteries as its storage medium, known for their high safety and long cycle life. These batteries feature a modular design that facilitates easy installation and maintenance. Aluminum-cased single cells of 280Ah/3.2V are used. The cells are assembled into PACK using laser welding technology, with a battery box configuration of 1P48S and a rated capacity of 43.008kWh. The total rated energy of the battery cluster is 215.04kWh.

a) Cell Parameters

Figure	Parameter Name	Parameter Value
	Dimensions (T*W*H)	71.7±0.8mm*173.9±0.5mm*207.3±0.5mm
	Weight	5.27±0.30kg
	Rated Capacity	280 Ah
	Rated Energy	896 Wh
	Rated Voltage	3.2 V
	Voltage Range	2.5 V ~ 3.65 V

b) Battery Box Module

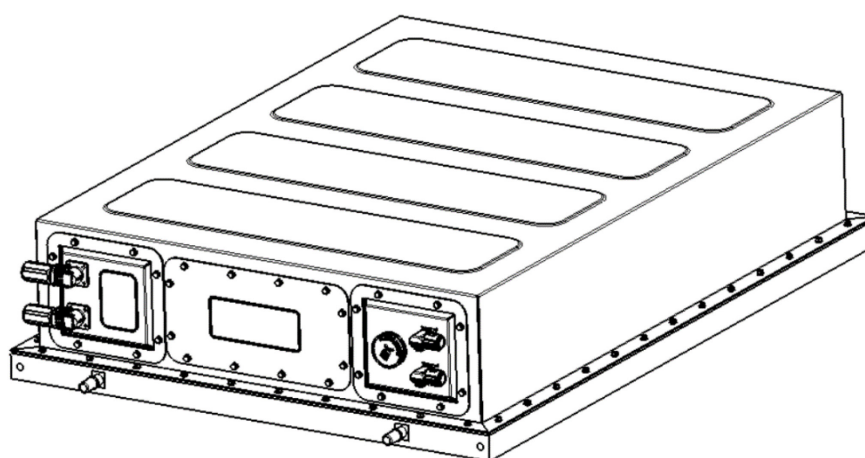


Figure 5: Schematic Diagram of the Battery Box

c) Battery Box Parameters

Item	Technical Specifications	Remarks
Battery Box Dimensions (mm)	L(1100±5)*W(810±5)*(240±5)	
Nominal Capacity (Ah)	280	25±2°C, 0.5C
Number of Cells and Configuration	1P48S	1 parallel, 48 series
Nominal Voltage (V)	153.6	
Operating Voltage Range (V)	134.4~170.4	2.8~3.55V
Continuous Charge Rate (C)	0.5	25°C
Continuous Discharge Rate (C)	0.5	25°C
Maximum Charge Rate	0.5	25°C
Maximum Discharge Rate	0.5	25°C
Weight (kg)	320±3	
Nominal Energy (kWh)	43.008	25°C, 0.5C
Number of Temperature Sampling Points	16	
Number of Voltage Sampling Points	48	

Insulation Parameters	≥130M	1000Ω/V
Pressure Resistance Parameters	2120V DC	
Life Cycle	≥8000 circles	Ambient temperature 25°C±3°C, DOD90%, 0.5C, battery remaining capacity not less than 70%
Charging and Discharging Efficiency	≥94%	
Protection Level	/	
Storage Environment	-20°C~45°C (within 1 month) 0°C~35°C (within 1 year)	Storage environment humidity < 85% RH, no condensation
Operating Environment	Charging: 3~52°C Discharging: -15~52°C	

2.2.3 High Voltage Box

The high voltage box for the battery cluster is meticulously designed based on the number of battery modules connected. It features control devices, fuses, and clear power disconnecting devices. It includes functions for fault alarm, fault protection, and safety protection to ensure the electrical safety of the batteries. It also has an emergency stop function and the capability to progressively disconnect the system during maintenance. Special consideration is given to the effects of high altitude on the direct current switch's breaking and withstand voltage capabilities. The high voltage box of the battery cluster is equipped with a total positive contactor, total negative contactor, pre-charge circuit, fuse, isolation switch, etc., and all contactors can be controlled by the Battery Management System (BMS).

High Voltage Box Hardware Specifications

Item	Specifications	Quantity	Remarks
DC Circuit Breaker	250A	1	Manual and automatic opening/ closing of the battery cluster circuit
DC Contactor	250A	2	Automatic opening/closing of the battery cluster circuit
Shunt	250A	1	Current measurement
Precharge Relay	20A	1	Precharge control
Precharge Resistor	200W/50Ω	1	
Fuse	250A	1	Protects against overcurrent in the battery circuit
Switching Power Supply	100W/24V	1	Power supply
Main Control Module	1000V	1	Battery cluster control and management module
Power Connector	250A	4	Power high voltage input/output

2.2.4 Liquid Cooling System

The liquid cooling unit primarily accomplishes the heat exchange work for the battery modules.

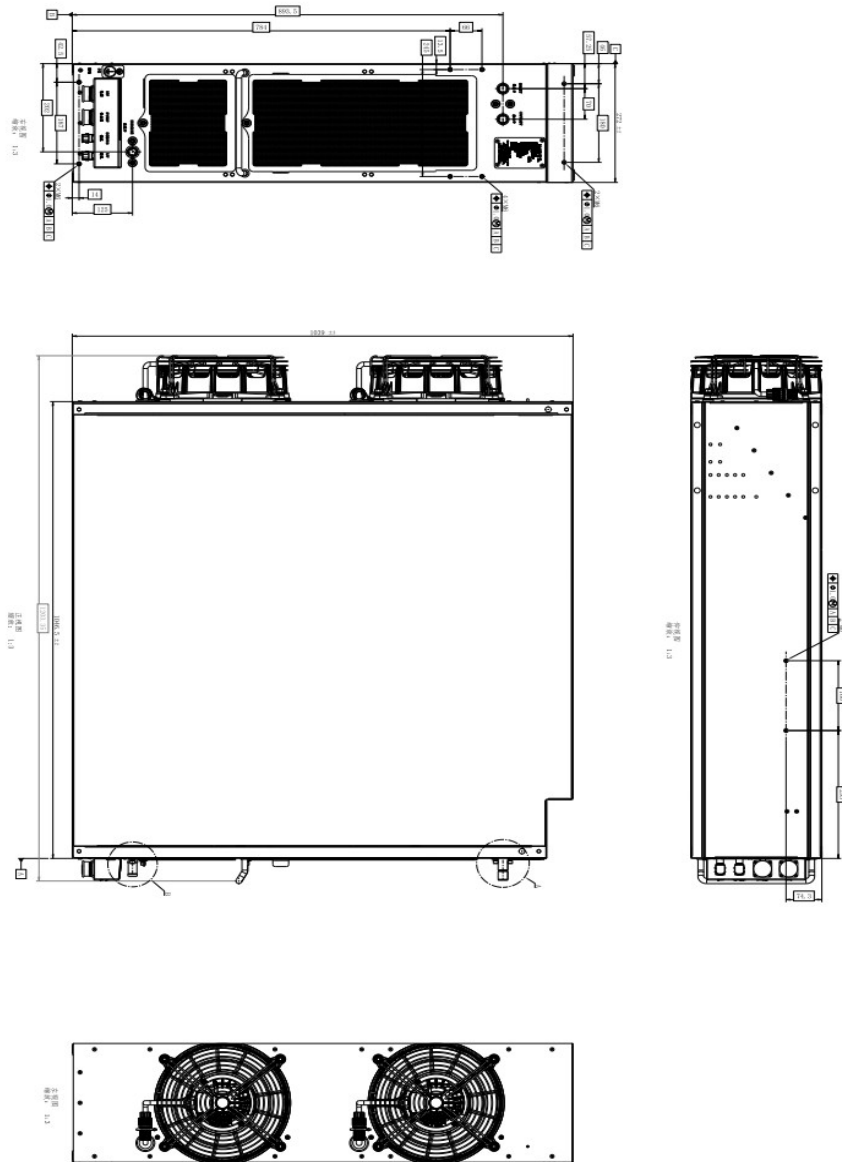


Figure 6: Schematic Diagram of the Liquid Cooling Unit

Liquid Cooling Unit Parameters

Model	BTMS-80-ESA01
Rated Refrigerating Capacity	8kW
Rated Heating Capacity	2.5kW
Total Power Supply	220
Frequency	60
Phase	1

No. of Wires	2
Total A – Cooling	20
Total A – Heating	12
Refrigerant, Type	R134a
Amount / oz	52.9
Design Pressure	-
High Side psig (MPa)	319 (2.2)
Low Side psig (MPa)	217 (1.5)
Operating Ambient Temperature (°C)	-30~60
Coolant Outlet Temperature (°C)	15~35(Cooling); <50(Heating)
Coolant Flow (L, Min)	Power Side Pressure Drop: 50@90kPa
Expansion Tank Volume (L)	2
Temperature Accuracy (°C)	±0.5
Cabinet Outer Enclosure	
Length (mm, max)	1203
Depth (mm)	272
Height (mm, max)	1039
Thickness (mm, min)	1.5
Corrosion Protection (Method)	Coating
Material	Aluminum
Weight (kg)	≤90
Color	RAL7035

2.2.5 Fire Suppression System

The product is equipped with an aerosol fire suppression system. A separate zone is designated for each PACK and battery compartment (6 zones in total), with each zone equipped with an aerosol module that includes a detector. In the event of a fire or other incidents, the fire suppression system is triggered to activate and release the aerosol extinguishing agent, thereby suppressing the spread of the fire.

Fire suppression system can upload the product status in real time. It can also output a dry contact signal to link with external devices for executing related actions when reaching the corresponding alarm level.

The system is designed to be intelligent and fully automatic. After factory settings are completed, users do not need to set parameters on site, making operation simple and maintenance convenient.

The fire suppression system uses aerosol as the extinguishing agent, which is safe, clean, and efficient.

Fire Suppression System parameters

Item	Parameter
Model Specification	QRR0.144G/S-MS-144-F-02-11
Operating Temperature Range	-40°C~+70°C
Activation Method	Dual thermal activation (no separate electrical activation)
Dispensing Time	≤15s
Oxidizer Name and Content	Strontium Nitrate, Potassium Nitrate 50%~58%
Nozzle Thermal Spacing at 400°C, 200°C, 75°C	0.2m, 0.3m, 0.4m
Net Weight per Unit	380±40g
Dimensions	155×104×16mm
Activation Current	≥700mA
Protection Space	2m ³
Thermal Initiator Activation Temperature	185±10°C
Shelf Life	10 years

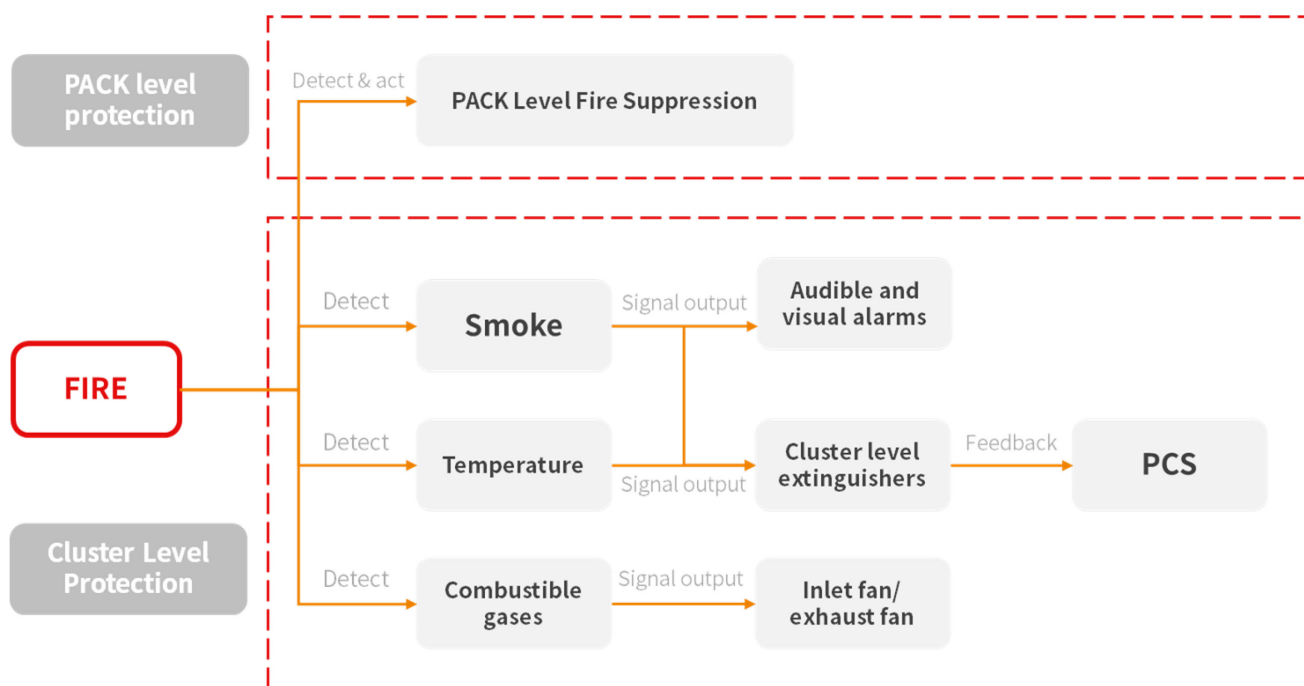


Figure 7: Logic Diagram of the Fire Suppression Device

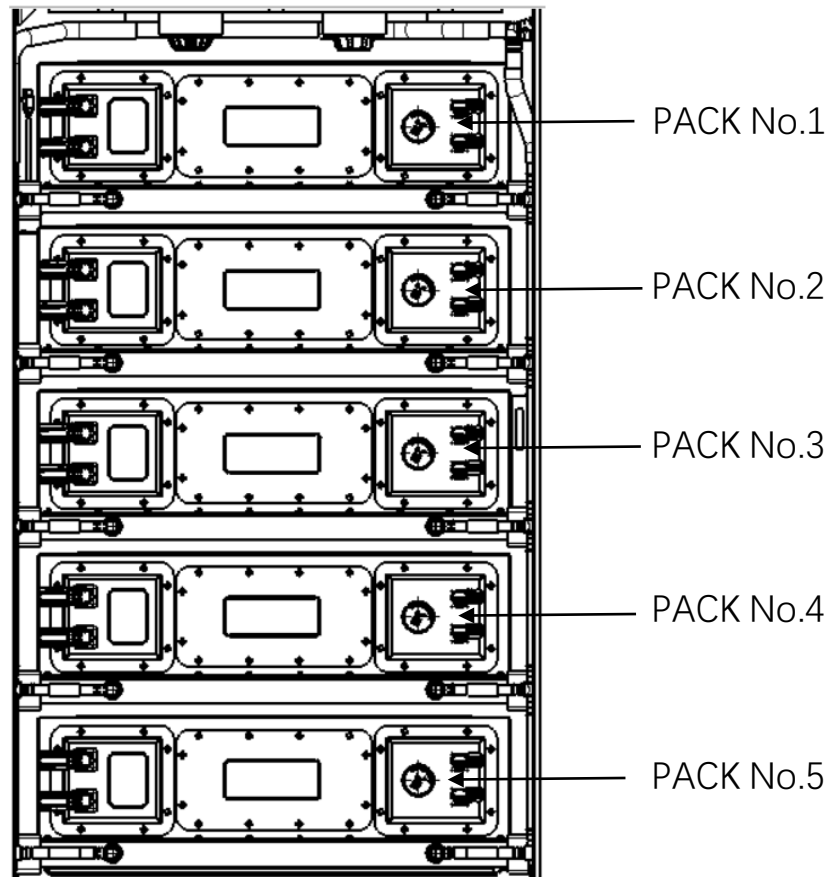


Figure 8: PACK Fire Suppression Arrangement Diagram

2.3 Cabinet Appearance

2.3.1 External Dimensions

The external dimensions of the outdoor cabinet system are as follows: the cabinet is 1300mm wide, 2300mm high, and 1400mm deep.

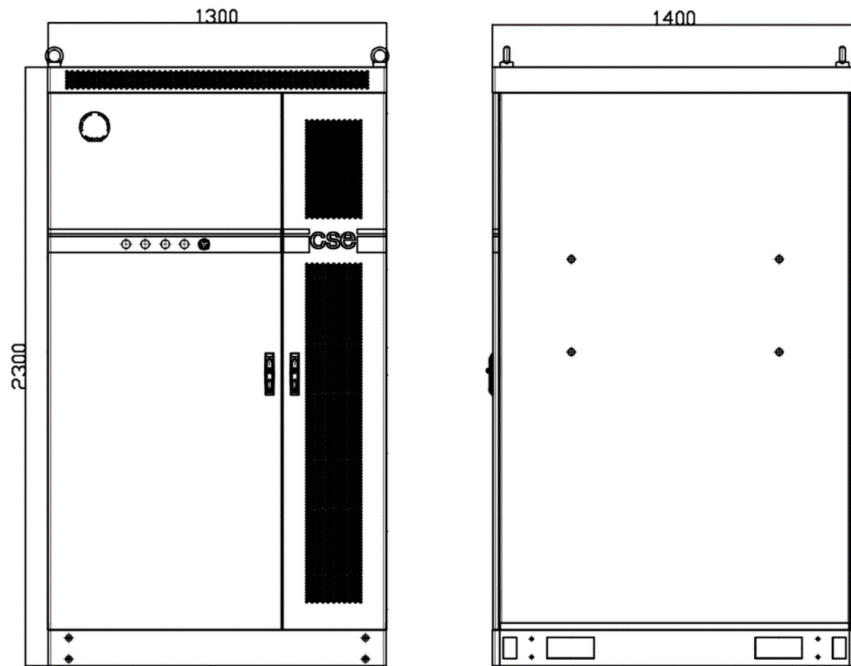


Figure 9: Dimensional Drawing of the EcoPower-Cube-L215A Energy Storage System

2.3.2 Door Panel Indicators

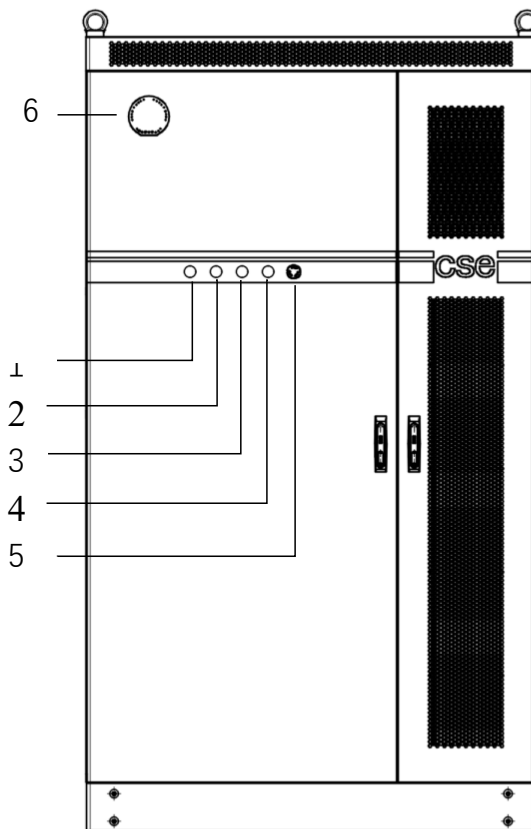


Figure 10: Front View Schematic of the EcoPower-Cube-L215A

No.	Silkscreen	Item	Description
1	Power	Power Indicator Light	Green: When the light is on, the control power supply is functioning normally
2	Grid-tied Operation	Operation Indicator Light	Blue: When the light is on, the system is operating normally in grid-tied mode
3	Off-grid Operation	Operation Indicator Light	Blue: When the light is on, the system is operating normally in off-grid mode
4	Fault	Fault Indicator Light	Red: When the light is on, a system fault is detected; the alarm indicator light will automatically turn off once the fault is cleared
5	Emergency Stop	Emergency Stop Button	Press the emergency stop button immediately in the event of an urgent system fault to disconnect the internal electrical connections of the energy storage cabinet
6	None	Audible and Visual Alarm	When the audible and visual alarm sounds and lights up, there is an abnormality occurs

3 Transportation and Storage

3.1 Transportation

The energy storage device, including the cabinet and modules, is transported as a whole unit, meaning the battery modules are fixed to the cabinet before transportation. In situations not conducive to the transportation of the entire unit, the cabinet and battery modules can also be transported separately. Attention must be paid to the markings on the packaging box when transporting and storing the cabinet. The energy storage device is designed modularly, facilitating the positioning and transportation of the equipment.

Each energy storage cabinet is rigorously inspected and tested before leaving the factory. During transportation and handling, care must be taken to avoid damaging the control system and electrical components.

Before unpacking, the energy storage cabinet should be moved as close as possible to the installation site.

During handling, the energy storage cabinet must be kept upright.

3.2 Handling



NOTICE

- During the handling process, the energy storage cabinet must be kept upright.
- When handling, if the external packaging box has been removed, it is necessary to ensure that the internal battery modules within the cabinet are securely fixed and that the cabinet's maintenance door is securely locked.

3.2.1 Forklift Handling

When moving the energy storage cabinet, a forklift can be used to move the entire cabinet. It is recommended to use a 5-ton forklift with fork length greater than 1.5 meters. Users can lift and move a single energy storage cabinet from the bottom using a forklift. During the handling process, the energy storage cabinet must be kept upright. Refer to the diagram below for guidance:

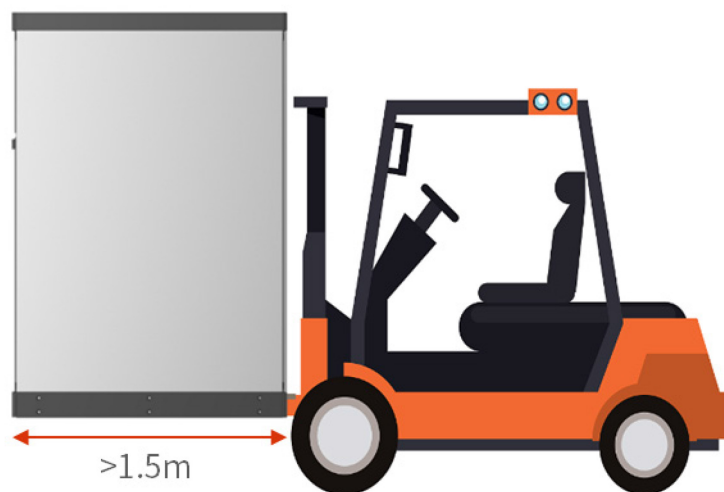


Figure 11: Forklift handling reference

3.2.2 Hoisting and Handling

When hoisting the outdoor cabinet, at least the following requirements must be met:

- Ensure site safety during the lifting process.
- Professional personnel should direct the hoisting and installation operation on-site throughout the process.
- The strength of the slings used should be sufficient to bear the weight of the outdoor cabinet.
- Ensure all sling connections are secure and reliable, making sure that the lengths of the slings attached to the corner pieces are equal.
- The length of the slings can be appropriately adjusted according to the actual requirements on-site.
- Throughout the entire lifting process, it is crucial to ensure the outdoor cabinet is stable and not tilted.
- Use the four lifting rings on the outdoor cabinet to carry out the lifting operation.
- Take all necessary auxiliary measures to ensure the outdoor cabinet is safely and smoothly hoisted.

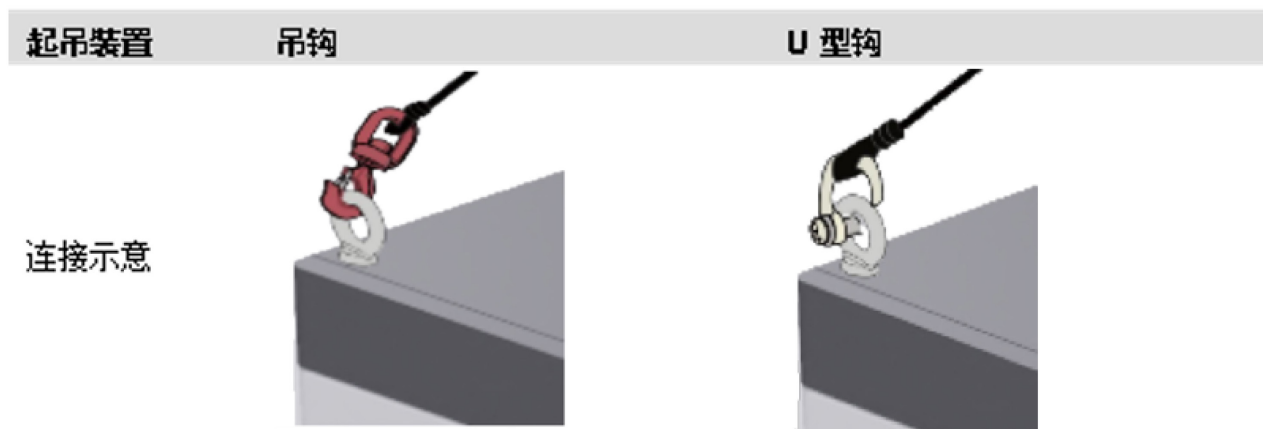


Figure 12: hoisting and handling reference

 NOTICE

Hooks should be attached from the inside outwards, hooking from outside to inside is not allowed. Safety pins must be tightened.

3.3 Storage

If the outdoor cabinet is not to be installed immediately after the delivery work is successfully completed, it should be stored properly as described in this section.

- To prevent condensation inside the outdoor cabinet or the bottom of the cabinet from being soaked by rainwater during the rainy season, the outdoor cabinet should be stored in an indoor environment, such as a large warehouse or workshop.
- If it is necessary to store the outdoor cabinet outdoors due to site conditions, the base of the outdoor cabinet must be elevated. The specific elevation height should be reasonably determined based on the site geology, weather conditions, etc. Additionally, heating should be provided for the internal equipment of the outdoor cabinet when the environmental temperature is low.
- Storage environment temperature: -20 to +45 ; storage environment relative humidity: 0% to 95%, no condensation.
- Storage SOC (State of Charge): 30% to 40% SOC. A complete charge and discharge should be completed every three months, and charged to 40% SOC to maximize its lifespan.
- Store the outdoor cabinet on dry, flat, sturdy ground with sufficient load-bearing capacity and no vegetation coverage. The storage ground must be flat, without water accumulation, and free from depressions or undulations.
- When storing, ensure the outdoor cabinet doors are securely locked.
- Effective measures must be taken to prevent rainwater, dust, and other elements from entering the outdoor cabinet. At a minimum, effective protection must be provided for the intake and exhaust vents of the outdoor cabinet.
- Perform regular inspections. Inspect at least once every half month to check whether the cabinet body and internal equipment are intact and undamaged.

4 Installation Instructions

This chapter primarily focuses on the installation of the energy storage cabinet, including unboxing inspection, installation process, installation preparation, mechanical installation, electrical connections, and system checks and testing.



NOTICE

Only personnel who have undergone professional training and obtained qualifications for working with high voltage and alternating current (AC) are permitted to install the energy storage cabinet.

This equipment is only suitable for installation on a concrete or non-flammable horizontal surface.

4.1 Purpose

To achieve the designed performance of the energy storage cabinet and maximally extend its service life, correct installation is crucial. Before unpacking, move the energy storage cabinet as close as possible to the installation site. During handling, the energy storage cabinet must be kept upright.

4.2 Unboxing Inspection

4.2.1 Arrival Inspection

Upon receiving the energy storage cabinet, check all parts for any obvious damage. Do not accept damaged equipment from the carrier. If possible, move the equipment close to its final installation site before unboxing. All parts are packed before being shipped in containers. If any damage is found upon unboxing, immediately report it to the carrier. If any concealed damage is discovered, also report it to the carrier and CSE ENERGY&TECHNOLOGY CO., LTD., Shanghai.

Besides checking the appearance, also inspect the following:

- Verify that the quantity of each item on the packing list matches the actual items received.
- Check that the product nameplate data matches the purchase contract, such as product model, rated capacity, voltage level, etc.
- Ensure that factory documents and accessories are complete.
- Check for any deformation and looseness in the battery modules of the energy storage cabinet.
- Inspect the inverter cabinet for deformation, paint loss, and looseness. If any of the above issues are found, promptly contact CSE ENERGY&TECHNOLOGY CO., LTD., Shanghai, and provide a report.

4.2.2 Packing List

The packing list for the energy storage cabinet is shown in the table below:

No.	Item	Quantity	Unit	Remarks
1	EcoPower-Cube-L215A	1	Unit	Outdoor Cabinet
2	User Manual	1	Copy	
3	External Dimensions and Basic Installation Diagram	1	Copy	User Manual
4	Electrical Diagram	1	Copy	
5	External Terminal Diagram	1	Copy	
6	Certificate of Conformity	1	Copy	

4.3 Installation Requirements

4.3.1 Selection of Installation Site

Before installation, ensure the installation environment meets the following requirements:

- The energy storage cabinet can be installed indoors or outdoors.
- The installation site should not be prone to shaking.
- Ambient temperature should be within 0~55°C.
- The installation site should allow for convenient maintenance.
- The energy storage cabinet needs to be installed on a flat surface, with surface flatness $\pm 5\text{mm}$, and the ground should have a load-bearing capacity of 1500Kg/m^2 .
- The surrounding area should be free of corrosive gases.
- The site should not be overly humid or hot.
- The environment should not be dusty.
- The site must comply with fire safety requirements.

4.3.2 Foundation Requirements

An unsuitable foundation construction plan can create difficulties or troubles for the placement of the energy storage integrated system, door operation, and later operation. Therefore, the installation foundation of the energy storage integrated system must be designed and constructed according to certain standards in advance to meet the requirements of mechanical support, cable routing, and later maintenance and repair.

At least the following requirements should be met when constructing the foundation:

- The bottom of the foundation pit must be compacted and leveled.
- The foundation must provide effective load-bearing support for the energy storage integrated system.

- Elevate the energy storage integrated system to prevent rainwater from eroding the base and interior. It is recommended that the foundation be about 300mm above the level of the installation site.
- Incorporate appropriate drainage measures based on local geological conditions.
- Construct a cement foundation with sufficient cross-sectional area and height. The height of the foundation should be determined by the contractor based on site geology.
- Consider cable routing when constructing the foundation.
- Construct a maintenance platform around the foundation to facilitate later maintenance.
- Determine the specifications and quantity of shooting pipes based on the cable model and the number of inlets and outlets.
- Temporarily seal both ends of all pre-embedded pipes to prevent impurities from entering; otherwise, later wiring will be inconvenient.
- After connecting all cables, seal cable entries, exits, and joints with fireproof mortar or other suitable materials to prevent rodent entry.

4.3.3 Installation Space

The front and back of the energy storage cabinet must not be directly against a wall. To ensure the normal operation of the energy storage cabinet, a reasonable distance must be maintained on both the front and back. The distance between the front of the cabinet door and any obstacles should be kept at over 1500mm to ensure necessary maintenance space, allowing the cabinet to be opened for maintenance and battery module disassembly. The distance between the back of the cabinet door and any obstacles should be maintained at over 1200mm, not only to ensure the necessary maintenance space but also to ensure adequate cooling space for the air conditioning unit at the back.

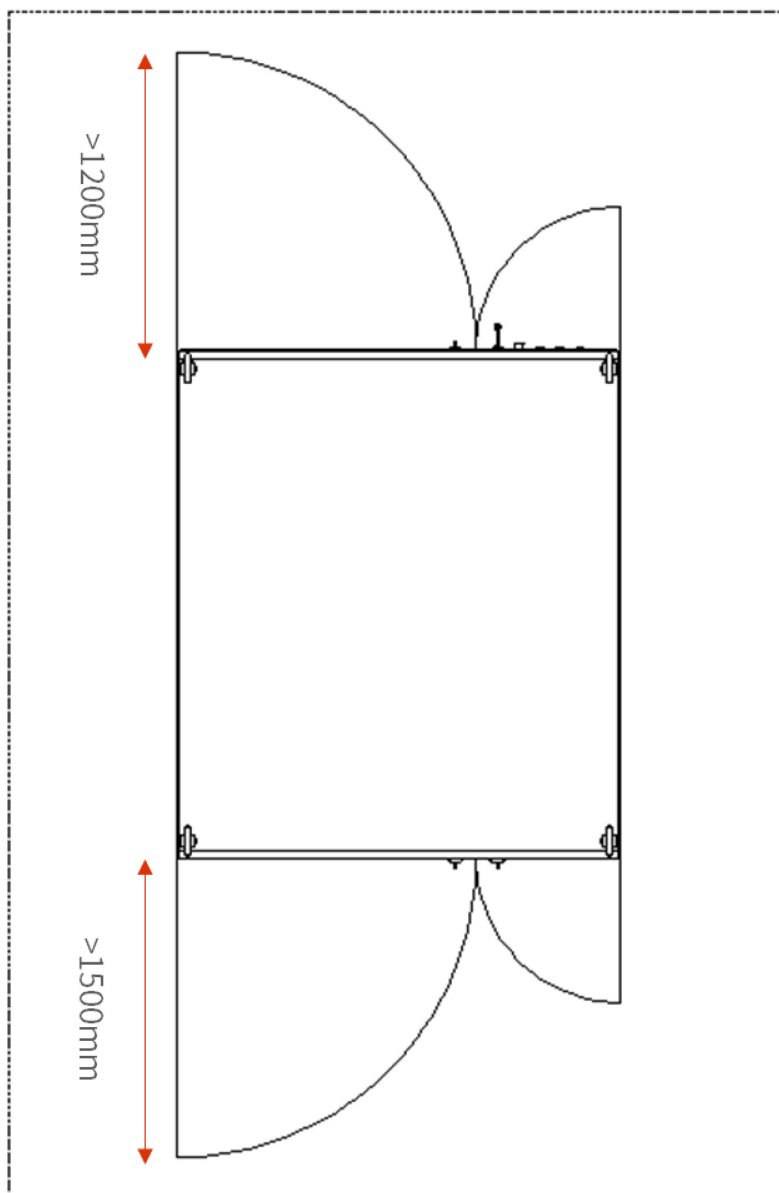


Figure 13: Recommended Installation Space

4.3.4 Installation and Securing

Once it is confirmed that the foundation is built according to requirements and is sufficiently dry, sturdy, and flat, the outdoor cabinet is lifted to the predetermined position.

Remove the front and rear bottom cover plates, and use M10*80 expansion bolts to secure the outdoor cabinet to the foundation. The positions for securing the outdoor cabinet are as shown in the diagram:

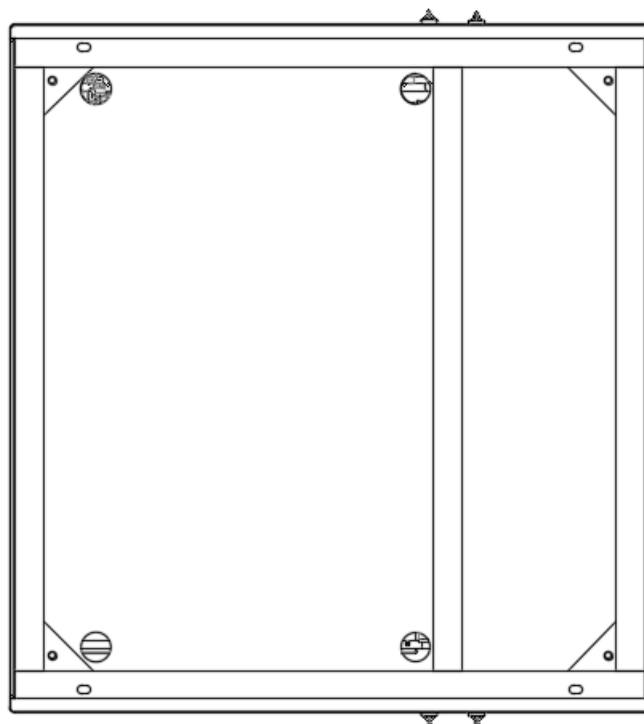


Figure 14: Bottom View

4.4 Electrical Connection

4.4.1 Installation Tools

Before installation, the following tools should be prepared at a minimum: torque wrench, wire stripper, socket wrench for tightening terminals, terminal crimping machine, heat gun, multimeter, screwdriver, and other necessary tools.

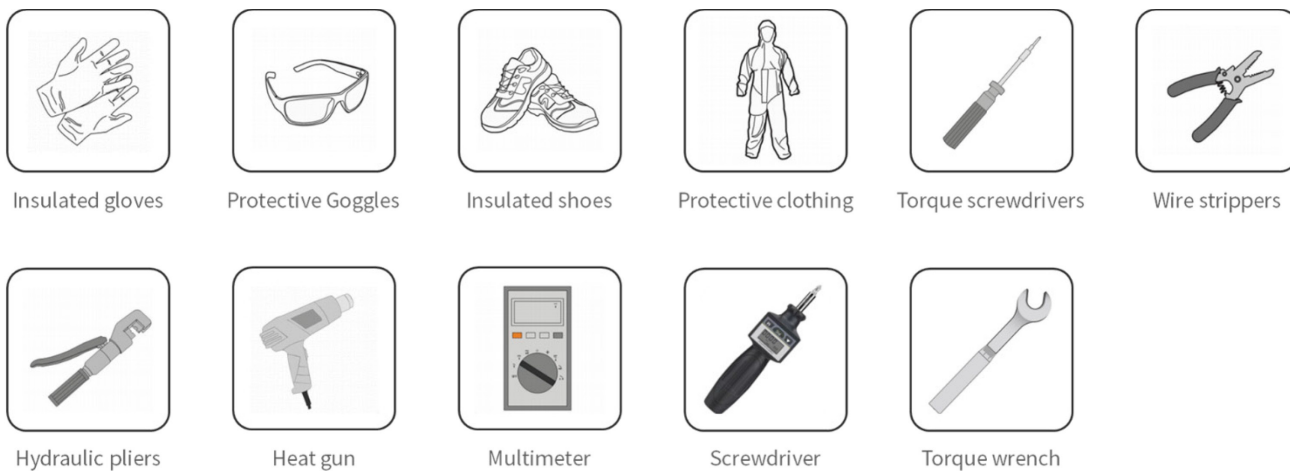


Figure 15: Installation tools

4.4.2 Output Requirements

The output of the energy storage device is three-phase five-wire, recommending the use of ZRC-YJV22 3*70+2*35mm² cable. The energy storage system is connected to the low-voltage power grid, with the connection point selected at a 250A circuit breaker.

4.4.3 Wiring Method

The entire system adopts a bottom-entry and bottom-exit wiring method, where cables enter through the wiring holes on the base and drop into the cable trench. By opening the rear door, the terminal block wiring ports can be seen.

The main circuit grid power is connected to the GRID wiring terminal; auxiliary control power is connected to the Power Supply wiring terminal; if there are other power sources to be connected, they should be connected to the A\B\C\N terminals below the QF2 switch. See the diagram below for terminal locations:

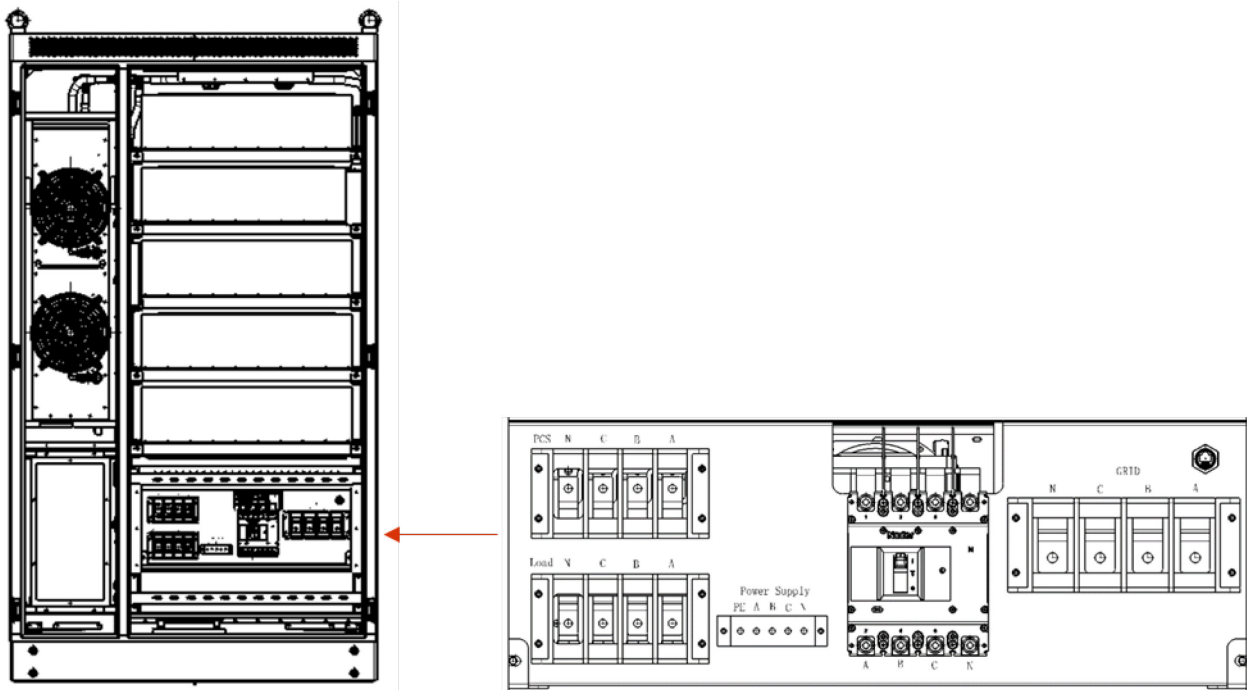


Figure 16: Schematic Diagram of the Terminal Ports

4.4.4 System Grounding

For the grounding of the energy storage system cabinet, a grounding busbar is installed at the bottom of the cabinet as shown in the following diagram. The requirement is for the grounding resistance to be less than 4 ohms.

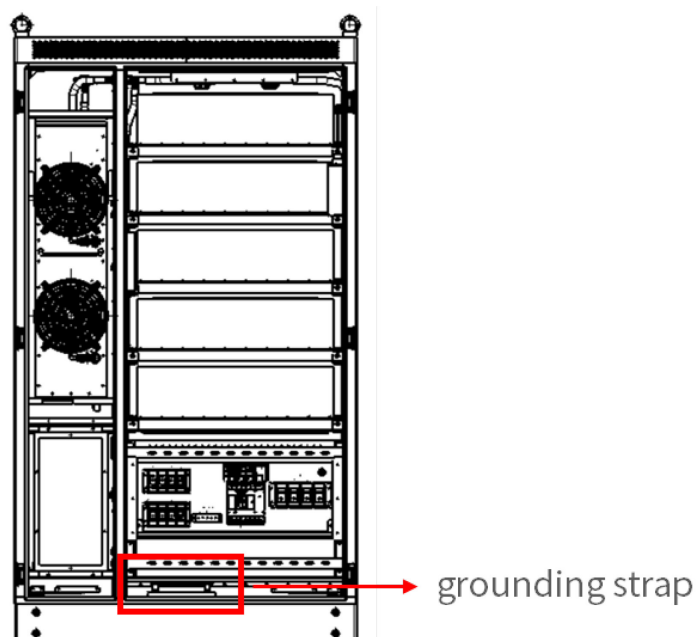


Figure 17: Rear Internal View

4.4.5 Grid Side Wiring

- Use a phase sequence meter to ensure that the phase sequence of the connected cables is correct.
- Use a multimeter to confirm that the cables connected to the terminals are not live.
- The output of the AC grid distribution switch QF A/B/C/N phases are connected to the grid's A/B/C/N phases, respectively, including the connection of the PE line.

 **WARNING**

When wiring, please ensure that there are no dangerous voltages present at the connection points.

 **NOTICE**

All wiring should be routed from the outside through the wiring holes located at the bottom of the energy storage device to the terminal blocks. Once the wiring is complete, please seal the wiring holes with fireproof mortar at the wiring hole location.

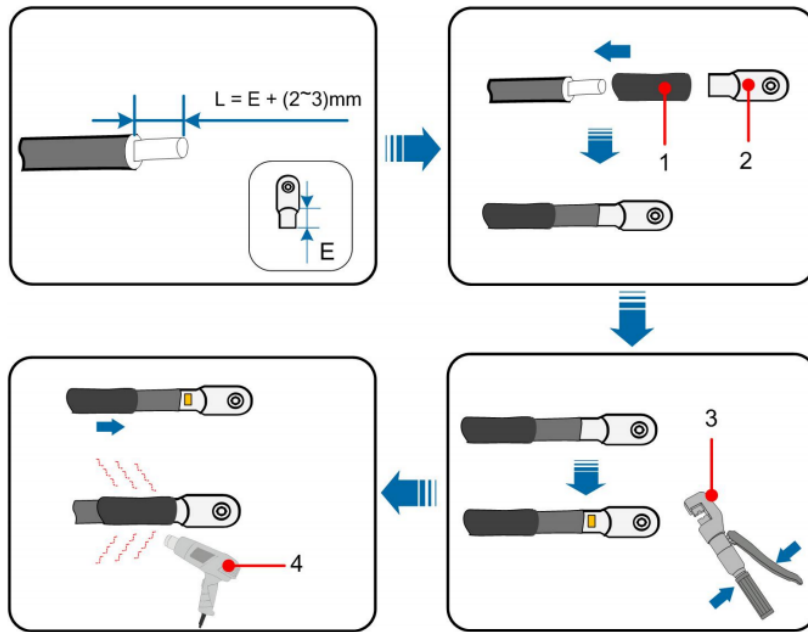


Figure 18: Crimp Terminal Diagram

1—Heat Shrink Tube; 2—OT/DT Terminals; 3—Hydraulic Crimping Tool; 4—Heat Gun

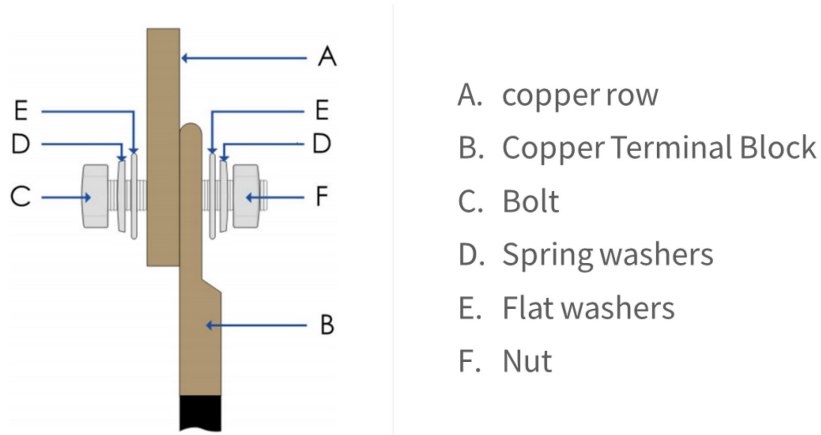


Figure 19: Copper Wire Connection Diagram

WARNING

All electrical connections must be made strictly according to the wiring schematic.

All electrical connections must be carried out with the equipment completely de-energized.

WARNING

Only qualified electrical engineers are allowed to conduct work related to electrical connections. Please adhere to the requirements given in the "Safety Instructions" section of this manual. CSE bears no responsibility for personal injury or property damage resulting from the disregard of these safety instructions.

4.4.6 Screw Tightening Torque

Screw Tightening Torque Reference Table:

No.	Type	Thread Diameter (mm)	Torque (N·m)
1	Expansion Bolt	M10	16.4
2	Screw	M8	12
3	Screw	M4	2.4

4.4.7 Post-Installation Check

After the complete installation of the energy storage device, a post-installation check is required:

- Ensure the equipment is placed and installed in a reasonable location, meeting the safety distance requirements.
- Verify that the primary connections are correct, the grounding wire is properly connected to the ground grid, and request the construction unit to test the ground resistance value.
- Compare the factory main wiring diagram with the actual site wiring to identify any differences, and assess whether these differences might affect the safe operation of the energy storage system.

5 Equipment Operation

This chapter primarily introduces the operation of the EcoPower-Cube-L215A, with practical operation as the standard.

5.1 Operating Procedure



NOTICE

Reconfirm that the battery terminal voltage is within the permissible range for the inverter, and close the battery side input isolation switch of the inverter.

5.2 Pre-operation Check

- Ensure the inverter's polarity connection is correct.
- Ensure the battery's polarity connection is correct.
- Ensure the battery connection terminals are securely wired.
- Ensure the AC input power is correctly connected.
- Ensure the grounding is normal.
- Check the position of the emergency stop button.

5.3 Starting Procedure

5.3.1 System Power-up Operation

- **Step 1:** Route the auxiliary power supply of the integrated energy storage unit to the grid connection point distribution box, turn on the UPS, close circuit breakers QF42-1 and QF42-2 to power up auxiliary uses such as the high voltage box, EMS, serial port server, temperature and humidity sensors, fire suppression system, etc. (Whether QF2 is closed depends on the actual situation).
- **Step 2:** Close circuit breakers QF4, QF41, QF42, QF43 to power up the liquid cooling machine, dehumidifier, and the fans inside the distribution box.
- **Step 3:** Route the main circuit power supply of the integrated energy storage unit to the grid connection point, close circuit breakers QF1, QF3.
- **Step 4:** Rotate the handle of the high voltage box to the ON position, the main positive and negative contactors of the high voltage box close, powering up the PCS auxiliary uses.
- **Step 5:** The main control BMS inside the high voltage box checks the battery status, and the PCS checks the grid-connected and off-grid status, sending out signals. When grid-connected or the energy storage part is running abnormally, the KM coil is energized, the KM main contact closes, the main circuit is conducted, and the integrated energy storage unit executes the grid-connected charge and discharge strategy. When off-grid or the energy storage part is running normally, the KM coil is de-energized, the

KM main contact cannot close, the main circuit is disconnected, and the integrated energy storage unit executes the off-grid strategy.

- System power-up is complete!
- Start the system via software!

5.3.2 System Shutdown

- **Step 1:** Disconnect circuit breakers QF42-1, QF42-2, powering down the high voltage box auxiliary, EMS, serial port server, temperature and humidity sensors, fire suppression system, etc.
- **Step 2:** Disconnect circuit breaker QF1, PCS detects the off-grid status, KM coil is de-energized, KM main contact opens.
- **Step 3:** Disconnect circuit breaker QF3, disconnecting the load power supply.
- **Step 4:** Sequentially disconnect circuit breakers QF4, QF41, QF42, QF43 (whether QF2 is closed depends on the customer's situation), turn off the UPS, disconnect the auxiliary power supply, powering down the liquid cooling machine, dehumidifier, and fans inside the distribution box.
- **Step 5:** Rotate the handle of the high voltage box to the OFF position.
- System shutdown is successful!

6 Cloud System Operation

6.1 Login Page

Users can successfully log in by entering the correct username and password. If entered incorrectly, an error message will be displayed.



Figure 20: Login Page

6.2 System Homepage

This page is the homepage. Administrators can view all the power station information upon logging in. By clicking on a specific power station, they can view the devices within that station displayed below.



Figure 21: System Homepage

6.3 Overall Electricity Usage Analysis

The device supports operations such as grid-connected and off-grid switching and control of the running curve. All data on the monitoring screen is refreshed in real time. The color of the data on the screen varies according to the quality code.

Numerical values support a slide-out operation menu, which includes setting values, blocking, remote adjustment, curve inquiry, alarm inquiry, etc.



Figure 22: Primary wiring diagram (supporting customization)

6.4 Energy Storage Monitoring and Management

The energy storage monitoring function includes the daily energy storage power curve, daily energy storage SOC (State of Charge), energy storage voltage and temperature, time-segmented charging and discharging volumes, overall information, and information for each battery cluster.

In addition to comprehensively monitoring the status and power curve of the energy storage batteries, it also allows for the calculation of charging and discharging volumes during peak, off-peak, and valley periods, providing insight into the energy-saving situation of the energy storage system.



Figure 23: Energy storage monitoring

6.5 Statistical Reports

The statistical reports section includes information on battery group SOC (State of Charge), STS (System Transfer Switch), PCS (Power Conversion System), DCDC power, maximum voltage difference between batteries, temperature difference between batteries, voltage difference between batteries, earnings, charging and discharging volumes, and etc...

Date	Charge and Discharge capacity										Efficiency	Income
	Charge capacity					Discharge capacity						
	Sharp	Peak	Flat	Valley	总	Sharp	Peak	Flat	Valley	总		
2024-02-28	0	0.4	0	1554.9	1555.3	901.5	0	0	0	901.5	0.52	621.84
2024-02-27	0	0.3	0	1837.71	1838	1762.7	0	0	0	1762.7	0.86	1610.56
2024-02-26	0	0.2	0	1758.9	1759.1	1762.11	0.29	0	0	1762.4	0.9	1636.03
2024-02-25	0	0.49	0	1491.41	1491.9	1592.61	0.59	0	0.4	1593.6	0.96	1511.02
2024-02-24	0	0.2	0	738.91	739.11	854.61	0.39	0	0	855	1.04	831.02
2024-02-23	0	0.4	0	675.1	675.5	704.1	0	0	0	704.1	0.94	662.38
2024-02-22	0	0	0	64.6	64.6	0	0	0	0	0	0	-21.18
2024-02-21	0	0	0	0	0	0	0	0	0	0	0	0
2024-02-20	0	0	0	0	0	0	0	0	0	0	0	0
2024-02-19	0	0	0	0	0	0	0	0	0	0	0	0
2024-02-18	0	0	0	0	0	0	0	0	0	0	0	0
2024-02-17	0	0	0	0	0	0	0	0	0	0	0	0
2024-02-16	0	0	0	0	0	0	0	0	0	0	0	0
2024-02-15	0	0	0	0	0	0	0	0	0	0	0	0
2024-02-14	0	0	0	0	0	0	0	0	0	0	0	0
2024-02-13	0	0	0	0	0	0	0	0	0	0	0	0
2024-02-12	0	0	0	0	0	0	0	0	0	0	0	0
2024-02-11	0	0	0	0	0	0	0	0	0	0	0	0
2024-02-10	0	0	0	0	0	0	0	0	0	0	0	0

Figure 24: statistical reports

6.6 Alarm Management

Alarm analysis primarily focuses on analyzing and displaying historical alarm information, including alarm analysis and the display of detailed historical alarm records. The system alerts users to alarms through pop-up notification boxes. Alarms support graded and categorized displays, making it easier for users to understand the system's operational status.



Figure 25: Alarm analysis

7 Troubleshooting

The product has comprehensive protection functions. If an anomaly or fault occurs, the system will automatically shut down output or input functions.

Fault Situation	Fault Reason	Troubleshooting Method
Unable to charge	Input cable	1. Internal disconnection of charging cable, replace the cable.
	Poor contact	2. Contact the warranty department.
Abnormal temperature alarm	Internal cabinet temperature too high	1. Check if the ambient temperature exceeds the allowable value.
	overtemperature	2. Check if the ventilation holes are blocked, leading to inadequate heat dissipation.
		3. Turn off the load and wait for the temperature to decrease before restarting.
Under-voltage alarm	Battery charge	1. Charge the battery.
System has no output	Circuit protection or output circuit is disconnected	1. Locate and reconnect the breakpoint.
		2. Check the screen for fault indications.
Circuit breaker trips repeatedly	Short circuit	1. Inspect until the short-circuited appliance or connection is found.
		2. If not found, contact the warranty department.
Unable to access remotely	Communication signal is absent	1. Check the external network connection.
Battery system water ingress	System leaking electricity, not operating normally	1. For minor faults, contact the warranty department.
		2. Change the installation location.
Main unit does not work or keeps restarting after system is powered	No power supply to the power source	Replace the system power supply.
BMS Temperature Collection Abnormal	Temperature sensor pins have bad soldering or desoldering, abnormal resistance of the temperature sensor, temperature sampling harness is broken or short-circuited	Replace the sub-control board, replace the temperature sensor, repair or replace the harness
BMS Voltage Collection Abnormal	Voltage collection connection line is abnormal, sub-control board fault	Repair or replace the voltage collection harness, replace the sub-control board
Current Collection Abnormal	Current sensor installed backward, current sensor failure, current sensor harness is disconnected or short-circuited	Reinstall the current sensor, replace the current sensor, repair or replace the current sensor harness

Communication Abnormal between Master and Slave Units	Communication harness fault between slave units, address conflict in slave unit, abnormal matching resistance	Replace the communication harness, reconfigure the slave unit address, check the communication matching resistance
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When the energy storage system encounters a fault and cannot function properly, please follow the troubleshooting instructions provided in the user manual. If the issue cannot be resolved, contact the dealer or manufacturer as soon as possible. **DO NOT ATTEMPT TO DISASSEMBLE PARTS ON YOUR OWN!**

8 Routine Maintenance

Because of environment, temperature, dust, and vibration, components within the energy storage system can be ageing and wearing, potentially leading to internal faults. Therefore, it is necessary to conduct daily and periodic maintenance on the energy storage system to ensure its normal operation and lifespan. All measures and methods that help keep the energy storage system in good working condition are considered part of maintenance work.

This chapter mainly introduces the maintenance and safety precaution measures, periodic maintenance, and maintenance operation steps for the energy storage cabinet.

8.1 Safety Precautions

Proper maintenance is the key to optimal operation of the energy storage cabinet and will ensure the device gains a longer lifespan.

8.1.1 General Safety Rules



Only qualified and authorized personnel may conduct maintenance or other operations on the energy storage system.

When conducting maintenance work, do not leave screws, washers, or other conductive materials inside the product, as they could damage the equipment!



Maintenance and other operations should only be performed after the energy storage system has been shut down. Please wait at least 15 minutes after shutdown before starting maintenance work.

8.1.2 Five Safety Rules

To ensure the safety of operators when performing maintenance or repair operations on the energy storage system, the following five safety rules must be strictly adhered to:

- Disconnect all external connections to the energy storage system.
- Ensure the energy storage system cannot be accidentally powered back on.
- Use a multimeter to ensure the energy storage system is completely de-energized.
- Implement necessary grounding and short-circuit connections.
- Cover adjacent parts that may become electrified during operations with insulating materials to insulate and protect.

8.2 Maintenance Work and Cycles

Inspection Content	Inspection Method	Maintenance Cycle
System operation status and environment	Listen for any abnormal sounds from the energy storage inverter. During system operation, check various parameters. Inspect whether main components are functioning normally. Check if the air intake and exhaust are normal.	Once every six months
System cleaning	Refill cooling fluid.	Once every three years (depending on the use of liquid cooling pressure)
Power circuit connection	Check if power cable connections are loose and retighten according to previously specified torque. Inspect power cables and control cables for damage, especially for cuts on the surface that encounter metal surfaces. Check if the insulation tape on the electrical cable terminals has fallen off.	Six months after initial commissioning, then every six months to every one year
Terminal and wiring connections	Check if control terminal screws are loose and tighten with a screwdriver. Inspect main circuit terminals for poor contact and overheating signs at screw locations. Check for color changes in the wiring copper bars or screws. Visually inspect terminal connections and their layout distribution.	Once a year
Circuit breaker maintenance	Perform routine checks on the mechanical condition of all components. Annual inspection of contactors (auxiliary switches and microswitches) to ensure their mechanical operation is in good condition.	Every six months to every one year