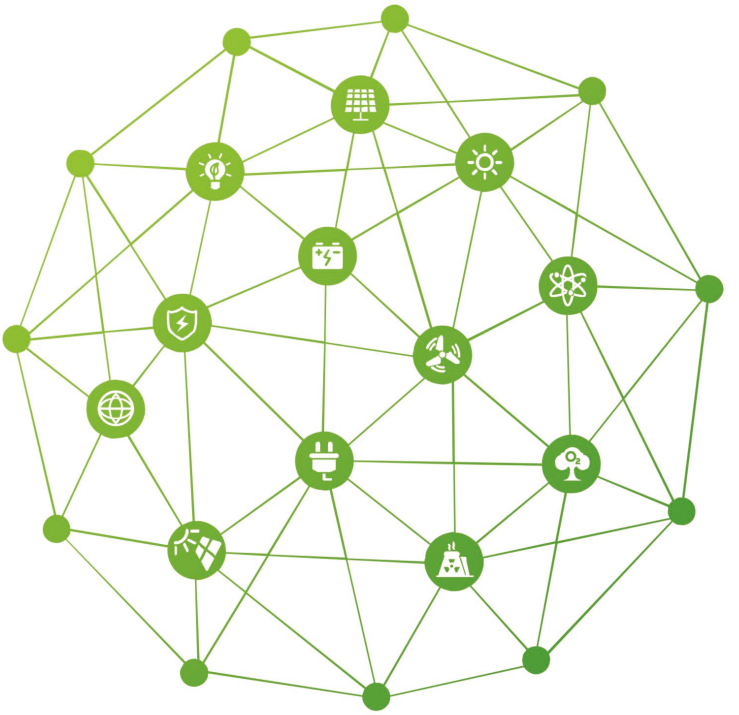
KOYOE



Energy Storage Systems

User Manual

Contents

1 About this Manual

1.1 Applicable Product

This manual is applicable to the following types of energy storage integrated systems:

- KYT15kW-30kWh-A
- KYT15kW-46kWh-A
- KYT15kW-60kWh-A
- KYT20kW-46kWh-A
- KYT20kW-60kWh-A
- KYT25kW-53kWh-A
- KYT25kW-60kWh-A

Energy storage integrated system model interpretation：

- KYT：Energy storage system
- 15kW/20kW/25kW：Power（The specific equipment power is subject to the physical）
- 30kWh/46kWh/53kWh/60kWh：Battery capacity（The specific equipment capacity is subject to the physical）

  A：Outdoor energy storage machine with temperature control（Integrated photovoltaic energy storage）

* The model matching listed is the recommended optimal matching, and the actual model is subject to the received product.

For the convenience of expression, in the following, where the following products are mentioned, they are replaced by the abbreviation of energy storage cabinet.

1.2 Introduction

This manual contains the following main contents.

Content	Brief overview
Safety Instruction	This paper introduces the safety issues that need to be paid attention to when the energy storage integrated system is installed, operated, maintained and overworked.
Product Description	This paper introduces the appearance, performance characteristics, composition and internal equipment layout of the energy storage integrated system.
Delivery	Delivery, inspection, etc., when the user receives the product.
Installation	This paper introduces the method of mechanical transportation, installation and electrical connection of energy storage integrated system
Turn On/Off	Steps to turn on/off internal equipment during normal maintenance/overhaul.
LCD Operation	The function and use method of man-machine interface.
Fire Fighting Notes	The main fire protection equipment in the energy storage integrated system is introduced.
Function	Main Function Description.
Troubleshooting	Simple troubleshooting and troubleshooting methods.
Daily Operation Instruction	The daily operation precautions and daily maintenance instructions of the energy storage integrated system are introduced.
Others	This paper introduces the technical data of the integrated energy storage system, the quality assurance clauses and the contact information of our company.

1.3 Applicable personnel

This manual is suitable for personnel who carry out transportation, installation, and other operation of this energy storage integrated system. Readers should meet at least the following requirements：

- Must have certain electronic, electrical wiring and mechanical professional knowledge, familiar with electrical, mechanical schematic diagram;
- Be familiar with the structure and working principle of energy storage integrated system; Familiar with the energy storage integrated system and the structure and working principle of the front and rear stage equipment;
- Receive professional training related to installation and commissioning of

electrical equipment;

- Should have the ability of emergency response to dangerous or unexpected situations arising during installation or trial operation;
- Be familiar with the relevant standards and regulations of the country/region where the project is located;
- Be familiar with what is described in this manual;

Only those who meet the above requirements can perform installation, operation and maintenance, overhaul, and other operations on the energy storage integrated system. Unauthorized personnel should not perform any operation on the energy storage integrated system, and should keep a sufficient safe distance from the system to avoid accidents.

1.4 Symbols

To ensure the personal and property safety of the user when installing this product, or the efficient and optimal use of this product, the relevant information is provided in the manual and highlighted with appropriate symbols.

The following is a list of symbols that may be used in this manual, so please read them carefully to make the best use of this manual.

DANGER **"DANGER" means that there is a high potential danger, if not avoided, it will lead to casualties and other serious accidents.**

WARNING **"WARNING" indicates that there is a moderate potential danger, and if it is not avoided, it may cause serious accidents such as casualties**

CAUTION **"CAUTION" indicates a situation of low potential hazard that, if not avoided, could result in moderate or mild injury to personnel**

NOTICE

“NOTICE” indicates a situation of low potential hazard that, if not avoided, could result in moderate or mild injury to personnel

Warning labels, please strictly follow all warning labels and their contents in this product!

Labels	Description
	Attention！ Warning！ Failure to follow the precautions and warnings in this manual may result in personal injury
	Risk of high voltage electric shock!
	Hot surface hazard！
	Recyclable parts.
	It must be placed in this direction during transportation, handling and storage.
	The product should not be treated as household waste.
	Please handle this package or product carefully. Do not dump or hang up.
	Please refer to the operation manual.
	Keep it dry! Packages and products must be protected from excessive moisture and should be stored in a moisture-proof environment
	The inverter can not be touched or operated until 10 minutes after turning off all power sources or disconnecting all connecting wires to prevent electric shock or personal injury.
	CE marking

1.5 Manual Usage

Please read this manual carefully before shipping and installing this product. And please keep this manual and other information in the product components together to ensure that the relevant personnel can obtain at any time.

The trademarks used in this manual and other KOYOE trademarks are all owned by Jiangsu KOYOE Energy Technology Co., LTD. It is prohibited to use the data contained in the firmware or software developed by the company for commercial purposes in any way. It is forbidden to crack, reverse engineer or any other operation that endangers the source program design of software developed by the company.

To continuously improve customer satisfaction, the company's products and product manuals are constantly improving and upgrading. If there is a difference between the manual and the product in your hand, it may be caused by the upgrade of the product version. Please refer to the specific product. If you still have any questions, please contact us.

1.6 Additional Information

For more information, please visit our website to download：www.koyoe.com

1.7 Abbreviation

Full Title	Abbreviation
Energy Storage System	ESS（Energy Storage System）
Power Conversion System	PCS
Photovoltaic	PV
Heating Ventilation Air Conditioning	HVAC（Heating Ventilation Air Conditioning）
Fire Suppression System	FSS（Fire Suppression System）
Switch Gear	S/G（Switch Gear）
Battery Management System	BMS（Battery Management System）
PACK	PACK
Energy Management System	EMS(Energy Management System)

2 Safety Instruction

All safety instructions in this manual must be strictly always followed. To avoid casualties and property losses that may occur during installation or operation, and to effectively extend the service life of the energy storage integrated system, please be sure to read the safety instructions carefully.

2.1 General Safety Rules

DANGER

Touch the contacts and terminals connected with the power grid or equipment inside, there is a danger of electric shock!

- Do not touch terminals or conductors connected to the grid loop.
- Pay attention to all instructions or safety instructions for connecting to the grid.

DANGER

Fatal high voltage exists inside the product!

- Pay attention to and follow the warning label on the product.
- Observe the safety precautions listed in this manual and other related document of this equipment.
- Comply with the relevant safety precautions and protection precautions for lithium batteries.

DANGER

Broken equipment or system failure can cause electric shock or fire!

- Initial visual inspection of equipment for damage or other hazards prior to operation.
- Check that other external devices or circuit connections are secure.
- Make sure the device is in a safe state before it can be operated.

WARNING

The installation and operation of the integrated energy storage system must comply with the relevant standards and regulations of the country/region where the project is located.

NOTICE

The battery outdoor cabinet is equipped with an automatic fire extinguisher system. The fire switch shall not be triggered at will in non-emergency situations.

2.2 Personnel Requirements

- Only professional electricians or personnel with professional qualifications can operate this product
- The operator should be fully familiar with the structure and working principle of the energy storage integrated system.
- Operators should be fully familiar with the relevant standards and norms of the country/region where the project is located.
- Operators should be fully familiar with the product manuals of outdoor cabinets and internal electrical equipment

2.3 Preservation of Manual

The product manual is an indispensable and important part of the product. The manual contains important information on transportation, installation, overhaul, maintenance, etc. Please read this manual carefully before transporting, installing, repairing, and maintaining the products.

- Please carry out transportation, installation, overhaul, maintenance, and other operations in strict accordance with the description in this manual, otherwise, it may lead to equipment damage, casualties, and property loss
- This manual should be kept properly and accessible to transportation, installation, and operation personnel always.

2.4 Battery Protection

⚠ DANGER

DC high voltage! Danger of electric shock!
The batteries in the system will generate high voltage after they are connected. If accidentally touched, there will be electric shock and even life risk.

In the installation, maintenance and overhaul of the equipment and other operations, to ensure that：

- The connection to the energy storage battery has been completely disconnected
- Set up a clear warning sign at the disconnection point to ensure that there is no accidental reconnection

2.5 Earth Fault Protection

DANGER

When the ground fault of the energy storage integrated system occurs, there may be a fatal high voltage in the originally uncharged part. If accidentally touched, very dangerous! Before operation, please ensure that there is no ground fault in the system. At the same time, relevant protective measures should be taken.

2.6 Live Line Measurement

DANGER

There is a high voltage in the equipment in the energy storage system, and accidental contact may lead to fatal electric shock risk. Therefore, during the live measurement, the following should be done:

- Do protective work (e.g. wear insulating gloves).
- Must be accompanied by a person to ensure personal safety.

2.7 Use of Measuring Equipment

In the electrical connection and trial operation of the energy storage integrated system, the relevant electrical measurement equipment is needed to ensure that the electrical parameters meet the requirements.

DANGER

- Choose high quality measuring equipment with range and usable conditions that meet the requirements of the field.
- Ensure that the connection and use of measuring equipment are correct and standardized to avoid arcing and other hazards.
- If the measurement is charged, protective work should be done (such as wearing insulating gloves)

2.8 Power off Operation

Only in the case of ensuring that each device and system in the energy storage integrated system is completely uncharged, can the operation be performed on it.

- Ensure that devices that have been powered off are not accidentally repowered.
- Use a multimeter to ensure that the device is completely uncharged internally.

- Implement the necessary grounding.
- Use an insulating cloth to cover the potentially live parts near the operating section.
- Ensure that escape routes are clear throughout the operation.
- Wait at least 20 minutes after the integrated energy storage system is completely out of operation before operating the integrated energy storage system.
- Ensure that the integrated energy storage system is completely uncharged.

2.9 Arc Protection System

> ⚠ DANGER
>
> To avoid unnecessary casualties and equipment damage, the product must be operated in strict accordance with the description in this manual. If not done properly, it may cause arcing hazards and may even cause other risks such as fire, explosion and so on. KOYOE shall not be responsible for any accidents such as arcing, fire, explosion, etc. caused by not operating in accordance with the machine label or product manual.

The following improper operation may cause arcing, fire, explosion, and other hazards inside the machine. And always keep in mind that in the event of an accident, it must be handled by a qualified professional. Improper operation for an existing accident may cause a wider range of failures or accidents.

- Live plug and unplug the DC side high voltage fuse of each device.
- Touch a potentially live cable end that has not been insulated.
- Touch wiring copper bars, terminals, or other internal parts of the machine that may be live.
- Loose connection of power cable.
- Screws and other parts accidentally fall into the power module.
- Incorrect operation by untrained unqualified operators, etc

Before operating the equipment, the operating area must be pre-evaluated for

arcing risk. If there is an arcing risk, you will need:

- Operators must have prior safety training.
- Try to assess areas of potential shock.
- Wear compliant protective clothing before operating on potential shock areas.

2.10 Electrostatic Protection

> **⚠ CAUTION**
>
> Contact or improper manipulation of printed circuit boards or other electrostatic sensitive components can lead to device damage.
> • Avoid unnecessary board contact.
> • Comply with static protection regulations, such as wearing an anti-static bracelet.

2.11 LCD Operation

Some of the settable parameters in the liquid crystal are closely related to the operation of the energy storage integrated system and its internal equipment. These parameters can only be modified after reliable analysis and evaluation of the operating status of the system.

> **⚠ WARNING**
>
> • Improper parameter Settings may affect the normal functional implementation of internal devices.
> • Only authorized professionals can set the parameters.

2.12 Sand and Moisture Protection

In case of sandstorm, thunderstorm, strong wind, hail and other bad weather, or when the relative humidity of the surrounding environment is greater than 95%, do not open the storage integrated system cabinet door.

2.13 Body Warning Mark Protection

The warning label on the body of the product and the internal electrical equipment contains important information about the safe operation of the product and the internal equipment. It is strictly forbidden to tear or damage artificially !

CAUTION

Do not tear or damage the sign.

- Ensure that body warning signs are legible at all times.
- If the body warning mark is damaged or blurred, it must be replaced immediately.

2.14 Safety Warning Sign Protection

When carrying out on-site transportation, installation, overhaul, maintenance and other operations on the energy storage cabinet, in order to prevent inadvertent operation or accidents caused by irrelevant personnel approaching, please observe the following precautions:

- Place eye-popping warning signs at the front and rear switches of the energy storage cabinet to prevent accidents caused by mis closing.
- Set up warning signs or safety warning belts near the site operation area.

2.15 Transportation and Inspection

An incorrect mode of transportation may result in equipment damage or loss of life. The storage cabinet shall be transported or moved in strict accordance with the operating procedures of the transportation equipment.

WARNING

Only complete and lossless energy storage cabinets can be installed and used!

After receiving the energy storage cabinet, it is first necessary to check whether the received equipment is complete according to the delivery list and check whether there is any damage during transportation. If you find any damage, please contact the carrier or KOYOE immediately, and please provide a photo of the damage, so that we can provide you with the fastest and best service.

2.16 Installation and Operation

The installation and operation environment of outdoor cabinet is outdoor, and its installation location and foundation must meet the requirements. In addition, during the whole process of electrical connection, the operation must be carried out strictly in accordance with the protocol.

⚠ WARNING

The outdoor cabinet can only be put into operation after installation confirmation by professional personnel and permission from the local power department. Please close all distribution circuit breakers before the operation of the equipment, and do not disconnect them during the operation of the machine.

⚠ CAUTION

Before the trial operation of the outdoor cabinet, the installation must be inspected thoroughly and carefully again.

- Check the installation.
- Check to make sure that no tools or parts are left inside the equipment.
- Check system parameters.

2.17 Daily Operation and Maintenance

In daily operation, it is necessary to ensure that the doors of the energy storage integrated system and internal equipment cabinets are closed and locked, and the keys have been pulled out and handed over to a special person for safekeeping. To prevent unauthorized personnel from entering the accident, or internal equipment by rain, animal invasion, etc. At the same time, the outdoor cabinet and internal equipment should be regularly inspected and maintained to ensure the long-term reliable operation of the energy storage integrated system.

⚠ WARNING

If the equipment is live, please be sure to do the relevant work insulation protection, and should ensure that at least two workers on site at the same time.
The power station where the outdoor cabinet is located is usually located in the field environment away from the urban area. The corresponding field rescue facilities should be prepared according to the needs, so that they can be implemented when needed.

In the process of daily operation and maintenance, we should always pay attention to the following:

- Avoid repair, maintenance and other operations on equipment in outdoor cabinets under rainy or humid weather conditions. The intrusion of moisture may damage electrical equipment.

- All electrical equipment in the outdoor cabinet has a nameplate. The nameplate contains important parameter information of the equipment, and attention should be paid to protection when performing various operations.
- Some equipment in the outdoor cabinet may have heating devices. When the equipment stops working, such devices will still have a high temperature. Please wear anti-scrubbing gloves when handling such devices.
- The power units and cooling fans in the energy storage integrated system may produce some noise during operation, and when some faults occur, the noise will be even greater. It is recommended to wear anti-noise earplugs when near outdoor cabinets.
- Comply with all installation requirements for fire extinguishing systems.
- If necessary, be equipped with appropriate protective equipment, such as goggles, insulated gloves, insulated shoes, etc., and take all necessary auxiliary measures to ensure the safety of personnel and equipment

2.18 Scrapping

When the integrated energy storage system as a whole or internal individual equipment needs to be discarded, it cannot be treated as conventional waste. Some components of the internal machine can be recycled and reused, and at the same time, some components will bring pollution to the environment.

Please contact local authorized professional recycling agencies for proper disposal of products and internal components

2.19 Manual Instructions

NOTICE

- The manual has been configured with a large number of images for ease of reading. The pictures are for illustration only. For details of the products, please refer to the actual products received.
- All descriptions in this manual are standard for energy storage integrated systems. If

you have special needs, please tell KOYOE staff when ordering. We will do our best to meet your needs. The specific details of the product are subject to the actual product you received.

• This manual cannot cover all possible situations during installation, operation, maintenance, overhaul, etc. Please contact KOYOE in time if you encounter a situation that is not explained in the manual.

• The latest manual is available at http://download.koyoe.com/, or scan the QR code below.

3 Product Description

3.1 Overview

The integrated energy storage system produced by KOYOE is mainly used in industrial and commercial scenarios. Taking KYT25kW-60kWh-A as an example, the system application diagram is shown in the following figure.

The energy storage integrated system is composed of energy storage variable current system and energy storage battery system. The energy storage converter system integrates the energy storage converter. The energy storage battery system integrates the battery module, battery management system, EMS, air conditioning and fire extinguishing equipment.

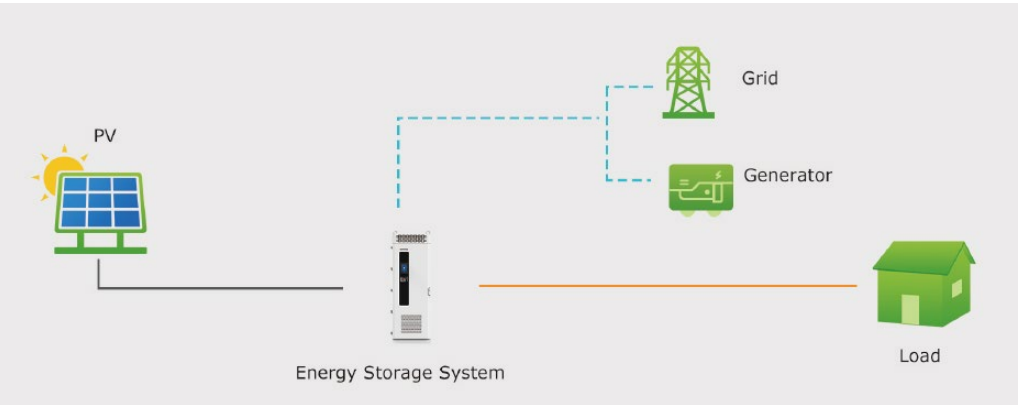


Fig. 3-1 System diagram

The energy storage integrated system is composed of the following two parts:

- Energy storage battery system

The energy storage battery system includes battery modules (the number of which can be customized by the user), BMS system, EMS system, fire control system and temperature control unit.

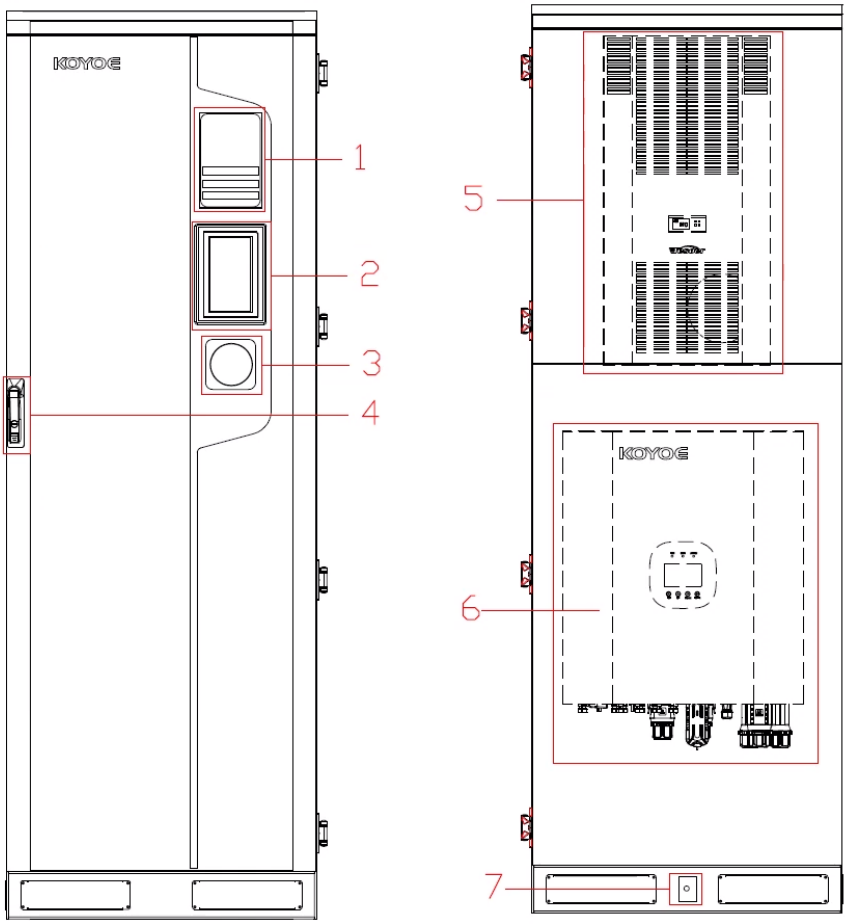
- PCS system

The energy storage converter system includes a three-phase hybrid off-grid inverter.

3.2 Appearance

3.2.1 View

Table 3-1 Appearance of energy storage cabinet（KYT25kW-60kWh-A）

View（Description）

1: audible and visual alarm 2: touch screen 3: scram button 4: door lock 5: air conditioner 6: inverter 7: ground copper bar
*The above pictures are for reference only, please refer to the material received!

3.2.2 Mechanical Parameter

The appearance and dimensions of the energy storage cabinet are shown in the following figure.

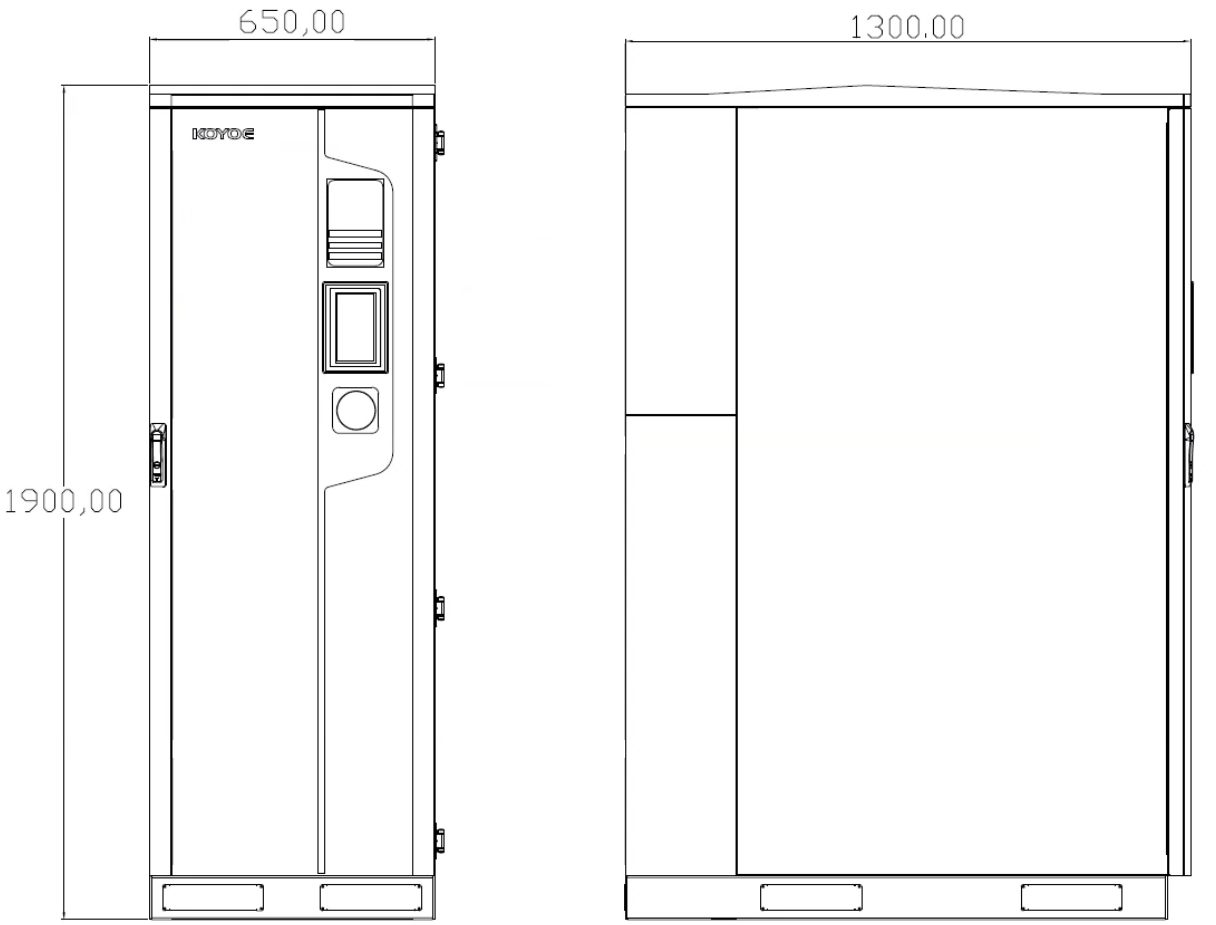


Fig. 3-2 Size of energy storage cabinet

* The above pictures are for reference only, please refer to the material received !

3.2.3 Ventilation Design

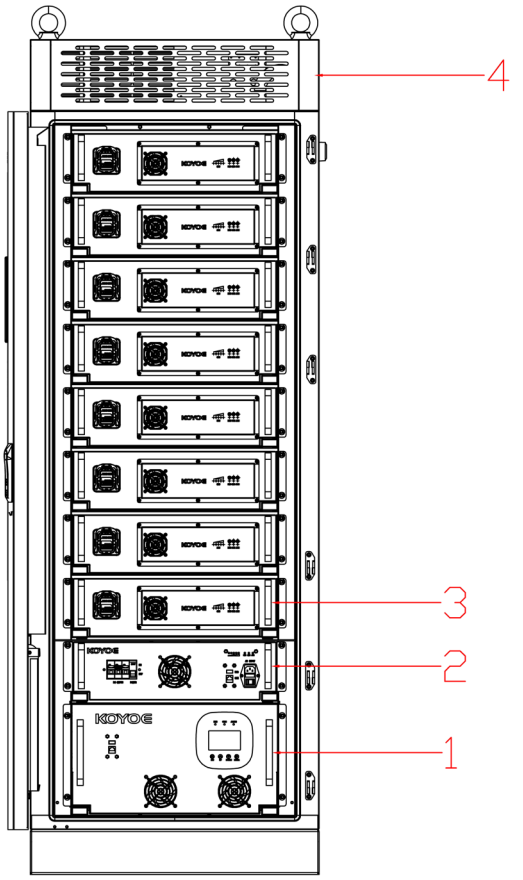
In order to ensure that enough cooling air is provided to the energy storage cabinet, an air conditioner is installed on the top of the cabinet and an air outlet is provided on the front of the cabinet

3.3 Interior Design

3.3.1 Layout

The system adopts a combinatorial design, which combines the energy storage variable-current system and the energy storage battery system into one system. The view of energy storage cabinet before opening is shown in the following figure respectively.

1: Inverter 2: Switch Gear 3:PACK 4: Air Conditioner



* The above drawings are for reference only, please refer to the physical goods received

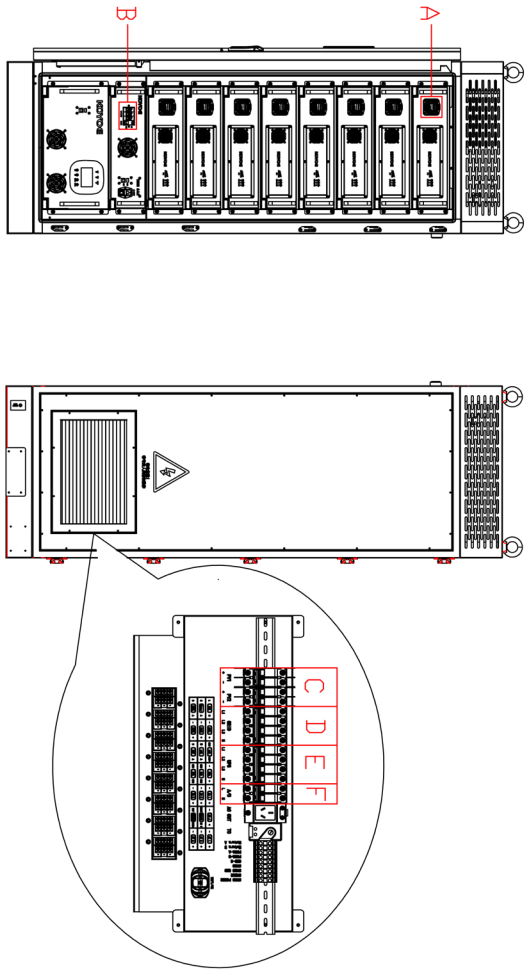
3.3.2 PCS

PCS adopts advanced digital control technology to optimize the control function and improve the system reliability. Applicable to all kinds of battery charging and discharging conditions. Modular structure design, easy installation, and maintenance. The main features are as follows

- Grid-connected mode, off-grid mode, hybrid mode, etc.
- Off-grid independent inverter function; Establish a microgrid system to ensure the power supply of important loads;
- Multiple PCS independent inverters in parallel;
- Powerful three-phase unbalanced load capability in off-grid mode;
- Operate at 110% of rated output power for long periods of time;
- Anti-drip and anti-condensation function;
- Long service life;
- Module design: easy to maintain.

3.3.3 Overview of operation switch location

The position of each circuit breaker in the energy storage cabinet is as follows：



A:MSD B:S/G（Left 3P）/Switch button（Right 1P） C: PV breaker
D: GRID breaker E: UPS breaker F:AC breaker

Fig. 3-4 Overview of operation switch location

3.3.4 Battery Pack

Typical system architecture for the use of lithium iron phosphate batteries is based on the lithium iron phosphate battery cell, the standardized and unitized battery module is developed. The battery module is connected in series and equipped with a switch box and a distribution box to form a high voltage battery cluster. The battery module is connected to the supporting energy storage converter (PCS) to form an electric energy storage system product (ESS) to complete the storage and release of electric energy.

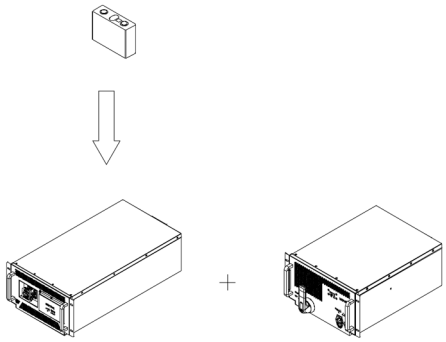
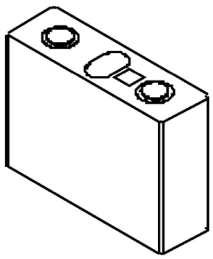


Fig. 3-5 System structure drawing

Cell

Table 3-2 Parameter of the battery cell

Battery cell	Parameter	Values
	Dimensions	50.1*160*118.5mm
	Nominal Capacity	100AH
	Nominal Energy	320Wh
	Nominal Voltage	3.2V
	Voltage Range	2.5~3.65V (T>0°C) 2.0~3.65V (T<=0°C)

Battery Pack

The lithium iron phosphate battery module is mainly composed of battery cells through series and parallel connection, and has the functions of voltage and temperature acquisition and equalization control for each battery cell. It adopts a special battery management chip design, receives control commands through CAN/ Daisy chain communication, and reports the collection data.

Table 3-3 Parameter of the battery

Parameter	Values
Model	KY-76V100AH-A00
Dimensions（W*H*D）	870*550*150mm
Number of Cell Strings	1P24S
Nominal Voltage	76.8V
Nominal Energy	7680Wh
Nominal Charge/Discharge Current	50A

Max. Charge/Discharge Current	65A
IP Rate	IP21

S/G

The switch gear contains fuse, relay and battery cluster management unit (BCMU), which mainly completes the overall monitoring of the battery module.

Table 3-4 Parameter of the switch Gear

Parameter	Values
Model	KY-BCMU45K-A00
Dimensions（W*H*D）	143*600*500mm
Min. Starting Voltage	200V
Max. System Voltage	750 V
Max. Charge/Discharge Current	60 A
Communication Mode	CAN、RS485
IP Rate	IP21

3.3.5 Air Conditioning Design

Air conditioners with heat exchangers are temperature control products developed for cabinets. It is suitable for scenarios where the equipment inside the cabinet emits a lot of heat and needs to be completely isolated from the outdoor environment.

3.3.6 Cable inlet design

For easy cable connections in the field, all cables between devices inside the energy storage cabinet have been connected prior to delivery. The cables connecting the energy storage cabinet to the external equipment can be accessed inside from the bottom cable entrance of the outdoor cabinet.

3.3.7 Fire Protection Design

Fire protection device (active fire protection + passive fire protection) is installed in the battery energy storage cabinet. When a fire or other emergency occurs, the hot aerosol fire extinguishing device will release the extinguishing agent when the temperature reaches the setting, thereby suppressing the fire.

4 Delivery and Storage

4.1 Supply Scope

See packing list for details.

4.2 Identifying Energy Storage Systems

The user can identify the equipment by the nameplate. The information contained in the nameplate is: equipment model, serial number, main technical parameters, and origin.

> **⚠ WARNING**
>
> The nameplate contains important parameter information related to the equipment. In transportation, installation, maintenance, overhaul and other operations, attention should be paid to protection. Destruction or demolition is strictly prohibited.

4.3 Check Transportation Integrity

Before leaving the factory, the integrated energy storage system has been carefully inspected by our staff and firmly packed. However, it is still possible to crash or even damage the equipment during transportation.

Upon receipt of the equipment, it is first necessary to check the integrity and integrity of the transportation. At a minimum, the following should be carefully checked:

- Check whether all shipped components are complete against the " packing list".
- Confirm that the received model of the integrated energy storage system and internal equipment are consistent with the model you ordered before
- Carefully check the integrated energy storage system and internal equipment for any damage during transportation. During the inspection, if any problems or doubts are found, please contact the carrier or our company in time.

WARNING

Only complete and no damage to the energy storage system, can be installed and test run! Before the installation starts, make sure to:

- The integrated energy storage system itself is intact and free of any damage.
- All equipment in the energy storage integrated system is intact and free of any damage.

4.4 Storage

If you do not install immediately after the delivery is successfully completed, then store properly as described in this section.

- In order to prevent condensation inside the energy storage cabinet, or to soak the bottom of the house in the rainy season, the energy storage cabinet should be stored in an indoor environment, such as a large warehouse or workshop.

- If it must be stored outdoors due to site conditions, the base of the energy storage cabinet must be raised. The specific elevation height should be reasonably determined according to site geological, meteorological, and other conditions. At the same time, it should also provide heating for the internal equipment of the energy storage cabinet when the ambient temperature is too low.

- Store the energy storage cabinet on dry, flat, strong, sufficient carrying capacity, and without any vegetation cover. Storage ground must be flat, no water, no bump or uneven.

- When storing, ensure that the door of the storage cabinet is locked.

- Effective measures must be taken to prevent rain, sand and dust from invading the inside of the energy storage cabinet. At least the air inlet and outlet of the energy storage cabinet must be effectively protected.

- Regular inspection. At least once every half month, check whether the cabinet and internal equipment are intact。

5 Installation of Mechanisms

> **WARNING**
>
> In the whole process of mechanical installation, the relevant standards and requirements of the project location must be strictly observed.

5.1 Conditions of Carriage

All kinds of equipment of the energy storage cabinet have been installed before leaving the factory, and the energy storage cabinet can be lifted and transported during transportation.

> **WARNING**
>
> During the whole process of loading, unloading and transportation, the safety regulations of the energy storage cabinet in the country/region where the project is located must be observed!
> • Any equipment used in the operation of the energy storage cabinet should be maintained.
> • All personnel engaged in handling and bolting shall receive appropriate training, especially in safety.

The following conditions should be met to transport the energy storage cabinet：

- Each cabinet door of the energy storage cabinet is locked;
- Select the appropriate crane or lifting tool according to the site conditions. The selected tool must have sufficient load-bearing capacity, arm length and radius of rotation;
- Additional traction may be required if movement on slopes, etc.
- Remove all obstacles that exist or may exist during the movement, such as trees, cables, etc.
- The storage cabinet should be transported and moved under better weather conditions as far as possible.
- Be sure to set up warning signs or warning belts to avoid non-staff entering the lifting and transportation area to avoid accidents.

5.2 Forklift Truck Transportation

If the installation site is level, the forklift can be used to move the storage cabinet. The bottom of the energy storage cabinet is equipped with fork holes specially for forklift transportation. Move the energy storage cabinet through the fork hole. If the forklift transportation method is used, the following requirements should be met.

- The forklift should be equipped with sufficient carrying capacity (at least 3 tons);
- Pin length should be at least 700mm;
- The pins should be inserted into the square jack at the bottom of the cabinet and fully inserted into place so that the pins are completely through the cabinet;
- Storage cabinets should be transported, moved and lowered slowly and steadily.

Fig.5-1 Forklift truck transportation

5.3 Transport by Lifting

When lifting the energy storage cabinet, the following requirements should be met at least:

- The strength of the sling used should be sufficient to withstand the weight of the storage cabinet;
- Ensure that all sling connections are safe and reliable, ensuring that each sling connected to the corner piece is of equal length;

- The length of the sling can be adjusted appropriately according to the actual requirements of the site;
- During the whole lifting process, the energy storage cabinet must be stable and not skewed;
- Please use the four rings of the energy storage cabinet to lift it;
- Take all necessary auxiliary measures to ensure the safety and smooth lifting of the storage cabinet.

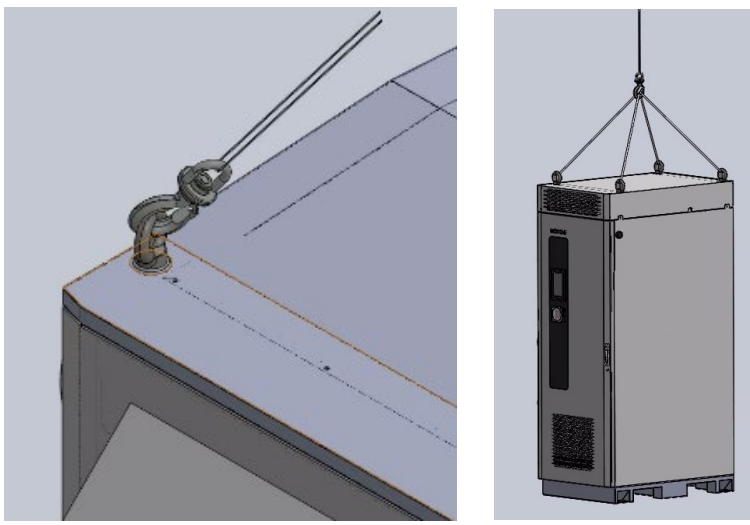


Fig. 5-2 Transport by lifting

* This drawing is for reference only, please refer to the physical goods received!

5.4 Preparation for Installation

5.4.1 Selection of installation site

When choosing an installation site, please follow at least the following principles：

- The climatic environment and geological conditions (such as stress wave emission and underground water level) of the installation site of the integrated energy storage system should be fully considered;
- The surrounding environment is dry and well ventilated, away from flammable and explosive areas;
- The soil at the installation site needs a certain degree of compactness. It is recommended that the relative compactness of the soil in the installation site be ≥98%. If the soil is loose, be sure to take steps to secure the foundation.

5.4.2 Equipment Base Cement Base

Fig. 5-3 Cabinet equipment cement foundation form 1

Fig. 5-4 Cabinet equipment cement foundation form 2

5.4.3 Other protective measures

⚠ CAUTION

A drainage system should be built at the installation site to avoid the bottom of the energy storage cabinet or the equipment in the cabinet being soaked in water during the rainy season or when there is a lot of precipitation.

⚠ CAUTION

Do not plant trees in close proximity to the installation site. In order to prevent the strong wind from blowing down branches or scraping down leaves and blocking the door or air inlet of the energy storage cabinet

5.5 Recommended Size for Device Base

Fig. 5-5 Cabinet equipment cement foundation form 1 (unit: mm)

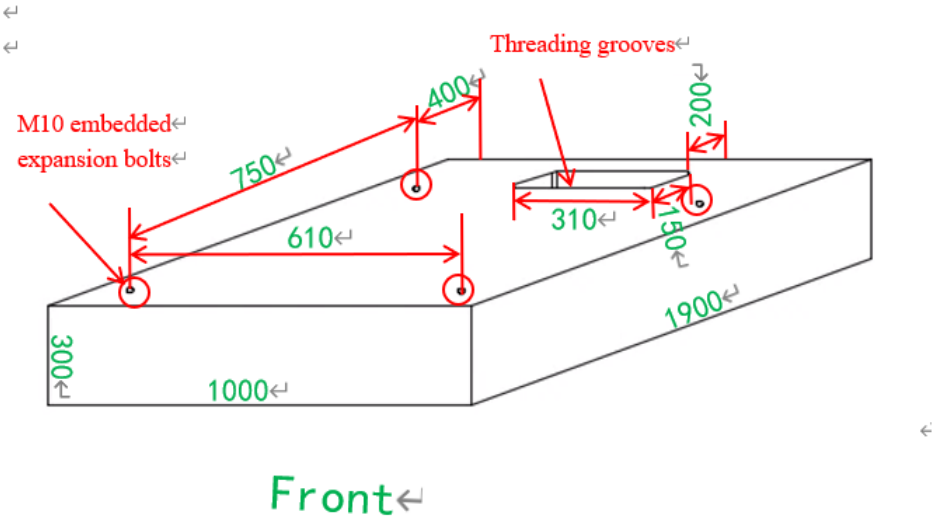
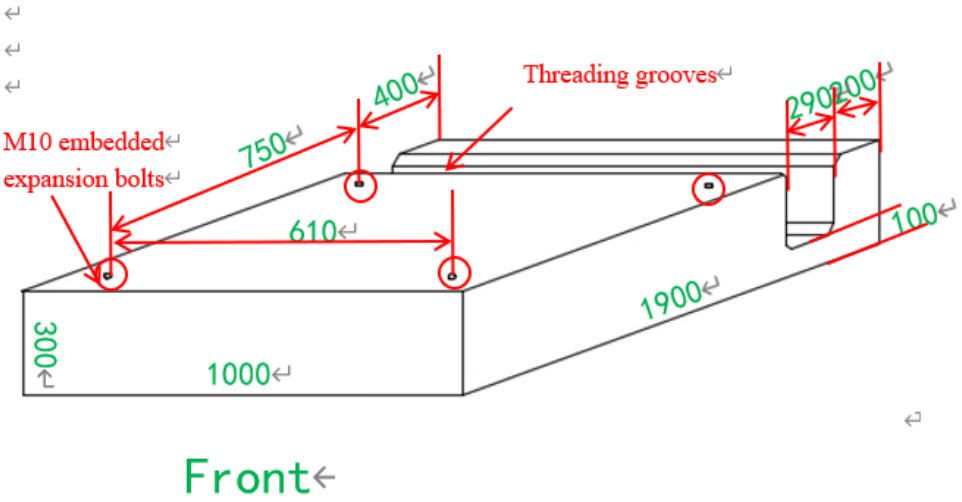


Fig. 5-6 Cabinet equipment cement foundation form 2 (unit: mm)



5.6 Fixed Installation

After confirming that the foundation construction meets the requirements and is dry, strong, and smooth enough, the energy storage cabinet is transported to the predetermined location. Fastening bolts are used to fix the energy storage cabinet to the foundation. The fixed position of the fastening bolt is shown in the figure.

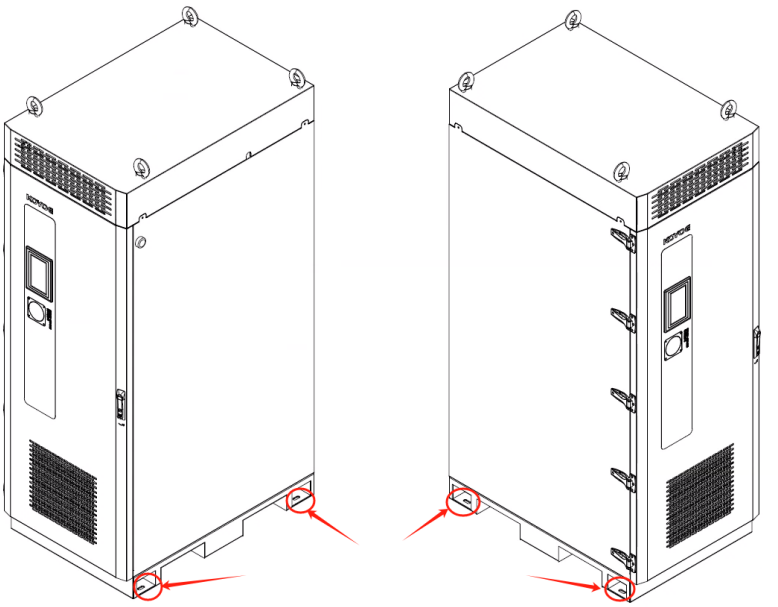


Fig. 5-7 Fixed position of the cabinet （KYT25kW-60kWh-A for example）

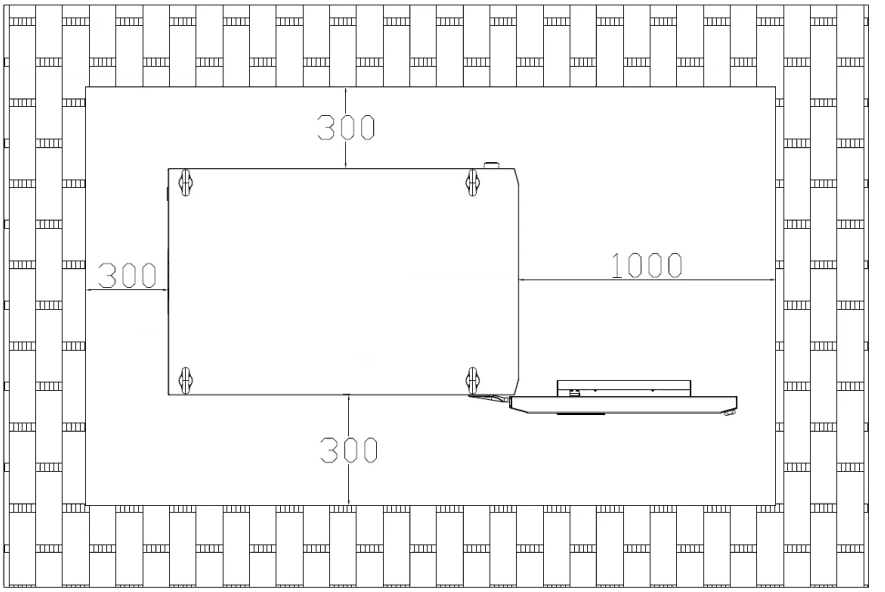


Fig. 5-8 The size of the range without occlusion around the cabinet (unit: mm)

6 Electrical Connection

6.1 Safety Precautions

6.1.1 General

DANGER

High pressure danger! Danger of electric shock!

- Do not touch live parts!
- Please ensure that AC and DC sides are not charged before installation.

• Do not place the integrated energy storage system on flammable surfaces.

DANGER

When the ground fault of the energy storage integrated system occurs, there may be a fatal high voltage in the originally uncharged part. If accidentally touched, very dangerous! Before operation, please ensure that there is no ground fault in the system. At the same time, relevant protective measures should be taken.

WARNING

• All electrical connections must comply with the relevant standards and codes of the country/region where the project is located.
• The integrated energy storage system can only be connected to the grid side when approved by the local power supply company and installed by professional technicians.

WARNING

Only professional electricians or personnel with professional qualifications can make electrical connections to this product. Please perform the wiring operation in strict accordance with the internal wiring mark of the equipment.

WARNING

Before wiring, the AC and DC sides of the energy storage integrated system should be disconnected.

WARNING

The entry of wind sand and moisture may damage the electrical equipment in the energy storage integrated system, or affect the operation performance of the equipment!
• Avoid electrical connection work during sandstorm season, or when the relative humidity in the surrounding environment is greater than 95%.
• When there is no wind and sand, and the weather is clear and dry, start the connection work.

WARNING

Failure to comply with torque requirements may result in fire at the joint! During the electrical connection, the bolts must be tightened strictly in accordance with the torque described in this manual.

⚠ WARNING

Only qualified electrical engineers can perform electrical connection related work. Please follow the safety instructions given in this manual. KOYOE shall not be liable for any loss of life or property caused by neglecting these safety instructions.

⚠ WARNING

When laying cables, it is necessary to ensure electrical insulation and comply with EMC specifications. Power cables and power and communication cables should be laid in layers. And if necessary, provide protection and support for the cable to reduce the stress of the cable.

⚠ WARNING

Please perform the wiring operation in strict accordance with the internal wiring mark of the equipment.

⚠ CAUTION

• The installation design of the integrated energy storage system must comply with the relevant standards or codes of the country/region where the project is located.

• If the installation is not in accordance with the installation design requirements given in this manual, or the installation is not in accordance with the relevant electrical standards or specifications of the installation location, and the energy storage integrated system or system failure is caused, it will not be covered by the warranty.

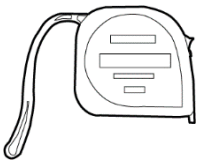
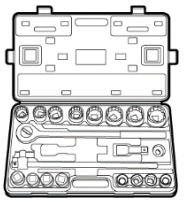
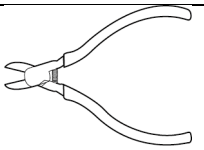
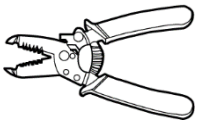
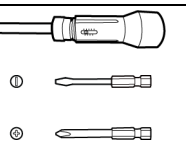
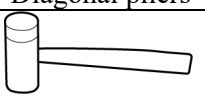
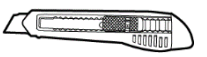
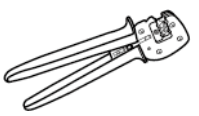
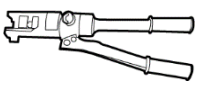
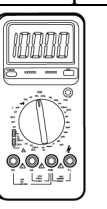
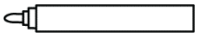
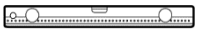
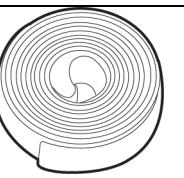
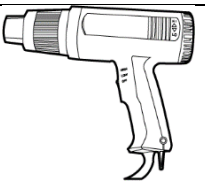
6.1.2 Five Rules of Safety

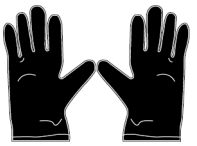
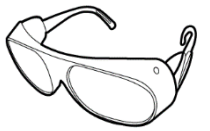
The following five safety rules should be followed during the entire process of electrical connection and all other operations performed on equipment such as energy storage integrated systems：

- Disconnect all external connections to the energy storage integration system, as well as the connection to the internal power supply of the device.
- Ensure that the disconnections are not accidentally repowered.
- Use a multimeter to ensure that the device is completely uncharged internally.
- Implement the necessary grounding.

- Use an insulating cloth to cover the potentially live parts near the operating part

6.2 Tool Preparation

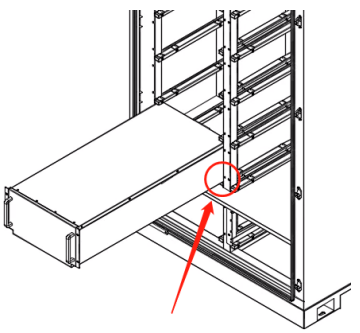
 Steel tape	 Torque socket wrench	 Torque wrench
 Diagonal pliers	 Wire stripper	 Torque screwdriver
 Rubber hammer	 Utility knife	 Wire cutters
 Crimping tool	 Cold-press terminal crimping pliers	 Hydraulic pliers
 Cable tie	 Vacuum cleaner	 Multimeter
 Marker pen	 Level	 Thermal casing
 Hot air blower	 Safety shoes	

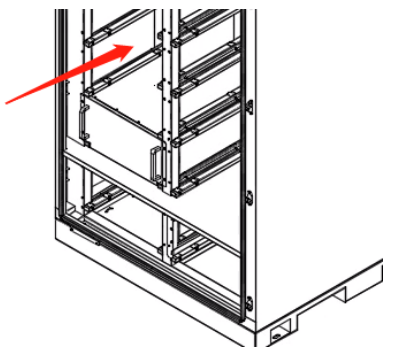
		Dust mask
 Safety gloves	 Safety goggles	

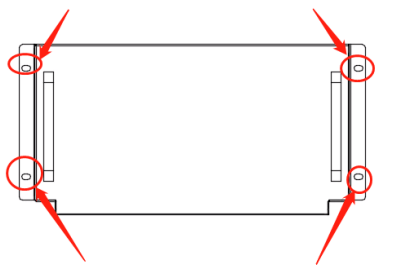
6.3 Remove Electrical Cabinet Wiring Panel

Step 1 : Press the cabinet lock arrow direction to open the cabinet door;

Step 2 : The back of the battery pack is attached to the front end of the slide rail, and the battery pack is pushed into the slide rail and fasten with the M5 screw lock；







Step 3 : Remove the screws and open the wiring sealing plate at the back of the cabinet to expose the wiring panel position；

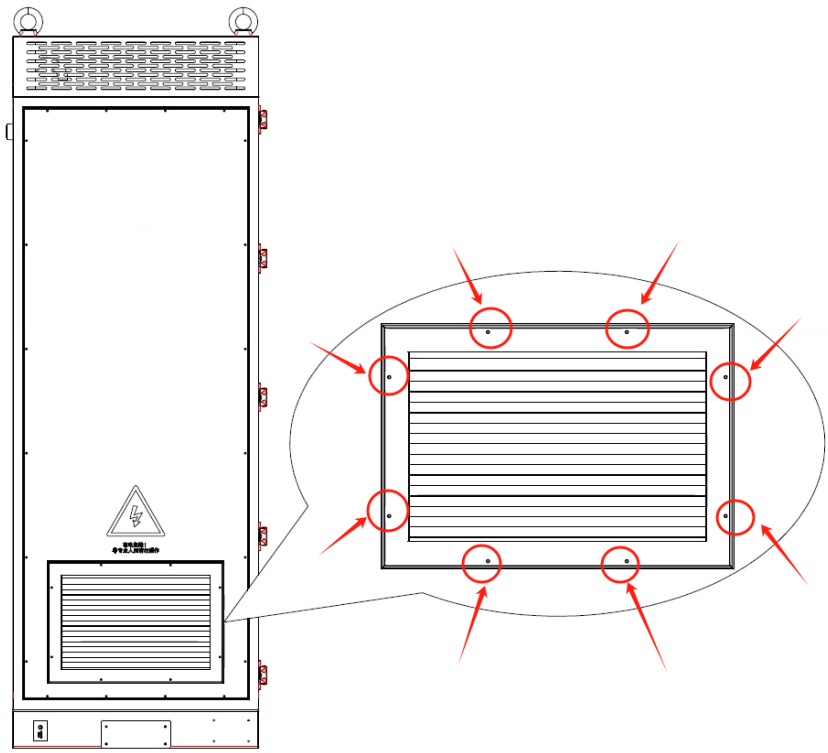


Fig. 6-1 Position of cabinet sealing board （KYT25kW-60kWh-A for example）

6.4 AC Connection

10mm² 5-core multi-strand oxygen-free copper cable is recommended. The color is yellow-green red + blue + yellow-green.

For L1, L2, L3 and N terminals, it is recommended to use sheet bare end cold press terminals

PE terminals are recommended to use circular bare end cold press terminals

Follow these steps to make the harness：

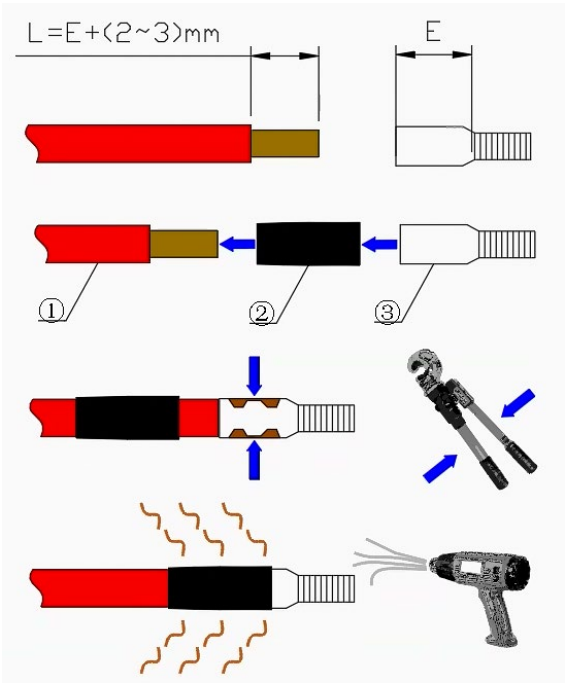
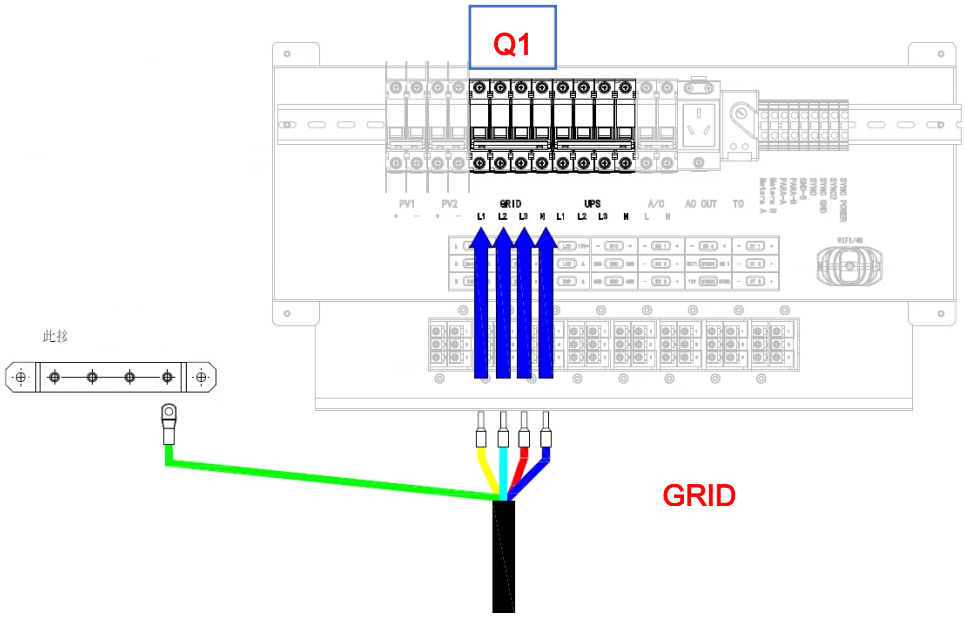


Fig. 6-2 Cabinet AC line crimping ①: wiring harness ②: heat shrink tubing ③: terminal（KYT25kW-60kWh-A for example）



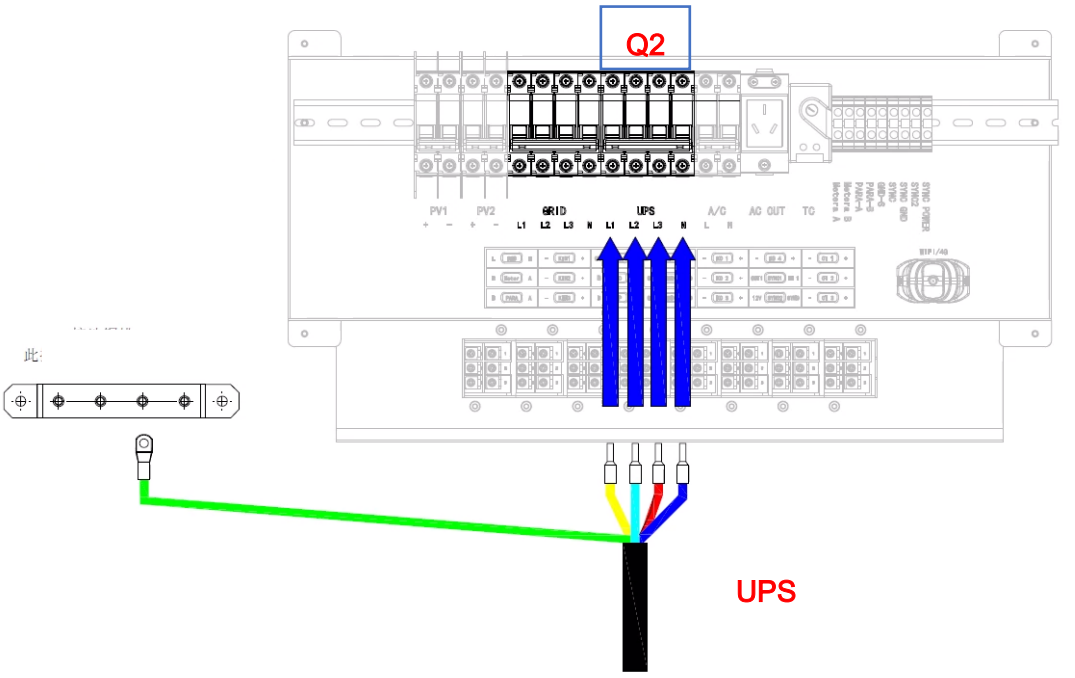


Fig. 6-3 AC connection position of cabinet （KYT25kW-60kWh-A for example）

6.5 PV Connection

4mm² PV cable is recommended, red (PV +)/black (PV -).

The terminal is recommended to use the sheet type bare end cold press terminal.

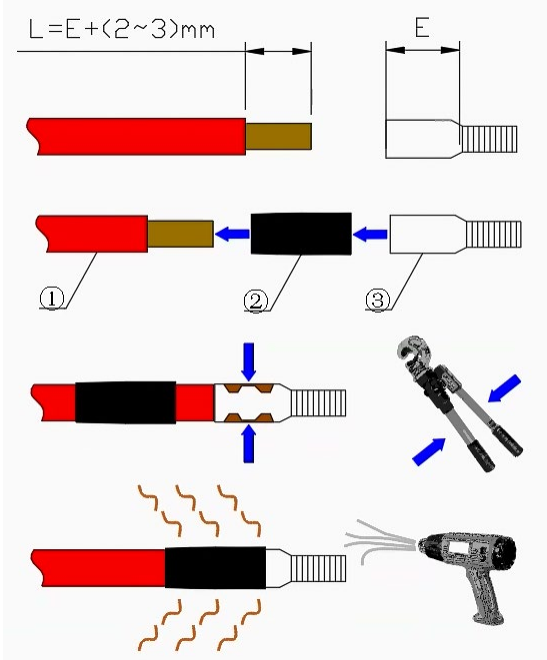


Fig. 6-4 Cabinet PV line crimping ①：wiring harness ②：heat shrink tubing ③：terminal (KYT25kW-60kWh-A for example)

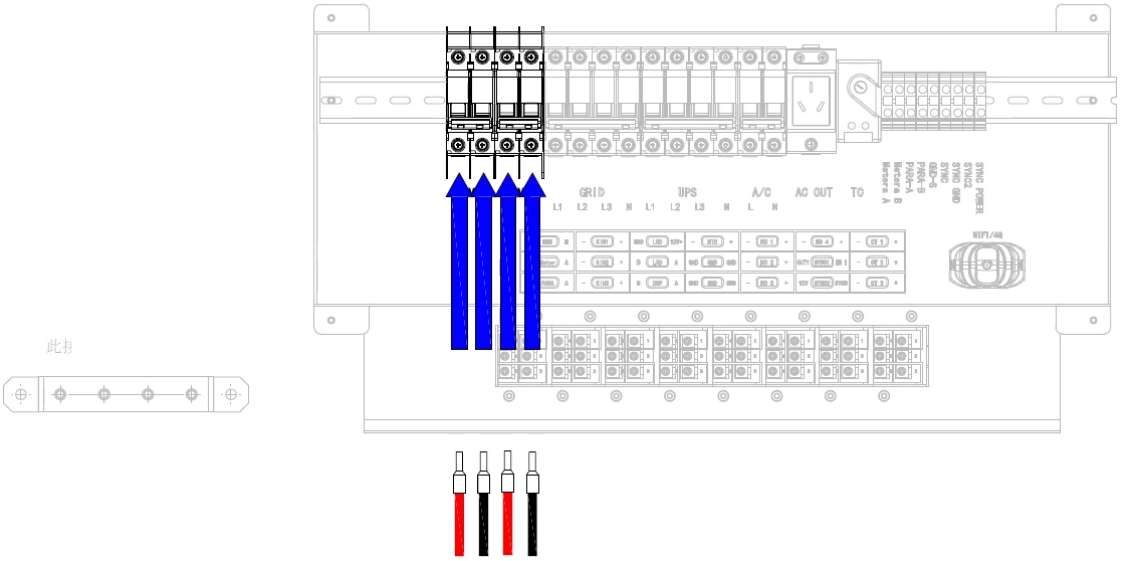


Fig. 6-5 PV connection position of cabinet （KYT25kW-60kWh-A for example）

6.6 COM Connection

0.5mm2 cable is recommended.

Sheet type bare head cold press terminal is recommended for terminal.

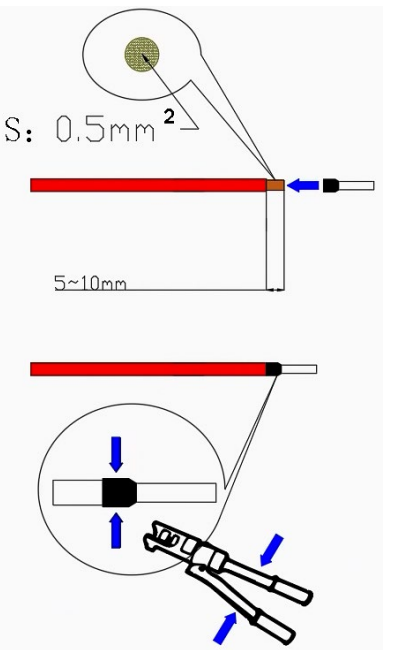


Fig. 6-6 Cabinet COM line crimping（KYT25kW-60kWh-A for example）

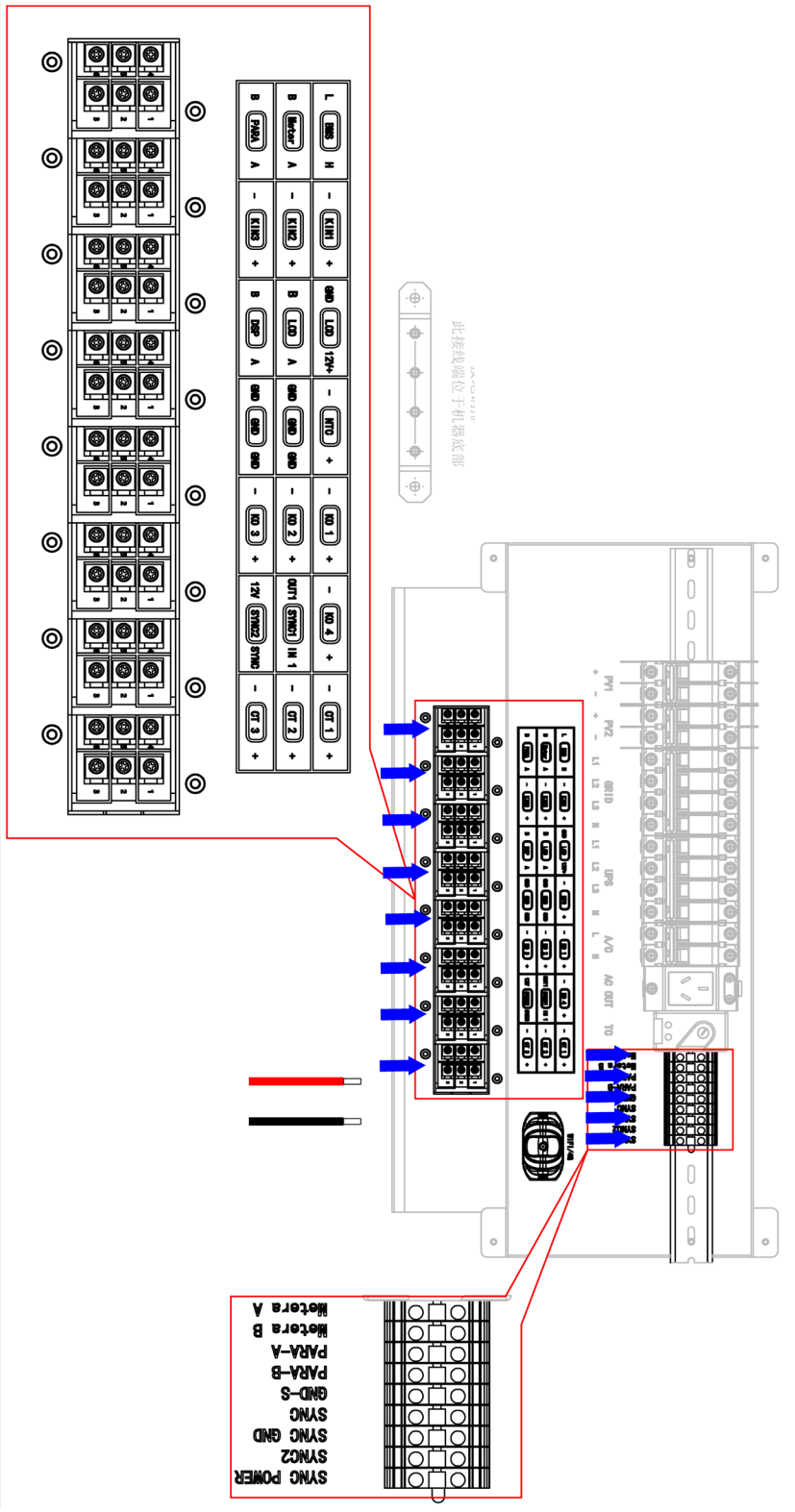


Fig. 6-7 COM connection position of cabinet（KYT25kW-60kWh-A for example）

6.7 End of Connection

According to the inlet and outlet line hole design of the storage cabinet base, the cable must be laid in advance at the inlet and outlet line position of the equipment base, and introduced into the equipment through the inlet and outlet line hole at the bottom of the cabinet. At the same time, the appropriate cable should be selected according to the requirements of the equipment inside the energy storage cabinet.

When wiring, ensure electrical insulation and comply with EMC specifications. Power cables, power supply and communication cables should be laid in layers. And if necessary, provide protection and support for the cable to reduce the stress of the cable.

Make sure all wiring is correct and firm. The gap of the cable inlet and outlet hole on the side of the energy storage cabinet shall be blocked with fire mud. At the same time, the installation foundation of the energy storage cabinet should be waterproof.

After the above work is completed, install the wiring sealing plate back.

7 Power On

7.1 Power On- Battery

A. The MSD module of each battery pack is sequentially inserted into the corresponding interface;

B. Open the G/S load switch of the main control module (left 3P switch), open the control switch on/off key (right 1P switch)

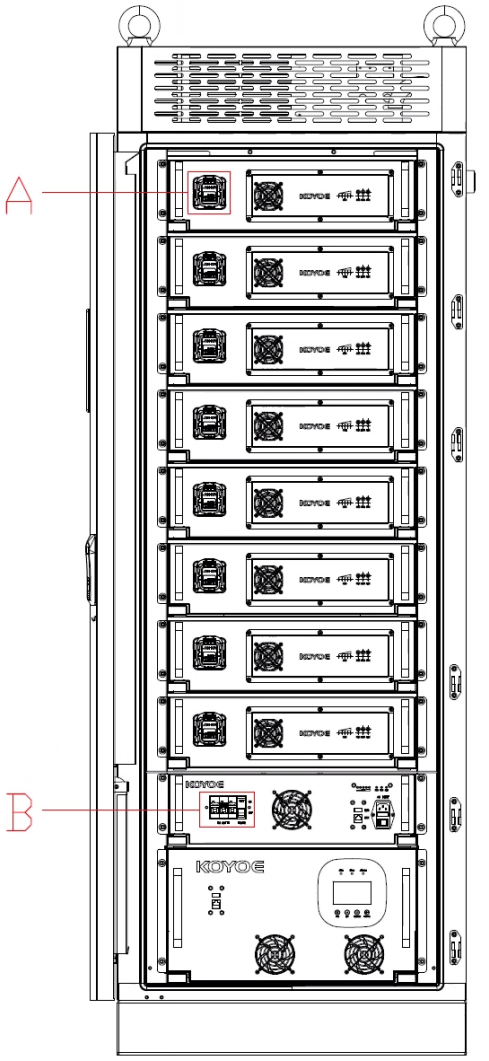


Fig. 7-1 Overview of operation switch position （KYT25kW-60kWh-A for example）

8 Power On/Off Operation

8.1 Power On

For the location of each circuit breaker, please refer to the 'Fig. 7-1'

Step 1: Complete the auxiliary power supply and main loop wiring, measure the voltage and frequency to meet the system requirements, and then proceed to the next step；

Step 2: Closed energy storage cabinet power supply: Operate S/G load switch closed；

Step 3: Close the BCMU control box in the energy storage cabinet: close the control switch, and the battery switch box is powered up. At this time, the touch screen and PCS are charged.；

Step 4: Close the three-phase power supply in the AC outdoor cabinet: Operate Q1 to close, and the air conditioner is charged at this time；

Step 5: Close the PV power supply in the AC outdoor cabinet: operate the PV switch to close, and the solar photovoltaic panel can work normally.

Step 6: Open the EPS load of AC outdoor cabinet; Operate Q2 to close, at this time, the AC outdoor cabinet can be outputted

- - Since then, the system power on is completed, you can check the operation touch screen, check whether the system is normal

8.2 Power Off

Step 1: Firstly, stop the system by controlling the Web interface or touch screen interface, and wait for the power of each end to drop to 0 before operating the following steps.；

Step 2: Disconnect the EPS load inside the AC outdoor cabinet: Operation Q2 is disconnected, and the AC outdoor cabinet is disconnected from the external output；

Step 3: Disconnect the PV power in the AC outdoor cabinet: Operate the PV switch to turn off, and the AC outdoor cabinet will be disconnected from the solar photovoltaic panel；

Step 4: Disconnect the three-phase power supply inside the AC outdoor cabinet: disconnect operation Q1, disconnect the air conditioning power supply；

Step 5: Disconnect the BCMU control box in the battery outdoor cabinet: Disconnect the control switch；

Step 6: Disconnect battery outdoor cabinet power: Operate S/G load switch to disconnect，

- - This end, the system power down completed

9 LCD

This chapter introduces the content distribution and operation method of liquid crystal interface.

9.1 Position of LCD screen

The LCD touch screen is located in the energy storage and current converter system, and is basically parallel with the line of sight, which is convenient for users to view data and perform related operations.

Users can view and set relevant data information by touching and clicking the icon button inside the screen.

9.2 Backlight Function

If the user does not perform any click operation on the LCD within a certain period of time, then

- If the non-operation time reaches 2 minutes, the LCD will automatically return to the main screen.
- If the non-operation time reaches 2 minutes, the LCD backlight lamp goes out.

When the user performs any click operation, the LCD backlight is lit, and the main page is displayed

> In order to facilitate users to operate the LCD, this chapter is configured with a large number of interface pictures. The parameter values and other specific details in the picture are for illustrative purposes only. Users please refer to the actual LCD of the product received.

9.3 Start Page

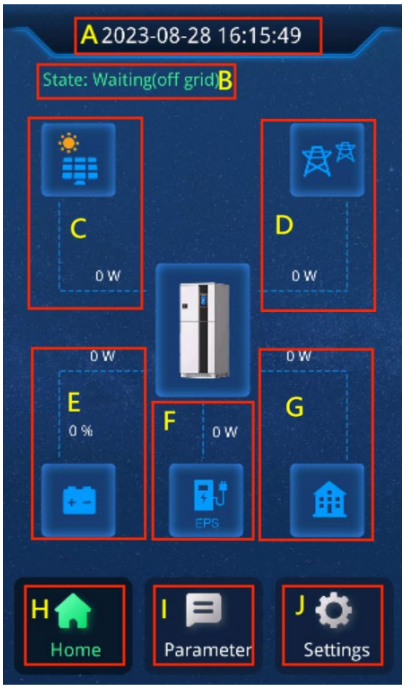
When the system is powered on, the LCD will start itself and display the startup page.This page will be displayed every time you power on, and you will enter the default main page after the boot process.

Start screen to enter the steps

Start screen and main page， click 

to enter.

Splash Screen Description



NO.	Explain
A	Time
B	Current power on/off status
C	Photovoltaic power
D	Grid power
E	Battery power and battery SOC values
F	EPS load
G	User load
H	Home page(Click to enter the startup screen)
I	Parameters (Click to view parameters)
J	Settings (Basic and advanced settings are available by clicking)

Function of splash screen:

The main interface can clearly know the time, networking status, photovoltaic power, grid power, battery SOC, battery power, EPS power, output load, etc.。

By cutting 

into the parameter interface for detailed information, by clicking 

into the setting interface for setting.

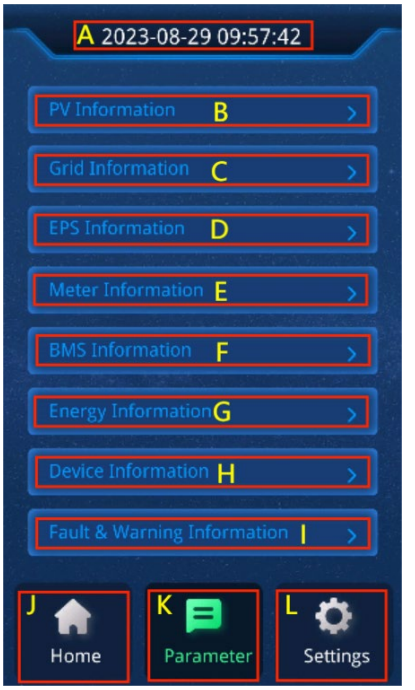
9.4 Parameter Interface

The parameter interface enters the step

Click the 

to access the parameters interface for detailed information.

Parameter interface Description



NO.	Explain
A	Time
B	PV Information
C	Grid Information
D	EPS Information
E	Meter Information
F	BMS Information
G	Energy Information
H	Device Information
I	Fault & Warning Information
J	Home
K	Parameter
L	Settings

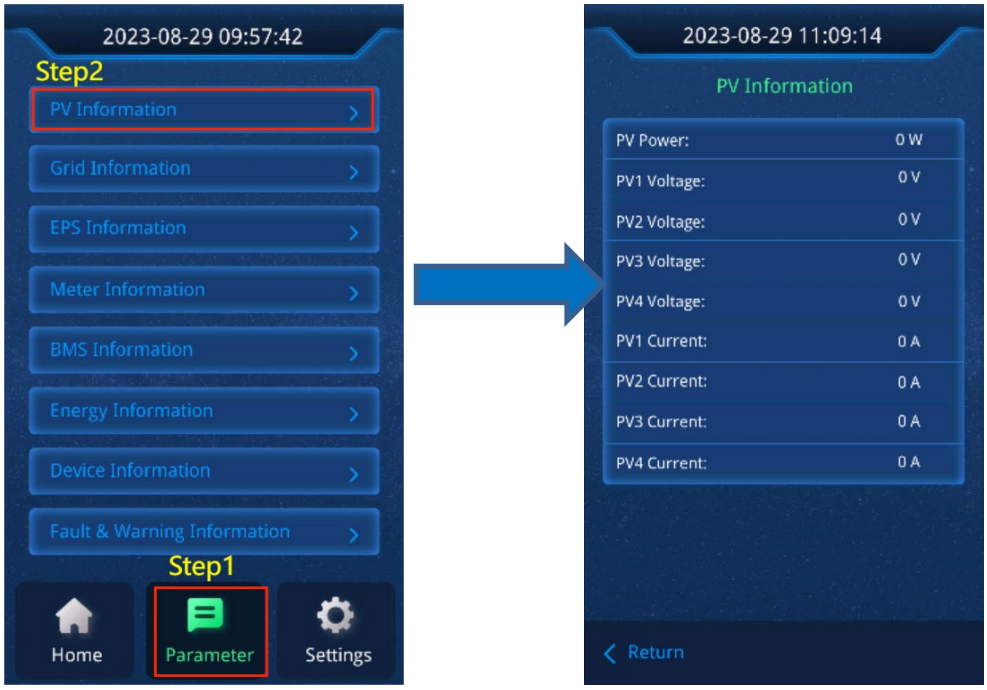
Function of parameter interface:

Through the parameter interface, you can click photovoltaic information, power grid information, EPS information, meter information, battery information, power information, equipment information, error and alarm information for detailed information.

9.4.1 PV Information

Step 1: Click 

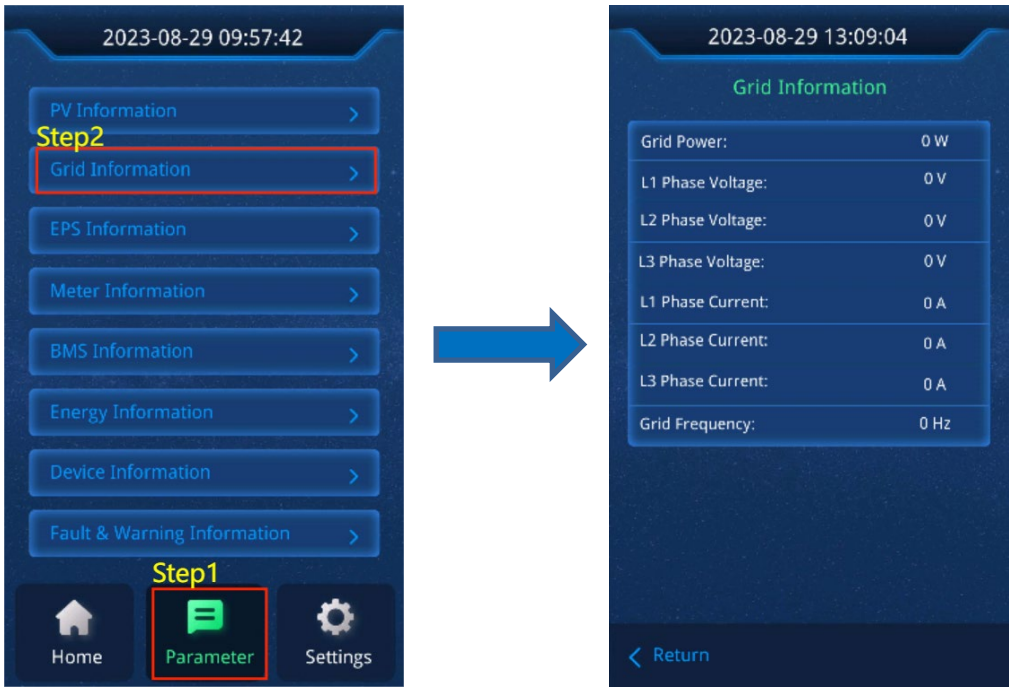
Step 2 : Click 



9.4.2 Grid Information

Step 1: Click 

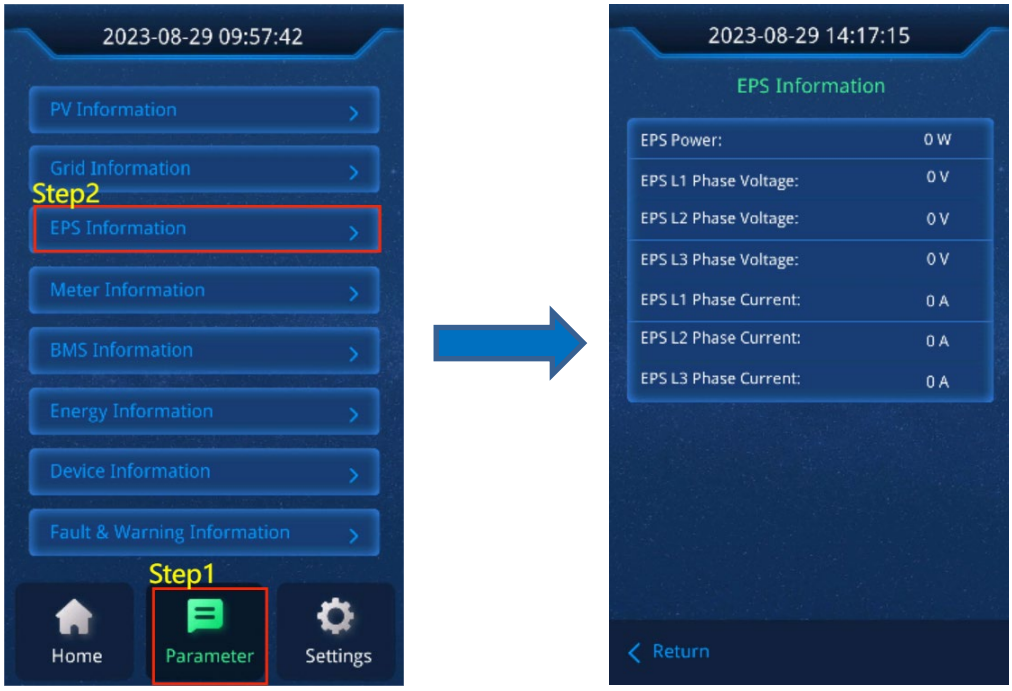
Step 2: Click 



9.4.3 EPS Information

Step 1: Click 

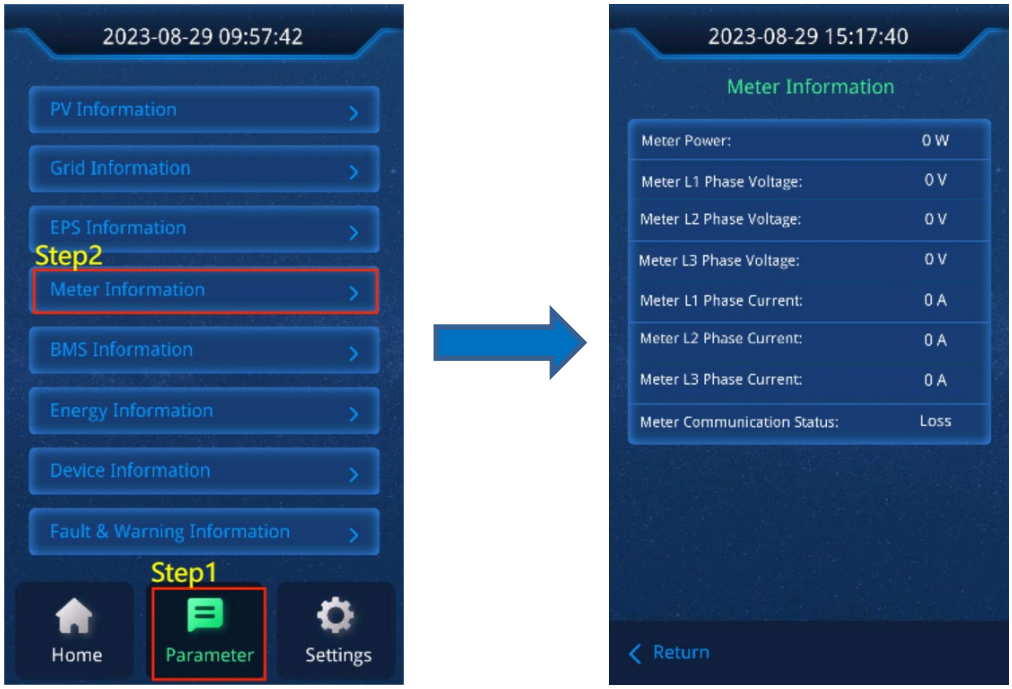
Step 2: Click 



9.4.4 Meter Information

Step 1: Click 

Step 2: Click 



9.4.5 BMS Information

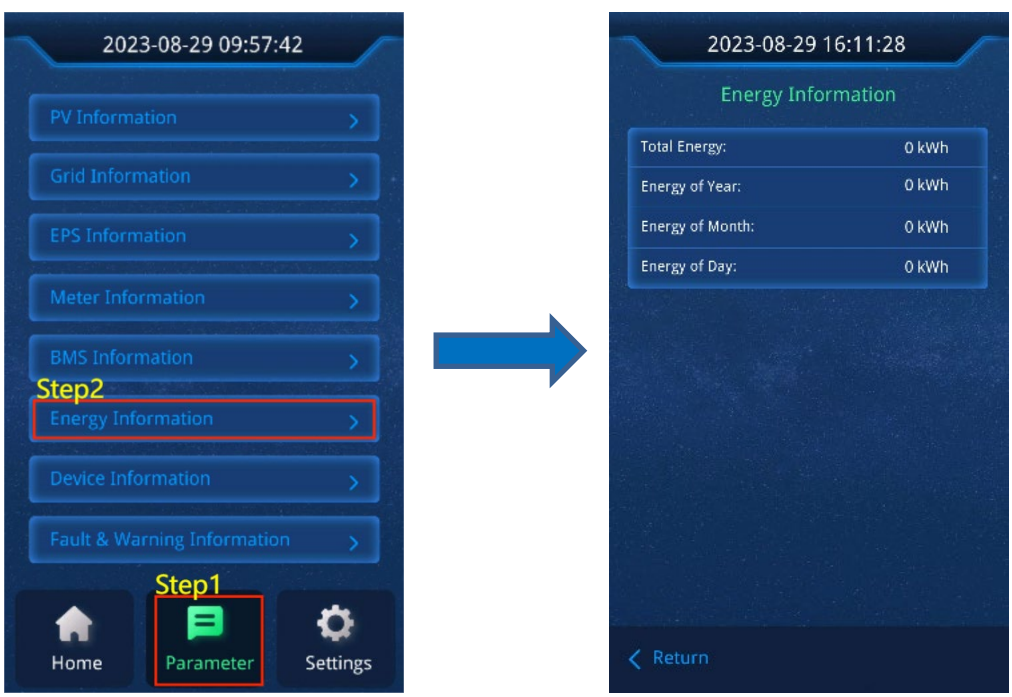
Step 1: Click 

Step 2: Click 

9.4.6 Energy Information

Step 1: Click 

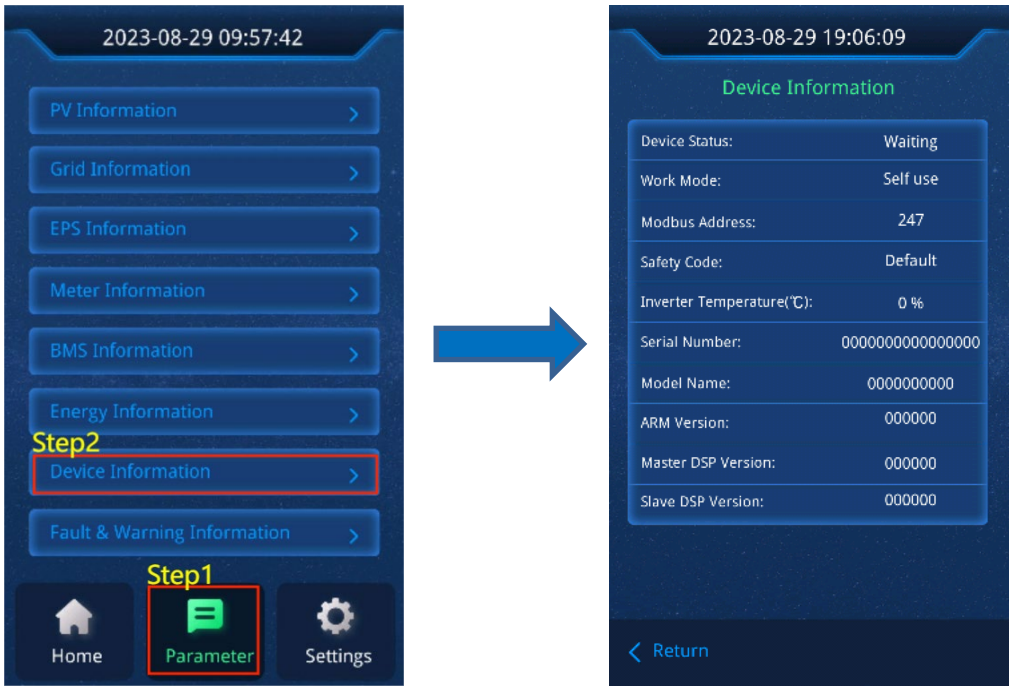
Step 2: Click 



9.4.7 Device Information

Step 1: Click 

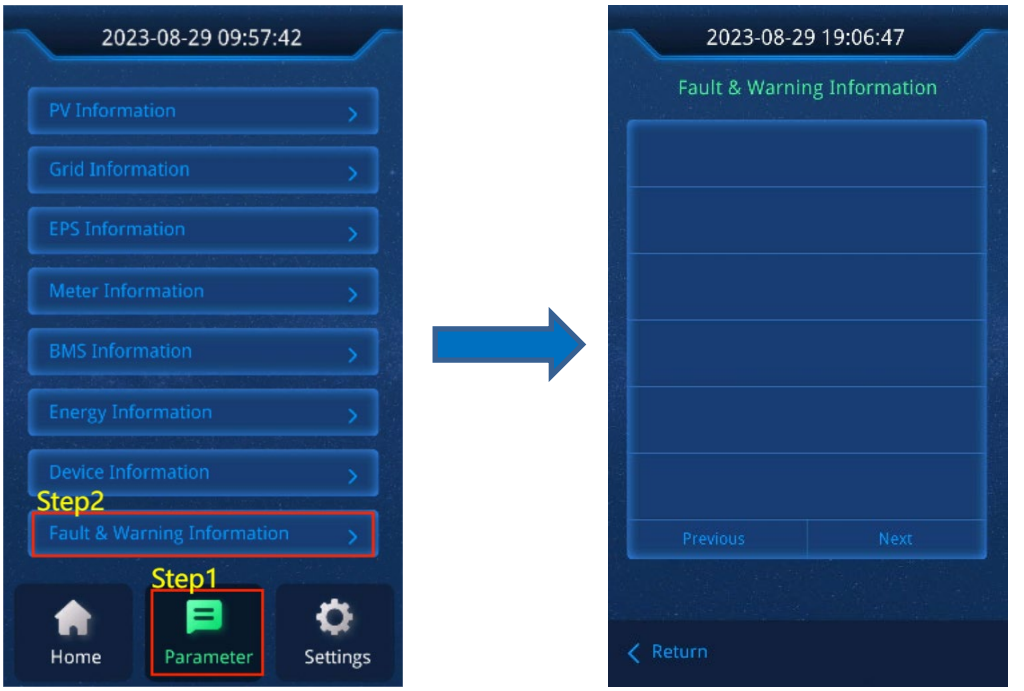
Step 2: Click 



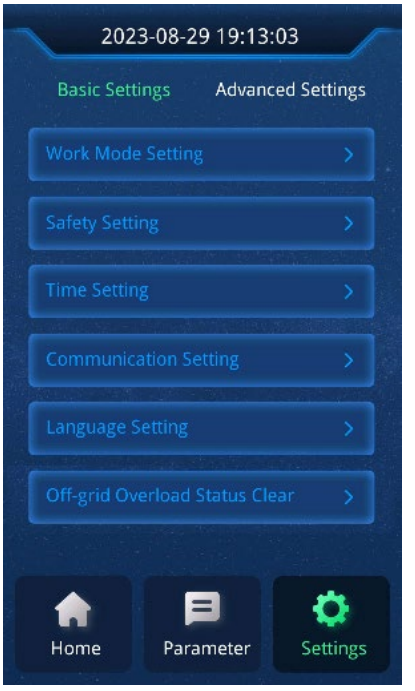
9.4.8 Fault & Warning Information

Step 1: Click 

Step 2: Click 



9.5 Basic Settings



Step 1: Click 

Step 2: Click 

9.5.1 Work Mode Settings

Step 1: Click 

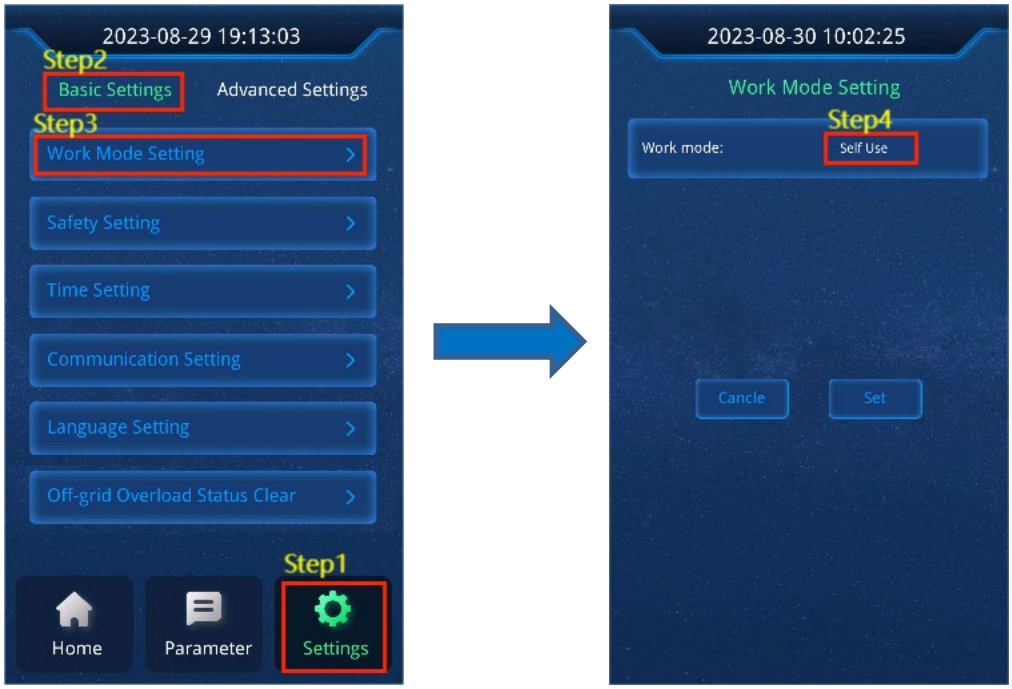
Step 2: Click 

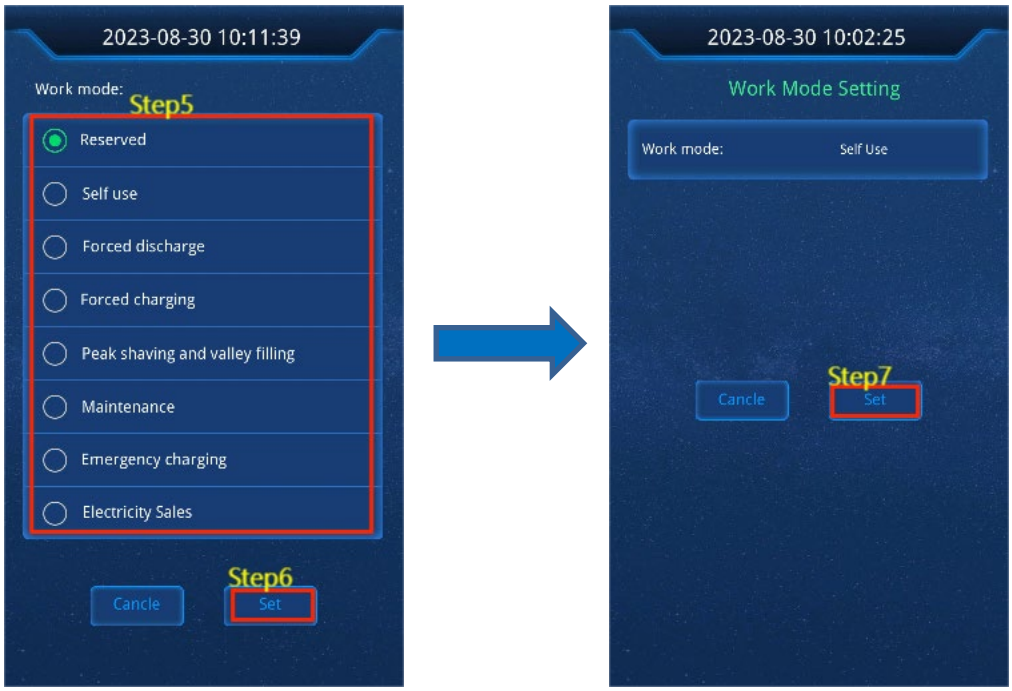
Step 3: Click 

Step 4: Click 

， When the working mode is ‘Peak Shaving and valley filling’ or ‘Electricity Sales’, the charging and discharging time period needs to be set.

Step 5: Click 





Function Declaration

Operating Mode	Declaration
Reserved	initial value
Self use	The energy generated by the photovoltaic system first meets its own load consumption, and then the excess energy is used to charge the battery. Finally, the remaining energy can be set to limit the power fed into the grid by setting the power size of the interconnection point.
Forced discharge	This mode must be connected to the grid to take effect. In the strong amplifier mode, the inverter chooses the appropriate power to feed into the grid according to the allowable discharge current of BMS, SOC and energy management calculation value and other conditions. After receiving the BMS stop discharge command or changing the working mode, the strong discharge mode will be exited.
Forced charging	This mode must be connected to the grid to take effect. In the forced charging mode, the inverter selects the appropriate power to charge the battery according to the permissible charging current of BMS and the calculated value of energy management. When the SOC is charged to the upper limit or the operating mode is changed, the forced charging mode is exited.
Peak Shaving and valley filling	This mode must be connected to the grid to take effect. In peak shaving and valley filling mode, the inverter can set up to 10 groups of discontinuous charging and discharging time periods within 24 hours. In this mode, the load is supplied with priority, and the power to charge or discharge is self-adjusted according to

	the allowable value of the BMS and the current energy management.
Maintenance	This mode must be connected to the grid to take effect. In the maintenance mode, the inverter will charge the battery until the SOC is charged to 100% or the mode is set to other mode. The power of the charge is self-regulated according to the BMS allowable value and the current energy management.
Emergency charging	This mode must be connected to the grid to take effect. In the emergency charging mode, the inverter will charge the battery according to the start or stop charging instruction of the BMS, until the SOC is charged to the maximum value or set to another mode, and then automatically exit the mode. The power of the charge is self-regulated according to the BMS allowable value and the current energy management.
Electricity Sales	This mode is similar to peak shaving and valley filling mode, and supports discharge without load.

9.5.2 Safety Setting

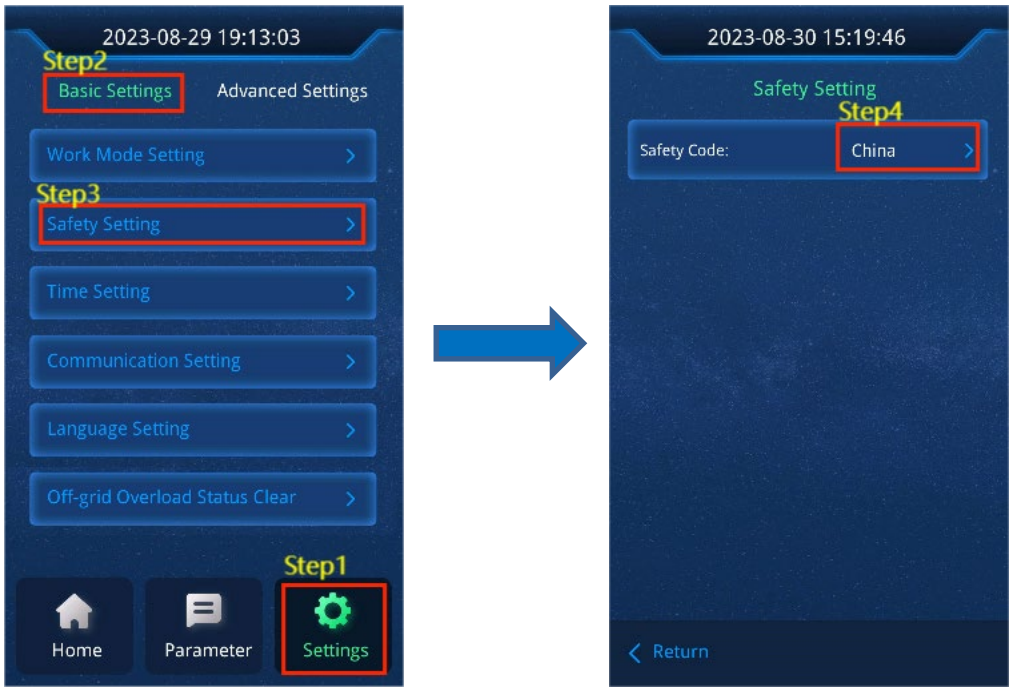
Step 1: Click 

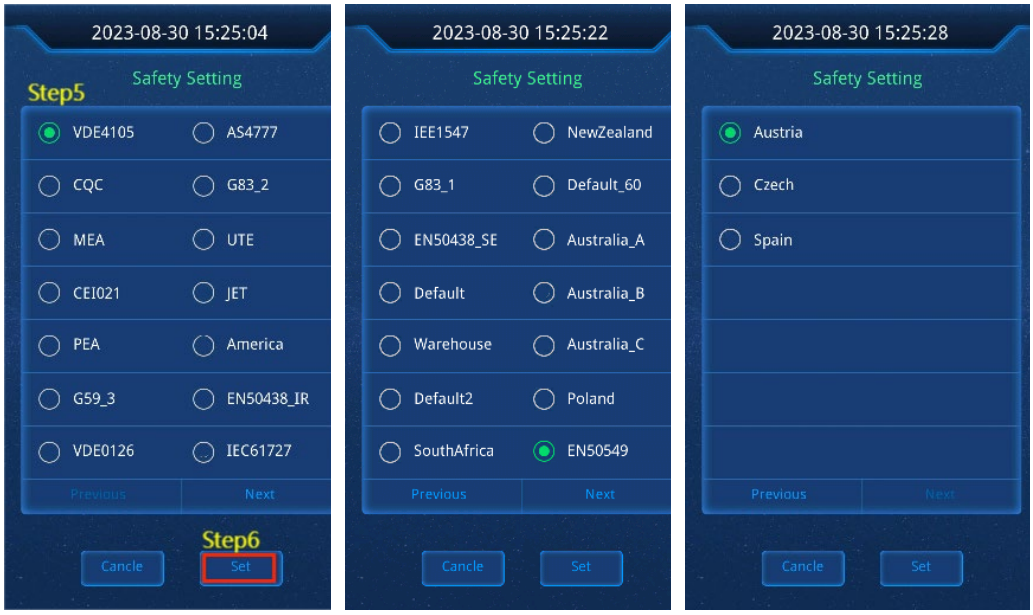
Step 2: Click 

Step 3: Click 

Step 4: Click 

Step 5: Click 



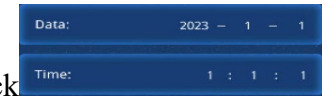


9.5.3 Time Setting

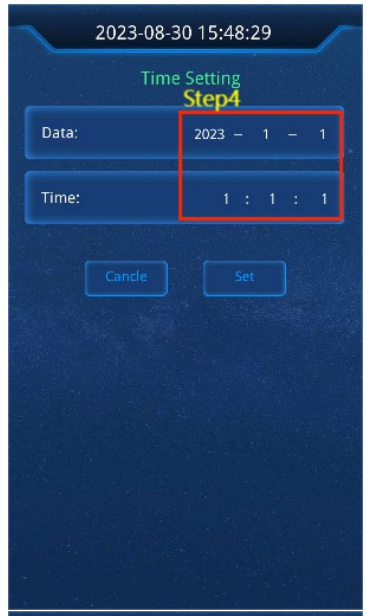
Step 1: Click 

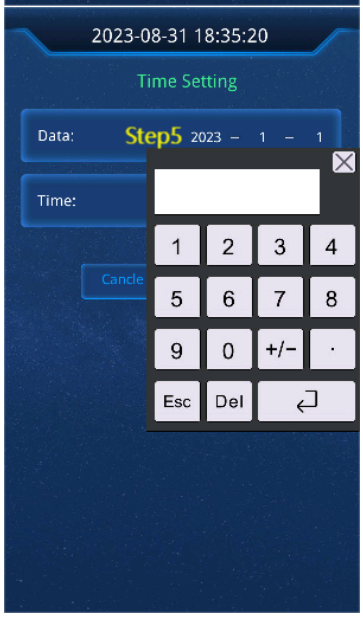
Step 2: Click 

Step 3: Click 

Step 4: Click 

Step 5: Click 





9.5.4 Communication setting

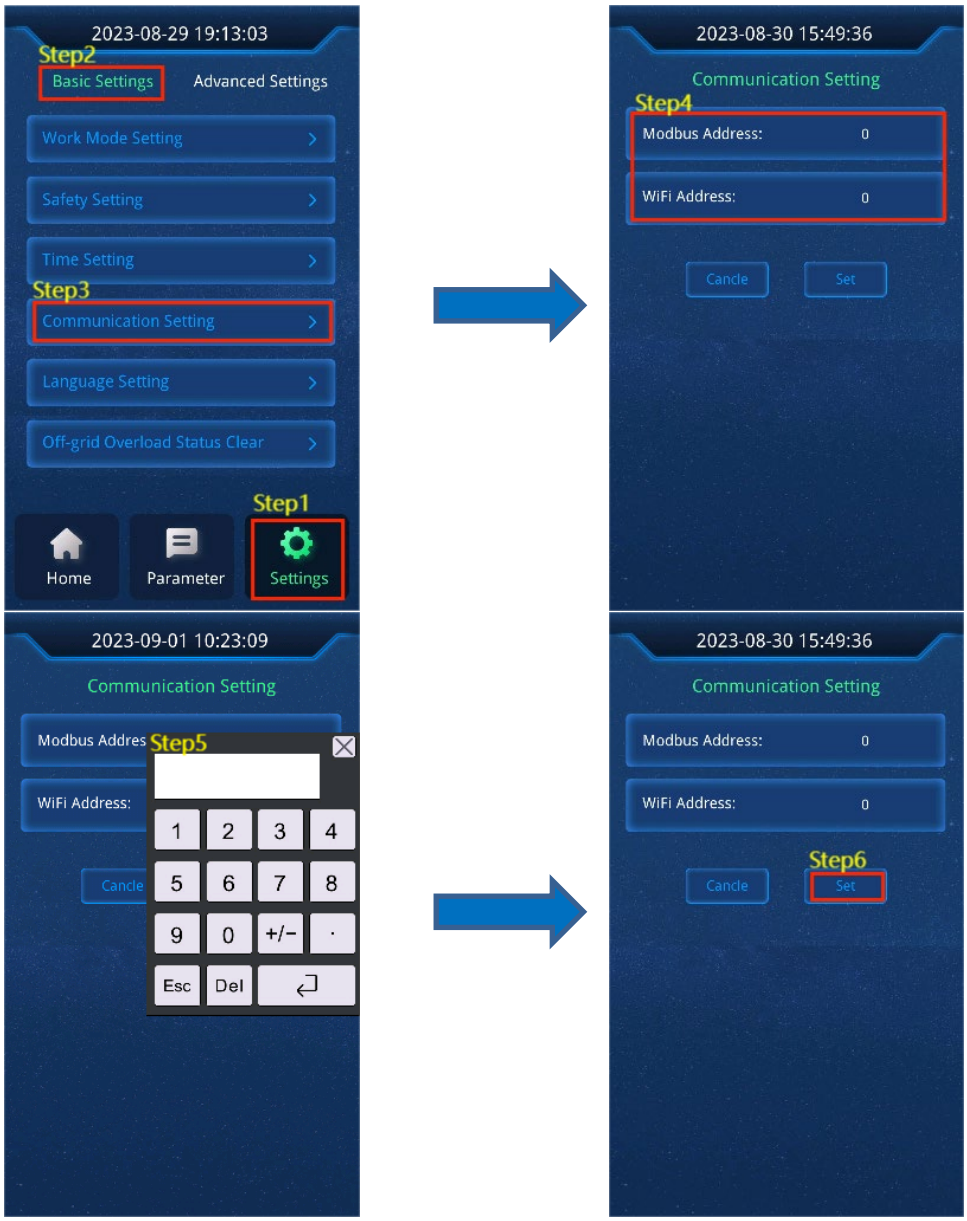
Step 1: Click 

Step 2: Click 

Step 3: Click 

Step 4: Click 

Step 5: Click 

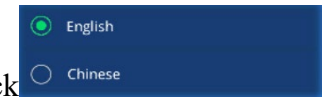


9.5.5 Language setting

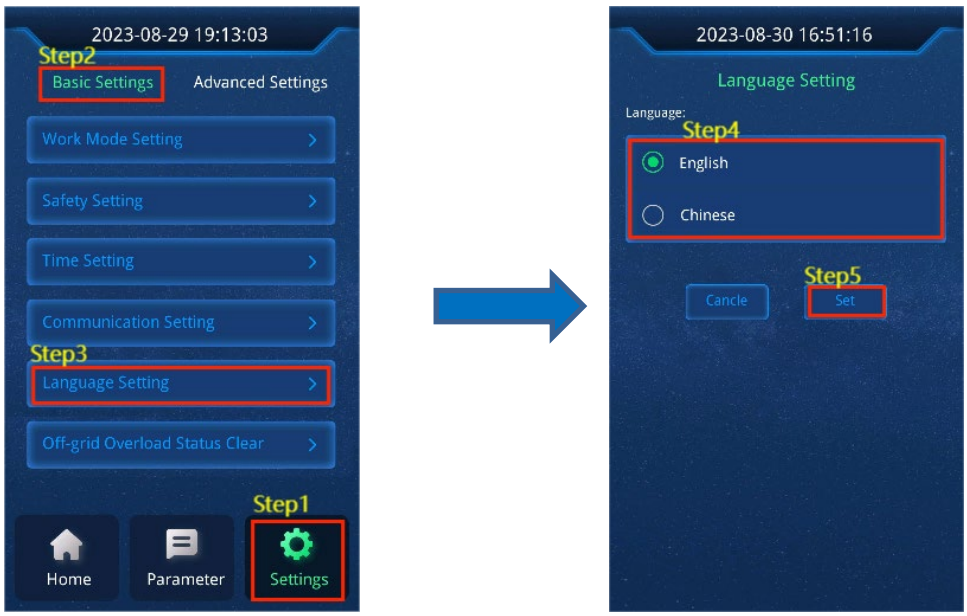
Step 1: Click 

Step 2: Click 

Step 3: Click 

Step 4: Click 

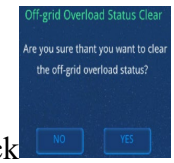
Step 5: Click 

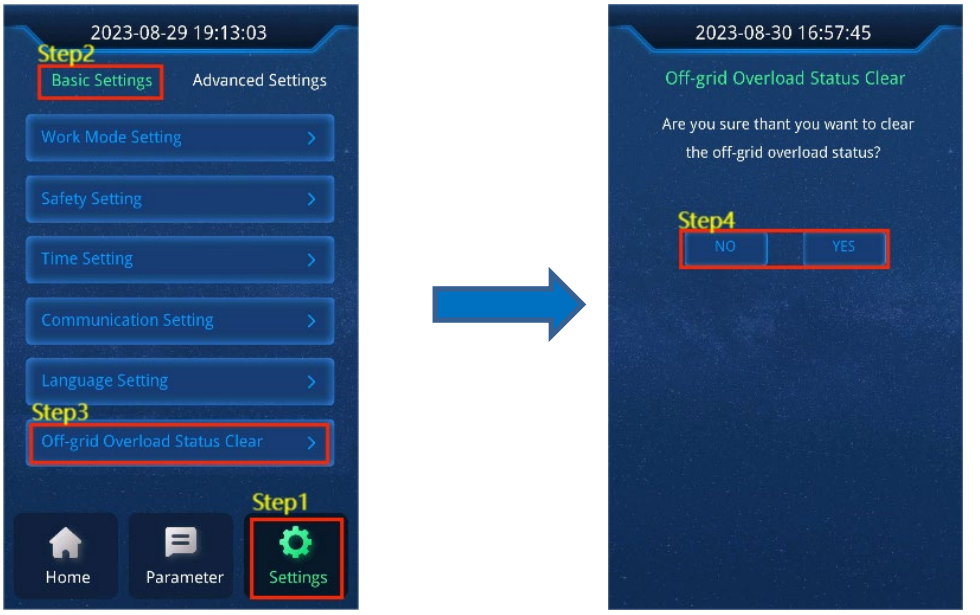


9.5.6 Off-grd Overload Status Clear

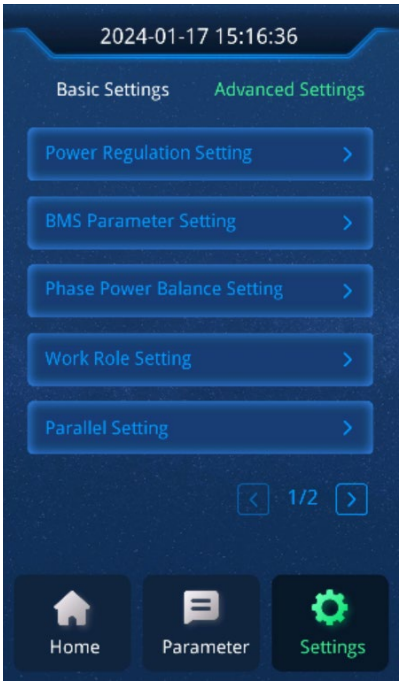
Step 1: Click 

Step 2: Click 

Step 3: Click 



9.6 Advanced Settings



Step 1: Click 

Step 2: Click 

9.6.1 Power Regulation Setting

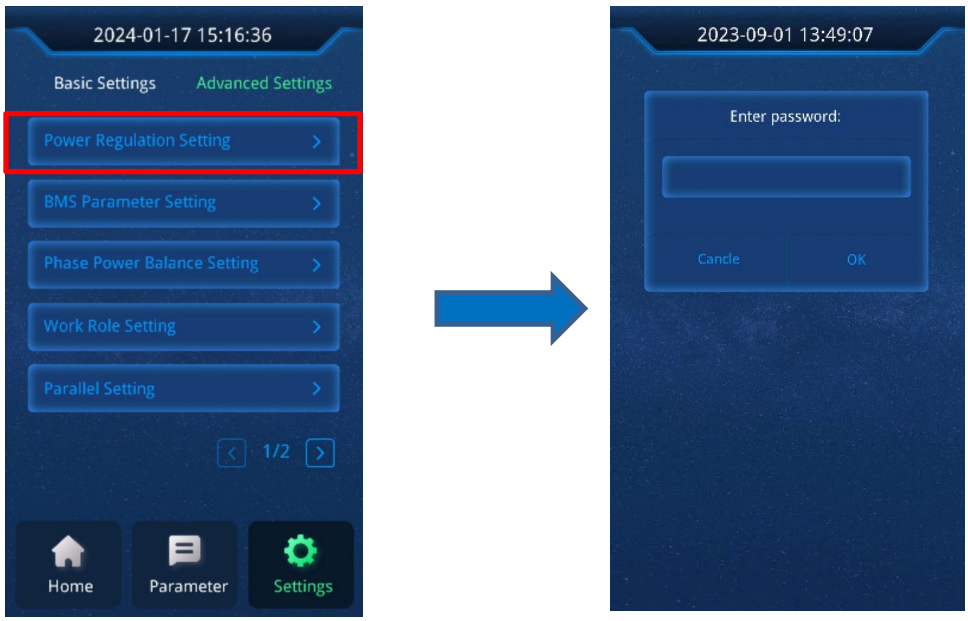
Step 1: Click 

Step 2: Click 

Step 3: Enter the password ‘1001’

Step 4: Click the ‘power regulation setting’ interface to set the active and reactive power

Step 5: Click 



9.6.2 BMS Parameter Setting

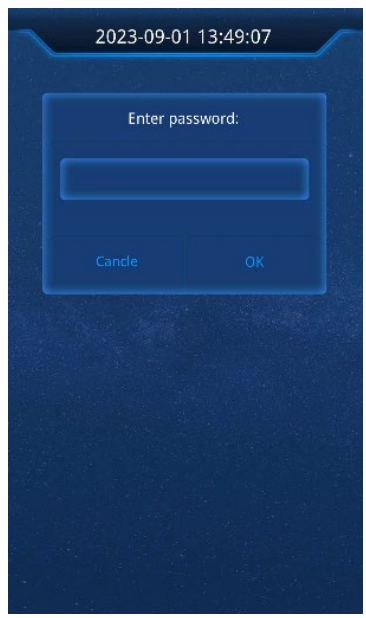
Step 1: Click 

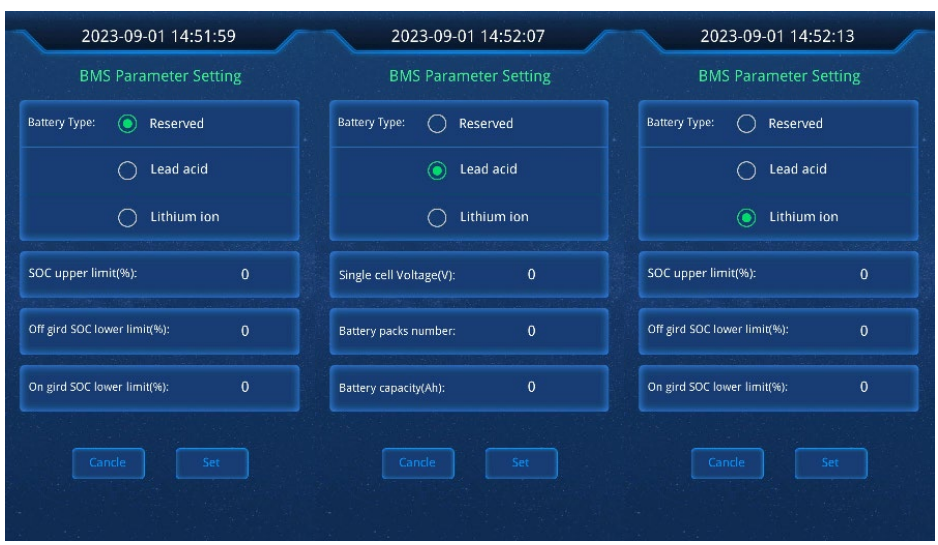
Step 2: Click 

Step 3: Enter the password '1001'

Step 4: Click 'BMS parameter setting' interface to select lead-acid or lithium battery, and set the SOC value or voltage value (retained as the initial value, meaningless).

Step 5: Click 





9.6.3 Phase Power Balance Setting

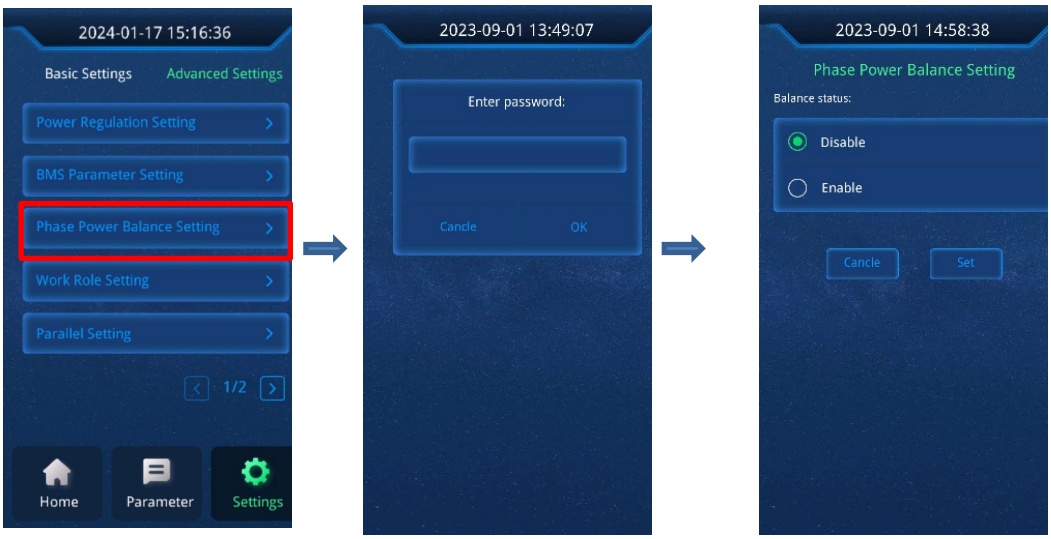
Step 1: Click 

Step 2: Click 

Step 3: Enter the password ‘1001’

Step 4: Click ‘phase power balance setting’ to enable or disable (this function is only available for three cameras)

Step 5: Click 



9.6.4 Work Role Setting

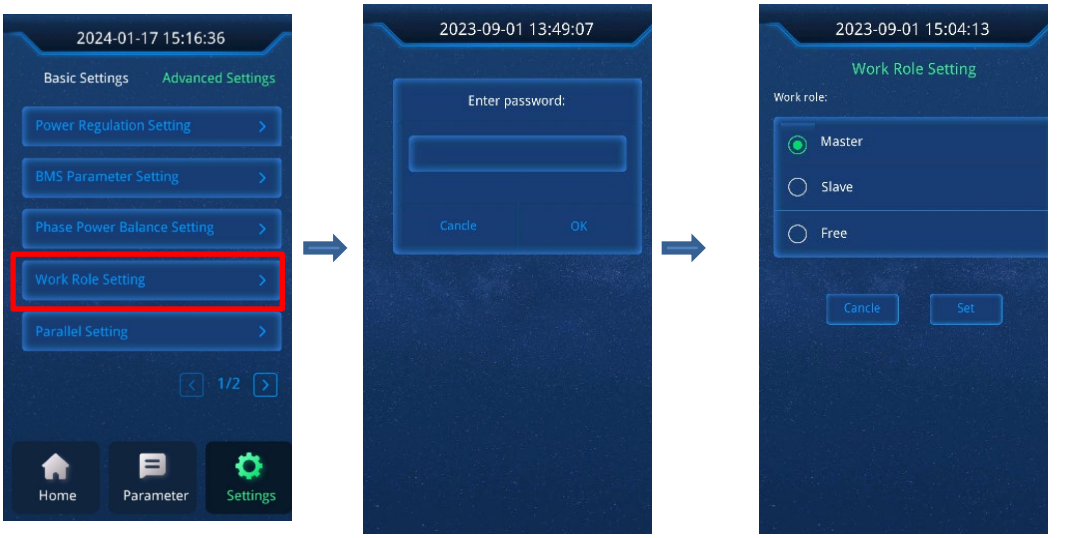
Step 1: Click 

Step 2: Click 

Step 3: Enter the password ‘1001’

Step 4: Click’ work role setting’ to set master, slave or free mode

Step 5: Click 



9.6.5 Parallel Setting

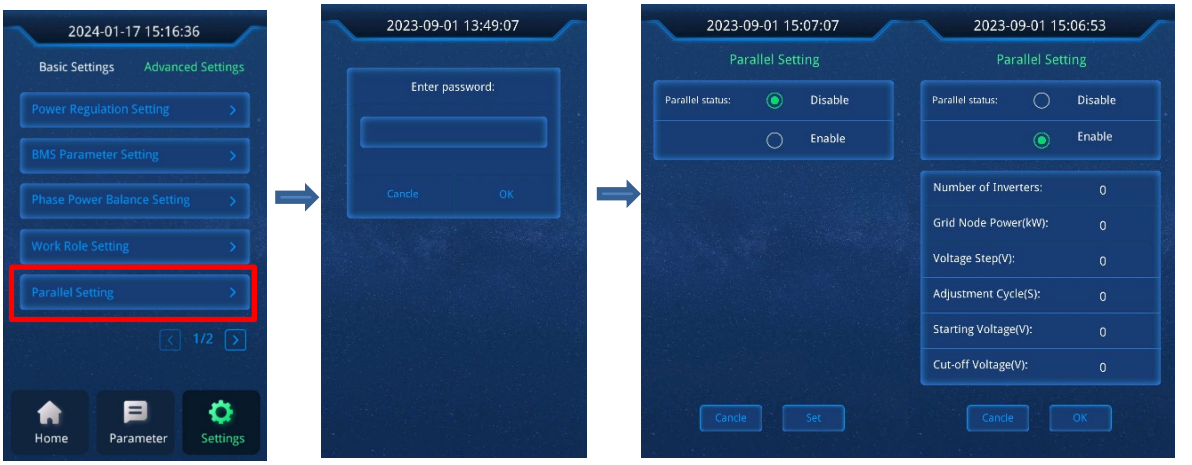
Step 1: Click 

Step 2: Click 

Step 3: Enter the password '1001'

Step 4: Click' parallel setting' to set the state of parallel machine. When the state is enabled, the number of parallel machines, power and voltage need to be set

Step 5: Click 



9.6.6 CT/Meter Setting

Step 1: Click 

Step 2: Click 

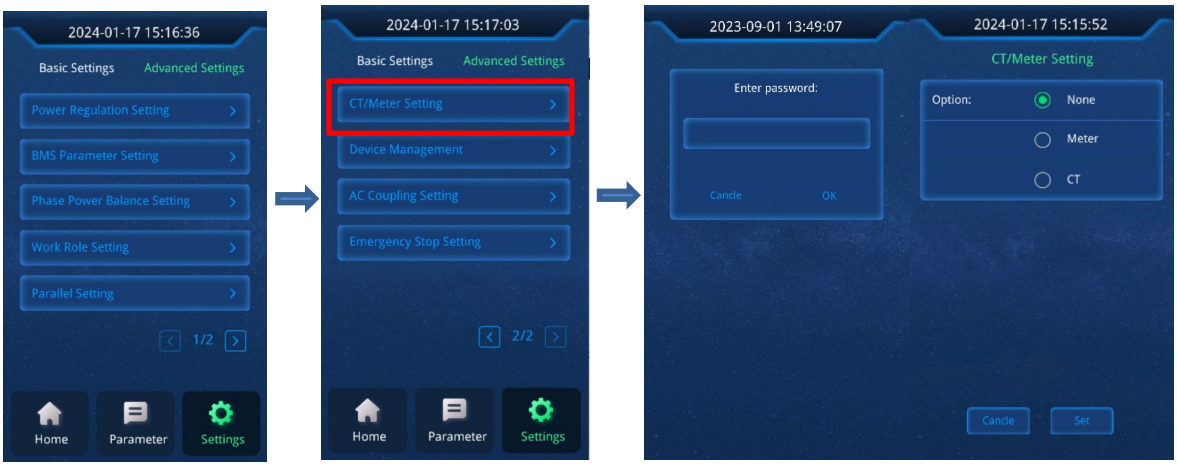
Step 3: Click 

into the next page

Step 4: Enter the password ‘1001’

Step 5: Click’ CT/Meter Setting’. According to the current selection of CT or meter, not connected to the need to select none. (An error will be reported if the meter is selected and not connected)

Step 6: Click 



9.6.7 Device Management

Step 1: Click 

Step 2: Click 

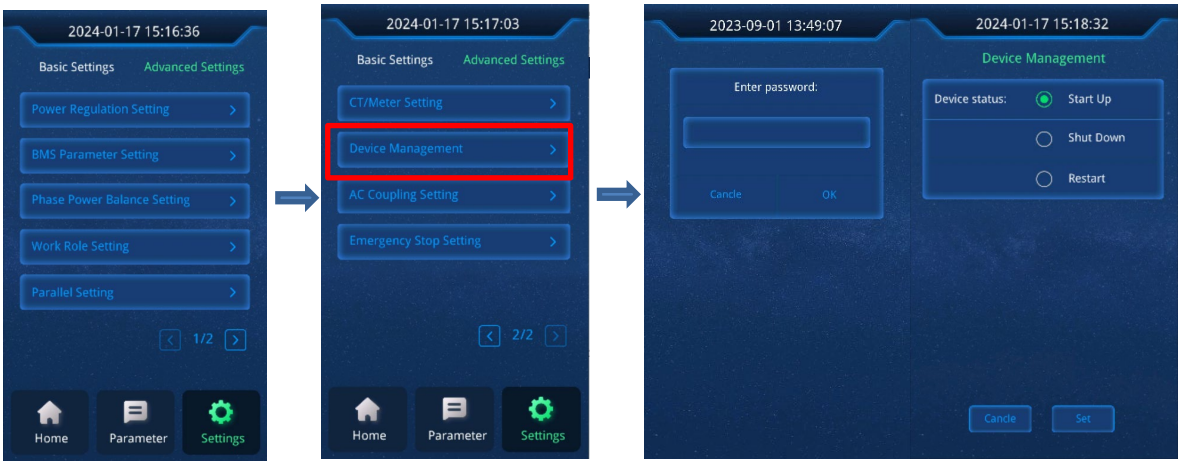
Step 3: Click 

into the next page

Step 4: Enter the password ‘1001’

Step 5: Click’ Device Management’, shutdown is no output, restart is machine restart, usually default to start up state.

Step 6: Click 



9.6.8 AC Coupling Setting

Step 1: Click 

Step 2: Click 

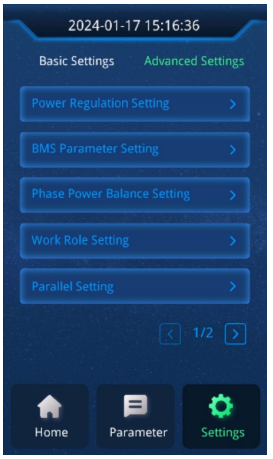
Step 3: Click 

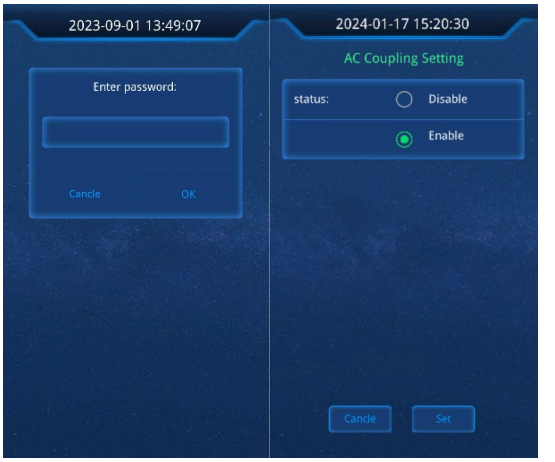
into the next page

Step 4: Enter the password ‘1001’

Step 5: Click’ AC Coupling Setting’, choose the mode according to the actual situation

Step 6: Click 





9.6.9 Emergency Stop Setting

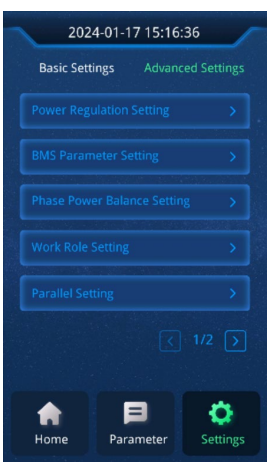
Step 1: Click 

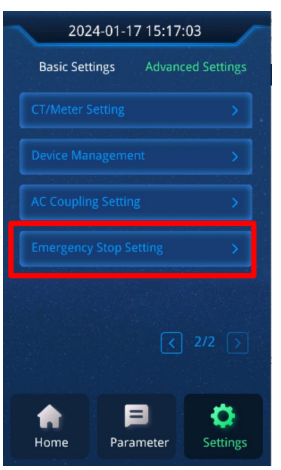
Step 2: Click 

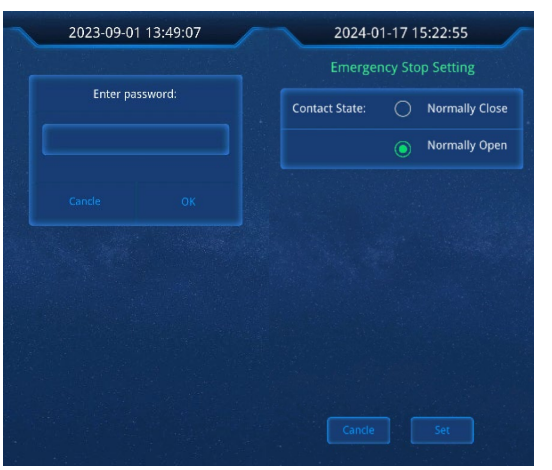
Step 3: Enter the password ‘1001’

Step 4: Click’ Emergency Stop Setting’. Select the settings according to the emergency stop button, the default is normally closed

Step 5: Click 







10 Troubleshooting

10.1 FAQ

Malfunction	Solution
GFCI Fault	1. The grounding current is too high. 2. After disconnecting the AC side circuit, pull out the photovoltaic cell at the input end and detect the peripheral equipment of the AC system. 3. After removing the fault, reconnect the PV panel and AC side circuit to detect the inverter status.
BMS Communication Fault	1. Communication between the battery pack and the inverter failed. 2. Check whether the communication cable is connected correctly and reliably. 3. Restart the inverter after replacing the connecting cable.
SPI Communication Fault	1. Master-slave DSP communication failure, please restart the inverter. 2. If it cannot work properly after reboot, please contact customer service
PV Overvoltage Fault	1. PV overvoltage fault, please check the PV input voltage, voltage value must be less than 1000V.
Isolation Fault	1. Check whether the inverter is effectively earthed and whether the impedance between the positive and negative poles of the photovoltaic cell is greater than 1M Ω; 2. Check whether the AC side is connected to the earth.
Grid Voltage Fault	1. Please check whether the network voltage is too low or too high. 2. Restart the inverter after the power grid is normal
Grid Frequency Fault	1. Please check whether the grid frequency is too low or too high. 2. Restart the inverter after the power grid is normal
Bus Voltage High	1. Bus voltage is high, please check whether the PV input voltage is less than 1000V.2. If the fault cannot be cleared after restarting the inverter, please contact customer service.
Off Grid Over Voltage Fault	1. High off-grid output voltage. 2. Please check whether the off-grid port is connected correctly and whether the off-grid load is working normally.
Battery Over Temperature Fault	1. Battery temperature is too high.2. Please confirm whether the battery is placed in a high temperature area.3. Please restart the inverter after the battery cools down.
Inverter Module Over Temperature Fault	1. High temperature of inverter module.2. Please confirm whether the heat sink of the inverter is blocked.3. Please confirm whether the working environment temperature of the inverter is normal.4. Restore the inverter after the surface temperature of the inverter cools.
Battery Voltage Low Fault	1. Low voltage battery failure. Please check the connection of the battery is correct.3. Please check whether the battery can work properly and restart the inverter.
Low ambient Temperature Warn	1. Low ambient temperature fault.2. Please confirm whether the ambient temperature of the inverter and battery is lower than the normal value, and restart the inverter after the ambient temperature rises.

11 Daily Operation and Maintenance

11.1 Safety Precautions

⚠ WARNING

There is a fatal high voltage inside the cabinet equipment of the energy storage integrated system. If it is accidentally touched, there is a danger of fatal electric shock.
Please wait at least 10 minutes after shutdown before opening the cabinet door. Before performing maintenance work, ensure that the internal power of the equipment is completely removed.

⚠ WARNING

Only qualified and authorized personnel can perform maintenance and other operations on the energy storage integrated system.
When performing maintenance work, do not leave screws, washers and other metal parts in the energy storage integrated system, or it may damage the equipment!

⚠ WARNING

The entry of wind sand and moisture may damage the electrical equipment in the energy storage integrated system, or affect the operation performance of the equipment!

- Do not open the door of the equipment cabinet in the energy storage integrated system in sandstorm season or when the relative humidity in the surrounding environment is greater than 95%.
- When there is no wind and sand, and the weather is clear and dry, all maintenance work can be started.

⚠ WARNING

If only the AC and DC switches are disconnected, the cable connection terminal inside the AC and DC cabinet of the energy storage integrated system is still charged! To avoid the danger of electric shock, before maintenance, overhaul and other operations:

- Disconnect all AC and DC side switches；
- Disconnect the front and rear circuit breakers of the energy storage integrated system.

11.2 Maintenance Introduction

11.2.1 Summarize

The energy storage integrated system has high protection level and is suitable for outdoor use. However, the harsh environment or long-term operation will still cause the aging of the energy storage integrated system or the damage of the internal equipment. Regular maintenance and inspection of the energy storage integrated system and replacement of aging and damaged components will effectively extend its service life and improve the performance of internal equipment.

NOTICE

Irregular inspections are necessary, especially if the overall performance of the system is poor.

11.2.2 Maintenance period

To ensure the good operation of the equipment in the energy storage cabinet, it should be maintained regularly.

Each maintenance period given in this section is a reference value. The actual maintenance period should be reasonably determined according to the actual environmental conditions of the project site. If the operating environment of the energy storage cabinet is harsh, such as in desert areas, the corresponding maintenance cycle should be shortened. Internal and external cleaning, anti-corrosion and rust work should be more frequent. If the system is installed in a desert area, it is recommended that after each sandstorm, the inside and outside of the storage cabinet should be carefully inspected and thoroughly cleaned.

⚠ WARNING

It is necessary to regularly check whether the cooling fan and fan of the module in the energy storage cabinet are running normally, and observe whether there is friction sound in the operation. If there is, it may be caused by dust entry. It is necessary to remove dust after the energy storage cabinet stops running.
After the energy storage cabinet is completely powered off, it needs to wait at least 10 minutes for the internal capacitor to discharge. Before cleaning the dust, please use the multimeter to make sure that the inside of the machine is completely free of electricity to avoid electric shock.

⚠ WARNING

The vast majority of maintenance work, all need to remove the machine internal

protective net cover can be implemented. At the end of all the maintenance work, be sure to remove all the maintenance cover to the original state.
Make sure all screws are fastened in place

WARNING

When performing routine maintenance, inspection and other work on the energy storage cabinet and internal equipment, please immediately correct any non-conformance found. If you have any questions, please contact KOYOE immediately

Maintenance（every two years）

Item	Inspection Method
System status and cleaning	Check the following items and correct them immediately if they do not meet the requirements: • Check whether the energy storage cabinet and internal equipment are damaged or deformed. • Check whether there is abnormal noise during the operation of the internal equipment. • Check whether the temperature inside the energy storage cabinet is too high. • Check whether the humidity and gray level inside the energy storage cabinet are within the normal range. Clean if necessary. • Check whether the air inlet and outlet of the energy storage cabinet are blocked.
Warning sign	Check that warning signs, labels, etc. are clearly visible and free of dirt. Replace if necessary.
Cable shield is grounded	Check whether the cable shield is in good contact with the insulation sleeve; Whether the grounding copper row is fixed in place.
Lightning protection equipment and fuse	Check whether lightning protection equipment and fuse are well fastened
Condition of corrosion	Check whether there is oxidation or rust inside the energy storage cabinet

Maintenance（every year）

Item	Inspection Method
Outside of cabinet	Check the following items and correct them

	immediately if they do not meet the requirements: • Check the top of the energy storage cabinet for flammable objects. • Check whether the welding point between the energy storage cabinet and the foundation steel plate is firm and corroded. • Check whether there is damage, paint loss, oxidation and other conditions of the energy storage cabinet shell. • Check whether the cabinet door lock can be opened flexibly. • Check whether the seal is well fixed.
Inside of cabinet	Check whether there are foreign bodies, dust, dirt and condensed water inside the energy storage cabinet.
Inlet and outlet	Check radiator temperature and dust. If necessary, a vacuum cleaner can be used to clean the heat dissipation module, etc.
Wiring and cable arrangement	Need to wait for the energy storage cabinet internal equipment completely power off, then start the inspection work! If any non-conformance is found during the inspection, please correct it immediately. • Check whether the cable arrangement is standard, whether there is a short circuit, etc. If there are any abnormalities, they should be corrected immediately. • Check that all inlet and outlet line holes of the energy storage cabinet are well sealed. • Check whether there is water leakage inside the energy storage cabinet. • Check whether the power cable connection is loose and tighten it according to the torque previously specified. • Check the power cables and control cables for damage, especially for cuts on the skin in contact with metal surfaces. • Check whether the insulation tape of the power cable terminal is detached.
Ground and equipotential connections	• Check that the grounding connection is correct, and the grounding resistance should not be greater than4Ω。 • Check whether the equipotential connection inside the energy storage cabinet is correct.
Fan	Check the running status of the fan. • Check if the fan is blocked.

	• Check whether there is abnormal noise in the operation of the fan.
Screw	Check whether there is a screw drop inside the energy storage cabinet.

Maintenance（Once every six months or once every year）

Item	Inspection Method
Safety function	• Check the emergency stop button and the stop function of LCD. • Simulate downtime. Check the body warning mark and other equipment mark, if found blurred or damaged, please replace it in time.
Internal component inspection	• Check the cleanliness of the circuit board and components. • Check radiator temperature and dust. If necessary, a vacuum cleaner can be used to clean the heat dissipation module, etc. • Replace the air filter if necessary. Attention! The ventilation of the air intake must be checked. Otherwise, if the module cannot be effectively cooled, it will fail due to overheating
Component maintenance	• Regular inspection of all metal components for corrosion (every six months). • Annual inspection of contactors (auxiliary switches and micro switches) to ensure good mechanical operation. • Check operating parameters (especially voltage and insulation)

NOTICE

The table only shows the recommended routine maintenance cycle of the product. The actual maintenance cycle should be rationally determined according to the specific installation environment of the product.
Power plant scale, location, site environment and other factors will affect the maintenance cycle of the product. If the operating environment is large or thick dust, it is necessary to shorten the maintenance cycle and increase the frequency of maintenance.

11.3 System Cleaning

11.3.1 Summarize

Cleaning around and inside the energy storage cabinet is an important part of maintenance work.

Due to the influence of temperature, humidity, dust, and internal equipment vibration in the environment of the energy storage cabinet, dust will accumulate inside it, block the inlet and outlet or enter the internal equipment, which will lead to the potential failure of internal equipment, shorten the service life of the equipment or reduce power generation.

During the normal operation of the equipment, regular inspection and cleaning should be carried out to ensure that the internal equipment is in a good operating environment to a certain extent.

11.3.2 Cleaning cycle

The cleaning cycle of the energy storage cabinet should be reasonably determined based on its operating environment, such as climatic conditions, to ensure that the external and internal cleaning conditions of the energy storage cabinet are good. If the operating environment is harsh, such as desert areas, etc., should shorten the maintenance cycle.

11.3.3 Internal cleaning

For the dust inside the energy storage integrated system, it is not recommended to clean directly with a broom, otherwise it is easy to cause ash raising, and it is recommended to use a vacuum cleaner to absorb dust.

11.3.4 Internal cleaning of foundation

Users should periodically enter the foundation to check the cleanliness of the foundation. Clean with a vacuum cleaner if necessary.

11.3.5 Check door locks and hinges

After the cleaning work, it should be checked whether the door lock and hinge of the energy storage integrated system can be used normally and whether the state is good. If necessary, the door should be properly lubricated keyhole, hinge etc

11.3.6 Seal inspection

The seal in good condition is an important guarantee to effectively prevent water

leakage inside the energy storage cabinet. It should be carefully checked. If damaged, please replace it immediately.

11.4 Paint Finishing Measures

Check the appearance damage of the energy storage cabinet:

Case 1: the surface dirt caused by water stains can be cleaned

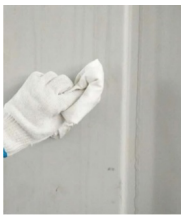
Case 2: Dirty surface & damaged finish, surface marks can not be cleaned.

Case 3: Primer damage exposed substrate

Operation steps for maintenance of Case 1:：

Materials

- Cloth, water, alcohol or other non-corrosive cleaning agent

Icon	Inspection Method
	1. Use a rag (or other scrubbing tool) with water, on the table Scrub the dirty part of the face 2. If water cannot be used to scrub clean, use 97% alcohol scrub until surface cleanliness is acceptable. (You can also try using a non-corrosive cleaner commonly used in your area)

Operation steps for maintenance of Case 2：

Materials

- Sandpaper, rag, water, alcohol, brush, color number RAL9003 of the paint

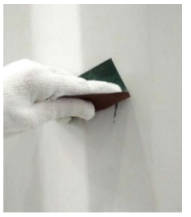
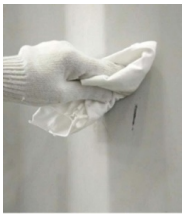
Icon	Inspection Method
	1. Use sandpaper to polish the surface paint on the furred or scratched parts, so that the surface is smooth

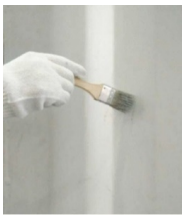
	2.Use a rag with water or 97% alcohol to scrub the damaged area to remove surface stains.
	3. After the surface is dry, use a soft brush to replenish the paint scratches, and keep the paint brush as uniform as possible.

Operation steps for maintenance of Case 3：

Materials

- Sandpaper, rag, water, alcohol, primer, brush, color RAL9003 of the paint

Icon	Inspection Method
	1.Use sandpaper to polish the surface paint on the furred or scratched parts, so that the surface is smooth
	2.Use a rag with water or 97% alcohol to scrub the damaged area to remove surface stains.
	3. After the surface is dry, spray zinc-rich primer on the exposed parts of the substrate for protection. Spraying should completely cover the exposed substrate.

	4.After the primer is dry, use a soft brush to repaint the damaged parts. The paint should be applied evenly and consistently.

NOTICE

It is necessary to check whether the protective paint sprayed on the shell of the energy storage integrated system has fallen off or fallen off. If found, please repair it in time.
The energy storage integrated system should be re-sprayed with special protective paint every 5 years.

11.5 Replace Electrical and Electronic Components

11.5.1 Attention

⚠ WARNING

When replacing the electronic and electrical components in the energy storage integrated system, please be sure to replace the same manufacturer's component products of the same model!
The model of the component can be obtained by the identification of the energy storage integrated system or the identification of the product itself. If this is not available, please contact KOYOE.

⚠ WARNING

If the site needs to replace other manufacturers or the same manufacturer of different models of products, must be confirmed by KOYOE analysis in advance. Otherwise, our company will not assume any responsibility for casualties or property losses that may be caused by this.

⚠ WARNING

Replace the fuse in strict accordance with this section.
KOYOE shall not be responsible for any loss caused by failure to operate in accordance with this section.

12 Appendix

12.1 System Parameter

Model	KYT15kW-30kWh-A	KYT20kW-46kWh-A	KYT25kW-60kWh-A
PV Input Data			
Max. Input Power[W]	22500	30000	37500
Max. Input Voltage[V]	1000		
MPPT Operating Voltage Range/Nominal Input Voltage[V]	180~900/610		
Max. Input Current[A]	36/36		
Max. Short Circuit Current[A]	40/40		
Number of MPPT Trackers	2		
Number of Strings per MPPT	2/2		
AC Output Data(GRID)			
Nominal Output Power[W]	15000	20000	25000
Max. Apparent Power [VA]	16500	22000	27500
Max Input Power[W]	30000		
Nominal Output Voltage[Vac]	380/400V,3L/N/PE		
Nominal Output Frequency[Hz]	50/60		
Max. Output Current[A]	24	32	40
Max. Three-phase Unbalanced Output Current[A]	33	43	43
Grid Bypass Current[A]	50		
Power Factor	~1 (0.8 lead to 0.8 lag can be set)		
Total Harmonic Distortion[%]	<3		
AC Output Data(EPS)			
Nominal Output Power[W]	15000	20000	25000
Max. Apparent Power [VA]	16500	22000	27500
Nominal Output Voltage[Vac]	380/400V,3L/N/PE		
Nominal Output Frequency[Hz]	50/60		
Max. Three-phase Unbalanced Output Current[A]	33	43	43
Max. Output Single-phase Apparent Power[A]	7500	10000	10000

Peak Output Apparent Power[VA](60s)	18000	24000	/
Peak Output Apparent Power[VA](10s)	22500	30000	30000
On/off Grid switching time [ms]	<10		
AC Output Data(GEN)			
Nominal Voltage[Vac]	380/400V,3L/N/PE		
Nominal Frequency[Hz]	50/60		
Nominal Input Apparent Power[VA]	15000	20000	25000
Battery Data			
Operating Voltage Range[V]	268.8~350.4	403.2~525.6	537.6~700.8
Battery model	KY-76V100AH-A00		
Nominal Charge/Discharge Current[A]	50/50		
Max. Charge/Discharge Current[A]	65/65		
Number of Batteries	4	6	8
Single Battery Capacity[kWh]	7.68		
Nominal Capacity[kWh]	30	46	60
Available Capacity[kWh]	27	41.4	54
Temperature Control System			
Temperature Control System	Constant temperature and humidity air conditioner		
Fire Fighting System			
Active	Detector+Condensed aerosol fire extinguishing device		
Passive	Condensed aerosol fire extinguishing device		
General Data			
Operating Temperature Range [℃]	-25~60 (>45 derating)		
Altitude[m]	<4000		
Ingress Protection Rating	IP54		
Relative Humidity[%]	0~95，No condensation		
Dimension(W*H*D)[mm]	900*1800*1150		
Certification			
Safety Standards	IEC62109-1/-2		
EMC Standards	EN61000-6-1/-3,IEC61000		

On-grid Standard	AS4777.2:2020,NRS097-2-1:2017,EN 50549-1 for Czech,VDE-AR-N 4105:2018,EN50549-1:2019+AC:2,G98 G99,OVE-R25,EN50549-1:2019 for Poland A&B

* If the product size and parameters change, the company's latest information shall prevail without prior notice.

12.2 Contact Information

If you have any questions or technical problems with this inverter, please contact us:

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