



# User Manual

## Pi Station

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**Air Cooling Outdoor Rated BESS**



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Date: 2024-12-30

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# 1 Overview

## 1.1 Applicable Models

This document applies to the following equipment models:

PI Station Outdoor Cabinet BESS

This section describes the product model definitions in this instruction manual,

As shown in Figure 1-1.

|       |                        |                          |
|-------|------------------------|--------------------------|
| PI    | Station                | 186                      |
| PYTES | Energy storage station | System capacity: 186 kWh |

Figure 1-1 Product Model Definition

## 1.2 Target Group

The content described in this document should only be operated by professionals.

Professionals must have the following skills.

Understand how the product works and how to operate it.

Understand how batteries work and how to operate them Trained and understand how to deal with hazards and risks that arise during the installation and use of electrical equipment.

Understand the installation and commissioning of electrical equipment and devices

Understand all applicable standard operating instructions

Understand and comply with this manual and all safety information

## 1.3 Terminology

| Name | Definition                                       |
|------|--------------------------------------------------|
| STS  | Static Transfer Switch                           |
| AC   | AC                                               |
| DC   | DC                                               |
| BESS | Battery Energy Storage System                    |
| ESS  | Energy Storage System                            |
| EMS  | Energy Management System                         |
| BMS  | Battery Management System                        |
| PCS  | Bidirectional Energy Storage Converter           |
| SLD  | Single Line Diagram                              |
| SOH  | Battery health status, expressed as a percentage |
| SCR  | Thyristor rectifier                              |
| DOD  | Depth of discharge, expressed as a percentage    |
| EOD  | End of Discharge                                 |
| SOC  | Remaining power, expressed as a percentage       |
| UI   | User Interface                                   |
| EPO  | Emergency Power Off                              |
| SPD  | Surge Protector                                  |

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## 2 Safety instructions

### 2.1 Symbols

| Logo                                                                                            | Explanatory notes                                                                                                                                                                                              |
|-------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  Danger        | Indicates a dangerous situation that, if not avoided, will result in death or serious injury                                                                                                                   |
|  Warning       | Indicates a dangerous situation that, if not avoided, will result in death or serious injury.                                                                                                                  |
|  Beware        | Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.                                                                                                                |
|  Attention     | Indicates that property damage will occur if not avoided                                                                                                                                                       |
|  Description | Attention to important information, best practices and recommendations. Attention is drawn to information used to resolve issues unrelated to personal injury, equipment damage and environmental degradation. |

### 2.2 Important Safety Instructions

This user manual is about the installation and operation of the PI Station 186 outdoor cabinet from Pytes.

Please read this user's manual carefully before installation.

The PI Station 186 outdoor cabinet must be commissioned and maintained by an engineer designated by the manufacturer or an authorized service partner. Failure to do so may endanger personal safety and result in equipment failure. Damage to the equipment caused as a result is not covered by the warranty.

The PI Station 186 Outdoor Cabinet should not be used in any environment or application related to life support equipment.

This manual contains important instructions for the PI Station 186 series models and should be followed when installing and maintaining the Energy Storage Outdoor Cabinet

 **Danger**

Any touching of the copper strip, contacts, or terminals connected to the grid circuit inside the unit may result in a fatal burn or electric shock!

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Do not touch any terminals and wires connected to the grid circuit.



### Warning

Pay attention to any instructions and safety documents regarding grid connection

There may be a risk of electric shock inside the equipment!

Any operation related to this equipment must be carried out by qualified personnel.

Please note the safety precautions listed in the safety instructions and installation documentation.

Please note the safety precautions listed in the operating and installation manuals and other documentation.



### Warning

Large amount of leakage current.

Before connecting input power, make sure grounding is reliable.

The equipment must be grounded in accordance with local electrical codes.



### Warning

When the battery is connected to the energy storage outdoor cabinet, DC voltage may be present at the input port. Be aware or check the battery system user manual during operation.



### Warning

Do not touch energized parts within 15 minutes of power failure!

Dangerous energy is stored in the internal capacitors, so do not touch the terminals, contacts, copper strips, etc. of the equipment for 15 minutes after disconnecting all power sources



### Attention

All internal maintenance and servicing of the equipment should be performed by trained personnel.

Internal components that require tools to open cannot be maintained by the user.

Please read this user manual before operation.

## 2.3 Additional Information

For additional details, please click: [www.pytesgroup.com](http://www.pytesgroup.com)

## 3 Product

### 3.1 System Introduction

PI Station 186 energy storage cabinet is an all-in-one outdoor cabinet system containing bidirectional energy storage inverter module, DCDC PV optimizer module, STS intelligent switching module, battery system, transformer, fire protection system, air conditioning system, auxiliary source power supply and other energy storage batteries.

The two-way energy storage converter can charge and discharge the built-in battery system, the DCDC PV optimizer module can access the PV system to store PV power to the batter or power the load through the energy storage converter, and the STS intelligent switching module can realize fast and intelligent automatic switching to and from the grid.

### 3.2 Appearance of the Integrated Energy Storage Cabinet

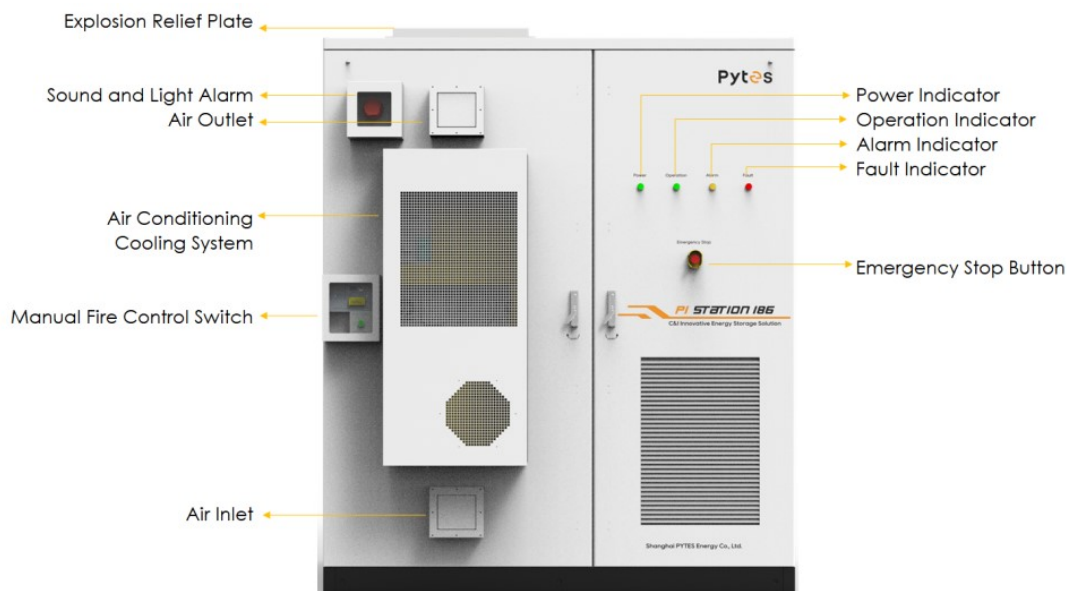


Figure 3.1 Appearance of the Integrated Energy Storage Cabinet

| Item                  | Description                                                          |
|-----------------------|----------------------------------------------------------------------|
| Power Indicator       | Indicating if the system is powered on/off                           |
| Operation Indicator   | Always on when system is in normal status                            |
| Alarm Indicator       | Always on when there is a system alarm                               |
| Fault Indicator       | Always on when error occurs and system stops running                 |
| Emergency stop Button | Press in case of emergency to disconnect AC and DC power immediately |

### 3.3 Dimension and Weight

The dimensions of PI Station 186 energy storage outdoor cabinet are marked as shown in Figure 3.2. The net weight of the product is about 2900kg, and the specific weight is subject to the actual nominal weight.



Figure 3.2 External dimensions of the energy storage integrated cabinet

### 3.4 System Schematic Diagram

PI Station 186 energy storage outdoor cabinet contains PCS, DC/DC module, STS, battery pack, SPD protector, BMS and auxiliary power distribution unit, etc. Up to 3 groups of 30kW DC/AC module, 2 groups of DC/DC module and 1 STS are optional. The PCS AC measurement can be connected to the grid or AC load through the isolation transformer, and the PV interface can be directly connected to the PV system.

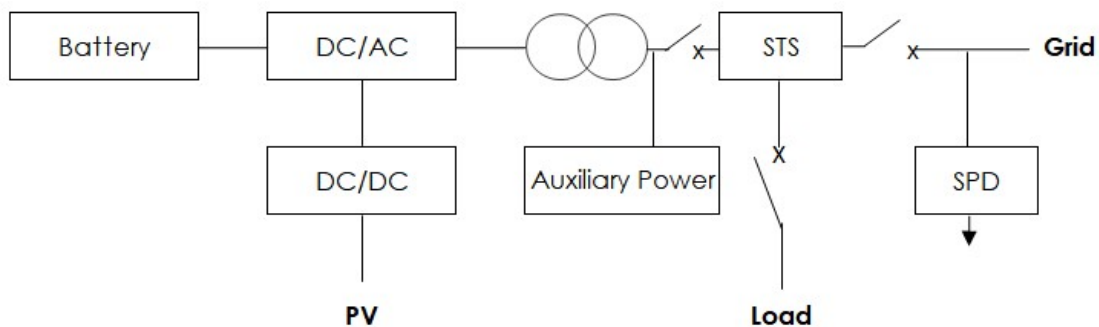


Figure 3.3 Topology diagram of the integrated energy storage cabinet

### 3.5 Heat Dissipation Design

The PI Station 186 Outdoor Cabinet BESS is IP54 outdoor machine, the whole adopts the structure design of forward air and side air outlet, the outdoor air enters through the front air inlet window of the energy storage all-in-one machine, the hot air is discharged through the exhaust air outlet at the cabinet back, the fan exhaust is 1880m<sup>3</sup>/h, the ventilation design is shown in Figure 3.4.



Figure 3.4 Heat Dissipation Design

### 3.6 Meter

| Meters                | Meter Brand | Model   | Communication Address | Current Transformation Ratio |
|-----------------------|-------------|---------|-----------------------|------------------------------|
| Energy Storage Meter  | Acrel       | ADL400  | 1                     | 40                           |
| Load Meter            | Acrel       | ADL400  | 1                     | 40                           |
| Interconnection Meter | Acrel       | ADW300W | 1                     | 40                           |

## 4 Technical Specifications

| Module                                         | PI STATION 186                                                                                                                                                      |
|------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>System Specification</b>                    |                                                                                                                                                                     |
| Battery Chemistry                              | LFP (LiFePO4)                                                                                                                                                       |
| Nominal Output Power                           | 30kVA*n (1~3)                                                                                                                                                       |
| Battery Capacity                               | 186.368kWh                                                                                                                                                          |
| Battery Nominal Voltage                        | 665.6V                                                                                                                                                              |
| Battery Charging and Discharging Voltage Range | 200V-750V (350V-750V @full load)<br>(Due to the electrical design different with the 30P module)                                                                    |
| Recommended Charging/Discharging Current       | 140A                                                                                                                                                                |
| Fire Fighting System                           | 1. Sensor tube(Aerosol)<br>2. Water Fire Fighting Port<br>3. Heat/Smoke/Gas sensor<br>4. Explosion Relief Plate(Optional) or Exhaust & Ventilation System(Optional) |
| Cycle life                                     | ≥5000[1](25±3°C, 0.5C/0.5C, 80%EOL)                                                                                                                                 |
| DOD                                            | 90%                                                                                                                                                                 |
| Warranty                                       | 3 Year Product Warranty, 10 Year Battery Warranty                                                                                                                   |
| <b>AC Side</b>                                 |                                                                                                                                                                     |
| Rated Output Power                             | 30kVA*n (1~3)                                                                                                                                                       |
| Maximum Apparent Power                         | 33kVA*n (1~3)                                                                                                                                                       |
| Maximum Active Power                           | 30kW*n (1~3)                                                                                                                                                        |

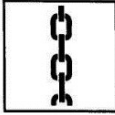
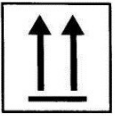
|                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AC power range                                 | 30kW (400 Or 800Vac & 350-750Vdc) *n units (n=1,2,3)<br>15kW (400 Or 480Vac & 150-350Vdc) *n units (n=1,2,3)                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| AC Voltage Grid-tied                           | 400V(-15%~15%)3P4W+PE/480V(-15%~15%)3P4W+PE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| AC Voltage Off-grid                            | 400V(-20%~20%)3P4W+PE/480V(-5%~5%)3P4W+PE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| AC Frequency                                   | 50Hz/60Hz(-2.5Hz~2.5Hz)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| THDi                                           | <3%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>PV Side (Optional)</b>                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Max units                                      | 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| PV Input Power                                 | 45kW*n units (n=1,2)<br>3 branches *15kW (per 45kW)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| PV Input Voltage Range                         | 250V-830V                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| MPPT Voltage Range                             | 200~750V (430~750V @full load )                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Maximum Input Current                          | 65A*n (1~2)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Auto-switching Compatibility (Optional)</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Rated Power                                    | 150kVA (AC208V)<br>300kVA (AC400V)<br>360kVA (AC480V)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Switching Time                                 | Active Switching: Seamless<br>Passive Switching: < 20ms                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Communication</b>                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Communication port                             | RS485/Ethernet/CAN                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Communication protocol                         | Modbus RTU/TCP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Mechanical</b>                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Dimensions(W*D*H)                              | 2100*1200*2544.8mm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Weight                                         | 2900kg                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Cooling System                                 | Forced air cooling for power electronics<br>5kW Air-conditioned for battery system (pre-installed)                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| IP protection                                  | IP54                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Environmental</b>                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Reactive Humidity                              | 0-95% (No condensing)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Operating Temperature Range                    | -20°C~55°C (De-rating over 45°C)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Altitude                                       | 2000m (>2000m derating)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Regulations</b>                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Certification                                  | <b>CELL:</b> IEC62619, UL1973, UL1642, UL9540A, GB/T 36276-2018, GB/T 36276-2023, IS16046(Part 2):2018, GB, GD22-2019, 2006/66/EC, RoHS, GB/T 30512, UN38.3<br><b>Module:</b> GB/T 36276, UL9540A, UN38.3<br><b>Unit:</b> IEC62619, IEC63056, CE-EMC, UL1973, UL9540A, UN38.3<br><b>PCS:</b> GB/T34120-2017 CE<br>VDE-AR-N 4105:2018<br>TOR Erzeuger TypeA V1.2:2022 /OVE-Richtlinie R 25:2020<br>DIN VDE 0126-1-1:2013 (with national deviation of France:<br>DIN VDE 0126-1-1WER 2019)<br>EN 50549-1:2019+AC:2019-04<br>NRS 097-2-1:2017 Edition 2.1 |
| [1] Under specific test conditions             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

## 5 Storage, Handling and Transport

### 5.1 Transport and Storage

During transportation, in order to ensure that the energy storage outdoor cabinet is in a better protected state, please choose to transport with packaging as far as possible, and transport according to the indication of various markings on the packaging, the illustration of packaging markings is shown in Table 5-1.

Table 5-1 package logo description

| Icon                                                                                | Description                                                                                                                                                |
|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    | Center of gravity marking, indicating where the center of gravity of the energy storage outdoor cabinet is located                                         |
|    | Lifting sign, indicating the position of chain or rope when lifting the energy storage outdoor cabinet                                                     |
|  | Upward marking, indicating the way to place the energy storage outdoor cabinet when handling and placing, forbidden to invert, place horizontally or tilt. |
|  | Lightly placed signs, transport and placement process should avoid violent friction or collision.                                                          |
|  | Fear of moisture signs, transportation and storage process should avoid energy storage outdoor cabinets suffer from rain or moisture                       |



As the location of the center of gravity is not the mechanical center of the energy storage outdoor cabinet, in the transportation process, must always pay attention to the center of gravity mark on the packaging box.



Whether or not the outdoor cabinet with external packaging, moving process is strictly prohibited to tilt angle  $> 5^\circ$ . Due to its volume and weight, tilt angle is too large may make

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the equipment backwards, resulting in casualties or equipment damage.

In the process of moving should avoid physical impact on the equipment, such as suddenly put down, lift, etc.



### Attention

Avoid rain or bad weather conditions for the transport of energy storage outdoor cabinets, if unavoidable, please take the necessary protective measures.

If on-site installation is not carried out immediately after the completion of delivery and acceptance work, the energy storage outdoor cabinet with external packaging should be stored in a ventilated, dry and tidy indoor environment. At the same time, the following aspects should be noted.

- Restore the package to the state at the time of receipt, and the desiccant inside the package must be retained.
- Storage floor is flat and sufficient to carry the weight of the energy storage outdoor cabinet with outer packaging.
- Equipment storage needs to pay attention to ventilation and moisture, storage environment is strictly prohibited to have standing water.
- Storage environment temperature requirements  $-40\text{ }^{\circ}\text{C} \sim +60\text{ }^{\circ}\text{C}$ , storage environment relative humidity requirements  $5 \sim 100\%$ , non-condensing.
- Pay attention to deal with the harsh environment around, such as sudden cold, sudden heat, collision, etc., so as not to cause damage to the equipment.
- Regular inspection, at least once a week. Check whether the packaging is intact to avoid insect and rodent bites, and the outer packaging should be replaced immediately if it is broken.
- If the storage time exceeds six months, the package should be opened for inspection and repackaged after replacing the desiccant.



### Attention

Energy storage outdoor cabinet for a whole device, transportation or storage are not allowed to break it down. Equipment failure caused by modifications not authorized by Pytes Electric is not covered by the warranty.



### Attention

When transporting and storing the equipment, stacking is strictly prohibited and no other items are allowed to be stacked on top of it.



### Attention

The equipment should be transported and stored in an environment free of corrosive gases, high temperature and heat sources, non-dusty, and in accordance with fire protection requirements. Storage without packaging is strictly prohibited.

## 5.2 Transport

Short distance handling not removed from the transport packaging box of energy storage outdoor cabinet is recommended to preferably use forklift to move the entire box, moving the box should pay attention to the center of gravity mark and lifting mark position, and ensure that the transport tools have sufficient bearing capacity, the use of lifting is strictly prohibited.

Moving energy storage outdoor cabinets without boxes are usually used in the vicinity of the equipment installation, and it is recommended that they be operated preferably with a forklift, which requires the removal of the bottom baffle.

### 1) Forklift movement (preferred)

Using forklift to carry the energy storage outdoor cabinet is the standard way to move. The center of gravity of the converter should fall between the two forks of the forklift when carrying, and be pre-inserted to ensure that it will not tilt after lifting. As shown in Figure 5-1, the length of forklift forks should not be less than 2.1m. When using forklift to fork up, put down and move the energy storage outdoor cabinet, make sure that it is slow and smooth, and the energy storage outdoor cabinet must be placed on a solid and flat ground. In the whole process of using forklift for operation, the forklift safety operation specification must be strictly observed. Due to the large size of the energy storage outdoor cabinet, it may block the driver's view, and there should be supporting personnel to cooperate.



5.2 Forklift diagram

### 2) Pallet truck movement

The use of pallet trucks to move the energy storage outdoor cabinet is only applicable to the case where the transportation route is relatively smooth. The center of gravity of the outdoor cabinet should fall between the two forks of the forklift when it is moved, and be pre-inserted to ensure that it will not be tilted after being lifted. As shown in Figure 5-2, the length of forklift forks shall not be less than 2.1m, the inner distance between the two fork arms of pallet truck shall not be less than 0.8m and the outer distance shall not be more than 1.2m, and the load-bearing capacity of pallet truck needs to be >3000kg.

In the process of using forklift to fork up, put down and move the energy storage outdoor

cabinet, make sure that it is slow and smooth, and the energy storage outdoor cabinet must be placed on a solid, flat ground.

In the whole process of using forklift for operation, the relevant safety operation specification must be strictly observed. Due to the large size of the energy storage outdoor cabinet, the operator's view may be blocked, there should be support personnel to cooperate.

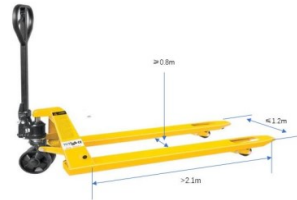


Diagram of pallet truck



Attention

The bottom baffle of the energy storage outdoor cabinet must be removed before using forklift or pallet truck for mobile operation, otherwise the bottom baffle will be damaged.



Attention

Regardless of the method chosen to move the energy storage outdoor cabinet, it must be ensured that:

- The position of its center of gravity must always be noted.
- Its size and weight must always be taken into account.
- Operator safety must be ensured at all times.

Take the necessary auxiliary measures to ensure that the equipment is delivered to the installation site in good condition.

## 5.3 Unpacking Inspection

### 5.3.1 Unpacking

After transporting the energy storage outdoor cabinet to the vicinity of the installation site, the transport packing box needs to be dismantled, and the dismantling steps are as follows.

- ① Remove the top panel of the packing box.
- ② Disassemble the wooden side panels of the packing box.
- ③ Remove the shielding material from the box.
- ④ Remove the anchoring components that secure the energy storage outdoor cabinet to the shipping wood tray



Attention

After removing the anchoring parts between the energy storage outdoor cabinet and the

transport wood tray, it is strictly forbidden to carry the energy storage outdoor cabinet through the wood tray again

### 5.3.2 Inspection

Before leaving the factory, the energy storage outdoor cabinet has been checked by Pytes Electric staff themselves and packed firmly. Nevertheless, after the removal of energy storage transport packaging, it is still need to inspect the following objects.

Check whether the nameplate data of the product matches with the ordering contract, such as product type, rated capacity, voltage level, etc.

Check whether the factory documents and accessories are complete.

Check whether the appearance of the energy storage outdoor cabinet is consistent with the description in this manual.

Check whether the energy storage outdoor cabinet has deformation, paint loss and loose parts.

The packing list of energy storage outdoor cabinet is shown in Table 5-2.

Table 5-2 Packing list

| NO. | Name                                                                                                  | Quantity |
|-----|-------------------------------------------------------------------------------------------------------|----------|
| 1   | PI Station 186 energy storage outdoor cabinet<br>(including cabinet door key and related accessories) | 1 set    |
| 2   | PI Station 186 user manual                                                                            | 1 copy   |
| 3   | Inspection report                                                                                     | 1 copy   |



#### Attention

Only the inspection is correct and complete without damage to the energy storage outdoor cabinet can be installed and commissioned, check the process, once the problem is found, please contact with the transporter or Pytes Electric in a timely manner.

## 6 Equipment Installation

### 6.1 Installation Requirements

#### 6.1.1 Basic Requirements

PI Station 186 energy storage all-in-one cabinet has IP54 protection level and can be installed outdoors, but it should not be placed in high humidity environment for a long time. Due to the noise generated during operation, the energy storage product should be installed in a location away from residential areas and the installation location should be free from corrosive and combustible gases.

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Installation environment.

- The energy storage integrated cabinet must be mounted on a suitable concrete support with a refractory surface, and the converter inlet and outlet must not be obscured.
- The installation ground is dry and flat, no water accumulation, the ground level does not shake, and it can completely carry the weight of the energy storage all-in-one cabinet.
- Installation site ambient temperature range: -20°C~45°C ; relative humidity range: 0~95%, non-condensing.
- Energy storage integrated cabinet grounding resistance <4Ω.
- Cabinet should be installed in a location that ensures easy viewing of the LED indicators and operation of the LCD touch screen.
- If the machine is placed directly outdoors, it is recommended to take the necessary shading measures for the machine to avoid the machine temperature rising due to direct sunlight, causing the machine to run at reduced capacity

### **6.1.2 Outdoor requirements**

PI Station 186 is capable of operating within an ambient temperature of -20°C to 45°C. When the temperature is higher than 45°C the machine will run at a reduced rate. When the temperature is lower than -20°C, it needs to warm up first before high power operation. The sunlight irradiation intensity should be  $\leq 1200\text{W/m}^2$ , and it is recommended that the converter installed outdoors should take the necessary shading measures.

### **6.1.3 Foundation Support Requirements**

Since the electrical compartment of the energy storage all-in-one cabinet is side air outlet and the front air outlet of the battery compartment, it is recommended to ensure at least 1m air ducts on the side and in front and behind when installing the all-in-one cabinet. Due to the installation of wall-mounted air conditioning in the battery compartment door of the integrated cabinet, 350mm space is reserved on the side of the battery compartment to ensure the normal opening of the door.

The energy storage cabinet needs to be installed on a concrete foundation or a structure supported by steel channel with a surface of flame retardant material. Must ensure the foundation is flat and solid, safe and reliable, and has sufficient bearing capacity, strictly forbidden to install on the surface of the foundation with depression or tilt.

When building the foundation, according to the overall design of the power station and the location of the cables in and out of the bottom of the energy storage cabinet, the cable trench should be preset.

Pre-opening holes are required on the base, and the size of the opening holes must be exactly the same as the positioning holes of the base of the energy storage cabinet, in order to firmly connect the energy storage cabinet with the foundation.

As shown in Figure 6-1, the base of the energy storage cabinet is equipped with eight 35mm\*20mm positioning waist holes, and it is recommended to use M16\*45 bolts to fasten

the converter base to the foundation.

#### 6.1.4 Space Requirements

As shown in Figure 6-2, when installing the energy storage all-in-one cabinet, sufficient distance must be retained between it and the wall and other equipment in order to meet the requirements for the narrowest maintenance access, evacuation routes and ventilation. This subsection requires the minimum space requirement for the normal operation of the energy storage all-in-one cabinet. If the site conditions allow, it is recommended to choose a larger spacing to ensure the reliable and efficient operation of the energy storage all-in-one cabinet.

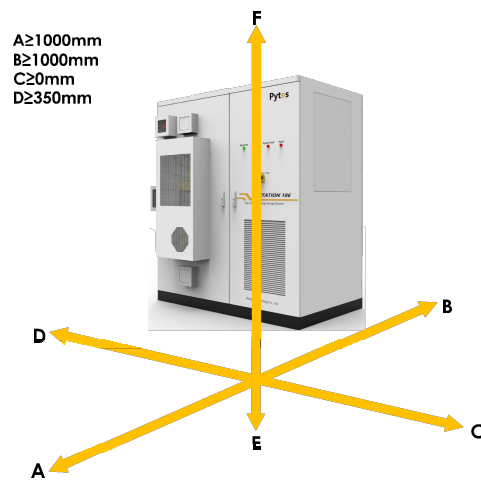


Figure 6-2 PI Station 186 cabinet space requirements

#### 6.1.5 Ventilation Requirements

The converter will generate a lot of heat when running, and the high temperature will directly affect the electrical performance of the equipment and even damage the equipment, so the ventilation and heat dissipation needs of the equipment should be fully considered when planning the installation environment of the converter to ensure the normal and efficient operation of the equipment.

To ensure the reliable and efficient operation of the energy storage cabinet, please regularly clean the grille, filter and filter cotton of the air inlet and outlet of the equipment, and regularly check whether the equipment exhaust fan is functional. In order to meet the ventilation requirements of the integrated energy storage cabinet, its installation environment needs to meet the following requirements.

- 1) The energy storage cabinet should be avoided to be installed in poor ventilation conditions and low air flow.
- 2) The air inlet should have sufficient fresh air supply.
- 3) Air quality must be ensured. If the air contains too much sand, dust and other suspended matter, the air purity can be improved by installing filters at the air supply grille and other measures.

4) The ventilation system of the energy storage cabinet must be independent of the ventilation system of other equipment and do not affect each other. Cooling ducts should be designed by professionals in advance to avoid placing the cabinet at backflow wind phenomenon. At the same time, each combination must be sealed to prevent air leakage, the choice of sealing materials to withstand the temperature of at least 80 °C. After installing the cooling duct, cabinet interior should be checked to prevent screws, gaskets and other debris fall during installation process.

## 6.2 Site installation

### 6.2.1 Wire Channel Design

The inlet and outlet cables are connected to the cabinet at the bottom. For ease of installation and maintenance, it is recommended that the cables connected with the outside are wired from the cable trench. Energy storage cabinet installation foundation should be pre-set under the concrete cable trench, or at the foundation with installed bracket to raise the installation surface, and cables are laid in the overhead. Foot screw or channel steel could be used to fix the cabinet installed with pre-set cable trench. If cabinet is installed in the overhead, it can be installed directly fixed on the bracket.

The cable trench is usually designed and constructed in accordance with the relevant standards, considering the weight of the required cables and the space.

The cross section of the trench is shown in Figure 6-3. The quantities of cable brackets refer to the user's demands. In order to facilitate the installation and maintenance, the DC circuit and AC circuit should be laid separately.

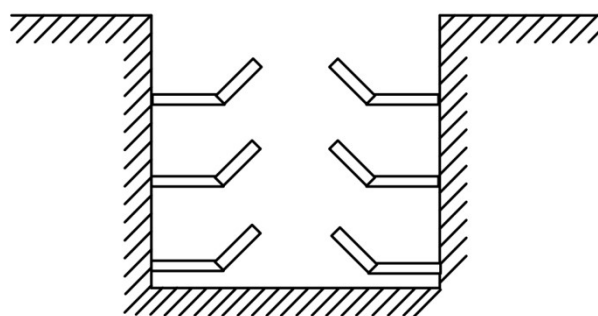
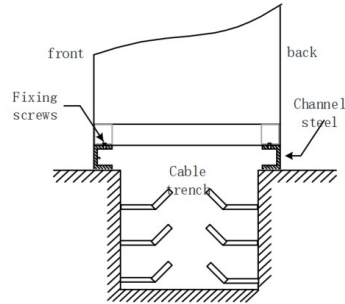


Figure 6-3 Cross-sectional view of the trench

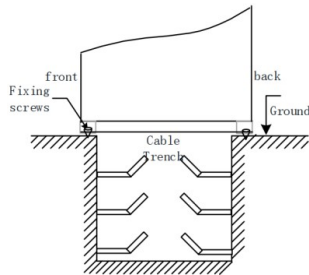
### 6.2.2 Fixation of Energy Storage Integrated Cabinet

If the energy storage cabinet is fixed on the channel steel, before the equipment is finally fixed, the laying of the cable trench and the opening of the channel steel meet the installation requirements of the energy storage cabinet. If the energy storage cabinet is fixed on the concrete ground, cabinet should be fixed on holes in the ground using expansion screws. The fixing method of the energy storage cabinet is shown in Figure 6-4. The fixing of the energy storage integrated cabinet needs to be done according to the following steps.

- 1) Select the appropriate tool to transport the energy storage cabinet to the installation location and align the installation holes.
- 2) Use M10X100 bolts to fix the energy storage cabinet on the channel steel or foundation through the waist hole of the base.
- 3) Install the base baffle of the energy storage cabinet to complete the fixed installation of the energy storage cabinet.



(a) Schematic diagram of the converter fixed to the channel



(b) Schematic diagram of the converter fixed to the ground

Figure 6-4 Energy storage integrated cabinet fixing method

## 6.3 Electrical Connection

### 6.3.1 General Safety Rules



**Danger**

Danger of electric shock!

Please make sure that the installation cables and equipment are not charged before installation.

The capacitor inside the energy storage converter is a hazardous energy storage device; do not place flammable and explosive substances near the energy storage converter



**Warning**

All electrical connections must comply with the electrical connection standards of the country where the project is located.

Energy storage converters should only be connected to DC with the permission of the local power company and only after installation by a qualified technician.



**Warning**

---

Only a qualified electrician or a qualified person should make the electrical connections to this product.

Please strictly follow the wiring signs inside the device.

The following safety rules must be observed throughout the electrical connection of the energy storage converter and during subsequent maintenance and repair operations.

- Disconnect all external connections to the energy storage converter and to the internal power supply of the device.
- Ensure that the energy storage converter is not accidentally re-powered.
- Use a multimeter to make sure that the inside of the energy storage converter is completely de-energized.
- Apply the necessary ground and short circuit connections.
- Insulate and cover the adjacent potentially energized parts of the operating section with a fabric made of insulating material.

### 6.3.2 Installation Tools

The following tools are required prior to installation.

- Torque wrench
- Screwdriver
- Wire stripper
- Terminal crimping machine
- Hot air gun (or hot air blower)
- Multimeter

### 6.3.3 Wiring Parts

Energy storage outdoor cabinet power cable wiring with fixed screws and other parts, equipment delivery has been packed using a uniform bag, please strictly follow the screw fastening rules for cable connection



When connecting the cables, make sure that the connectors are tightened. Inadequate connection or oxidation of the contact surface may cause local heat accumulation, which may lead to fire and combustion



When wiring the power line, use copper wire of appropriate size and use copper terminals to fix it tightly before connecting it to the wiring copper strip.

### 6.3.4 Preparation before Wiring

1. Open the front door of the outdoor energy storage cabinet.
2. The overall design of the outdoor energy storage compartment, etc., adopts a bottom-entry, bottom-exit structure. An entry hole is reserved at the bottom of the storage cabinet for user connections, and all external wiring enters through the bottom of the machine. To prevent foreign objects from entering the equipment, the delivered

equipment has entry holes at the bottom, which need to be sealed with sealing mud after the wiring is completed.

### 6.3.5 Cable Requirements

The cable selection requirements are as follows.

- The selected cable must have sufficient current-carrying capacity. The current carrying capacity of the conductor is related to the environmental conditions, the type of conductor insulation, the laying method, the wire material and the cross-sectional area.
- The wire diameter of all cables must be selected in accordance with the maximum current on either side of the energy storage converter, and must leave a margin.
- The connection wires on the same side should be the same size and type of wire.
- Please use the flame retardant cable.

The recommended specifications of the connection cable diameter are shown in Table 6-1. Please refer to our technical staff for specific equipment type cable recommendation table.

| Table 6-1 Recommended specifications for connecting cables |                                                                   |                              |
|------------------------------------------------------------|-------------------------------------------------------------------|------------------------------|
| Cable                                                      | Wire diameter requirement                                         | Mounting bolt specifications |
| Battery side DC+                                           | Recommended 2 x 50mm <sup>2</sup>                                 | M8*12                        |
| Battery side DC-                                           | 2 x 50mm <sup>2</sup> recommended                                 | M8*12                        |
| Grid side ABCN phase                                       | Recommended 100mm <sup>2</sup> per phase                          | M6*12                        |
| Load-side ABCN phase                                       | Recommended 50mm <sup>2</sup> per phase                           | M6*12                        |
| Ground wire                                                | Recommended grounding copper conductor at least 50mm <sup>2</sup> | M8*12                        |
| PV-side DC+                                                | Recommended 4mm each <sup>2</sup>                                 | M6*16                        |
| PV-side DC-                                                | Recommended 4mm each <sup>2</sup>                                 | M6*16                        |



Attention

It is strictly forbidden to overload the cable. The current distributed on the 1 mm<sup>2</sup> cable is strictly forbidden to exceed 3A

### 6.3.6 Wiring Precautions



Attention

Before carrying out all electrical wiring, all connected cables must be checked for insulation and integrity.

Do not use cables that are poorly insulated, partially exposed or otherwise damaged



Attention

---

Before wiring, make sure the polarity of either side of the cable is correct.  
During wiring, do not pull on the cable to avoid damaging its insulation properties.  
All cables should have a certain amount of bending space.  
Take the necessary auxiliary measures to reduce the stress on the cable.  
The length of the screws should be selected appropriately; screws that are too long may affect the insulation performance of the equipment.  
Installation should prevent part of the heat-shrinkable sleeve from being sandwiched between the copper nose and the copper row, otherwise it may lead to poor contact and even damage the equipment.  
After each step of the wiring operation, it should be carefully checked to ensure that the wiring is correct and firm.



### Attention

Incorrect wiring may lead to fire and combustion. Please pay attention to the connection order of wiring components.  
When connecting, make sure that the connections are tight. Inadequate connections or oxidation of the contact surfaces can cause local heat build-up and may lead to fire and combustion.



### Attention

After all electrical connections are made, the wiring should be thoroughly inspected and the inlet gaps should be sealed with fireproof mud after confirming that they are correct to prevent small animals from entering.

## 6.3.7 Wiring area Overview

The input, output terminals and communication ports are all located at the bottom of the cabinet. The PV connection port is on the DCDC device. The terminals are arranged as shown in the figure, please wiring correctly according to the signs.

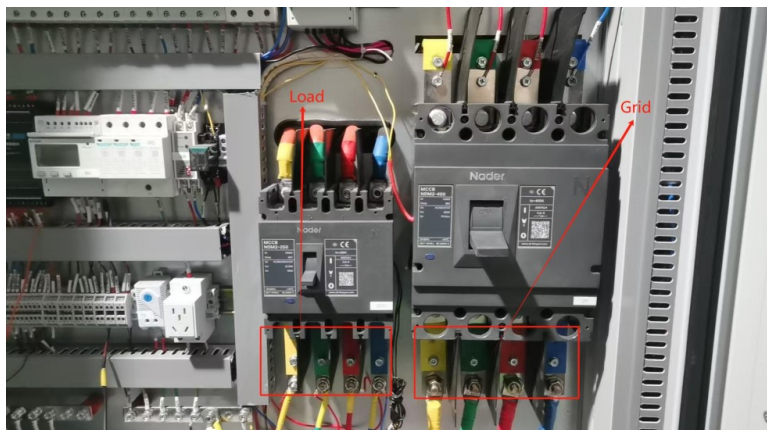


Figure 6-1 DC terminal diagram

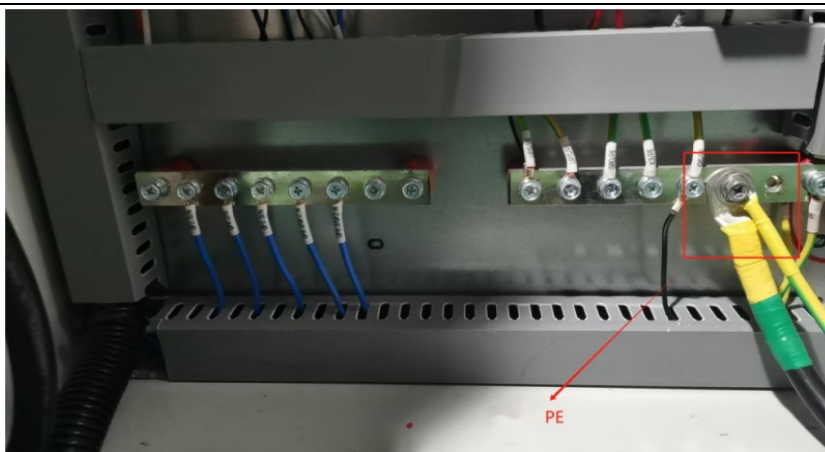


Figure 6-2 AC terminal diagram

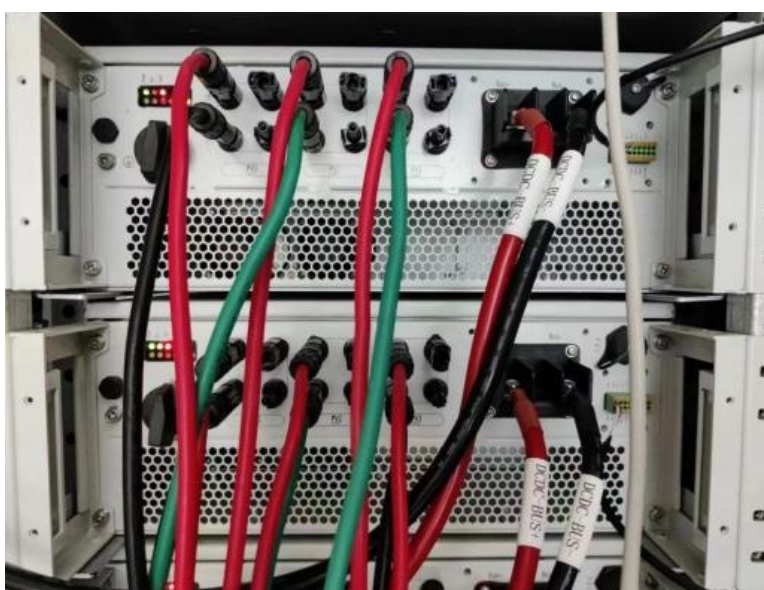


Figure 6-3 30P+DCDC wiring physical diagram

### 6.3.8 DC Side Wiring

Before performing DC side wiring, the following checks should be performed.

- Measure the open-circuit voltage of the battery/busbar set to ensure that the open-circuit voltage is within the normal DC voltage range of the energy storage outdoor cabinet.
- Confirm the positive and negative cable poles and mark them well.
- Wear high voltage insulation gloves is the must before any operation.



Attention

The open circuit voltage of the battery pack is strictly prohibited to exceed the maximum DC input voltage of the energy storage outdoor cabinet, too high open circuit voltage will lead to damage of the energy storage outdoor cabinet.

Battery pack positive and negative and energy storage outdoor cabinet positive and negative copper row corresponding connection, can not be connected to the reverse.

Either side of the cable connection steps are as follows.

- ① Confirm that the battery or bus bar of the front stage of the energy storage outdoor cabinet are disconnected.
- ② Confirm that the DC disconnect switch or DC circuit breaker of the energy storage outdoor cabinet are both disconnected.
- ③ Strip the insulation skin at the end of the cable, the length of the exposed cable should be about 5mm more than the depth of the wiring copper nose wire hole.
- ④ Use terminal crimping machine or crimping pliers to crimp the copper nose.
- ⑤ Select heat shrink tubing that matches the size of the cable and use a hot air blower to shrink the tubing.
- ⑥ Select the appropriate size bolt and use a wrench to tighten the "DC+" and "DC-" cables on the DC side respectively.

In order to prevent the wiring copper nose from loosening and causing poor contact, or increasing the contact resistance and causing local overheating or even fire, ensure that the tightening screws meet the torque requirements shown in Table 6-2.

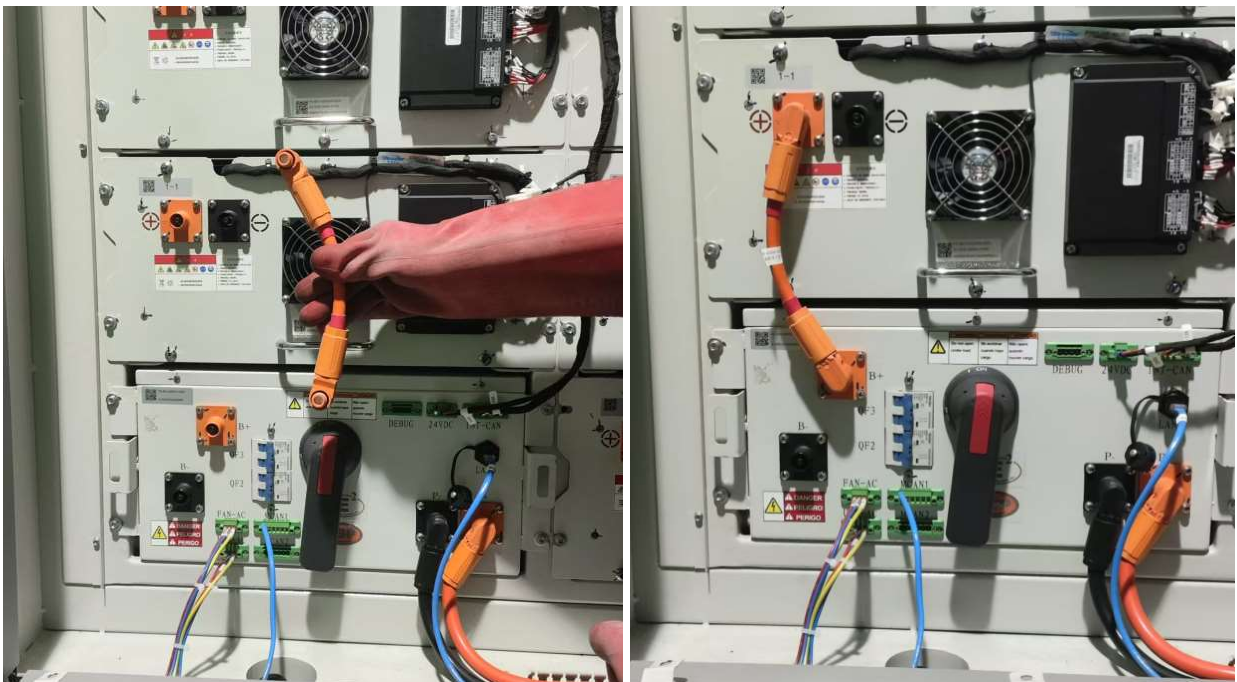
| Table 6-2 Screw size and torque comparison table |     |       |       |       |         |
|--------------------------------------------------|-----|-------|-------|-------|---------|
| Screw size                                       | M6  | M8    | M10   | M12   | M16     |
| Torque(N.m)                                      | 7~8 | 17~20 | 34~40 | 60~70 | 119~140 |

## Wiring Procedure Guidance

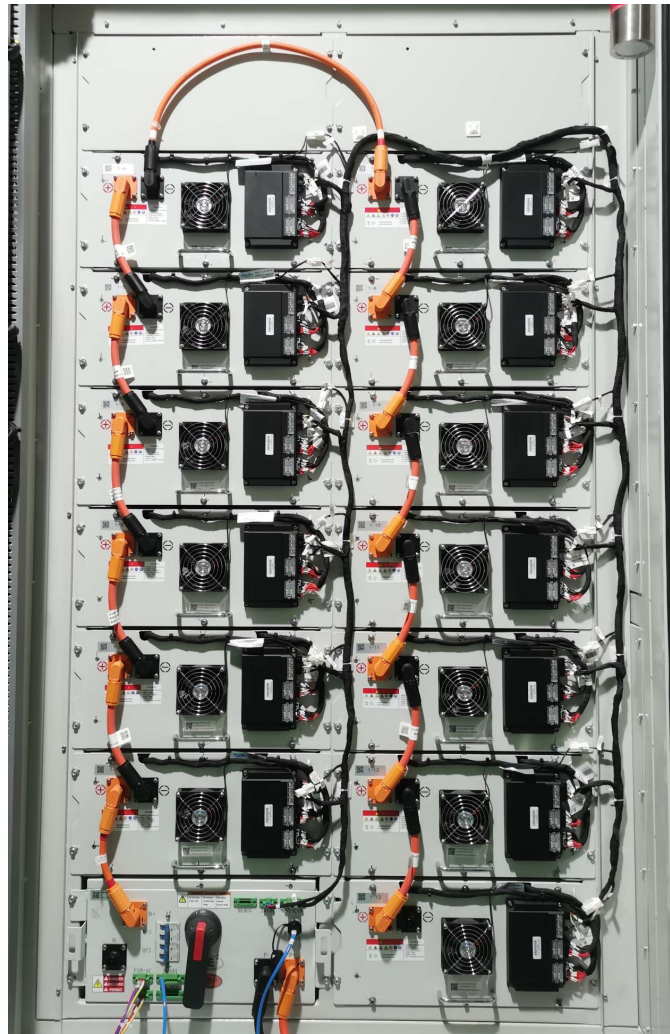
Wear high voltage insulation gloves is the must before any operation.

Cable terminal has been fully inserted and the connection is complete when there's a "Click" Sound.

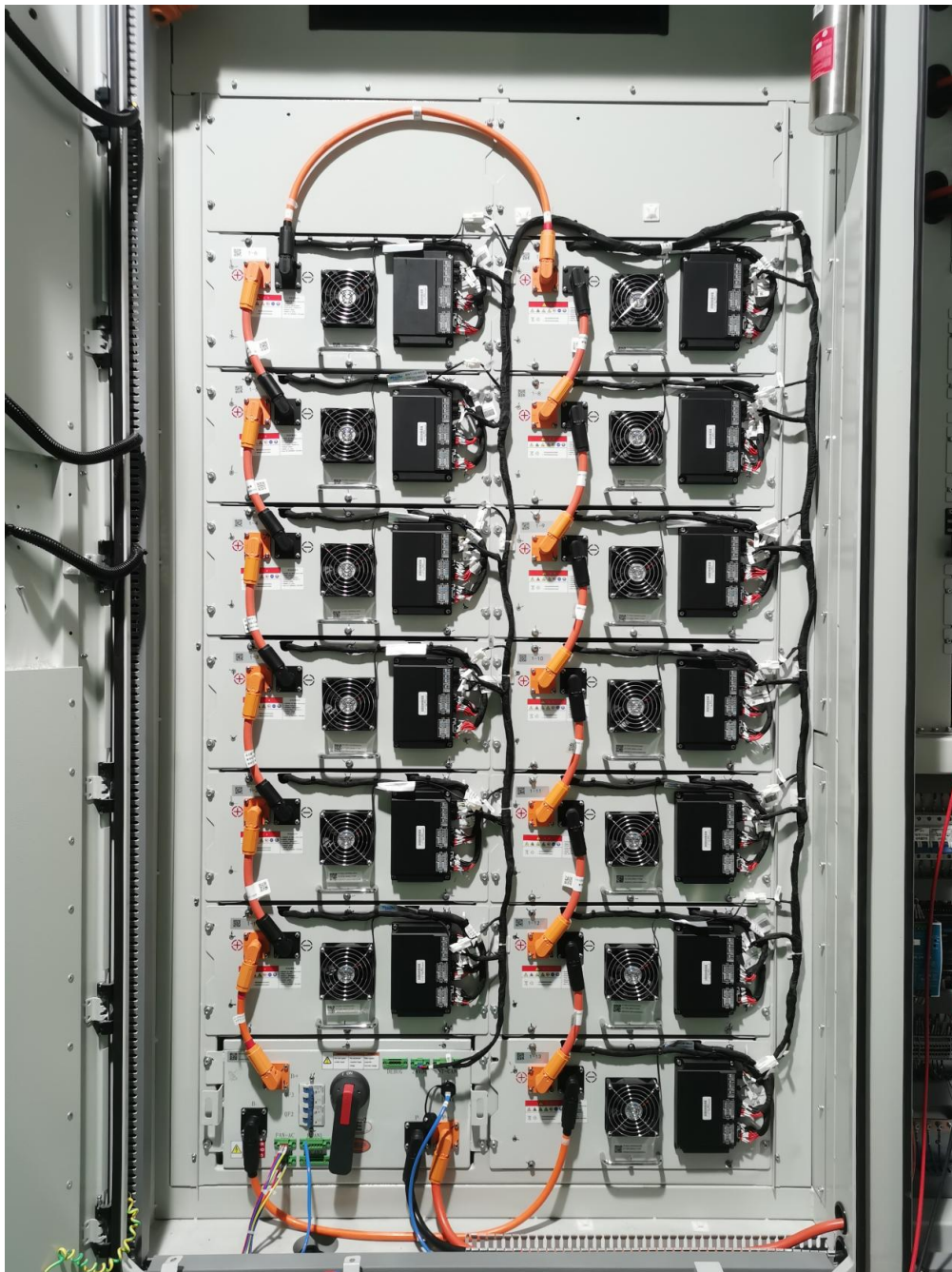
Step 1: Connect the positive terminal of High Voltage Box to positive terminal of BAT1-1.



Step 2: Series connect the battery modules, from negative terminal of BAT1-1 to positive terminal of BAT1-2, then proceed to connect in sequence to positive terminal of BAT1-13.



Step 3: Connect the negative terminal of High Voltage Box to negative terminal of BAT1-13.



DC Wiring Complete.

---

### 6.3.9 AC Measurement Wiring

Before wiring the AC side, the following checks should be performed.

- Measure the AC line voltage to ensure that the AC line voltage is within the normal AC voltage range of the energy storage outdoor cabinet.
- Confirm the cable phase sequence and mark it well.



#### Attention

Wrong AC side wiring will lead to energy storage outdoor cabinet cannot work normally or even damage.

Before wiring, make sure the grid side distribution circuit breaker is in disconnected state and the AC and DC disconnect switches are in disconnected state.

In order to avoid the cable transmission process due to uneven cable wiring and three-phase

current imbalance, it is recommended that the AC cable group alignment, each group contains a three-phase cable. The distance between the group and the group is at least two times the diameter of a single cable. And energy storage outdoor cabinet AC wiring side to the isolation transformer machine side winding of each phase cable length should be similar.

The AC side of the energy storage outdoor cabinet needs to be connected to the grid through the isolation transformer, connecting the AC side cable steps are as follows.

- ① Confirm that the grid distribution switch at the rear stage of the AC side of the energy storage outdoor cabinet is off.
- ② Confirm that both AC and DC disconnect switches of the energy storage outdoor cabinet are in the disconnected state.
- ③ Determine the phase sequence of the AC connection cable and mark it.
- ④ Select the appropriate size bolts and use a wrench to fasten the "A" phase, "B" phase, and "C" phase cables respectively.

### 6.3.10 Ground Connection



#### Attention

The grounding cable must be well grounded, otherwise.

- In the event of a fault, it may cause a fatal click hazard to the operator.
- May cause damage to the equipment in the event of a lightning strike.
- May cause the equipment not to operate properly.

Before leaving the factory, the shell of the energy storage outdoor cabinet and the devices in

the cabinet that need to be grounded have been connected reliably with the grounding copper row at the bottom of the machine. When making the grounding connection, at least 20mm<sup>2</sup> of grounding copper conductor area is needed to connect the PE grounding copper row reliably with the installation site ground or the equipotential connection device in the machine room, and then connected to the earth or ground network through the equipotential connection device, and grounding resistance must not be greater than 4Ω.

After the cable connection is completed, the gap around the bottom of the converter should be sealed with fireproof mud. Tighten the waterproof terminals of communication cables, etc., and plug the unused waterproof terminals with suitable plugs to meet the requirements of waterproof and dustproof.

### 6.3.11 Installation Checklist

After all the installation of the energy storage outdoor cabinet is completed, at least two staff members are required to conduct a comprehensive inspection of its installation in accordance with the items listed in Table 3-5. Records need to be made during the inspection process, and once the entries that do not meet the requirements are found, they should be rectified immediately.

Table 6-3 Checklist

| <b>Mechanical installation project inspection</b> |                                                                                                                                           |
|---------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/>                          | No deformation or damage to the energy storage outdoor cabinet                                                                            |
| <input type="checkbox"/>                          | Energy storage outdoor cabinet bottom fixed, support stable and reliable                                                                  |
| <input type="checkbox"/>                          | There is enough space around the energy storage outdoor cabinet                                                                           |
| <input type="checkbox"/>                          | The temperature, humidity and ventilation of the environment in which the energy storage outdoor cabinet is located meet the requirements |
| <input type="checkbox"/>                          | Cooling air circulation smoothly                                                                                                          |
| <input type="checkbox"/>                          | The cabinet sealing protection is complete and reliable                                                                                   |
| <b>Electrical installation inspection</b>         |                                                                                                                                           |
| <input type="checkbox"/>                          | Energy storage outdoor cabinet grounding is complete and firm                                                                             |
| <input type="checkbox"/>                          | The voltage on the net side matches the voltage on the AC side of the energy storage outdoor cabinet                                      |
| <input type="checkbox"/>                          | Network side connection phase sequence consistent, tightening torque meet the requirements                                                |
| <input type="checkbox"/>                          | The DC voltage of the battery system matches the DC voltage of the energy storage outdoor cabinet                                         |
| <input type="checkbox"/>                          | DC positive and negative polarity match the positive and negative polarity of the energy storage outdoor cabinet                          |
| <input type="checkbox"/>                          | Communication wiring is correct, and keep a certain distance from other cables                                                            |
| <input type="checkbox"/>                          | Cable markings are correct and clear                                                                                                      |
| <input type="checkbox"/>                          | Insulation shield is complete and reliable, and hazard warning labels are clear and firm                                                  |
| <b>Other checks</b>                               |                                                                                                                                           |
| <input type="checkbox"/>                          | All useless conductive parts are tied with insulating ties                                                                                |
| <input type="checkbox"/>                          | No tools, parts, iron filings or other foreign objects left inside the cabinet                                                            |
| <input type="checkbox"/>                          | No condensation of moisture or icing inside the cabinet                                                                                   |

---

## 7 Product Operations

### 7.1 Check before Operation

Before the first operation or after completing maintenance and overhaul, the installation of the equipment should be thoroughly checked again.



Warning

All operations during operation must be performed by professional electrical personnel, and no individual may operate without authorization.

#### 7.1.1 Check Cable Connections

- Check all connection cables for tears or cracks and make sure that all connection cables are intact.
- Double-check that all cables are connected correctly against the system wiring schematic.
- Make sure that all cables are securely connected.
- Confirm that the cabinet grounding point is well connected to the grounding point of the foundation. Each grounding inside the cabinet is normal.

#### 7.1.2 Check the Energy Storage Converter

- Ensure that all AC and DC disconnect switches in the main circuit are in the off position.
- Ensure that the emergency stop button has been released and is functioning properly.
- Check and ensure that the electrical switches and buttons of the energy storage inverter and the upstream and downstream stages are flexible and meet the specification requirements.
- Ensure that the load disconnect switch QF10 remains in the off position, and the lightning protection circuit breaker QF3 remains in the off position.
- Ensure that the plastic casing AC circuit breaker QF1 is in the off position.
- Ensure that the miniature circuit breakers QF2 to QF9 remain in the off position.

#### 7.1.3 Check the Battery/Grid Side Voltage

- Measure the open-circuit voltage of each energy storage battery for compliance and record it accurately.
- Make sure the positive and negative polarity is correct.
- Measure the resistance of the cable between the battery pack junction box and the machine using an ohmmeter with a megohm range and record it accurately.



Warning

Make sure that the measuring device is used correctly; otherwise there is a danger of clicking.



Warning

---

The voltage on either side shall not exceed the maximum DC voltage allowed by the energy storage inverter,

Excessive DC voltage can damage equipment or even cause safety accidents

- Accurately measure the three sets of line voltage on the AC grid side, the measured value should not exceed the allowable grid voltage range on the AC side of the energy storage converter, and the three phases are balanced.
- Accurately measure the AC grid side frequency, the measured value should not exceed the allowable grid frequency range of the AC side of the energy storage converter.
- It is recommended to measure the THD (Total Harmonic Distortion) of each phase voltage. If the distortion is severe, the energy storage inverter may not operate.

## 7.2 Operation of the Equipment

### 7.2.1 Power-up Operation

#### **Check before Powering up:**

- 1) Check that the AC and DC cables are tightly connected according to the installation manual;
- 2) Test the insulation voltage according to international or local standards, the following parts need to be measured: positive to ground, negative to ground
- 3) Measure and confirm the voltage on the AC side of the grid, the DC voltage of the battery, and the DC voltage of the PV;
- 4) Make sure that the AC voltage, battery DC voltage and PV DC voltage are all within the normal range of the equipment specifications before closing the switch in turn;

#### **Power on every time:**

- 1) Check if the EPO button is reset; if not, rotate the button clockwise to reset it.
- 2) Close the surge protection switch QF3.
- 3) Close the grid switch QF1.
- 4) Wait for the STS and PCS to power on. Once powered on, the energy storage meter screen will light up.
- 5) Close the distribution panel main switch QF2.
- 6) Close the UPS power supply switch QF4.
- 7) Turn on the UPS device (Figure 7-2).
- 8) Set the isolation switch of the high-voltage box to ON, and close the circuit breakers QF2 and QF3 on the high-voltage box (Figure 7-3).
- 9) Close the air conditioning switch QF5.
- 10) Close the 24V power supply switch QF7.
- 11) Close the socket switch QF8.
- 12) Close the fan switch QF9.
- 13) Close the fire alarm main power supply switch QF6, then connect the power cable to the internal battery of the fire alarm main unit (Figure 7-4).
- 14) Close the load switch QF10.
- 15) Extra ATS is required to support generator.
- 16) System supports parallel connection with extra ATS.

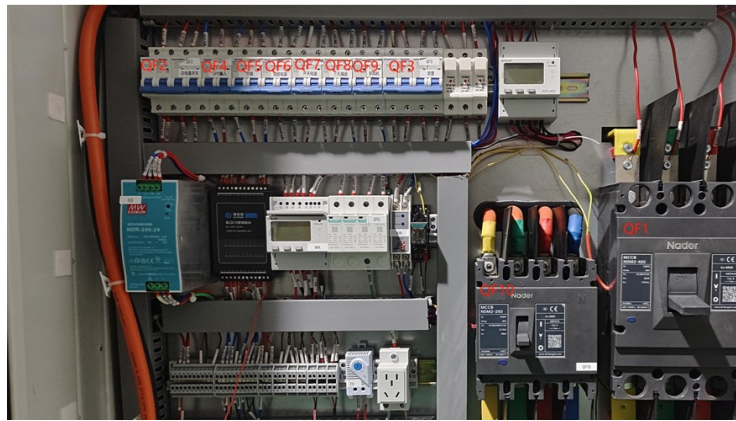


Figure 7-1 Distribution Terminal Switch



Figure 7-2 UPS Device



Figure 7-3 High-Voltage Box

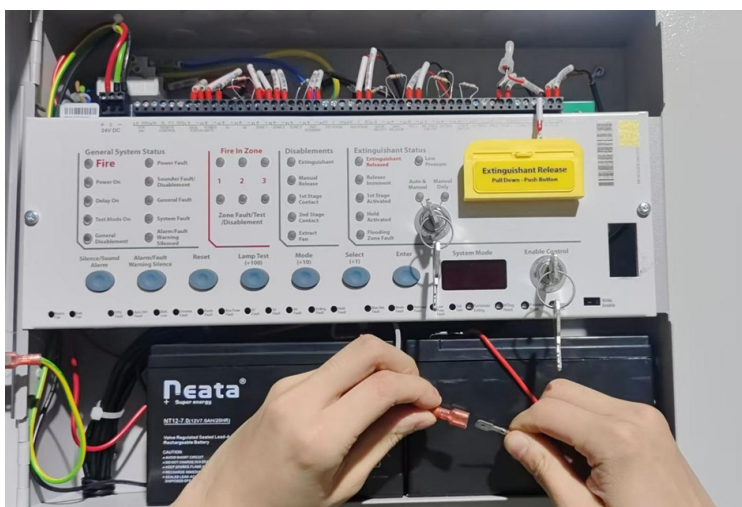


Figure 7-4 Fire Alarm Main Unit

## 8 EMS System Introduction

Copy and paste the following URL to browser: <https://microgrid.skiffenergy.com/#/cards>

Enter account name and password to enter the system.

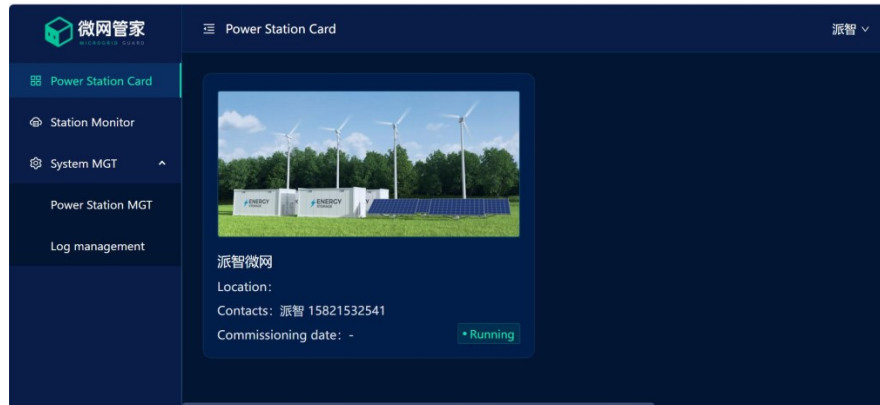


Figure 8-1 Front Page Interface

### 8.1 Dashboard

Select the "dashboard" menu and the result will be displayed as shown in the figure below. The real-time operation information of the energy storage system is displayed in this menu

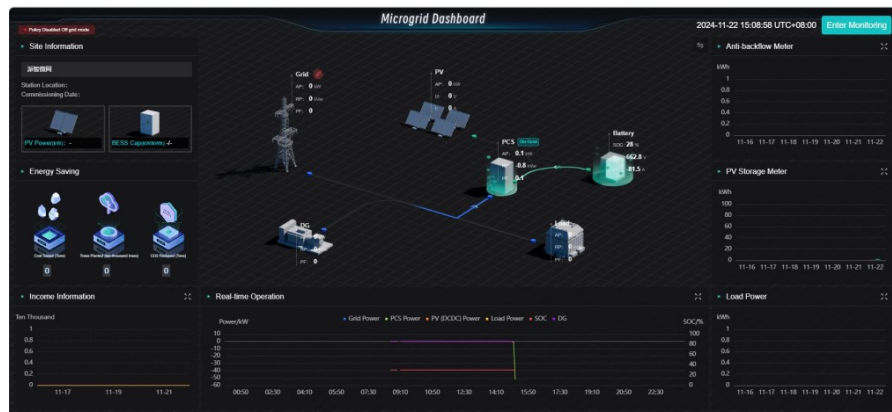


Figure 8-2 Dashboard Interface

### 8.2 PCS

The operating status data will be displayed in this screen.

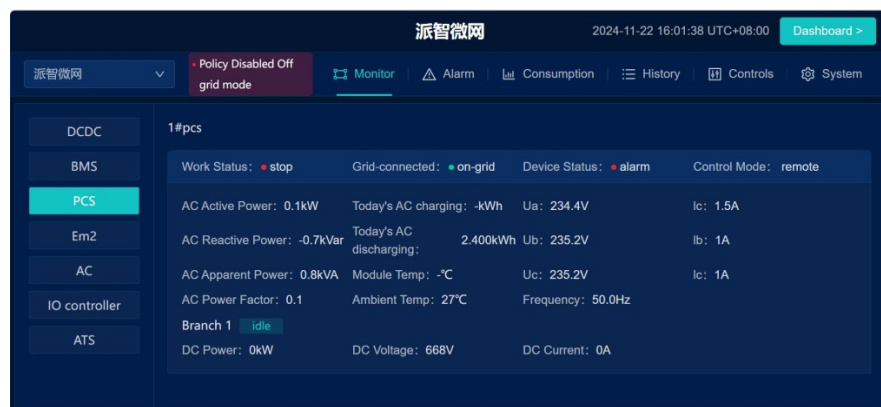


Figure 8-3 PCS Interface

## 8.3 EMS

Select "EMS" menu, you can choose Equipment Control mode or Strategy Control Mode. Refer to the following figure for details.

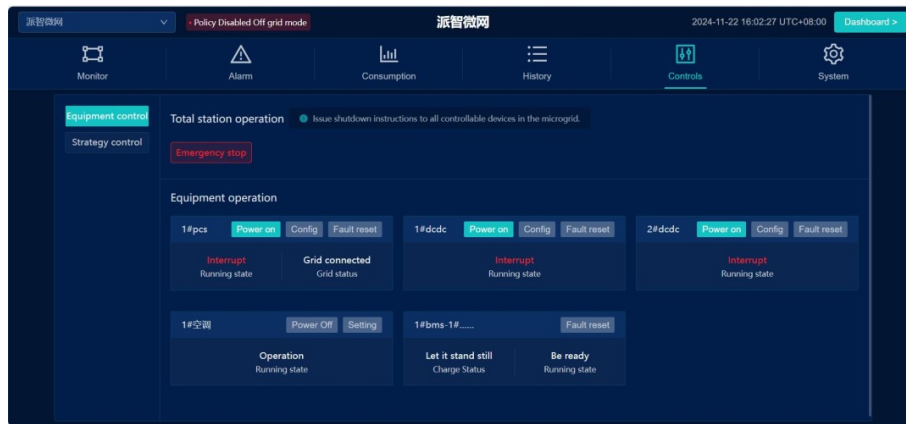


Figure 8-4 EMS Interface

### A. Equipment Monitoring

Monitor and control the PCS, DCDC, air conditioning and BMS.

### B. Strategy Control

Automatically operate under grid-connected and off-grid conditions according to the strategies set.

## 8.4 History

Select the "History" menu to see the fault records, status records and EMS operation records of the device in this menu.

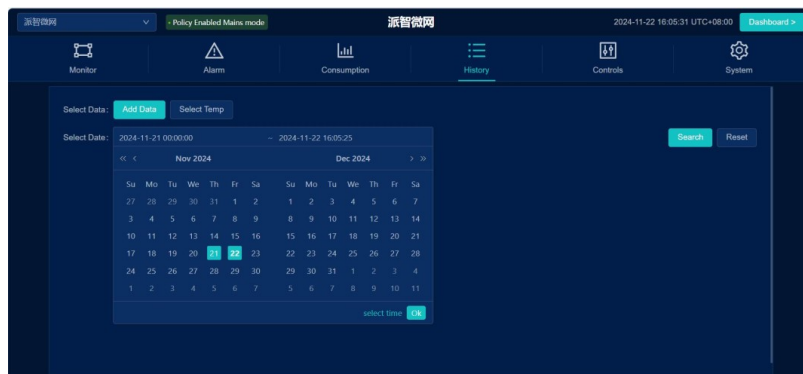


Figure 8-5 History Interface

## 8.5 Tools

Select the "Tools" menu and you can see the "Connection Information" interface in the figure below. After all devices are successfully connected, check the communication status. The blue color means the communication is normal, and the red color means the communication is abnormal. After the communication is normal, you can view the detailed real-time data of different devices in the "Debug Tools" interface.

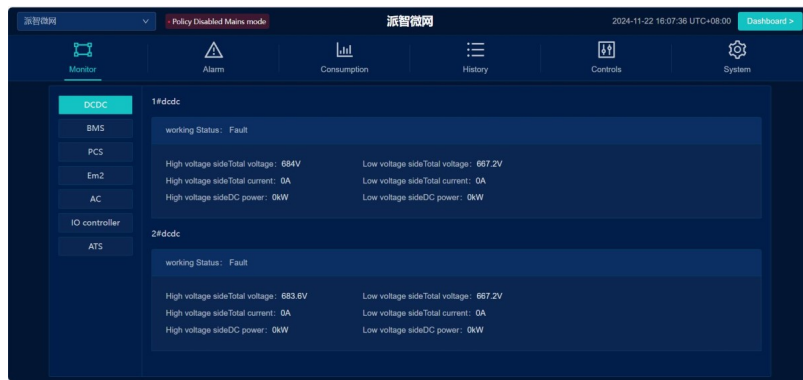


Figure 8-6 DCDC Communication Interface

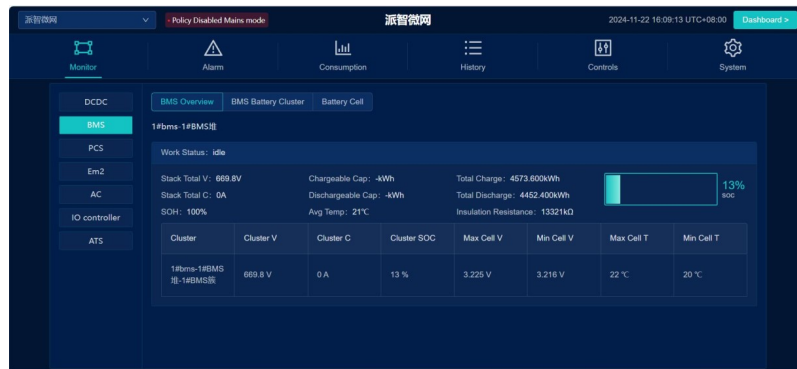


Figure 8-7 BMS Interface



Figure 8-8 PCS Interface

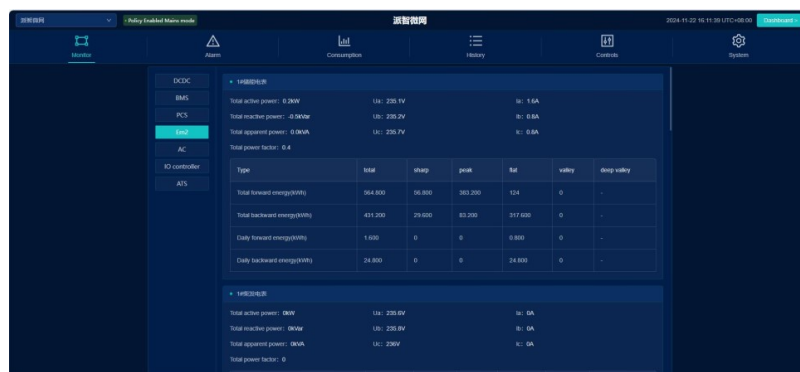


Figure 8-9 Electricity Meter Communication Interface

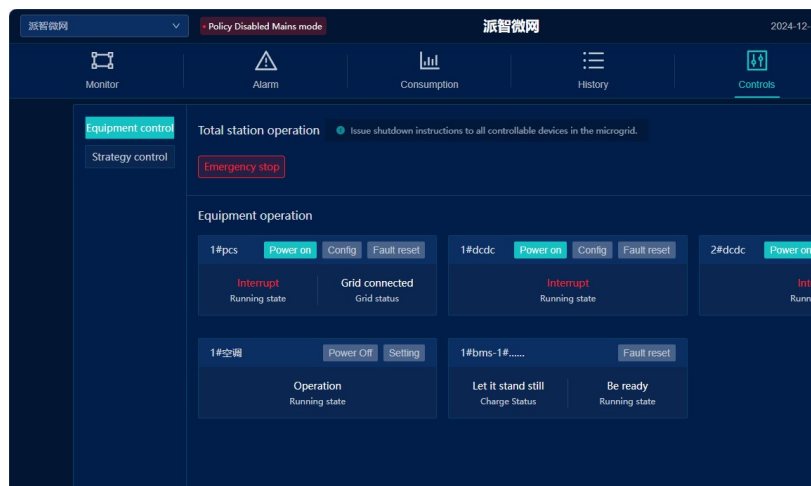


Figure 8-10 Equipment Control Interface

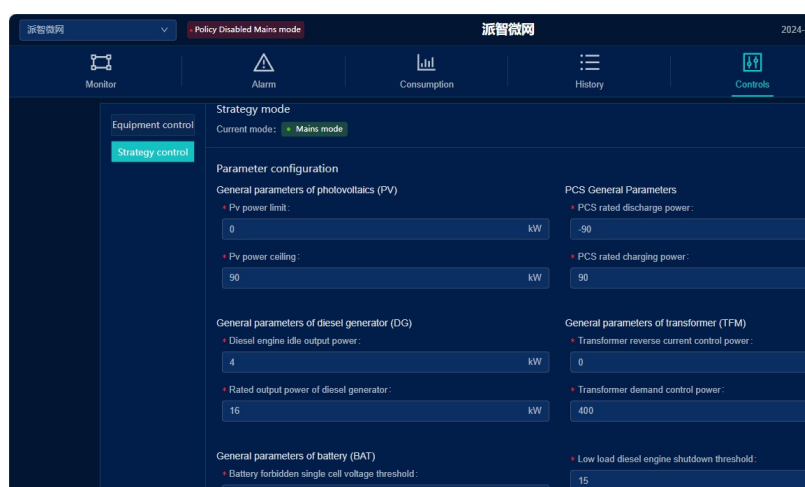


Figure 8-15 Strategy Control Interface

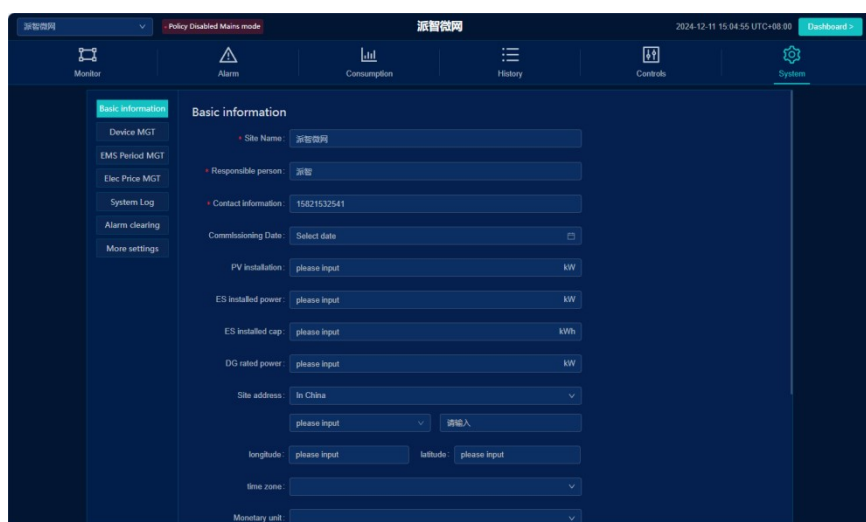
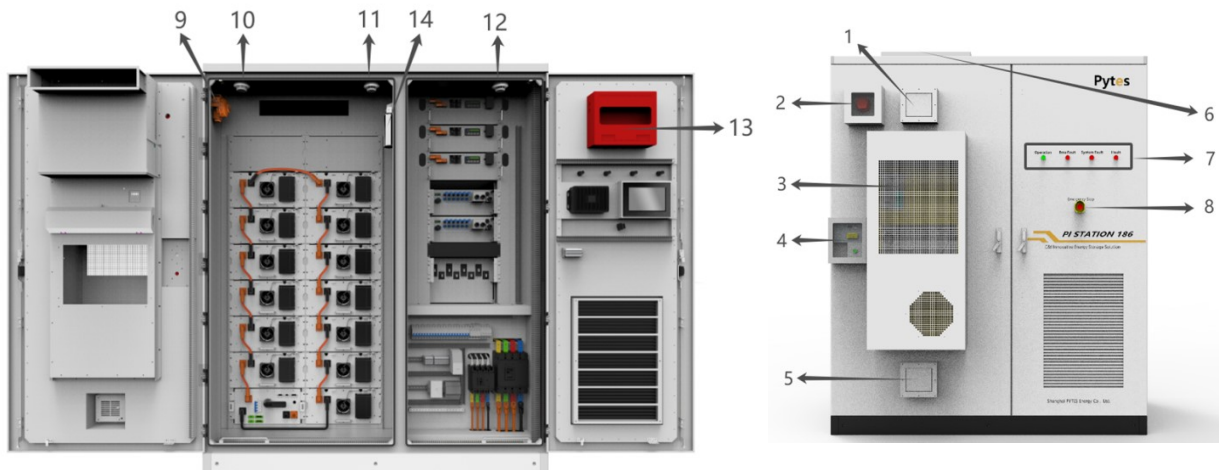


Figure 8-16 Basic Information Interface

## 9 PI Station 186 Outdoor Cabinet FFS



| No. | Item                            | Quantity |
|-----|---------------------------------|----------|
| 1   | Explosion Proof Fan Air Outlet  | 1        |
| 2   | Sound and Light Fire Alarm      | 1        |
| 3   | Air Conditioning Cooling System | 1        |
| 4   | Manual Fire Control Switch      | 1        |
| 5   | Explosion Proof Fan air Inlet   | 1        |
| 6   | Explosion Relief Plate          | 1        |
| 7   | System Status Indicators        | 4        |
| 8   | Emergency Stop Button           | 1        |
| 9   | CO Detector                     | 1        |
| 10  | Smoke Detector                  | 1        |
| 11  | Temperature Detector            | 1        |
| 12  | Smoke Detector                  | 1        |
| 13  | Fire Alarm Control Host         | 1        |
| 14  | Aerosol                         | 1        |

Table 1 Description of Fire Fighting System Components

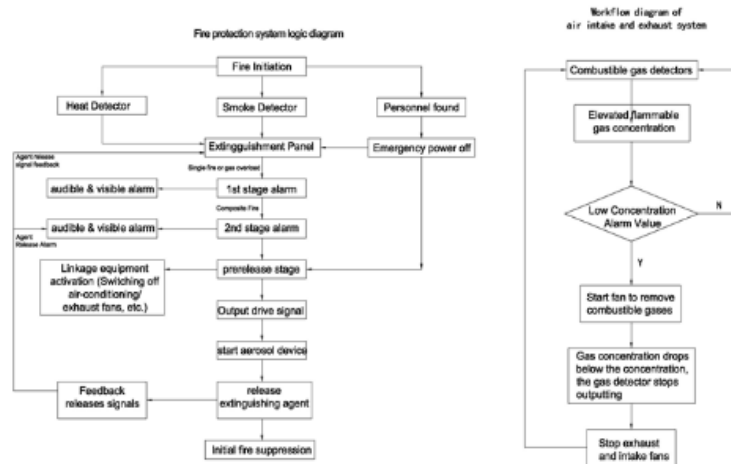


Figure 9-1 Fire protection system logic diagram

## 10 Troubleshooting



### Warning

Only qualified technicians are allowed to perform the operations described in this chapter. "Qualified" means that the operator has previously attended professional training on all troubleshooting operations of the equipment.

Only perform the troubleshooting operations described in this manual.

Observe all safety practices during operation.

If with the help of this manual, you still cannot solve the problem or still have questions, please contact Pytes. In order to provide you with better and faster service, we usually need the following information:

- Energy storage converter model number
- Energy storage converter serial number
- Manufacturer and model of the components connected to the converter, as well as the configuration of the energy storage battery
- Communication scheme of the energy storage converter
- Fault information and brief description
- Photos of the fault site (if site condition allows)

### 10.1 Pre-examination

When the energy storage converter does not work as expected or the charge/discharge volume changes abnormally, please pay attention to check the following before consulting our maintenance personnel:

- Whether the open circuit voltage of the energy storage battery meets the requirements of the energy storage converter
- Whether the emergency stop knob is pressed or not
- Whether the grid and DC side are properly connected and energized
- Whether the communication cable is loose

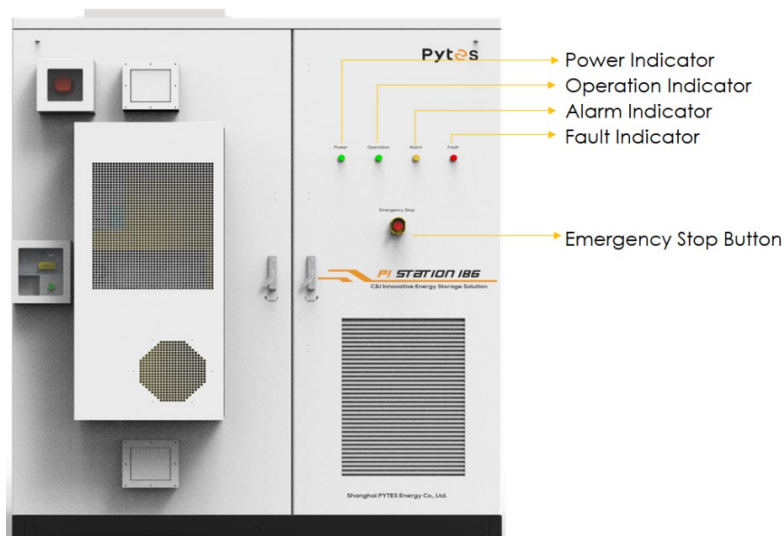


Figure 10-1 External indicators of Pi Station 186

| Item                  | Description                                                          |
|-----------------------|----------------------------------------------------------------------|
| Power Indicator       | Indicating if the system is powered on/off                           |
| Operation Indicator   | Always on when system is in normal status                            |
| Alarm Indicator       | Always on when there is a system alarm                               |
| Fault Indicator       | Always on when error occurs and system stops running                 |
| Emergency stop Button | Press in case of emergency to disconnect AC and DC power immediately |

Please refer to the following table for equipment status descriptions:

Table 10-1 Troubleshooting method

| LED Status                          | Handling method                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| POWER indicator is not on           | <p>It means that the AC and DC sides of the energy storage converter is not powered.</p> <ol style="list-style-type: none"> <li>1. Check whether the power supply and connection of grid and battery are normal.</li> <li>2. Check whether the AC/DC power disconnect switch is rotated to the closed state.</li> <li>3. If the indicator still does not light up, please contact our after-sales service.</li> </ol>                                                                                                                                 |
| Operation indicator light is not on | <p>It means the energy storage converter is not in operation.</p> <ol style="list-style-type: none"> <li>1. Check whether the AC/DC wiring is correct, and use a multimeter to measure the DC input voltage to ensure that the voltage value exceeds the starting voltage of the energy storage converter.</li> <li>2. Make sure the grid power supply and all parameters meet the requirements of energy storage converter operation.</li> <li>3. If the indicator still does not light up, please contact our after-sales service staff.</li> </ol> |
| FAULT indicator is always on        | <p>It means that the energy storage converter is malfunctioning and the fault has not been removed.</p> <ol style="list-style-type: none"> <li>1. Please check the detailed fault information on the web monitor and take the appropriate troubleshooting measures.</li> <li>2. If the indicator light stays on, please contact our service personnel.</li> </ol>                                                                                                                                                                                     |

## 10.2 Common Faults and Handling Methods

### 10.2.1 Energy Storage Converter-related Faults



#### NOTICE

Alarm classification:

Fault - hardware shutdown failure;

Warning - alarm but not shutdown.

Alarm clearing methods:

Auto - the alarm is cleared automatically when the cause of the alarm disappears;

Manual - the alarm is cleared after the cause of the alarm disappears and a reset command is sent;

Power Off - the alarm is cleared after the cause of the alarm has disappeared and the alarm is cleared after a power failure and reboot.

The following is simplified

|                     |     |
|---------------------|-----|
| Fault + Automatic   | F.A |
| Fault + Manual      | F.M |
| Fault + Power Off   | F.P |
| Warning + Automatic | W.A |
| Warning + Manual    | W.M |
| Warning + Power Off | W.P |

| Alarm Name                     | Alarm Type | Alarm Cause                                                                              | Alarm Troubleshooting                                                        |
|--------------------------------|------------|------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|
| Emergency stop (EPO)           | F.A        | 1. EPO interface triggered fault signal;                                                 | 1. If the alarm is misreported, check whether the interface line is abnormal |
| Calibration parameter abnormal | W.P        | 1. Abnormal reading of calibration parameters during DSP power-on initialization;        | 1. Check whether the PCS has not been calibrated for sampling;               |
| Flash abnormal                 | W.P        | 1. During DSP power-on initialization, reading FLASH data is abnormal;                   | 1. Check whether the FLASH external to DSP is damaged;                       |
| Hardware version abnormal      | F.P        | 1. PCS key parameters are set incorrectly;                                               | -                                                                            |
| ID duplicated fault            | F.M        | 1. Code dialing and number duplication occurs between modules in communication parallel; | 1. Redial the code for the module with duplicate number;                     |

|                            |     |                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|----------------------------|-----|------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Master Conflict Fault      | F.M | 1. If the key parameters of each module in the communication parallel are set differently, the alarm will be reported; | 1. Check whether the rated voltage level (2813 register) of each module is the same;<br>2. Check whether the rated frequency level (2814 register) of each module is the same;<br>3. Check whether the AC incoming mode (2804 register) of each module is the same;<br>4. Check whether the off-grid voltage start mode (1311 register) of each module is the same;<br>5. Check whether the mode of offline and parallel operation of each module is the same;<br>6. Check whether the inverter type (2802 register) of each module is the same;<br>7. Check whether the model setting (2800) of each module is the same;<br>8. Check whether the authentication region of each module is the same as the reference standard (2815 and 2816 registers); |
| DSP Parameter mismatch     | W.A | 1. PCS DC parameters are not set according to the required size relationship;                                          | 1. If the battery type set is lithium battery, it is necessary to ensure that the average charging voltage (1615 register)>DC lower limit voltage (1613 register);<br>2. If the battery type set is lead-acid battery, ensure that the average charging voltage (1615 register) >floating charging voltage (1616 register)>DC lower limit voltage (1613 register);                                                                                                                                                                                                                                                                                                                                                                                      |
| Monitor parameter mismatch | F.P | 1. PCS monitoring parameters are not set correctly;                                                                    | 1. Check whether the automatic power setting value is set correctly;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Drm0 Shutdown              | F.A | 1. The Drm0 interface triggered the fault signal;                                                                      | 1. If the alarm is misreported, check whether the interface line is abnormal                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

|                            |     |                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|----------------------------|-----|--------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Module Quantity Abnormal   | F.A | 1. Module detected different from actual module quantities (2805) installed          | Check the reason why the online module quantity is not equal to the rack module count (2805), or manually set to make the same.                                                                                                                                                                                                                                                                                                                                                                       |
| CAN A comm. Fault          | F.A | 1. PCS communication parallel CAN is lost;                                           | 1. If a single module does not use the application of parallel communication, set parallel communication detection (1218 register) to disable;<br>2. Check whether the matching resistance is connected in the way specified in the document;<br>3. Check whether the communication line between modules has poor contact;                                                                                                                                                                            |
| CAN B comm. Fault          | F.A | 1. CAN communication loss between DSP and monitoring chip in PCS;                    | 1. Check whether the matching resistance is connected in the way specified in the document;<br>2. Open the PCS panel and check whether the CAN communication between DSP and monitoring chip has poor contact;                                                                                                                                                                                                                                                                                        |
| CAN C coMM. Fault          | W.A | 1. Loss of CAN communication between PCS and parallel/offline switching device;      | 1. If no external switching device is applied, set the inverter type (2802 register) to 0;<br>2. Check whether the matching resistance is connected in the way specified in the document;<br>3. Check whether the communication line between the module and the switching device has poor contact;<br>4. If the power grid is powered off and the PCS is not in the off-grid operation state, the switching device will be in the power-off state, and it is normal for the PCS to report this alarm; |
| Synchronous signal 1 fault | F.M | 1. The power frequency synchronization signal of PCS communication parallel is lost; | 1. Check whether the communication line between modules has poor contact;                                                                                                                                                                                                                                                                                                                                                                                                                             |

|                              |     |                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                |
|------------------------------|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Auxiliary board comm. fault  | F.A | 1. Communication between DSP and auxiliary controller is lost;                                                                                                                   | 1. Check whether the auxiliary controller program is burned;<br>2. Check whether the auxiliary controller program burns the correct version;                                                                                                                                                                                                   |
| EMS comm. connection timeout | F.A | 1. Communication between EMS and PCS is interrupted;<br>2. EMS is not connected;                                                                                                 | 1. Check whether the connecting wire between EMS and PCS is loose;<br>2. Check whether the EMS is working normally;<br>3. If it is not necessary to detect EMS communication timeout, set "Remote 485 communication timeout setting (2408 register)" and "Remote TCP communication timeout setting (2409 register)" to 0;                      |
| BMS comm. connection timeout | F.A | 1. Communication between BMS and PCS is interrupted;<br>2. BMS is not connected;                                                                                                 | 1. Check whether the connecting wire between BMS and PCS is loose;<br>2. Check whether the BMS is working normally;<br>3. If it is not necessary to detect BMS communication timeout, set "BMS communication timeout setting (2407 register)" to 0;                                                                                            |
| Grid ammeter comm. timeout   | W.A | 1. If any mode of the limiting feeder function (1327 register) is enabled, the alarm will be given if the communication between PCS and the ammeter or switching device is lost; | 1. Check whether the connecting wire between PCS and electricity meter is loose;<br>2. Check whether the electricity meter is working normally;<br>3. Check whether the connecting wire between PCS and switching device is loose;<br>4. If it is not necessary to use the restricted feeder function (1327 register), set this register to 0; |
| Module Fan fault 1           | F.M | 1. The fan of PCS stops rotating                                                                                                                                                 | 1. Check whether the PCS fan is blocked by foreign matters and cannot rotate;<br>2. Clean the dust on the PCS fan;<br>3. Check whether the PCS fan is damaged and unable to rotate;                                                                                                                                                            |

|                                |     |                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                    |
|--------------------------------|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Auxiliary power fault 1        | F.M | 1. PCS detects that the main auxiliary source fault detection signal is set high                                                                                                                                                                                                                    | 1. Set the fault clearing command to PCS and repeat it three times. If it still cannot be cleared, contact the manufacturer                                                                                        |
| Auxiliary power fault 2        | F.M | 1. PCS detects that AC auxiliary source fault detection signal is set high                                                                                                                                                                                                                          | 1. Set the fault clearing command to PCS and repeat it three times. If it still cannot be cleared, contact the manufacturer                                                                                        |
| Auxiliary power fault 3        | F.M | 1. PCS detects that DC secondary source fault detection signal is set high                                                                                                                                                                                                                          | 1. Set the fault clearing command to PCS and repeat it three times. If it still cannot be cleared, contact the manufacturer                                                                                        |
| Module over temperature 1      | F.A | 1. PCS detects that the AC radiator is overheated; 2. PC detects that the DC radiator is overheated;                                                                                                                                                                                                | 1. Check whether the PCS fan operates normally;<br>2. Clean the vent of PCS fan;<br>3. Check whether the operating ambient temperature of PCS is too high;                                                         |
| Ambient over-temperature fault | F.A | 1. PCS detects that the ambient temperature is too high;                                                                                                                                                                                                                                            | 1. Check whether the operating ambient temperature of PCS is too high;                                                                                                                                             |
| Start frequently               | F.M | 1. PCS is repeatedly started for more than 10 times within 15 minutes;                                                                                                                                                                                                                              | 1. Check the cause of PCS repeated startup;                                                                                                                                                                        |
| Controller sampling difference | F.M | 1. If the sampling of DSP and auxiliary controller is inconsistent, this alarm will be given;                                                                                                                                                                                                       | 1. Set the fault clearing command to PCS and repeat it three times. If it still cannot be cleared, contact the manufacturer                                                                                        |
| Battery under energy           | W.A | 1. When the PCS is externally connected to photovoltaics and running off-grid, if it receives an empty command from the BMS, or the maximum discharge current (1627 register) is 0, it will turn off the AC to power off the load, so as to ensure that the battery will not continue to discharge; | In any of the following situations, the alarm will be cleared and the AC will restart to supply power to the load<br>1. The shorting command of BMS is cleared to 0;<br>2. The maximum discharge current is not 0; |

|                                 |     |                                                                                              |                                                                                                                                                                                                                                                                                                    |
|---------------------------------|-----|----------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Insulation detection 1 abnormal | F.P | 1. PCS ground leakage current exceeds the standard value;                                    | 1. Check whether the positive and negative grounding impedance of the DC side does not meet the requirements;<br>2. Check whether there is a short circuit between the AC side phase line and the casing, ground wire or N line;                                                                   |
| Insulation detection 2 abnormal | F.P | 1. This alarm will be given if the PCS leakage current detection self-test circuit fails;    | 1. Power on the PCS again and repeat three times. If it still cannot be cleared, contact the manufacturer;                                                                                                                                                                                         |
| BMS dry contact fault           | F.A | 1. PCS detects that BMS fault input dry contact signal is set high;                          | 1. If the alarm is misreported, check whether the interface line is abnormal;                                                                                                                                                                                                                      |
| Module over current fault<br>1  | F.P | 1. During PCS aging, it is detected that the DC side triggers wave-by-wave current limiting; | 1. If this alarm is reported, contact the manufacturer;                                                                                                                                                                                                                                            |
| Module current limit alarm<br>1 | W.A | 1. PCS detected that AC phase A triggered wave-by-wave current limiting;                     | 1. If this alarm is triggered frequently in a short time during grid connection, check whether the grid is seriously distorted;<br>2. If this alarm is triggered frequently in a short time during off-network operation, check whether the load capacity is close to the specified maximum value; |
| Module current limit alarm<br>2 | W.A | 1. PCS detected that AC phase B triggered wave-by-wave current limiting;                     | 1. If this alarm is triggered frequently in a short time during grid connection, check whether the grid is seriously distorted;<br>2. If this alarm is triggered frequently in a short time during off-network operation, check whether the load capacity is close to the specified maximum value; |

|                                 |     |                                                                                               |                                                                                                                                                                                                                                                                                                                                   |
|---------------------------------|-----|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Module current limit alarm<br>3 | W.A | 1. PCS detected that AC phase C triggered wave-by-wave current limiting;                      | 1. If this alarm is triggered frequently in a short time during grid connection, check whether the grid is seriously distorted;<br>2. If this alarm is triggered frequently in a short time during off-network operation, check whether the load capacity is close to the specified maximum value;                                |
| Module current limit alarm<br>4 | W.A | 1. PCS detected that the DC side triggered wave-by-wave current limiting;                     | 1. If this alarm is triggered frequently in a short time during grid connection, check whether the voltage at the DC input terminal of PCS fluctuates greatly;<br>2. If this alarm is triggered frequently in a short time during off-network operation, check whether the load capacity is close to the specified maximum value; |
| Module current limit alarm<br>5 | W.A | 1. PCS detected that the balance circuit triggered wave-by-wave current limiting;             | 1. If this alarm is triggered frequently in a short time during off-network operation, check whether the load capacity is close to the specified maximum value;                                                                                                                                                                   |
| Module current abnormal<br>1    | F.A | 1. PCS detects that the average value of balance circuit current exceeds the threshold;       | 1. If this alarm is reported during off-network operation, check whether the half-wave load capacity exceeds the specified value;                                                                                                                                                                                                 |
| Module current abnormal<br>2    | F.P | 1. PCS detects that the instantaneous value of balance circuit current exceeds the threshold; | 1. If the fault occurs, contact the manufacturer                                                                                                                                                                                                                                                                                  |
| Module current abnormal<br>3    | F.P | 1. PCS detects that the instantaneous value of DC inductance current exceeds the threshold;   | 1. If the fault occurs, contact the manufacturer                                                                                                                                                                                                                                                                                  |
| Module current abnormal<br>4    | F.M | 1. Uneven battery current detected in the PCS AC/DC parallel system                           | 1. Check whether the PCS module that reported the fault has an open circuit of the DC side relay                                                                                                                                                                                                                                  |

|                        |       |                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|------------------------|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DC input over voltage  | F.A   | 1. DC voltage is higher than average charging voltage setting (1615 register)                                                                                                       | <p>1. Correctly configure the equalizing charge voltage setting (1615 register) according to the battery parameters;</p> <p>2. If the DC input is disconnected during PCS charging operation, this alarm will be generated. Wait until the alarm is cleared automatically;</p> <p>3. If the difference between DC voltage sampling and DC voltage measurement is large, contact the manufacturer;</p>                                                                                             |
| DC input under voltage | F.A   | 1. The DC voltage is lower than the DC lower limit voltage setting value (1613 register);                                                                                           | <p>1. According to the battery parameters, correctly configure the DC lower limit voltage setting value (1613 register), and the DC lower limit voltage setting value should be lower than the actual access battery voltage;</p> <p>2. Check whether the DC voltage is not connected, or BMS disconnected the battery contactor due to the alarm;</p> <p>3. If the difference between the DC voltage sampling value and the DC voltage measurement value is large, contact the manufacturer;</p> |
| DC overload alarm      | W.A   | 1. The current and power at the DC side exceed the rated value when the PCS is running off the grid;                                                                                | 1. During off-grid operation, the load exceeds the rated value, causing an alarm. Reduce the load, and the alarm will disappear automatically;                                                                                                                                                                                                                                                                                                                                                    |
| DC overload timeout    | F.A+M | 1. During PCS operation, when the DC current and power exceed the rated value, PCS will give an alarm after overload operation for a period of time according to the specification; | 1. During off-grid operation, the load exceeds the rated value, causing an alarm. Reduce the load, wait for 5 minutes, and the alarm will be cleared automatically, and the PCS can run again. However, if the fault is triggered three times within 50min, the fault will be locked. After locking, the fault can be                                                                                                                                                                             |

|                                              |     |                                                                                                                     |                                                                                                                                                                                                                                                                                                 |
|----------------------------------------------|-----|---------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                              |     |                                                                                                                     | cleared only by issuing the fault clearing command.                                                                                                                                                                                                                                             |
| DC input galvanic-break-device open circuit  | F.M | 1. PCS internal DC relay open circuit fault;                                                                        | 1. If the fault occurs, contact the manufacturer;                                                                                                                                                                                                                                               |
| DC input galvanic-break-device short circuit | F.M | 1. PCS internal DC relay short circuit fault;                                                                       | 1. If the fault occurs, contact the manufacturer;                                                                                                                                                                                                                                               |
| DC input soft galvanic-break-device fault    | F.P | 1. The internal DC soft start relay of PCS is faulty;                                                               | 1. If the fault occurs, contact the manufacturer;                                                                                                                                                                                                                                               |
| DC bus over voltage                          | F.A | 1. During PCS operation, the voltage on DC bus capacitor is too high;                                               | 1. If the DC input is disconnected during the charging operation of the PCS30, this alarm may be generated. Wait until the alarm is cleared automatically;<br>2. If this alarm is reported during off-network operation, check whether the half-wave load capacity exceeds the specified value; |
| DC bus under voltage                         | F.A | 1. During PCS operation, the voltage on DC bus capacitor is too low;                                                | 1. If this alarm is reported during off-network operation, check whether the load capacity exceeds the specified value;                                                                                                                                                                         |
| DC bus voltage unbalanced                    | F.A | 1. During PCS operation, DC positive and negative bus capacitance voltage varies greatly;                           | 1. If this alarm is reported during off-network operation, check whether the half-wave load capacity exceeds the specified value;                                                                                                                                                               |
| DC bus soft start failed                     | F.M | 1. When the PCS establishes the bus voltage, the bus startup circuit is abnormal, resulting in the startup failure; | 1. Check whether the IGBT drive line on the DC side has poor contact;<br>2. Check whether the IGBT on the DC side is damaged;                                                                                                                                                                   |

|                           |     |                                                                                                                                                                                                                                  |                                                                                                                                                       |
|---------------------------|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| BMS shutdown fault        | F.A | 1. PCS receives the shutdown command from BMS;                                                                                                                                                                                   | 1. Check the reason why BMS sends the shutdown command;                                                                                               |
| Grid connection forbidden | F.A | 1. When IEE1547 authentication mode is selected, the grid connection service permission(1307 register) is set to 0;                                                                                                              | 1. Set the grid connection service permission (1307 register) to 1;                                                                                   |
| Grid overload timeout     | F.M | When AS4777 authentication mode is selected, the limit feeder function (1327 register) is set to 2. If the active power on the grid side is greater than the feeder power limit ratio (1328 register), this alarm will be given; | 1. Check the reason why the active power on the grid side is greater than the feed power limit ratio (1328 register);                                 |
| AC bus over voltage       | F.A | 1. The PCS AC voltage is higher than the overvoltage protection setting value;<br>2. The average value of PCS AC voltage within 10 minutes is higher than the 10-minute overvoltage amplitude (1351 register).                   | 1. If the AC voltage sampling value read is higher than the overvoltage protection parameter setting, the protection setting value will be increased; |
| AC bus under voltage      | F.A | 1. PCS AC voltage is lower than the setting value of undervoltage protection;                                                                                                                                                    | 1. If the AC voltage sampling value read is lower than the undervoltage protection parameter setting, lower the protection setting value;             |
| AC bus over frequency     | F.A | 1. PCS AC frequency is higher than the setting value of over-frequency protection;                                                                                                                                               | 1. If the read AC frequency is higher than the setting of the over-frequency protection parameter, set the protection value higher;                   |
| AC bus under frequency    | F.A | 1. PCS AC frequency is lower than the setting value of underfrequency protection;                                                                                                                                                | 1. If the read AC frequency is lower than the over-frequency protection parameter setting, lower the protection setting;                              |

|                         |       |                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------------|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AC bus phase reversed   | F.A   | 1. The phase sequence of the three-phase incoming line of the power grid is reversed;                                                                                                          | 1. The phase sequence of the incoming line of the power grid does not meet the requirements, so it is necessary to replace the phase sequence of the incoming line of the power grid, which is consistent with the ABC phase sequence at the incoming line of the power grid switch. The alarm will be cleared automatically after the phase sequence is correct;        |
| AC bus voltage abnormal | F.A   | 1. This alarm will be given if the instantaneous value of PCS AC voltage exceeds the threshold;                                                                                                | 1. If the PCS suddenly disconnects its AC input switch during grid-connected discharge operation, this alarm will be given;                                                                                                                                                                                                                                              |
| AC bus phase loss       | F.M   | 1. If PCS detects AC wiring error;                                                                                                                                                             | 1. If the PCS is set to 3P3W, but the AC incoming line is connected to the N line, this alarm will be reported. Disconnect the N line from the PCS, and then set the fault clearing command to clear this alarm;                                                                                                                                                         |
| Island protection       | F.A   | 1. When PCS sets the island protection enable, the island is detected in the grid connection mode;                                                                                             | 1. The alarm will be cleared automatically after the power grid is restored;                                                                                                                                                                                                                                                                                             |
| AC overload alarm       | W.A   | 1. The current and power at the AC side exceed the rated value when the PCS is running off the grid;                                                                                           | 1. During off-grid operation, the load exceeds the rated value, causing an alarm. Reduce the load, and the alarm will disappear automatically;                                                                                                                                                                                                                           |
| AC overload timeout     | F.A+M | 1. When the current and power at the AC side exceed the rated value during PCS operation, PCS will give an alarm after overload operation for a period of time according to the specification; | 1. During off-grid operation, the load exceeds the rated value, causing an alarm. Reduce the load, wait for 5 minutes, and the alarm will be cleared automatically, and the PCS can run again;<br>2. This alarm will be given when the AC bus is in short circuit state when it is started or operated off the grid. It is necessary to power down and check whether the |

|                             |     |                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                       |
|-----------------------------|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                             |     |                                                                                                                                                                                                                                                                                                                                                                                                                               | AC bus is in short circuit;                                                                                                                                                                                                           |
| Ac bus neutral loss         | F.M | 1. PCS detects that the AC incoming line lacks N;                                                                                                                                                                                                                                                                                                                                                                             | 1. If the PCS is set to 3P4W, but the AC incoming line is not connected to the N line, this alarm will be reported. Connect the N line, and then set the fault clearing command to clear the alarm;                                   |
| AC bus connection forbidden | W.A | 1. After setting the grid connection startup order, the grid voltage and frequency did not reach the set grid connection access range for more than 5 minutes;<br>(1) Grid reconnection upper limit voltage (1352 register);<br>(2) Lower limit voltage of grid reconnection (1353 register);<br>(3) Grid reconnection upper limit frequency (1369 register);<br>(4) Grid reconnection lower limit frequency (1370 register); | 1. Check whether the grid voltage and frequency sampling is outside the set grid access range. If so, the grid access range can be appropriately widened;                                                                             |
| On/Off grid switching error | F.A | 1. The PCS is in off-grid shutdown, but AC input voltage is detected on the AC bus;                                                                                                                                                                                                                                                                                                                                           | 1. When PCS30 receives the off-grid command, the superior power grid must be disconnected. If the power grid is not disconnected, an alarm will be given; If the power grid is disconnected, the alarm will be cleared automatically; |

|                                        |     |                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|----------------------------------------|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AC soft start failed                   | F.M | 1. In the process of PCS startup, this alarm will be given if the power grid waveform distortion is serious, which leads to the inability to track;<br>2. The IGBT drive line at the AC side of the PCS is loose, resulting in the failure of startup;<br>3. The IGBT on the AC side of PCS is damaged, resulting in startup failure; | 1. Abnormal distortion of grid voltage may lead to failure to track the grid during startup, resulting in startup failure. At this time, check whether the power grid is seriously distorted. If so, wait for the power grid to return to normal, and then send the alarm reset command to clear the alarm;<br>2. Check whether the IGBT drive line on the AC side is loose; 3. Check whether the IGBT on the AC side is damaged; |
| AC galvanic-break-device open circuit  | F.M | 1. Open circuit fault of AC relay in PCS;                                                                                                                                                                                                                                                                                             | 1. If the fault occurs, contact the manufacturer;                                                                                                                                                                                                                                                                                                                                                                                 |
| AC galvanic-break-device short circuit | F.M | 1. Short circuit fault of AC relay in PCS;                                                                                                                                                                                                                                                                                            | 1. If the fault occurs, contact the manufacturer;                                                                                                                                                                                                                                                                                                                                                                                 |

## 10.2.2 Air conditioning System Related Faults

### 10.2.2.1 Pre-examination

- Check whether the air conditioner is assembled in the direction of the installation schematic and not installed upside down;
- Check whether the air conditioner structure is complete, firmly installed and free from shaking;
- Check whether the air conditioner input power and dry contact alarm output are assembled in accordance with the requirements of electrical assembly, and check whether the terminals are misplaced or omitted;
- Check whether the voltage and frequency of the input power of the cabinet meet the requirements of the air conditioner

### 10.2.2.2 Product Operation Check

The air conditioner is automatically checked for operation when it is powered on, and it can also be manually checked for self-test. After the self-test, if there is no alarm in the system, the air conditioner will automatically judge whether it conforms to the air conditioner operation logic according to the temperature of the internal circulation return air outlet detected at present; if there is an alarm, please check the contents of the fault alarm and conduct fault analysis and treatment; then please deal with it by yourself or contact the manufacturer's professional staff for overhaul in time.

### 10.2.2.3 Fault Alarm Content View

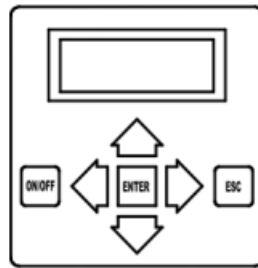


Figure 10-2 External of alarm indicator identification

When a fault alarm occurs, you can enter the query interface in the following way:

Press ENTER → Input Password → Main Menu → Alarm Contents

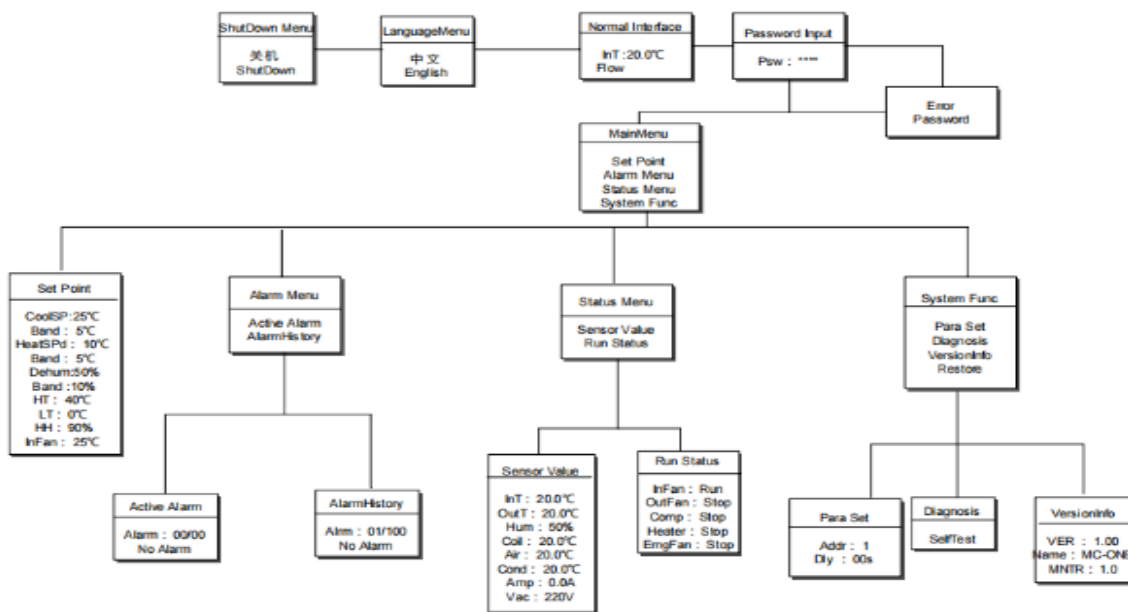


Figure 10-3 Information Query

#### Key Operation Explanation

| Button | Description                                                                                           |
|--------|-------------------------------------------------------------------------------------------------------|
| ON/OFF | Power On/Off Button: Press this button to power the unit on or off.                                   |
| ↑      | Up Arrow Button: Select the previous record/menu, or increase the setting value (only for passwords). |
| ↓      | Down Arrow Button: Select the next record/menu, or decrease the setting value (only for passwords).   |
| ←      | Left Arrow Button: Increase the setting value, or select the previous digit when entering a password. |
| →      | Right Arrow Button: Decrease the setting value, or select the next digit when entering a password.    |
| ENTER  | Enter Key: Confirm the input.                                                                         |
| ESC    | Exit Key: Return to the previous screen/menu.                                                         |

#### Alarm Information

| Alarm                                    | Default Value | Setting Range | Unit | Alarm Trigger Condition                            |
|------------------------------------------|---------------|---------------|------|----------------------------------------------------|
| No Alarm                                 | -             | -             | -    | No Alarm                                           |
| Cabinet Internal High Temperature Alarm  | 55            | 25~80         | °C   | Internal Temperature Higher than Alarm Value       |
| Cabinet Internal Low Temperature Alarm   | 0             | -20~15        | °C   | Internal Temperature Lower than Alarm Value        |
| Cabinet Internal High Humidity Alarm     | 90            | 0~100         | %    | Internal Humidity higher than Alarm Value          |
| Cabinet Internal Temperature Sensor Fail | -             | -             | -    | Internal Temperature Sensor Fail                   |
| Cabinet External Temperature Sensor Fail | -             | -             | -    | External Temperature Sensor Fail                   |
| Cabinet Internal Humidity Sensor Fail    | -             | -             | -    | Internal Humidity Sensor Fail                      |
| System High Voltage Alarm                | -             | -             | -    | System High Voltage (or External Fan Fail)         |
| Compressor Fail                          | -             | -             | -    | System Fail to Cooling                             |
| Evaporator Coil Anti-freeze Protection   | 0             |               | °C   | Evaporator Coil Low Temperature                    |
| Evaporator Coil Temperature Sensor Fail  | -             | -             | -    | Evaporator Coil Temperature Sensor Fail            |
| AC High Voltage Alarm                    | 253           |               | V    | AC Voltage Higher than Alarm Value                 |
| AC Low Voltage Alarm                     | 187           |               | V    | AC Voltage Lower than Alarm Value                  |
| AC Shutdown                              | -             | -             | -    | AC Shutdown                                        |
| Soak Alarm                               | -             | -             | -    | External Soak Alarm Triggered (Optional)           |
| Smoke Alarm                              | -             | -             | -    | External Smoke Alarm Triggered (Optional)          |
| Access Control Alarm                     | -             | -             | -    | External Access Control Alarm Triggered (Optional) |

#### 10.2.2.4 Common Fault Analysis and Handling

| Fault                    | Analysis                                                                                                                                                                   | Troubleshooting                                                                                                                                         |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| Internal fan not working | 1. Check the input AC is normal and voltage range is within 220V±15%<br>2. Check if there's any object Jammed fan.<br>3. Check if any fan connecting terminal is loosened. | 1. Low return air temperature, entering energy-saving operation mode.<br>2. Main power failure.<br>3. Fan jammed.<br>4. Terminal loose or disconnected. |

|                                             |                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Fan works but control functions not working | Relay not working                                                                                                                                                                                      | <ol style="list-style-type: none"> <li>1. Check if the relay is faulty.</li> <li>2. Check if there is AC voltage at the relay coil. If there is voltage, replace the control board.</li> </ol>                                                                                                                                                                                                                                                                                                                                    |
| Fan noise or abnormal fan sound.            | <ol style="list-style-type: none"> <li>1. Fan bearing wear.</li> <li>2. Fan blades scraping against other objects.</li> </ol>                                                                          | <ol style="list-style-type: none"> <li>1. Replace the fan.</li> <li>2. Check for any cables or other objects interfering with the fan blades.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                          |
| Compressor not starting.                    | <ol style="list-style-type: none"> <li>1. Power not turned on (standby mode).</li> <li>2. Loose electrical connections.</li> <li>3. Compressor motor burned out.</li> </ol>                            | <ol style="list-style-type: none"> <li>1. Check the main power switch and verify if the power-on operation is displayed on the interface.</li> <li>2. Tighten the electrical connections.</li> <li>3. Inspect the motor, and if any defects are found, replace it immediately.</li> </ol>                                                                                                                                                                                                                                         |
| Compressor not working                      | <ol style="list-style-type: none"> <li>1. No cooling required.</li> <li>2. Shutdown delay.</li> <li>3. Compressor internal temperature protection.</li> <li>4. High-pressure switch opened.</li> </ol> | <ol style="list-style-type: none"> <li>1. Check the temperature display inside the cabinet and the compressor output status on the operation interface.</li> <li>2. The compressor has the shortest downtime under normal conditions. If the temperature rises back to the start point during this period, the compressor will still delay starting.</li> <li>3. Check if there is 220V AC voltage at the relay contacts.</li> <li>4. Follow the operational steps for troubleshooting high discharge pressure faults.</li> </ol> |
| High discharge pressure.                    | <ol style="list-style-type: none"> <li>1. Condenser is dirty or clogged.</li> <li>2. Condenser fan is not operating.</li> </ol>                                                                        | <ol style="list-style-type: none"> <li>1. Clean the condenser.</li> <li>2. Follow the troubleshooting steps for fan-related issues.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                    |

|                                                                                                                                                                                                                   |                                                                  |                                                                                                                                                              |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Refrigerant surge in the compressor.<br>2. Bearing wear due to loss of lubricating oil.<br>3. Interference in the compressor or copper pipe line.<br>4. Broken connecting rod, valve, or other rotating gears. | Excessive compressor noise.                                      | 1. Check if the suction is overheating.<br>2. Replace the compressor.<br>3. Adjust the angle and position of the copper pipes.<br>4. Replace the compressor. |
| Compressor intermittently cycles on and off.                                                                                                                                                                      | 1. Sensor failure.<br>2. Insufficient refrigerant in the system. | 1. Check if there is a sensor fault alarm displayed.<br>2. Check for leaks, repair the leak, and add refrigerant.                                            |
| Compressor intermittently cycles on and off.                                                                                                                                                                      | 1. High discharge pressure.                                      | Check the condenser filter for dirt or clogging, and verify if the condenser fan or fan motor is blocked.                                                    |
| Frequent voltage alarm.                                                                                                                                                                                           | Power supply failure.<br>Circuit sensor failure.                 | 1. Check the external input power supply.<br>2. Replace the circuit board.                                                                                   |

### 10.3. Other Faults

#### ● Machine working noise is too high

Possible causes: abnormal operation of energy storage converter, abnormal work of inductor; cooling fan failure.

Solution: Check whether the power is within the normal range, measure whether the grid-connected current and voltage waveforms are normal; abnormal waveforms will generate a lot of noise and the inductor will heat up. Repair or replace the cooling fan.

#### ● The upper computer communication is not up

Ethernet communication mode

1. Check whether the IP address, subnet mask and gateway are set correctly.
2. Check if the communication line is straight through and well connected.

---

# 11 Maintenance

Due to the impact of environmental temperature, humidity, dust, and vibration, the internal components of the energy storage system may age and fail to operate properly, leading to potential faults. Therefore, it is necessary to perform regular maintenance on the energy storage system to ensure its operation and service life. All maintenance work must be carried out by qualified professionals. Before performing any maintenance, please disconnect the power supply and signal lines. After the maintenance work is completed, reconnect the power supply and signal lines.

## 11.1 Securities & Cautions



### Warning

Only qualified and authorized personnel are allowed to perform the maintenance. Do not leave metal parts such as screws and washers in the energy storage converter when carrying out maintenance work; otherwise there is a risk of damaging the equipment.



### Warning

Before starting formal maintenance, not only should the AC/DC disconnect switch be disconnected, but also the battery cabinet switch and the grid side distribution switch should be off.

If only the DC switch is off, the copper bar of the DC cable at the bottom of the converter is still charged.



### Warning

After disconnecting the DC switch/breaker, please wait at least 15 minutes before performing maintenance operations.



### Warning

Please refer to the precautions mentioned in section 6.3 when electrical connections are involved in the maintenance process.

## 11.2 Maintenance Work and Cycle

| Check contents     | How to check                                                                                                                                      | Maintenance cycle |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| Save software data | <ul style="list-style-type: none"><li>● Save running data, parameters, and logs to related files</li><li>● Check the parameter Settings</li></ul> | Once a month      |

|                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                        |
|--------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| System running status and environment      | <ul style="list-style-type: none"> <li>● Observe the energy storage converter for damage or deformation</li> <li>● Listen for abnormal sound when the energy storage converter is running</li> <li>● When the system is running, check whether the variables are abnormal</li> <li>● Check that the main components are working properly</li> <li>● Use a thermal imager to check that the system heats up properly</li> <li>● Check that the inlet and outlet winds are normal</li> <li>● whether all air inlet filters function properly</li> </ul> <p>Pay attention! Ventilation at the inlet and outlet must be checked</p> | Once every 6 months                                                                    |
| System cleaning                            | <p>Check circuit boards and components for cleanliness</p> <ul style="list-style-type: none"> <li>● Check the heat sink temperature and dust. Clean the module if necessary by using compressed air and turning on the fan</li> <li>● Replace the air filter</li> </ul>                                                                                                                                                                                                                                                                                                                                                         | Once every 6 to 12 months (depending on the dust content of the operating environment) |
| Power circuit connection                   | <ul style="list-style-type: none"> <li>● Check for loose power cable connections</li> <li>● Check power cables and control cables for damage, especially if there are signs of cuts on the skin that comes into contact with the metal surface</li> <li>● Check whether the insulation wrapping tape of the power cable terminal has fallen off</li> </ul>                                                                                                                                                                                                                                                                      | 6 months after the initial debugging, and once every 6 to 12 months thereafter         |
| Terminal, bar wire connection              | <ul style="list-style-type: none"> <li>● Check that the screws controlling the terminals are loose</li> <li>● Check the main loop terminals for poor contact and for signs of overheating in the screw locations</li> <li>● Check the wiring copper bar or screws for color changes</li> <li>● Visually inspect terminal connections and wiring distribution</li> </ul>                                                                                                                                                                                                                                                         | Once every 12 months                                                                   |
| Maintenance and replacement of cooling fan | <ul style="list-style-type: none"> <li>● Check the fan blades for cracks</li> <li>● Listen for abnormal vibration and sound when the fan is running</li> <li>● If the fan is abnormal, replace it in time</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                            | Once every 12 months                                                                   |

|                                                       |                                                                                                                                                                                                                                                                                                                       |                           |
|-------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| Isolation<br>switch/circuit<br>breaker<br>Maintenance | <ul style="list-style-type: none"> <li>● Do a routine inspection of all metal components for rust</li> <li>● Annual inspection of isolation switches (auxiliary switches and icr switches) to ensure proper mechanical operation</li> <li>● Check operating parameters (especially voltage and insulation)</li> </ul> | Once every 6 to 12 months |
|-------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|

Table 11-1 Recommended routine maintenance periods and contents

## 11.3 Component Inspection

### 11.3.1 Replacing the Dust Jacket

Read the user's manual carefully and pay special attention to safety matters.

Disconnect the switch between the battery and the machine and the switch between the AC output and the power grid, and let it stand for at least 15 minutes to discharge. Use a multimeter to measure the remaining voltage of the live copper bar within the safe operating voltage range before performing subsequent operations.

Check the dustproof cotton as shown in Figure 11-1. If you need to replace the dustproof cotton, remove it using a screwdriver.

After replacing the dustproof cotton, lock the fixing screws and restore it to its original state. You are advised to replace the dustproof cotton every six months

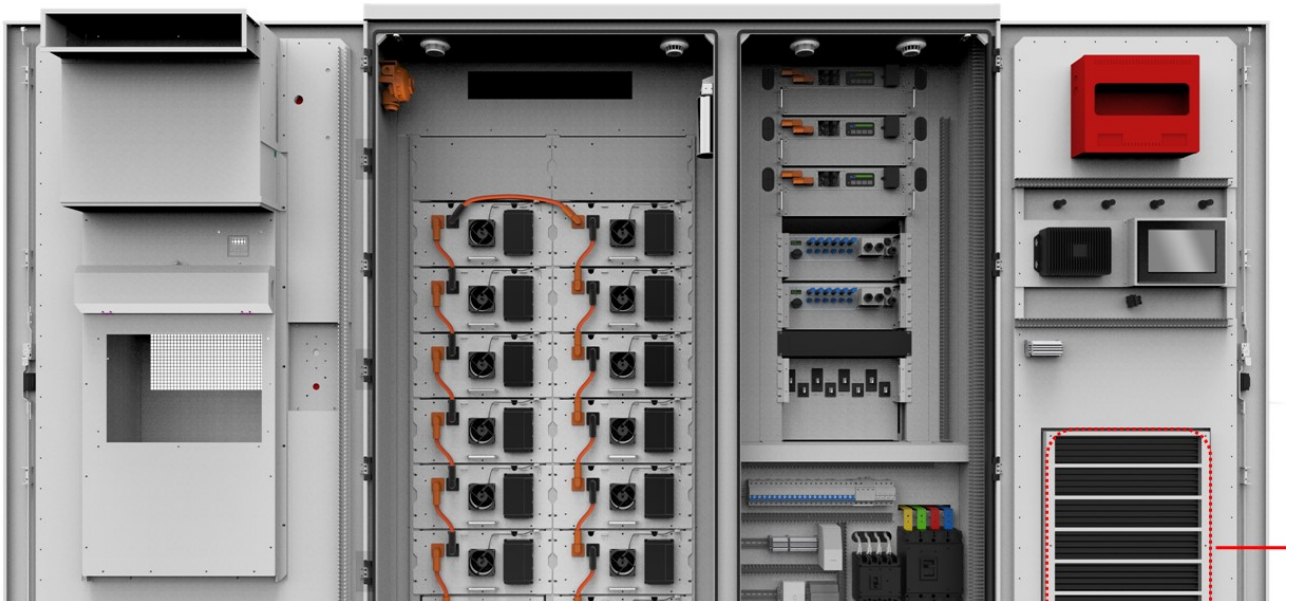


Figure 11-1 Location of the dust-proof cotton

### 11.3.2 Check and Maintain the Fire Extinguishing System

In order to ensure timely detection of the real-time situation in the cabinet during the working of the machine, timely fire occurrence, timely treatment to avoid the expansion of the fire, please periodically check and verify whether the fire control system can work normally. The parts to be checked include the smoke sensor, temperature sensor, and combustible gas detection module.

The specific operations are as follows.



Figure 11-2



Figure 11-3



Figure 11-4



Figure 11-5

Use a special smoke generator near the smoke sensor module. If the sensor is working properly, the red light in the sensor will trigger an alarm. Figure 11-2 and Figure 11-3 show the smoke sensors, Figure 11-4 shows the temperature sensor, and Figure 11-5 shows the CO sensor. Fire alarm information will be displayed on the system's alarm page.

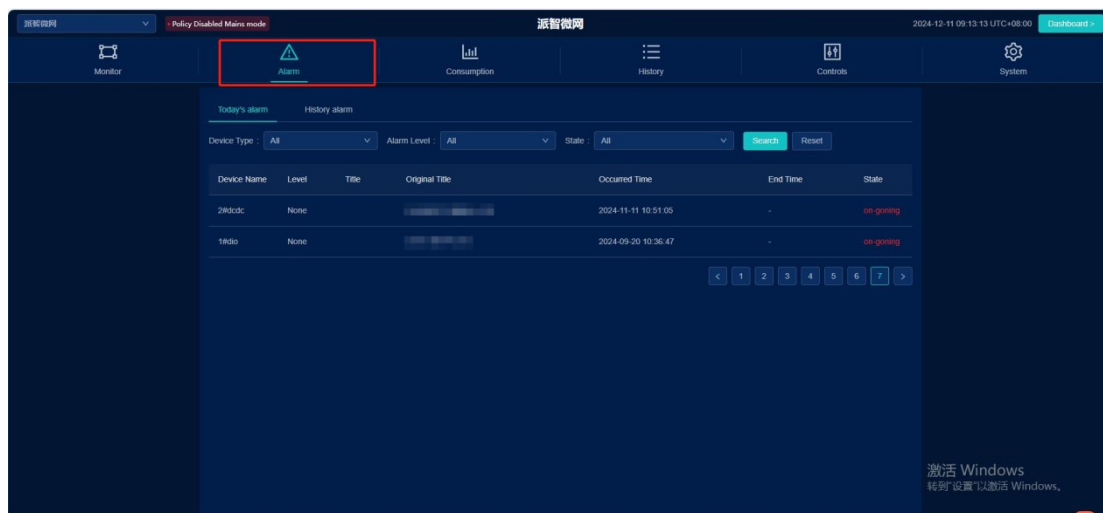


Figure 11-6 The fire alarm information is displayed on the system page

When the system triggers a fire alarm, the aerosol will be directly discharged from the tube.

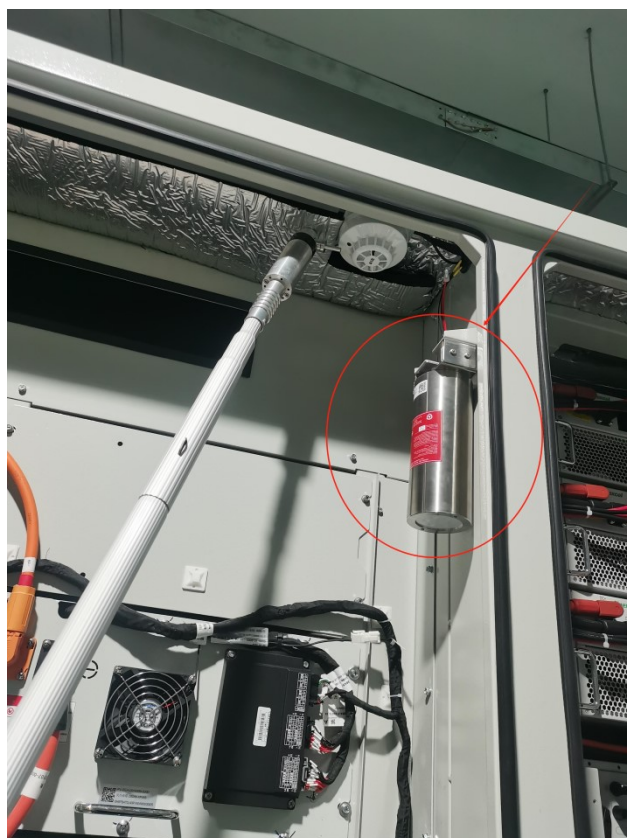


Figure 11-7 System fire extinguishing liquid installation

### 11.3.3 Check Vents

The upper mouth of the cabinet is the air outlet, and the lower mouth of the cabinet is the air inlet. Clean the dust and foreign bodies in and out of the seals to prevent hot air or smoke from being excluded due to blockage of the air outlet.



Figure 11-8 Air exhaust outlet of the cabinet



Figure 11-9 Air intake air outlet of the cabinet

#### 11.3.4 Maintaining the Fire Hose

The cabinet itself is equipped with a sprinkler device, and the right size of the fuselage is equipped with a fire hose interface. After connecting to the right side of the fuselage, spray water to extinguish the fire in the cabinet when a fire occurs. During normal inspection and maintenance, ensure that the interface can be unscrewed, and paint to avoid rust.



Figure 11-10 Ports on a cabinet fire hose

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## 11.4 Air Conditioner Maintenance

### 11.4.1 Maintenance of the Air Conditioner Module Structure

Check whether the air conditioner in the cabinet runs normally, and whether there is obvious temperature difference between the inlet and outlet inside and outside the cabinet when the refrigeration system starts;

Check whether the fan and compressor work normally when the system is running, and whether there is obvious abnormal sound or jitter;

Check whether the mechanical structure is damaged and deformed;

check the air conditioning of the internal and external circulation inlet and outlet, the cabinet outside the protective cover of the inlet and outlet screen is blocked;

According to the air quality of the actual use environment, please arrange maintenance personnel to inspect the cabinet air conditioning every 3-6 months. Regular maintenance, cabinet air conditioning operation in the process of dust will be covered in the heat exchanger fins, resulting in thermal resistance affecting the performance of heat exchange, serious will lead to a decline in the performance of air conditioning, it is recommended to clean and maintain the heat exchanger every 3-6 months, maintenance interval depending on the degree of air pollution in different areas and the operation time to determine, Do not use hot water or gasoline and other organic solvents when cleaning.

### 11.4.2 Check Normal Operation

The air conditioner will run automatically after power-on, and can be self-checked manually. Function key Prg/mute confirmation key Set will enter the self-check operation mode.

Self-test procedure:

1. Through the system function menu, press the system diagnostic button, and the unit will automatically enter the self-test program.
2. The indoor fan operates for 30 seconds.
3. The compressor and outdoor fan operate for 3 minutes.
4. The compressor and outdoor fan stop, and the electric heater works for 2 minutes.
5. If an emergency fan is installed, the emergency fan operates for 2 minutes.
6. The unit operates according to normal logic.

After the self-check, if there are no alarms in the system, the air conditioner will automatically determine whether the temperature of the indoor return air outlet meets the operational logic of the air conditioner based on the detected temperature.

If there is an alarm, refer to Chapter 10 of this user manual for fault analysis and troubleshooting. Handle the alarm yourself or contact the manufacturer's service technician promptly for maintenance.



Figure 11-11 Exterior cabinet of the air conditioner

## 11.5 Common Faults and Troubleshooting measures

| Faults                                     | Cause                                                                                                                                                                              | Avoiding measures                                                                                                                                                                                                                            |
|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| EMS communication connection times out     | 1.The communication between the EMS and PCS is interrupted.<br>2.The EMS is disconnected.                                                                                          | 1.Daily check whether the connection line between EMS and PCS is loose;<br>2.Make sure to check whether EMS is working normally;                                                                                                             |
| The BMS communication connection times out | 1. Communication between BMS and PCS is interrupted;<br>2.The BMS are not connected.                                                                                               | 1. Daily check that the connection cable between BMS and PCS is not loose;<br>2.Ensure that the BMS are working normally;                                                                                                                    |
| Grid meter communication is timed out      | 1.Limit the network feed function(1327 register) when any mode is enabled, the communication between PCS and ammeter or switching device is lost, and this alarm will be reported; | 1. Ensure that the connection line of communication between PCS and a meter is not loose;<br>2.Ensure that the electricity meter is working normally;<br>3.Ensure that the connection line between PCS and the switching device is not loose |
| Module fan is faulty.                      | 1.The PCS fan stops working                                                                                                                                                        | 1.Avoid whether the PCS fan is blocked by foreign matter and cannot rotate;<br>2.Regularly clean the dust of PCS fan;<br>3.Check whether the PCS fan is damaged                                                                              |

|                                 |                                                                                                          |                                                                                                                                                                                                                                              |
|---------------------------------|----------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                 |                                                                                                          | and unable to rotate                                                                                                                                                                                                                         |
| The module is over heated.      | 1.PCS detects over temperature of AC radiator;<br>2.PCS detects over temperature of DC radiator;         | 1.Ensure the normal operation of PCS fan;<br>2.Ensure that the vent of PCS fan is unobstructed;<br>3.Avoid excessively high temperature of PCS operating environment;                                                                        |
| Dc overload alarm               | 1.When PCS is running off-grid, the current and power of DC side exceed the rated value;                 | 1.During off-grid operation, avoid the load exceeding the rated value, which may cause alarms. If the load is reduced, the alarm will automatically disappear;                                                                               |
| Dc bus under voltage            | 1.During PCS operation, the voltage on the DC bus capacitor is too low;                                  | 1.If the off-grid operation process, report this alarm to avoid whether the load capacity exceeds the specified value;                                                                                                                       |
| Dc bus voltage imbalance        | 1. In the process of PCS operation, the capacitor voltage of positive and negative DC busbars imbalance; | 1. If this alarm is reported during off-grid operation, check the half- wave load capacity to avoid exceeding the specified value;                                                                                                           |
| Ac overload alarm               | 1.When PCS is running off-grid, the current and power of AC side exceed the rate value;                  | 1. When PCS is in off-grid operation, avoid the load exceeding the rated value and causing alarms. Reduce the load, and the alarm will automatically disappear;                                                                              |
| And off-network switching error | 1.PCS is in off-gateway machine, but AC input voltage is detected on AC busbar;                          | 1.When PCS30 receives off-grid instruction, ensure that the power grid has been disconnected, if the power grid is not disconnected, an alarm will be generated; If the power grid is disconnected, the alarm will be automatically cleared; |

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## 12 Contact

If you have technical questions about our products, please contact us through the following information.

Please provide the following information in order to give you the necessary help.

- Model number of the equipment
- Serial number of the device
- Specification of the cell
- Information about the PV module
- Current alarm information of the device
- Current AC and DC information of the device
- Software version of the equipment

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