EPCS110/115/120/124.9/125-AM(-F)

Europe & Australia Versions, with VG Terminal

PCS



User Manual

Version	**V3.2**
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1 Forward

1.1 Overview

Dear customer, thank you very much for using EPCS110/115/120/124.9/125-AM(-F) series Power Conversion System (PCS) products developed and produced by our company. We sincerely hope that this product can meet your needs, and look forward to your more valuable comments on the performance and function of the product. We will continue to improve, and constantly improve the quality of products.

The main function of EPCS110/115/120/124.9/125-AM(-F) series Power Conversion System (PCS) is to realize the energy exchange between the battery and the grid, and to control and manage the charge and discharge of the battery. In the grid-connected system, the converter mainly operates in the current source (P/Q) mode to achieve peak shaving and valley filling, frequency modulation and peak regulation, active power reserve and reactive power support for the grid. At the same time, the converter also supports a variety of charge and discharge modes of constant voltage and constant power.

This manual is only applicable to EPCS110/115/120/124.9/125-AM(-F) series PCS.

This manual describes the functions and features of EPCS110/115/120/124.9/125-AM(-F) series PCS and their use methods, including product installation, parameter setting, fault diagnosis, daily maintenance and other related instructions and precautions. Before use, be sure to read this manual carefully, and understand the safety precautions before use of the product.

1.2 Product confirmation

The following confirmation is required before installation:

- Verify that the appearance is free from damage, scratches, dents and other phenomena.

- Verify that the product order options are complete.
- Verify that the nameplate information is consistent with the ordered product model.
- Verify that the warning label is free of damage, scratches, and blurring.

If anything out of the ordinary occurs, please contact the company.

1.3 Version Record

Table 1-1 Version record

Date	version	Content overview
2026.9.14	V3.2	1. Added legal statement. 2. Added restrictive safety statement: prohibited for use as traditional UPS and for life-sustaining medical equipment; supplemented with disclaimer. 3. COMM3 pin1/2 function definition changed from "Reserved" to "BMS-CAN". 4. Added specifications: supplemented 110/115/120/124.9 kW ratings. 5. Added Compliant certifications parameter. 6. Added usage notes related to constant voltage source, grid-connected/off-grid operating modes, and isolation transformer. 7. Added heat dissipation requirements for integrated module cabinets. 8. Added dehumidification warning notes. 9. Added VG terminal related content: ① DO4 function definition supplemented with EQS fast transfer switch control / external switch closing; ② VG terminal supplementary notes (grid voltage sampling, cable gauge changed to 1.5~2.5 mm^2); ③ For one-cluster-one-management multi-unit grid-connected/off-grid solutions and common DC bus multi-unit off-grid solutions, added wiring diagrams for VSG scenarios. 10. Added overseas packaging markings.

2 Security

2.1 Safety statement

Before installing, operating and maintaining the product, please read and follow these safety precautions.

- For personal and equipment safety, follow all the safety precautions described on the label and manual when installing, operating, and maintaining the product.
- The words "Caution", "Warning" and "Danger" in this manual do not represent all safety precautions to be followed. They are only supplements to all safety precautions.
- This product should be used in an environment that meets the requirements of the design specifications, otherwise it may cause failure, and the abnormal function or component damage caused by failure to comply with the relevant regulations are not within the scope of product quality assurance.
- Due to illegal operation of the product caused by personal safety accidents, property losses, etc., our company will not assume any legal responsibility.

2.2 Definition of safety level

The following is a list of identifiers used in this manual. Please read carefully and understand the meaning of each identifier.

Table 2-1 Symbol Description

Symbol	Instructions

DANGER	Indicates a hazardous operating condition. Failure to follow these warnings will result in severe personal injury or death.
WARNING	Indicates a potentially-hazardous operating condition. Failure to follow these warnings may result in personal injury.
CAUTION	Indicates potential hazards during operation. Failure to follow these warnings may result in equipment damage.
NOTICE	Used for equipment-related details and environmental safety messages. Failure to observe may cause equipment damage, data loss, degraded equipment performance or other unforeseen consequences. NOTICE indicates no risk of personal injury.
NOTE	Provides supplementary explanation for key information in the main text. NOTE is not a safety warning and involves no risk of personal injury, equipment damage or environmental harm.

2.3 Installation safety

DANGER

High voltage is present in the live parts of the device, and touching the live parts may result in death or serious electric shock injury. Touching DC cables may cause electric shock. The DC cable that connects the battery is live, and contact with the live cable may result in death or serious injury by electrocution. Before connecting the DC cable, ensure that the DC cable has no voltage.

- Do not touch any live parts.
- To avoid personal injury and product damage, do not install or remove cables (including power and signal cables) while power on.
- Follow all warning messages that appear in the device and documentation.
- Follow all safety information provided by the battery manufacturer.
- Wear the appropriate personal protective equipment for the job.

WARNING

Entering the storage system involves an electric shock risk. Damage to insulation in a storage system can lead to a deadly ground current that can cause an electric shock. Ensure that the insulation resistance of the storage system exceeds the minimum insulation resistance: 14 kΩ.

- The PCS must be installed in a closed electrical operating area.
- Fire may be caused by failure to follow torque specifications when bolting.
- Failure to comply with the specified torque will reduce the load carrying capacity of the bolted connection, thus reducing the contact resistance value.
- May cause components to overheat and catch fire.

- Make sure to use the torque specified in this document to always tighten the bolt connection.
- Only use the correct tools when working on the equipment.
- Avoid repeatedly tightening bolts, as this can lead to unacceptably high torque.

⚠CAUTION

Pay attention to waterproofing, ventilation.

- Waterproof: The IP rating of the PCS module is IP20, which is only suitable for installation in a dry and clean carrier. At the same time, attention should be paid to avoid the carrier water leakage damage to the PCS.
- Ventilation: When a module is integrated in a cabinet, a heat dissipation and ventilation device must be installed behind the module to ensure that the heat emitted by the bidirectional energy storage converter can be smoothly discharged outside the cabinet.

2.4 Electrical installation safety

In order to ensure the life safety of the installation personnel, there must be necessary safety protection measures shall be taken in the electrical installation of this product. During electrical installation, the following procedures must be followed:

⚠DANGER

- Before installation, all switches of the converter and the external front stage must be disconnected. Confirm that all cables and the inside of the converter are in a de-energized state.
- Do not allow the installation in a live state, otherwise there is a risk of electric shock.
- After powering off the converter for 5 minutes, ensure that there is no power inside the converter before operating.

- All power supplies connected to the converter must be disconnected to ensure that the converter is in a de-energized state.
- A warning sign must be placed on the disconnected position in case it is re-powered during installation.
- Necessary ground and short circuit connections should be made.
- Live parts shall be properly handled and isolated with insulation materials to avoid injury to personnel.
- Only professional personnel are permitted to perform installation work on the converter. During the installation, strictly follow the instructions in the user manual.
- The installation personnel must comply with the relevant electrical operation regulations of the country or region where they are located.

- The installation personnel must know the voltage level of the power supply area and determine the voltage compatibility.

2.5 Use safety

⚠DANGER

- In the case of AC circuit breaker tripping during use, the converter is not allowed to be powered on again.
- In the case of DC high voltage box tripping during use, the converter is not allowed to be powered on again.

In case of the above crisis situation, please contact the after-sales engineer of the company immediately to solve it. It is prohibited to power on twice, otherwise the corresponding losses will not be borne by the company.

⚠CAUTION

When the PCS is used as a DC constant-voltage source, it is recommended that the maximum DC voltage be kept below 920 Vdc to prevent equipment fault and damage caused by DC constant-voltage fluctuation.

⚠WARNING

- This product is prohibited from being used as a conventional UPS (e.g. data centers). The company assumes no legal liability for consequences arising from non-compliance with these instructions.
- This product is strictly prohibited from being used to power life-directly-related and life-sustaining medical equipment, as a power interruption would directly endanger life safety

2.6 Cable protection

NOTICE

- Communication cables are thin and shall be protected to prevent them from being torn by mechanical stress.
- Cables shall meet the required voltage insulation rating, and necessary protection shall be provided to avoid scratches and damage to cable insulation.

3 Product Introduction

PCS (Power Conversion System) can control the charging and discharging process of the battery. PCS is composed of bidirectional AC/DC converter, control unit, etc., receives control instructions through communication interface, sends the instructions to the power part to realize charge/discharge control of the battery, and then realizes the adjustment of active power and reactive power of the grid. PCS can also operate off the grid to provide energy for the load in the isolated island environment.

3.1 Product positioning and features

3.1.1 Product positioning

This series of PCS module is mainly suitable for industrial and commercial energy storage: from the scale, it is suitable for industrial plants, commercial buildings, small communities and other relatively small scenes, usually in kilowatt-hour (kWh) as the unit; Can be applied to energy storage, standby power supply, load smoothing, peak shaving and valley filling, and other scenarios; In terms of economic benefits, it is more suitable for meeting local electricity demand, managing energy costs, and has direct economic benefits for independent industrial plants or commercial buildings.

Overall, industrial and commercial energy storage is an important tool to provide energy reliability, reduce costs, and promote clean energy applications.

3.1.2 Product features

Efficient conversion

- Charge and discharge conversion time ≤100ms;
- The highest conversion efficiency is 98.5%.

Flexible application

- Compatible with three-phase three-wire/four-wire system, customized communication bus can monitor all module data.

Battery friendly

- Different battery clusters can work completely independently, avoiding circulation between battery clusters and improving service life;
- Support 30+BMS protocol.

Fully featured

- Support pure on-grid, pure off-grid, on/off-grid switching and other operating modes;
- Support LVRT, HVRT, island operation, black start;
- Off-grid working mode, support 100% three-phase unbalanced load;
- Support reactive power compensation, three-phase unbalance compensation.

Easy maintenance

- Group series scheme, the fault branch does not affect the operation of other branches;

Safe and stable

- Perfect fault protection function;
- Low battery circulation, multi-parallel automatic current sharing;
- Support stable operation in the grid environment with 20% THDu.

3.2 Application scenarios

- **Load smoothing:** PCS is used to release the electrical energy stored in the period of low electricity prices in the period of high electricity prices to smooth the load curve and help users reduce energy costs.
- **Backup Power:** In the case of power system failure or sudden power outage, PCS can be quickly switched to backup power to ensure the continuous operation of key equipment and ensure the continuity of industrial and commercial operations.
- **Peak Shaving:** PCS helps users avoid peak electricity prices and reduces stress on the grid by storing energy during off-peak hours and releasing power during peak hours.
- **Renewable Integration:** In conjunction with renewable energy systems such as solar panels and wind turbines, PCS coordinates the storage and release of energy, improving the predictability and stability of renewable energy.
- **Microgrid Applications:** In a microgrid system, PCS acts as a key energy conversion and management device, coordinating different energy sources to ensure the reliability and independent operation of the microgrid.
- **Power Quality Optimization:** PCS can improve the quality of power supply, reduce harmonics and ensure the stable operation of the power system by adjusting parameters such as voltage, frequency and phase.
- **Battery Energy Storage Systems:** In the battery energy storage system, PCS is responsible for controlling the charging and discharging process of the battery, coordinating the flow of electric energy, and improving the efficiency and life of the energy storage system.
- **Grid Scheduling Support:** PCS can respond to grid scheduling instructions, provide flexible energy scheduling, and support the balanced and stable operation of the power system.
- **Distributed Energy Systems:** In a distributed energy system, PCS coordinates the output of various distributed energy sources to ensure the coordinated operation of the system.

The capacity configuration of the converter in off-grid mode needs to be determined based on specific load characteristics after technical coordination with our technical staff.

3.3 Model description

Figure3-1 Model number

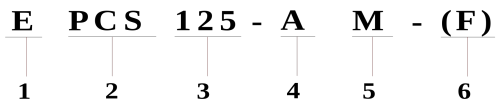


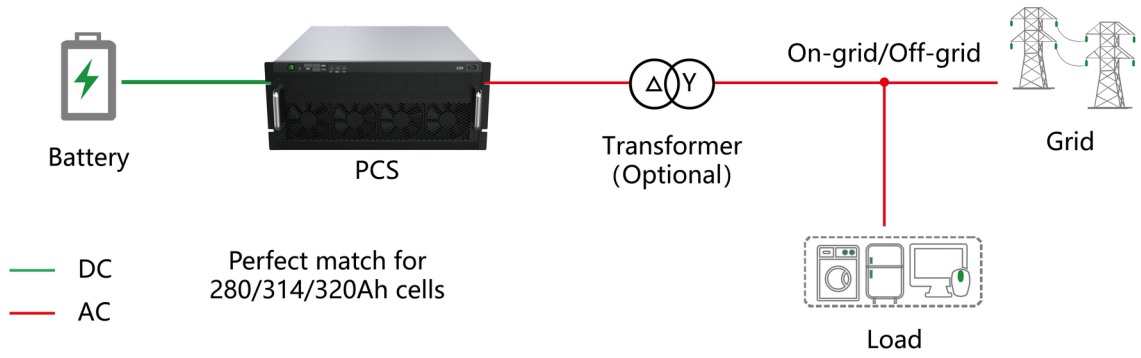
Table 3-1 Model description

Serial number	Meaning	Value description
1	Brand identity	E: Brand identity
2	Product type identity	PCS: Power conversion system
3	Power level identity	• 110: Rated at 110kW • 115: Rated at 115kW • 120: Rated at 120kW • 124.9: Rated at 124.9kW • 125: Rated at 125kW
4	Converter type	A: Three-phase ACDC conversion
5	Assembly method	M: Modular assembly
6	Wiring position	If there is F, the maintenance side is in front. If there is no F, the maintenance side is in behind.

3.4 Product system architecture

As shown in the following figure, the energy storage system built by PCS module can be composed of battery pack, PCS, transformer, grid and load. When the battery pack is connected to PCS, and then connected to the load and grid, the DC power output of the energy storage battery pack can be converted into AC power, which can be used by the grid or AC load. At the same time, the AC power provided by the grid can also be rectified to direct current for charging the battery pack.

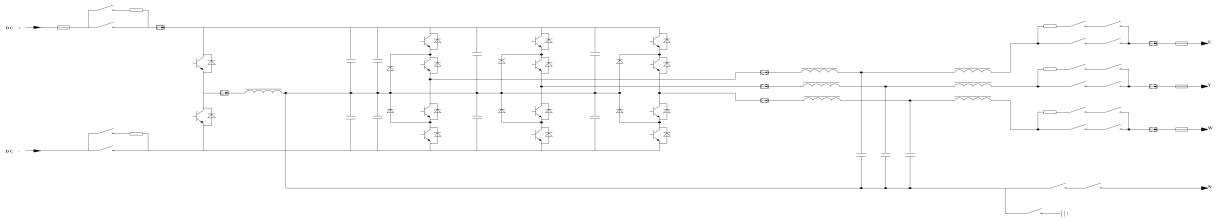
Figure3-1 Components of energy storage system



3.5 Product principle

3.5.1 Principle of main loop

Figure3-1 Electrical topology of the PCS



3.5.2 Operating mode

PCS support two operating modes: on-grid and off-grid.

- In on-grid operation, the AC side of the PCS is connected to the grid, and the DC side is connected to the battery. Cooperate with the grid dispatching system, participate in the voltage and frequency regulation of the power grid, and realize the peak shaving and valley filling of the grid load. According to the selected operating mode, the battery can be charged and discharged at constant voltage and constant power.

- In off-grid operation, the DC side of the PCS is connected to the battery, and the system can output three-phase AC voltage with fixed frequency and effective value to realize continuous power supply to the AC side load.

□ NOTE

The PCS module and the STS module form a on-grid and off-grid switching system to realize uninterrupted power supply for important loads. The system operates normally when it is connected to the grid, when the grid drops out, STS transmits the signal to PCS, and PCS transmits the open command to STS, and at the same time, it switches from the on-grid mode to the off-grid mode, and then turns into a voltage source to supply power to the loads, and thus completes the process of the system being connected to the grid and cut off from the grid. The whole process is completed within 20ms, thus realizing uninterrupted power supply to the loads after the power grid is down. Details of the off-grid switching will be added separately in another document.

3.6 Product structure

3.6.1 Product module structure

The appearance and heat dissipation of the PCS module is shown in the following figure, respectively, the rear-maintenance heat dissipation diagram and the front-maintenance heat dissipation diagram.. The schematic diagram is only used to show the wind direction and does not represent the actual appearance of the aircraft.

Figure3-1 Rear-maintenance heat dissipation model

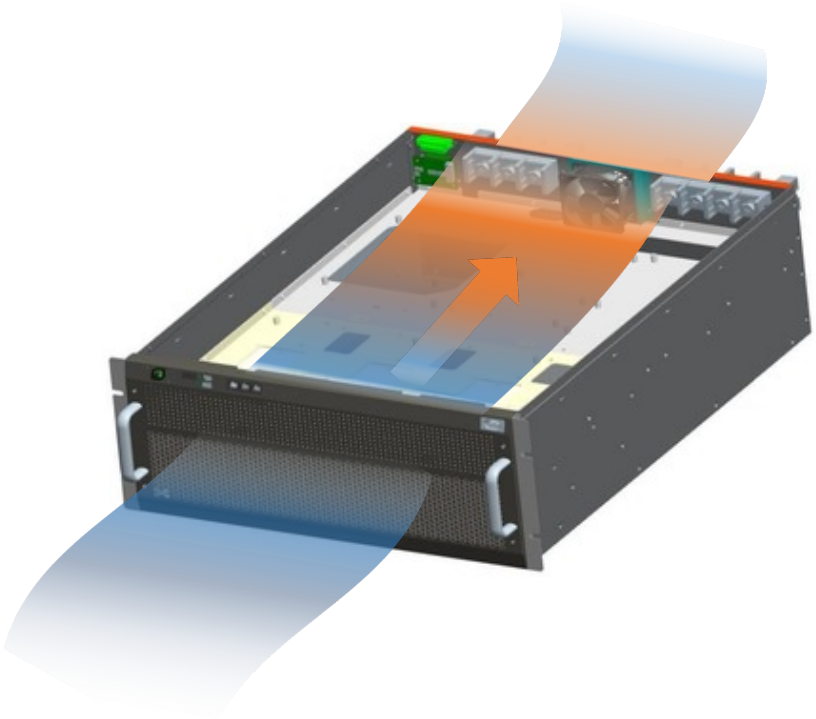
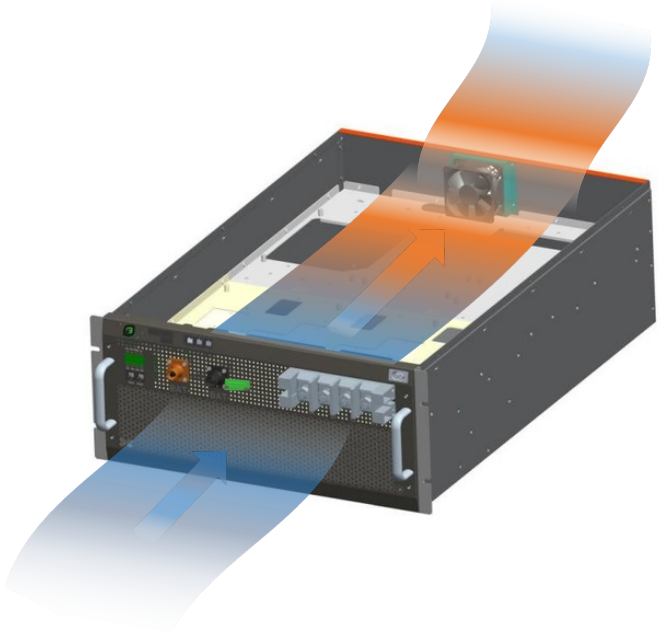


Figure3-2 Front-maintenance heat dissipation model



3.6.2 Structural dimensions

Figure3-1 Dimensions (rear-maintenance)

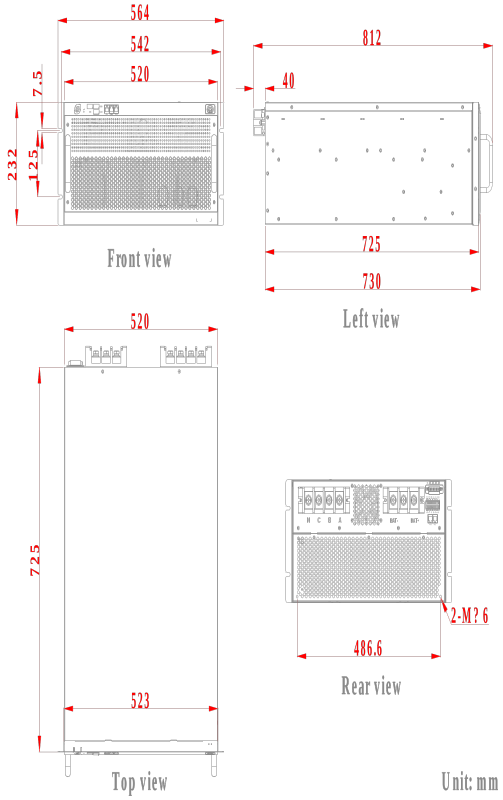
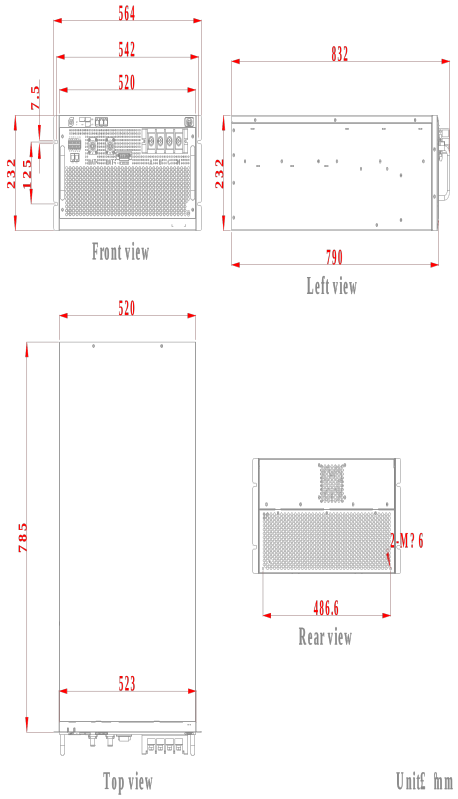


Figure3-2 Dimensions (front-maintenance)



3.7 Product appearance definition

The front view and rear view of the rear maintenance module and the front maintenance module are shown in the following figure respectively, and the corresponding explanation is shown in the corresponding description table.

Figure3-1 Rear maintenance models interface

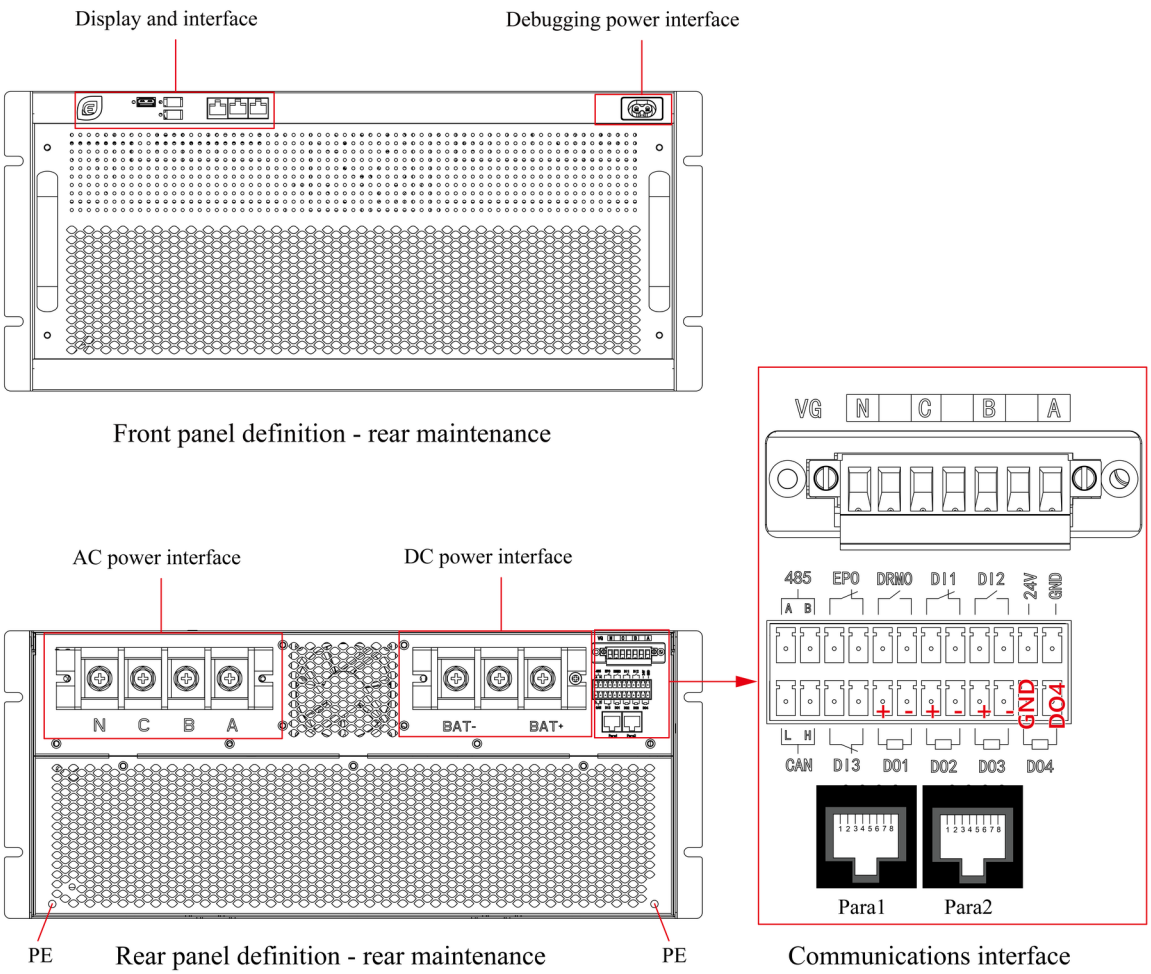


Figure3-2 Front maintenance models interface

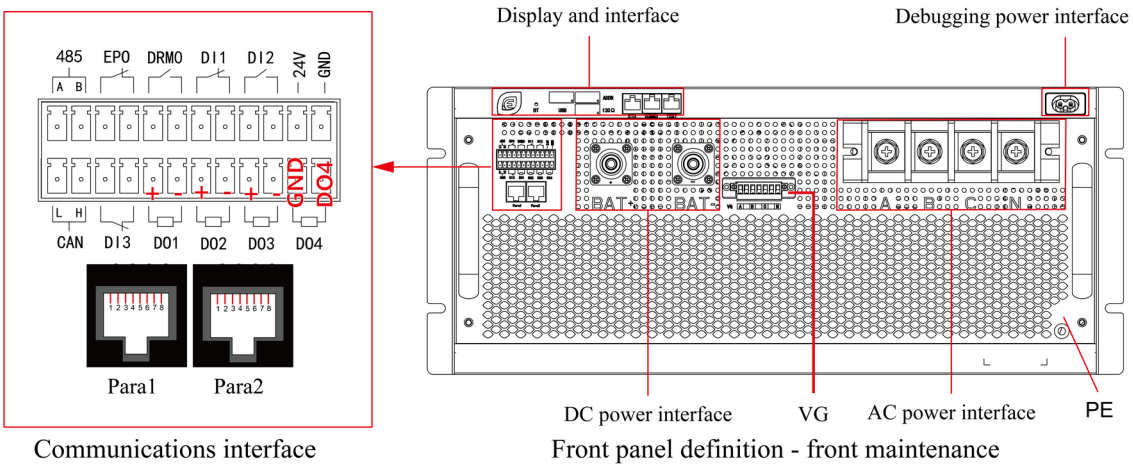


Figure3-3 "Display and interface" appearance details

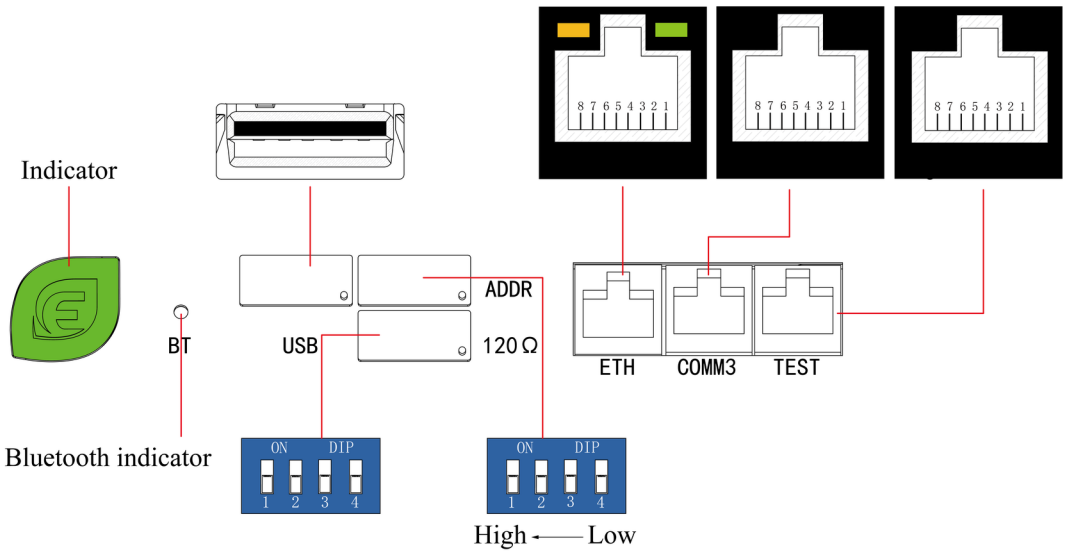


Table 3-1 Display and interface description

Name/symbol	Function description
Pilot lamp	• Operating output power is green for a long time; • In standby (0kW operation), the green light blinks 0.5s quickly; • When the system is not powered on and no fault occurs, the green light blinks slowly for 1s. • If the device is faulty, the indicator blinks red.
BT	Bluetooth indicator; Blue light on successful Bluetooth connection.
USB	Reserve USB interface for software/profile upgrades.
ADDR	"ADDR" sets the dip switch for the module address (binary) with the 4th bit as the lowest (carry from right to left)
120 Ω	This interface is a 4-bit binary DIP switch 1.ARM_CAN1 Reserve CAN1 communication matching resistor, dial up to access 120Ω matching resistor; 2 .ARM_CAN2 CAN2 communication matching resistor, dial up to access 120Ω matching resistor (CAN2 in COMM3); 3 .DSP_CAN1 CAN communication matching resistance, PCS parallel communication, dial up to access 120Ω matching resistance (CAN1 in Para) ;

	4. DSP_CAN2 CAN communication matching resistor (CAN2 in Phoenix terminal), dial up to access 120Ω matching resistor.
ETH	Ethernet interface: supports Modbus TCP and can connect to the EMS or switch
COMM3	Supports CAN and 485 communication
TEST	Special interface for background debugging
Debugging power interface	220V AC power input (for debugging)
DC (AC) power port	AC/DC side power interface
PE	Ground connector (M6 screws)
Para1, Para2	PCS parallel interface. PCS Parallel or PCS communicates with STS

Table 3-2 Definition of VG terminals (grid voltage sampling)

Name/Symbol	Function Description	Remarks
A	Grid phase A voltage sampling input	• Used when VSG function is enabled, for collecting grid voltage signals. • Terminal specification: Pin pitch 5.08mm, cable specification 1.5~2.5mm², rated voltage 600V
B	Grid phase B voltage sampling input	
C	Grid phase C voltage sampling input	
N	Grid neutral (N) line voltage sampling input	

Table 3-3 Communication interface description

Name/symbol	Function description	Remarks
485	485 communication port	485 communication with EMS is possible
EPO	Emergency power off signal input interface	Default normally closed
DRM0	DRM0 monitoring interface(for Australian standards)	Default normally closed
DI1	BMS fault signal	Default normally closed
DI2	Digital input signal 2	Default normally open

CAN	CAN communication interface	CAN communication with BMS
24V	24V DC output interface	This interface can handle power < 15W
GND		
DI3	External switch feedback signal	Default normally closed
DO1	Fault status interface	24V active output signal
DO2	Operating status interface	
DO3	Fan drive interface/External switch opening	
DO4	External switch closing	• When using other switches, DO4 serves as the closing control for external switches. • When using a fast transfer switch, DO4 serves as the open/close control for the fast transfer switch.

NOTE

- DRM0: DI signal for Australian certification requirements;
- DI1: closed -BMS normal (default), open -BMS fault.

Table 3-4 Para1/Para2 interface description

PINS	Pin definition	Pin definition
1	CAN1_L	CAN parallel signal
2	CAN1_H	
3	INV_SYNC	Internal power frequency synchronization signal
4	CARRIER_SYNC	Internal carrier synchronization signal
5	GND	Common signal terminal

6	GND	Common signal terminal
7	Not enabled yet	Not enabled yet
8	Not enabled yet	

NOTE

Para1/Para2 is for PCS parallel use, or for PCS to connect when communicating with STS.

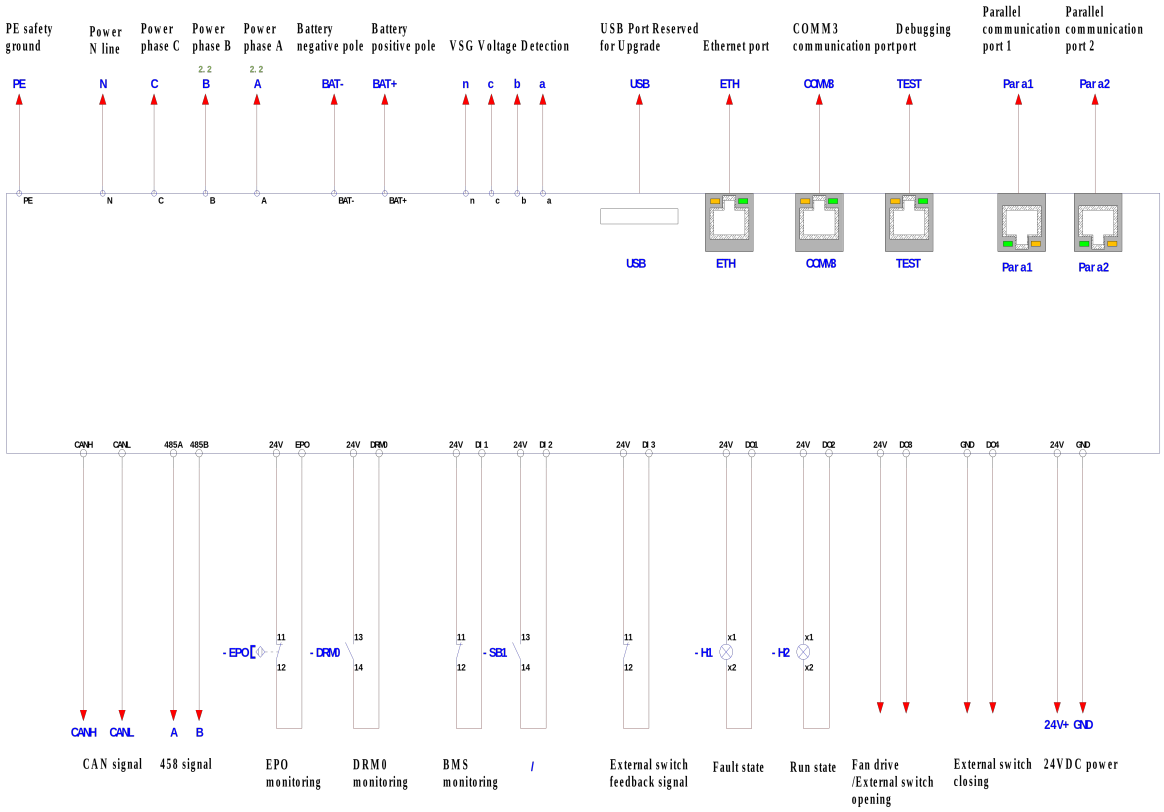
Table 3-5 COMM3 Communication interface description

Pins	Pin definition	Pin description
1	CAN1_H	BMS-CAN
2	CAN1_L	
3	CAN2_H	Can be used to upgrade PCS software (can be used when communicating with EMS via CAN protocol)
4	CAN2_L	
5	485_2B	Can be used to upgrade PCS software. PCS 485 as Modbus Slave, default address 1, baud rate 9600/8/N/1
6	485_2A	
7	485_1B	Reserved
8	485_1A	

3.8 PCS module interface definition

The following figure lists all the ports of PCS and introduces their main functions.

Figure3-1 PCS connector function



3.9 Specifications

Table 3-1 Technical parameters

Specifications	EPCS110-AM(-F)	EPCS115-AM(-F)	EPCS120-AM(-F)	EPCS124.9-AM(-F)	EPCS125-AM(-F)
DC side					
Operating voltage range (V)	615 ~ 950 (3W+PE) /650 ~ 950 (3W+N+PE)				
Full load voltage range (V)	615 ~ 950 (3W+PE) /680 ~950 (3W+N+PE)				
Number of inputs	1				
Maximum current (A)	179	187	195	203	203
AC side (on-grid)					

Rated voltage (V)	230/400				
Voltage deviation	- 15% ~ + 15%				
AC Output type	(3W+PE) three-phase three-wire/(3W+N+PE) three-phase four-wire				
Rated output power (kVA)	110	115	120	124.9	125
Maximum output power (kVA)	121	126.5	132	124.9	138
Maximum current (A)	175	183	190	180	200
Rated grid frequency (Hz)	50/60(±5)				
Power factor	0.99				
Power factor range	-1 lagging ~ +1 leading				
Current distortion rate	< 2% (rated power)				
DC component	< 0.5%				
Overload capacity	110% long term(at rated operating conditions)				
Maximum efficiency	98.5%				
AC side (off-grid)					
Rated output voltage	230/400				
AC voltage harmonics	< 3% (linear load)				
Rated frequency (Hz)	50/60				
Rated output power (kVA)	110	115	120	124.9	125
Maximum apparent power (kVA)	121	126.5	132	124.9	138

Maximum output current (A)	175	183	190	180	200
Protective features					
Features	AC overcurrent protection, AC overvoltage protection, AC short circuit protection, anti-island protection, DC reverse connection protection, etc				
General parameters					
Inside dimensions (W × H × D, mm)	Rear-maintenance: 520×232×725 Front-maintenance: 520×232×785				
Weight (kg)	Rear-maintenance: 69 Front-maintenance: 74.5				
Altitude (m)	4000m (> 2000m derated use)				
Operating temperature	-30℃ ~ 55℃ (> 45℃ derated use)				
Storage temperature	-45℃ ~ 70℃				
Humidity	0%RH ~ 95% RH, non-condensing				
Cooling method	Intelligent forced air cooling				
IP Level	IP20				
Communication interface	CAN/RS485/Ethernet				
Grid support	LVRT/HVRT, active and reactive power control				
Compliant certifications	GB/T 34120-2023, GB/T 34133-2023, EN/IEC 62477, EN/IEC 61000, etc.				

Note 1: When the PCS is used as a DC constant voltage source, it is recommended that the maximum DC voltage does not exceed 920 Vdc.

Note 2: When the PCS is used as a DC constant voltage source, the on-grid mode adopts a three-phase three-wire system.

Note 3:When an isolation transformer is configured, the PCS shall adopt a three-phase three-wire system. Without an isolation transformer, off-grid operation must adopt a three-phase four-wire system.

4 Transportation, Storage, and Handling

4.1 Transportation and storage

Pay attention to the marks on the carton when transporting and storing the converter. The transportation and storage process should meet the following requirements:

- Do not remove the converter's outer package;
- There is no corrosive gas around;
- The storage temperature is maintained at -45℃~70℃, and the relative humidity is maintained at 0%RH~95%RH;
- Non-dusty environment;
- Maximum yard pile 4 layers;
- Regular inspections are required during storage, and packaging materials need to be replaced in a timely manner if insect and rodent bites are found;
- Meet fire protection requirements;
- **If the storage time is more than half a year, the converter needs to be checked and tested by professionals before it can be put into use.**

⚠CAUTION

- Please avoid transporting the PCS in rain or bad weather. If it cannot be avoided, please take

necessary protective measures.

- After long-term storage, it must be guaranteed to be powered on once within half a year for at least 6 hours. The input voltage must be slowly raised to the rated value with a voltage regulator.

Packaging marks differ for domestic-sale and export-sale products. Please refer to the marks printed on the physical carton.

Table 4-1 Domestic-Sale Product Packaging Marks

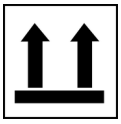
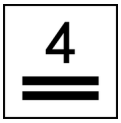
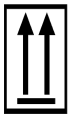
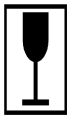
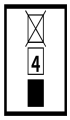
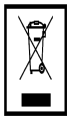
Icons	Descriptions
	Upward marking: When handling and placing the PCS, ensure the device remains in an upright vertical position. Inverting or placing it at any inclined angle is strictly prohibited to prevent damage to its internal structure.
	Handle with care marking: During the transportation and placement of the PCS, avoid excessive force, collisions, dropping, or severe vibrations.
	Keep dry marking: Keep the PCS dry during transportation and storage, and avoid exposure to rain or moisture.
	Stacking limit marking: During transportation and storage, the stacking height should not exceed four layers.

Table 4-2 Export-Sale Product Packaging Marks

Icon	Instructions
	Paper material mark: The packaging is made of paper, recycling code 20 (PAP).
	Upward marking: Ensure that the equipment is upright when moving and placing the inverter. Do not place it upside down or at any Angle to avoid damaging its internal structure.
	Lightly put the marking: Handle the marking gently and avoid excessive force, collision, drop or violent vibration during transportation and placement of the inverter.
	Moisture-sensitive marking: Keep the inverter dry during transportation and storage, and avoid rain or moisture.
	Recyclable mark: The package material can be recycled.

	Stacking limit marking: Stacking height should not exceed 4 layers during storage.
	No tipping mark: Do not roll or invert the package during handling and storage.
	Do not discard as household waste mark: This product shall not be disposed of with domestic waste; it requires professional recycling after end-of-life.

4.2 Unpack

4.2.1 Unpacking steps

1. Remove all ties and uncover the box.
2. Remove all filler material.
3. Remove the module and accessories.
4. Cut the plastic wrap around the module.
5. Ensure there is no evidence of damage.
6. Dispose of or recycle packaging according to local regulations.

Table 4-1 Conventional lists of accompanying materials

Name	Descriptions	Quantity	Pictures
PCS module	110/115/120/124.9/125kW	N	
Factory test report	List of factory test items	1	

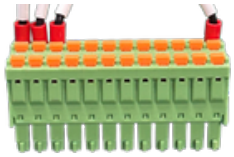
Certificate of Conformity	Certificate of conformity of the product	1	
Communication plugs	24pin Phoenix plug for communication	1	
Magnetic ring	For use with parallel network cables	According to the quantity of parallel modules	

Table 4-2 Non-conventional lists of accompanying materials

name	Descriptions	Quantity	Pictures
Aviation terminal connectors	One PCS with a pair of yellow and black connectors	According to the number of aviation terminal equipment shipped	

⚠CAUTION

Check whether the dustproof film on the air duct is damaged. If it is damaged, check whether there is foreign matter entering the module.

NOTICE

For orders requiring three-phase three-wire system, our company will replace the N wire with white nylon screw (metal screw delivered with the attachment) when shipping. If you need to change to the three-phase four-wire system, please contact after-sales engineers.

4.2.2 Unpacking inspection

Each module has undergone strict factory inspection and testing. In order to prevent damage during transportation, an unpacking inspection is required before the PCS is ready for installation. The main inspection contents are as follows:

- Check whether the quantity of each item in the packing list is consistent with the physical object;

- Check whether the product nameplate data is consistent with the order contract, such as product model, rated capacity, voltage level, etc.;
- Check whether the factory documents and accessories are complete;
- Check whether the PCS is deformed, paint off;

Check each received item against the supply sheet. If the goods are missing or damaged, notify the shipping company as soon as they are found.

4.3 Handling

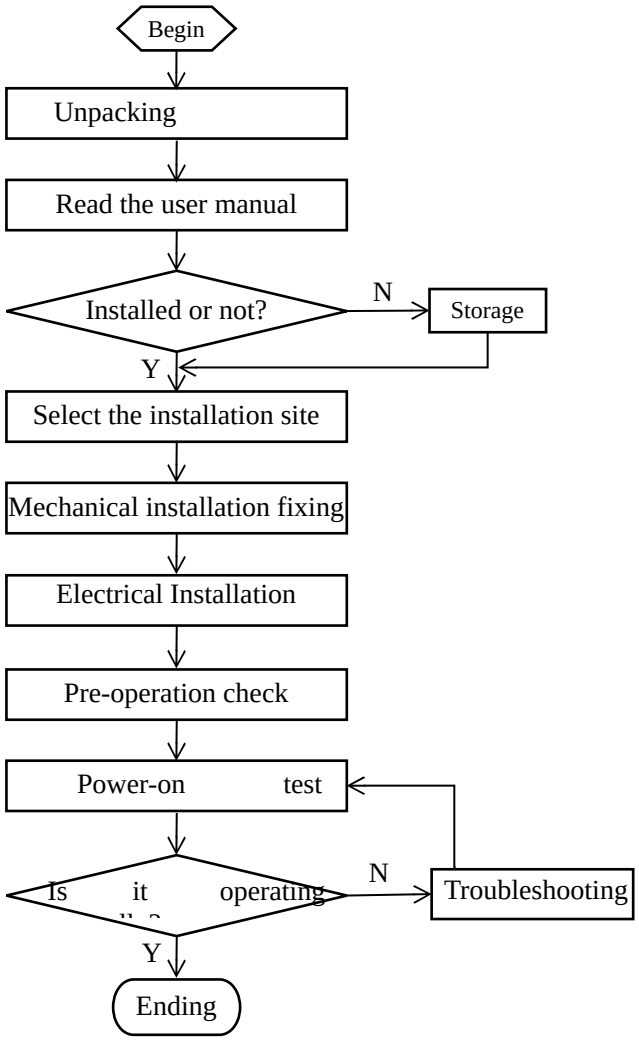
⚠CAUTION

- Test fork, if not fit to adjust the foot of the forklift. After the test fork is suitable, the fork will start the PCS and move it to the appropriate position.
- Do not carry the forklift for a long distance or walk on a slope, otherwise there is a risk of dumping.
- When moving, pay attention to the level of the ground.
- Four operators are required to move the enclosure together, or use a suitable moving tool.
- When the equipment is placed on the ground, it is necessary to pad foam or cardboard under it to avoid damaging the enclosure.
- During lifting, lowering and moving of the PCS by crane, make sure it is slow and smooth to avoid collision and damage to the case.

Adjust the width of the forklift foot so that the center of gravity is in the center of the forklift foot. If the package has been removed, it is necessary to fork into the same position of the converter.

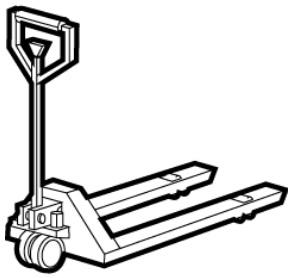
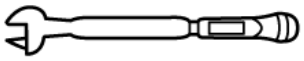
5 Mechanical Installation

Figure5-1 Installation flowchart



5.1 Installation tool

Table 5-1 Install required tools

Tools		
Forklift	Torque wrench	Screwdriver
		
Indoor and outdoor handling equipment	Fix screws	Phillips screwdriver M6 screws, used to secure the module in the cabinet

Note

The above table only lists the general tools, the field technician please add or subtract according to the situation.

5.2 Requirements for installation environment

DANGER

- The PCS must be installed in a place that is shielded from sunlight.
- The PCS should be installed in a place with good ventilation to prevent poor heat dissipation from affecting its working performance.
- When the PCS is operating, the temperature on the surface of the machine is high. Please be sure to install it in a position that is not easy to touch.
- The PCS must be kept away from children and special people.
- The PCS should be installed away from flammable and explosive materials and free from strong electric interference devices.
- The installation frame or wall of the PCS should have certain fire resistance.
- The PCS should be avoided in the vicinity of office areas or living places that are relatively sensitive to noise.

NOTE

Installation environment restrictions when integrated in a cabinet:

- In desert environments, IP20 cabinets are not recommended, because sand can pass through the dust filter and enter the module, causing damage to the module.
- It is strictly prohibited to install the cabinet under trees or around trees. Under or around trees, water mist can enter the module through the louvers, causing damage to the module.
- The cabinet is not recommended to be installed by the roadside, as splashing water from passing vehicles can easily enter the module and cause damage.
- The cabinet is not recommended to be installed near water channels or ditches, as moisture can easily cause damage to the module.

In order to ensure the life safety of the installation personnel, necessary safety protection measures must be taken during the electrical installation of this product. During electrical installation, the following procedures must be followed:

- All power supplies connected to the PCS must be disconnected to ensure that the PCS is in a no-power state.
- A warning sign must be placed on the disconnected position in case it is re-powered during installation.
- Make the necessary ground connections.
- Live parts need to be treated as necessary and isolated with insulation materials to avoid injury to personnel.
- Only professional personnel can install the PCS. Strictly follow the instructions in the manual during installation.
- The installation personnel must comply with the relevant electrical operation regulations of the country or region where they are located.
- The installation personnel must know the voltage level of the power supply area and determine the voltage adaptation.

Table 5-1 Environmental Requirements

Items	**Environmental requirements**
Installation site requirements	This product is a cabinet installation product that needs to be installed in the final system
Altitude	The use of altitude range <4000m, if more than 2000m need to reduce the amount of use, is strictly prohibited more than 4000m use.
Temperature	-30 °C ~ +55 °C, > 45°C derated use
Humidity	0%RH to 95%RH, non-condensing
Dust conditions	In a high dust environment, it is necessary to add a dust filter device

	according to the site situation
Corrosion conditions	Strong acid, strong alkali and strong salt areas need to make special remarks according to the site situation

5.3 Installation steps

1. Push the PCS along the rails into the cabinet (use the front-maintenance model as an example).

⚠CAUTION

The handle may not be used for load-bearing purposes, the handle is intended for pull-out modules and may not be used for carrying purposes.

Figure5-1 Front panel handle

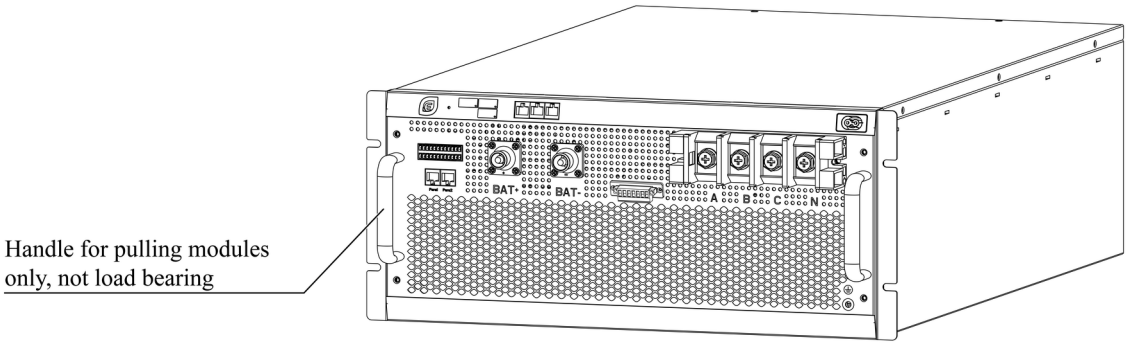
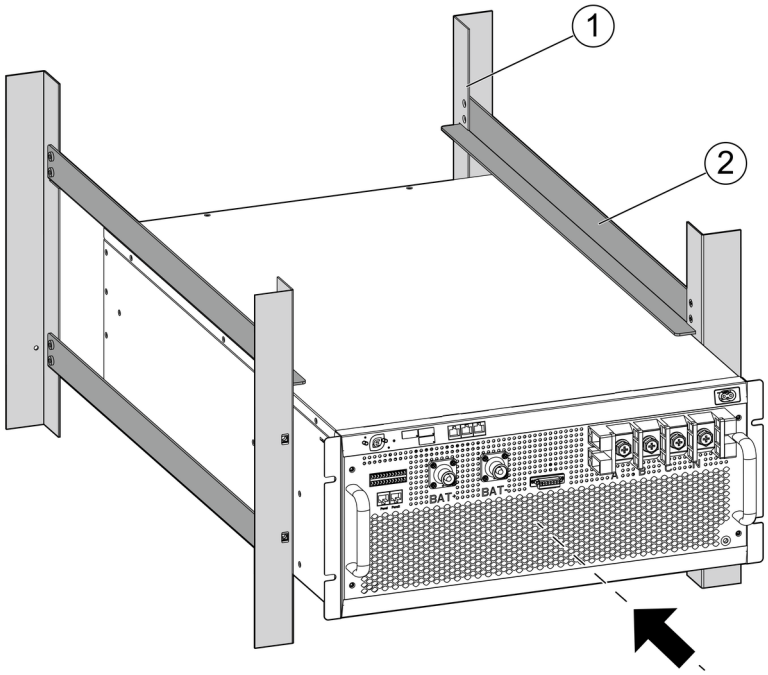


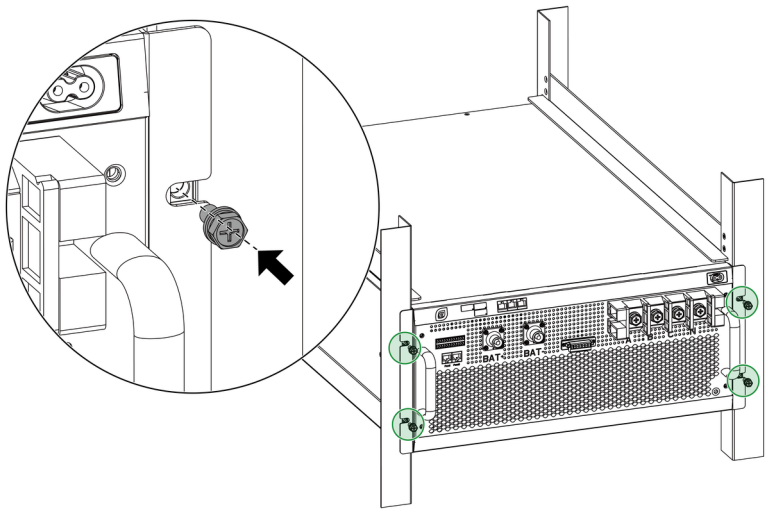
Figure5-2 Push the PCS into the cabinet



① Columns ② Rails

2. Secure the PCS to the cabinet post through the mounting ears using four M6*12 cross concave outer hexagon screws.

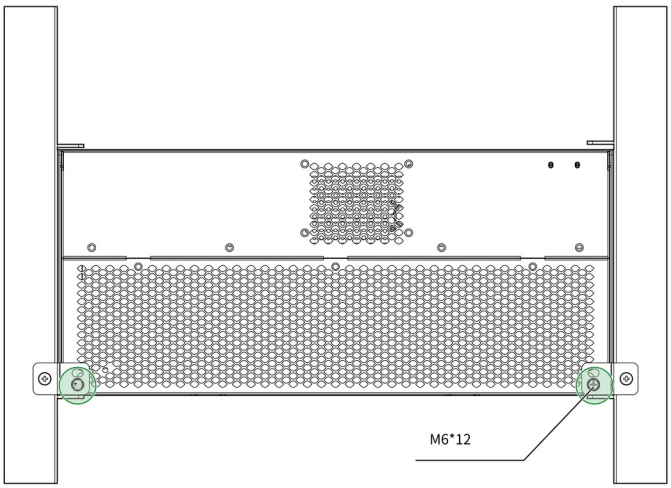
Figure5-3 Secure the PCS mounting ears



3. When the PCS is installed in the system and needs to be transported together with the system, it is necessary to add a rear fastener, and connect the rear of the module to the cabinet with two M6*12 cross concave outer hexagon combination screws to ensure that the module will not

swing up and down in the cabinet (one on the left and one on the right).

Figure5-4 Fix the rear part of the converter



NOTE

The machine supports side mounting. If the machine is installed on the side, it is recommended to fix the machine on a tray, and ensure that the rails avoid mounting ears. When the PCS is installed in the system and needs to be transported together with the system, a rear fastener is also required to connect the rear of the module to the cabinet.

Figure5-5 The side installation

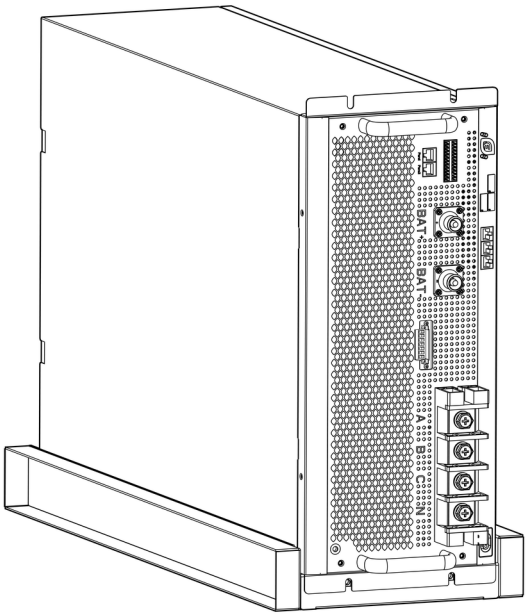
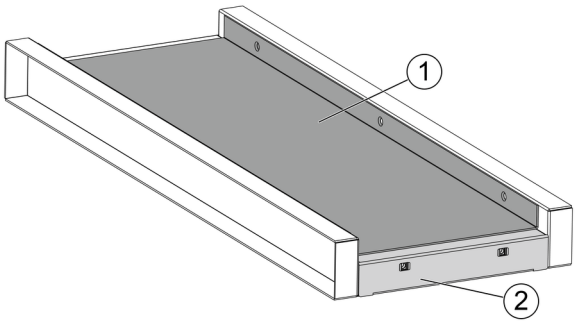


Figure5-6 Pallet diagram



① Tray ② Beams

5.4 Module usage requirements in cabinet

Steps for cabinet fan selection:

1. Calculate the total cooling airflow required for all modules based on the ***Actual effective air intake area of the cabinet*** from Table 5-3.
2. Determine the maximum airflow (Qmax) of the cabinet fan.
3. Select the fan specifications and quantity based on the maximum airflow (Qmax).

Note:

- Cabinet fan maximum airflow **Qmax** = (1.3× to 1.5×) Total required cooling airflow (when louver, filter cotton, insect screens, or similar components are not installed at cabinet air inlets/outlets).
- Cabinet fan maximum airflow **Qmax** = (1.8× to 2.5×) Total required cooling airflow (when louver, filter cotton, insect screens, or similar components are installed at cabinet air inlets/outlets).

NOTE

- **Qmax** refers to the airflow of the cabinet fan at zero static pressure.
- The selected fan's maximum airflow must not be less than **Qmax**. If a single fan cannot meet the requirement, multiple fans can be installed in parallel.
- The above is an empirical method for fan selection. For more accurate assessment of cabinet fan suitability, cabinet airflow simulation is recommended.
- Module cooling is achieved via forced air cooling. When used in energy storage cabinet systems, the louver specifications and installation spacing can be referenced in Figure 5-8. The temperature difference (ΔT) between the module intake/exhaust (including cabinet intake/exhaust) should not exceed 15℃.

- When designing a cabinet, the front and rear door panels should increase the effective air intake area under the condition of meeting the corresponding IP protection level, and should be determined according to the number of modules inside the cabinet. The opening size of the ventilation holes shall not be less than the value specified in Table 5-3.
- It is recommended that the cooling fan of the energy storage cabinet be installed at the air outlet, with a certain distance from the PCS module outlet (refer to Figure 5-8 below).
- The airflow inside the cabinet shall follow a straight-in and straight-out path. Airflow short-circuit and hot-air recirculation shall be avoided. It is strictly prohibited for the PCS air inlet to draw in hot air from other components inside the cabinet.
- An independent cooling duct space shall be reserved inside the cabinet. Cables and components must not block the PCS air-in and air-out channels. Physical isolation is recommended.
- It is recommended that the temperature logic for the EMS control system's internal cooling fan (not the PCS fan) be set to start at 35°C or when the output power exceeds 30%. If intervention is delayed or the temperature rises, resulting in the heat source being unable to dissipate heat.

Figure5-1 Heat dissipation diagram

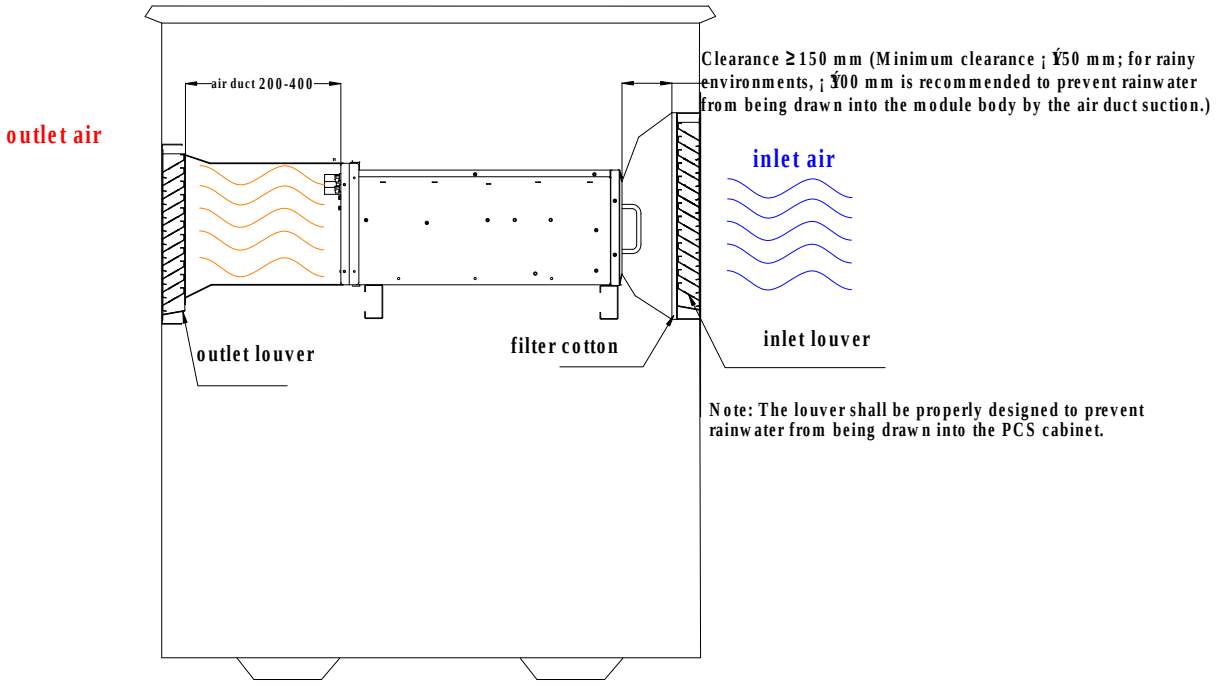


Table 5-1 Ventilation parameters of PCS module in cabinet

Actual effective air volume of the module		**Actual effective air intake area of the chassis ()**	**Actual effective air outlet area of the chassis ()**
(CFM)	**(/min)**		
510	14.45	0.066	0.080

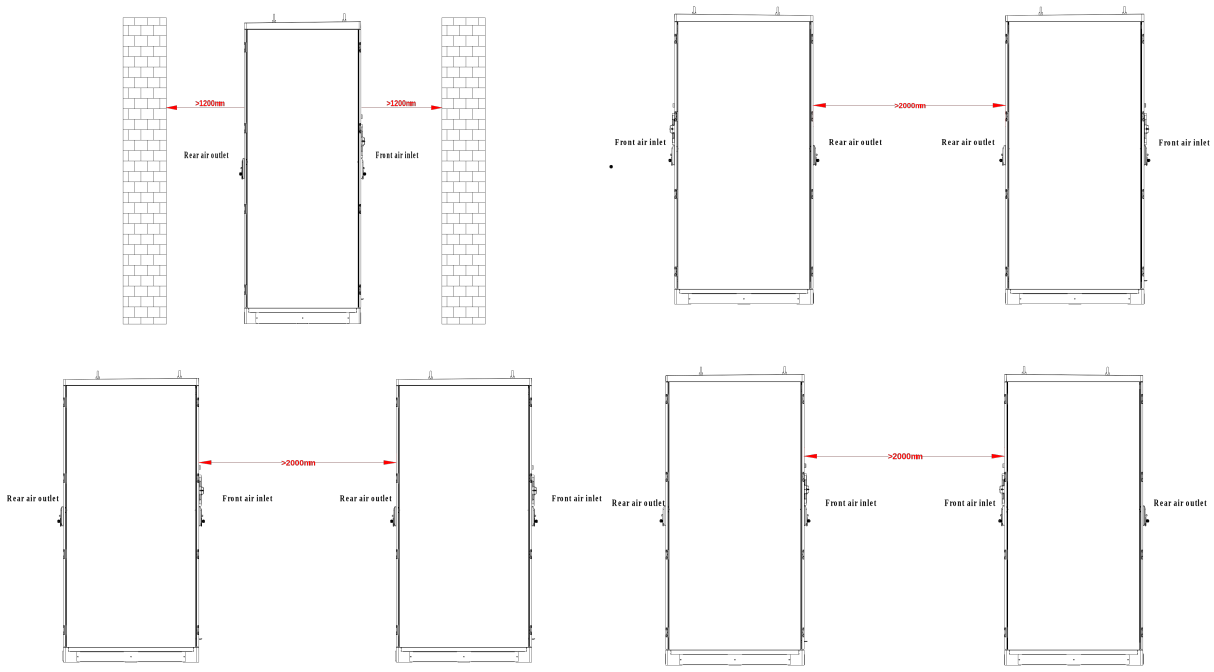
NOTE

- The **Actual effective air intake area of the cabinet** and **Actual effective air outlet area of the cabinet** in the table above refers to the area of the cabinet through holes;
- The parameters in the table above apply only to a single PCS module, and the heat dissipation of other components in the cabinet is not taken into account.
- **High-temperature operation risk**: Ensure the installation environment is well-ventilated and heat-dissipation requirements are satisfied. If the PCS operates for a long time at an ambient temperature ≥45 °C with inadequate heat-dissipation measures, component aging will be accelerated, which will seriously impair equipment reliability and service life, and may result in equipment damage.

⚠WARNING

Sufficient heat dissipation space shall be reserved for the PCS cabinet (see figure below). Additionally, corresponding operational clearance shall be reserved based on the actual door opening dimensions of the cabinet.

Figure5-2 Cabinet spacing requirements



Specific Risks and O&M for PCS Modules Installed in Cabinet

- **Risk 1: Cabinet Condensation Corrosion**

  The cabinet blocks rainwater but not water vapor. Day-night temperature difference causes condensation. With IP20 rating, PCS circuit boards and power capacitors are exposed to cabinet air; condensate dripping may result in short-circuit and component corrosion.

Preventive measures: Install dehumidifier; prevent hot-cold airflow collision; keep proper cabinet ventilation during shutdown-idle periods.

- **Risk 2: Dust-clogged Filter & Heat Dissipation Degradation**

  O&M Requirement: Regularly clean PCS inlet filter and cabinet louver dust filters.

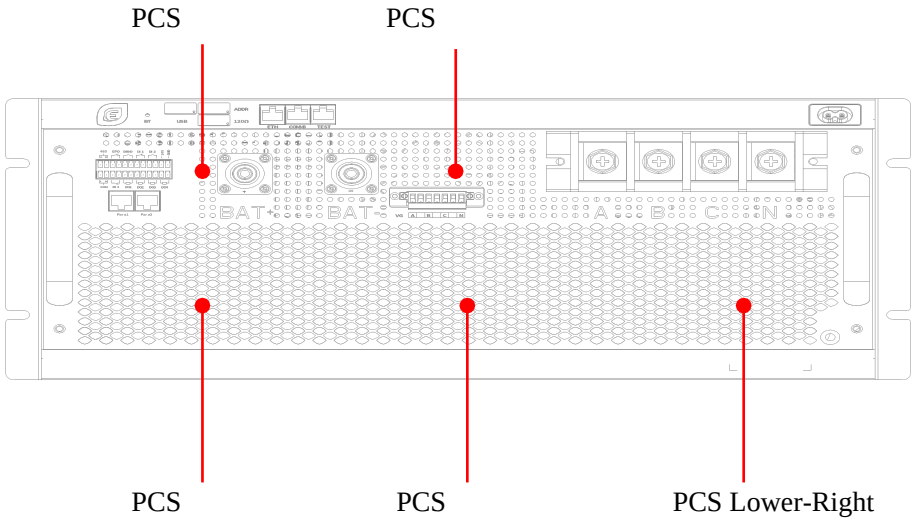
- **Risk 3: Protection Rating Misconception**

  Cabinet protection rating applies only to enclosure. PCS is IP20. Operating temperature, humidity and dust conditions shall comply with PCS nameplate and this manual. The cabinet-enclosure protection rating shall not be used to relax the environmental requirements for the PCS.

Recommended Cabinet Heat Dissipation Measurement

Under full-load operation, measure temperature at five sampling points on PCS air-in side. The temperature difference among ambient environment, PCS air-inlet and unit background ambient temperature shall be ≤5 ℃, preferably within 3 ℃. Abnormal reading at any measuring point indicates hot-air accumulation or airflow short-circuit; the air-duct layout shall be optimized accordingly.

Figure5-3 Recommended Measuring Points on Air-Inlet Side



Water-proof Requirements

Do not deploy cabinets in environments with risk of rainwater ingress. For example: locate equipment away from vehicle roads to avoid splashing-water risk caused by passing vehicles; elevate the cabinet bottom with raised base plinth to reduce the probability of ingress from rebounding pooled water on ground.

Warranty Definition

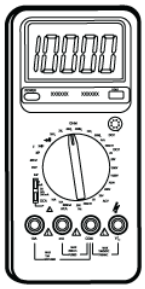
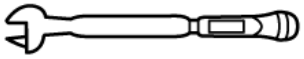
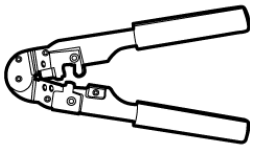
Failures such as PCS overheating and corrosion damage, resulting from long-term over-temperature, condensation, water ingress or dust accumulation inside cabinet due to inadequate ventilation scheme, hot-air recirculation or other thermal-design defects and improper management of energy-storage cabinet, shall be regarded as integrated operating conditions failing to meet OEM installation specifications. Such failures are excluded from free-of-charge product warranty coverage.

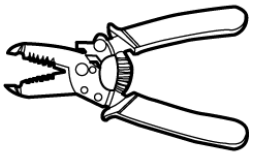
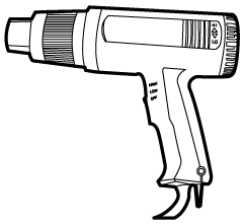
6 Electrical Installation

6.1 Electrical wiring preparation tools

Installation tools include but are not limited to the following recommended tools, in actual operation, you can flexibly choose other appropriate auxiliary tools according to the specific situation on the site.

Table 6-1 Wiring tool list

Tools and meters		
Multimeter	Torque wrench	Crimping pliers
		
Measure the live status of the measuring equipment	Connect the power wire	For power cable crimping
Screwdriver	Wire strippers	Heat gun (or heat outlet fan), heat shrink sleeve

		
Phillips screwdriver ×2, for M6 and M8 screws	Used to make power cables	Wrap the conductive part of the power cable to avoid leakage

6.2 Power cable preparation

Figure6-1 Front-maintenance power port (DC side aviation terminal)

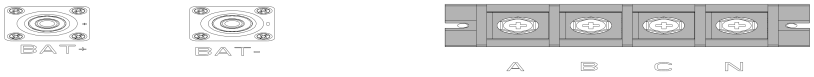


Figure6-2 Rear-maintenance power port (conventional terminals)



Table 6-1 Cable configuration specification sheet

Cable location	Maximum voltage/current	Cable diameter recommended	Cable terminals	Torque	Remarks
DC side terminals (BAT+, BAT-)	Voltage: 950V Current: 203A	70mm²	M10/ Aviation terminal	32~34N·m	Power cables and cable terminals should be provided by the user. Aviation terminals are provided by the front maintenance PCS
AC side terminals (A, B, C)	Voltage: 440V Current: 200A	70mm²	M10	32~34N·m	
N wire terminal	/	70mm²	M10	32~34N·m	
Ground terminal	/	1/2 phase line	M6	3~4N·m	

ETH/Para	/	Super Category 5 network cable	Network Port connectors		
Phoenix terminal	/	Adapter wire	Adapter terminals		

⚠CAUTION

- The cable diameter must comply with the local cable standards (yellow and green cables can only be used for grounding protection). Factors affecting cable selection include: rated current, cable type, laying method, ambient temperature, and maximum expected line loss.
- Our company provides aviation terminals, but users need to make their own cables, if there is any other need, please explain.
- Our company provides the default communication cable, if there is any other need, please explain.
- The DC power cable must operating voltage ≥1000Vdc. AC output cable must operating voltage ≥500Vac.
- When multiple PCS are connected in parallel, the related ground cables must be connected to one ground bus.

6.3 Requirements for wiring of DC aviation terminals

⚠DANGER

- Cable terminals may fall off if they are not tightly crimped.
- There is a risk of falling off if the aviation terminal assembly is not properly assembled.
- Aviation terminal cables may fall off if they are not securely inserted into the cabinet.

1. Strip the cable insulation according to the specified length requirements.

Figure6-1 Strip the cable insulation



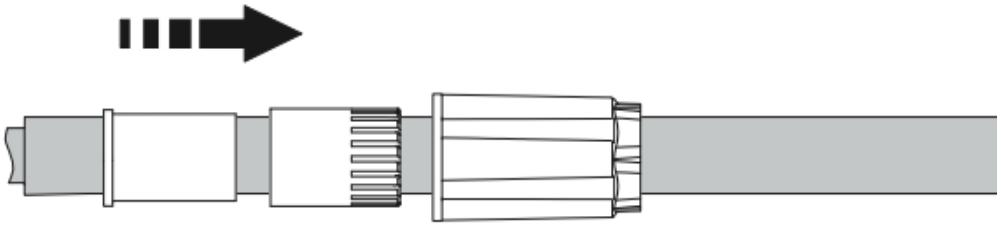
Table 6-1 Stripped wire length requirements

mm^2(Chinese Standard)	**a**	**AWG(American Standard)**	**a**
$35mm^2$	19mm~21mm	AWG 2	19mm~21mm

50mm^2	19mm~21mm	AWG 1/0	19mm~21mm
70mm^2	19mm~21mm	AWG 2/0	19mm~21mm

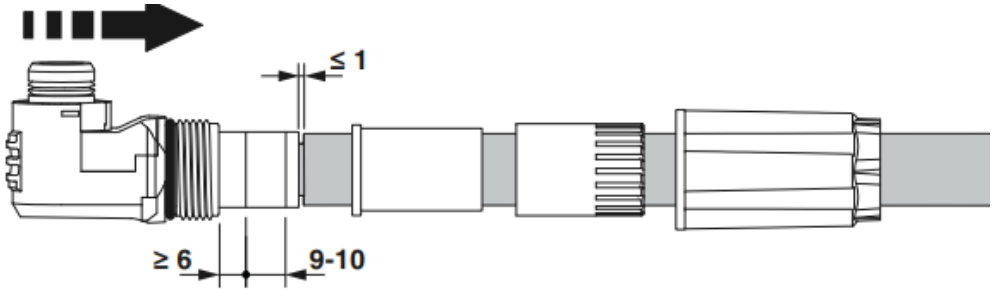
2. Prepare the aviation terminal, disassemble it and put it into the cable layer by layer.

Figure6-2 Put the aviation terminals into the cable



3. Insert the copper core part of the cable into the aviation jack and press tightly;

Figure6-3 Insert the copper part of the cable into the aviation jack



NOTE

- A distance of at least 6mm or more should be left between the edge of the crimping position and the plastic wall of the plug after stripping;
- The recommended width of the crimping area is about 9~10mm;
- The distance between the outer jacket of the cable and the edge of the copper tube of the plug should be less than or equal to 1mm;
- It is recommended to use a hexagonal internal retractable fixture with a hexagonal crimp, and the corresponding crimp height **b** of the relevant cable is shown in the figure below;
- In the case that the pulling force, temperature rise and contact resistance meet the requirements and the section metallurgy has no broken wire, you can also evaluate the relevant crimping parameters by yourself if there is a mature crimping process.

Figure6-4 Crimp height schematic

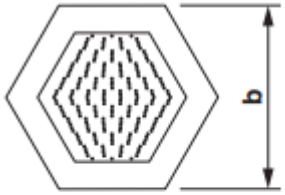


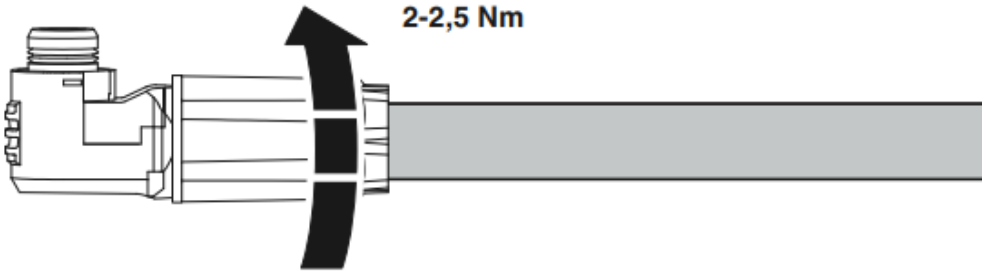
Table 6-1 Crimp height requirement

mm^2(Chinese Standard)	**a**	**AWG(American Standard)**	**a**
$35mm^2$	$8mm^{\pm0.2}$	AWG 2	$8mm^{\pm0.2}$
$50mm^2$	$9.2mm^{\pm0.25}$	AWG 1/0	$10mm^{\pm0.25}$
$70mm^2$	$10.8mm^{\pm0.25}$	AWG 2/0	$10.65mm^{\pm0.25}$

4. Reassemble the aviation terminals;

   The plug shell mounting torque is recommended to be 2~2.5N·m;

   Figure6-5 Assemble the aviation terminals



5. Insert the fabricated cable into the terminal sockets on the module chassis, with the positive aerial terminal (orange) connected to the positive connector “+” and the negative aerial terminal (black) connected to the negative connector “-”, and make sure to lock it.

6.4 DC side wiring

⚠DANGER

- The battery voltage cannot be greater than 950Vdc. Otherwise, the device may be damaged.
- If a ground fault exists, rectify the fault before connecting cables.
- An incorrect wiring sequence may cause a fire.
- The cables should be securely fastened, otherwise they may cause a fire.
- The wrong wiring will cause the PCS to fail to work properly and may burn the device.

1. Measure the port voltage of the battery with a measuring tool to ensure that its voltage is within the input voltage range of the PCS;
2. Disconnect the previous level of DC switch;
3. Use a multimeter to measure and confirm that the connected terminal is not live;
4. Strip the DC cable to a suitable length with a tool, put the terminal over it and press it tightly with the tool;
5. Connect the positive and negative cables of the battery pack to BAT+ and BAT- on the DC terminal block. The DC connection is complete.

6.5 AC side wiring

⚠DANGER

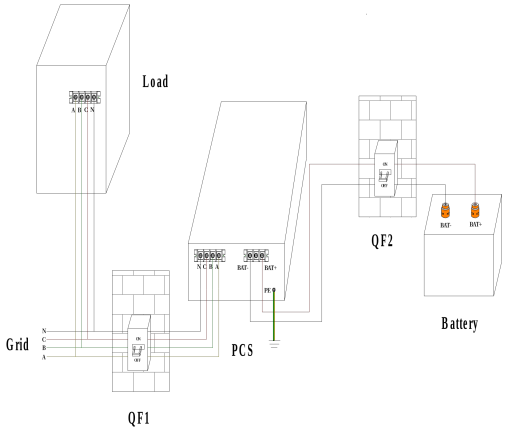
- The wrong voltage has the potential to damage the PCS.
- Incorrect wiring sequence will cause poor contact and may cause a fire.
- The cables must be securely fastened; otherwise, a fire may occur.
- The wrong phase sequence can cause the PCS to work improperly.

1. Measure the port voltage on the AC side with a measuring tool to ensure that its voltage is within the input voltage range of the PCS;
2. Disconnect the previous level of AC switch;
3. Use a multimeter to measure and confirm that the connected terminal is not live;
4. Use a tool to strip the AC cable to the appropriate length, cover the terminal and press it tightly;
5. Measure with a phase sequence table to ensure that the phase sequence of the connected cable is positive;
6. The AC cable should be connected to the AC terminal block: "A", "B", "C", "N". The AC cable is connected to the AC side.

6.6 Power cable connection

The following figure shows one connection method of PCS power cables. For reference only, the ground cable must be connected with yellow and green cables.

Figure6-1 Power cable connection for reference



6.7 Communication cable connection

6.7.1 Communication connection

PCS supports Modbus RTU protocol, Modbus TCP protocol, CAN 2.0B protocol, RS485/CAN/ Ethernet communication mode, which is convenient for users to monitor the PCS in the background, and realize the telecommunication, telemetry, telemodulation of the energy storage system.

Communicate with EMS

PCS can communicate with the EMS via Ethernet or 485.

Communicate with BMS(Optional)

PCS can communicate with the BMS via CAN.

NOTE

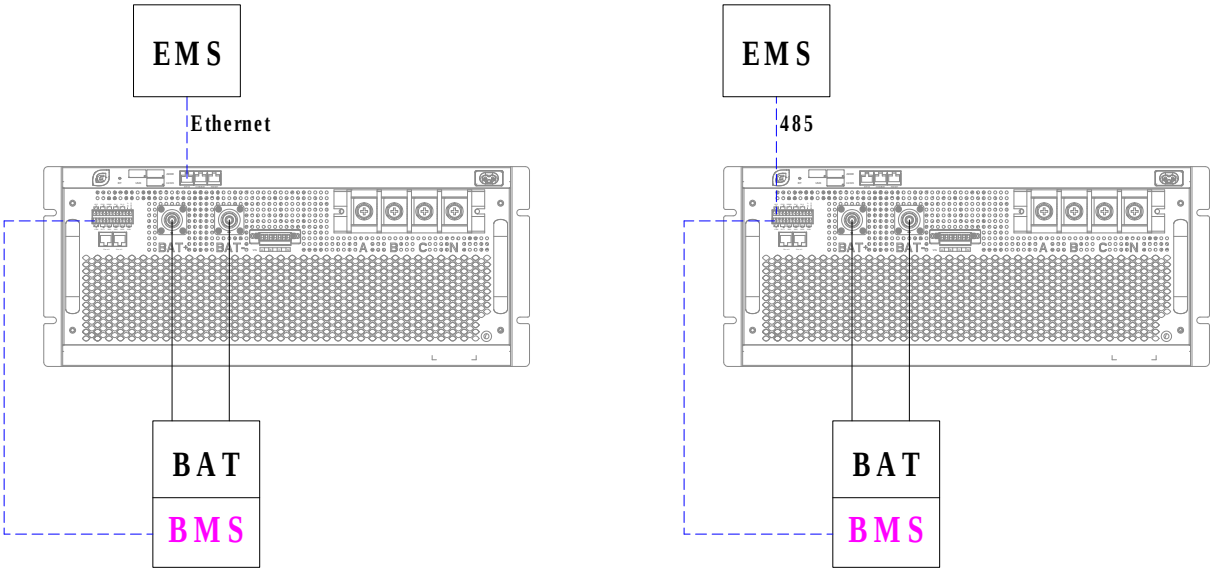
If direct communication between the converter and the BMS is required, the adapted BMS CAN protocol needs to be customized.

If you need other communication methods, please contact our pre-sales engineers.

6.7.1.1 Single-machine scheme

When the PCS module is used as a single unit (not in parallel), the communication between the PCS and EMS supports either Ethernet or 485, and this connection method is also applicable to grid-connected / off-grid switching.

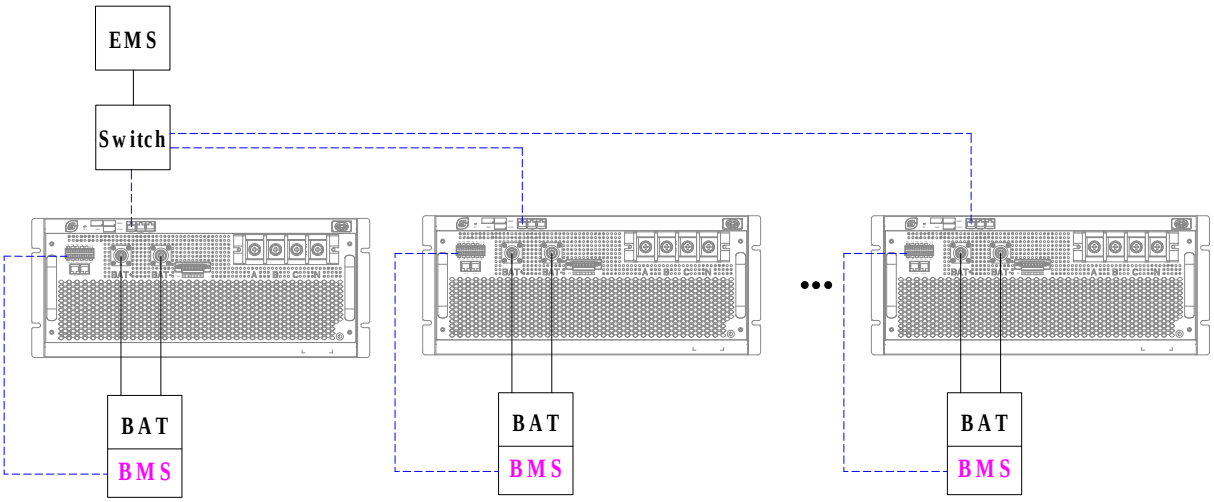
Figure6-1 Single-machine scheme reference



6.7.1.2 One cluster, one management, multi-machine on-grid scheme

In this scheme, when multiple PCS AC sides are connected in parallel, the DC side of a single PCS is connected to the battery. The DC side of each PCS is not interfered with each other, and each PCS can be connected to the EMS through a switch. This scheme is limited to on-grid use. For example, if an EMS controls a PCS, the EMS can be directly connected with the PCS to be controlled, without the need for a switch.

Figure6-1 One cluster, one management, multi-machine on-grid scheme reference



6.7.1.3 One cluster, one management, multi-machine on/off-grid scheme

Different from the multi-machine on-grid scheme, the one cluster, one management, multi-machine on/off-grid scheme can not only realize the grid →PCS→ battery, but also realize the working capacity of battery →PCS→ load. Different from the on-grid scheme, each PCS needs to communicate. As shown in the figure below, the Para2 port of the first PCS is connected to the Para1 port of the second PCS, and the Para2 port of the second PCS is connected to the Para1 port of the third PCS, and so on.

The communication wiring method under the One cluster, one management pure off-grid (VSG) condition is the same as that of the One cluster, one management multi-machine on-grid scheme.

Figure6-1 One cluster, one management, multi-machine on/off-grid scheme reference (VF)

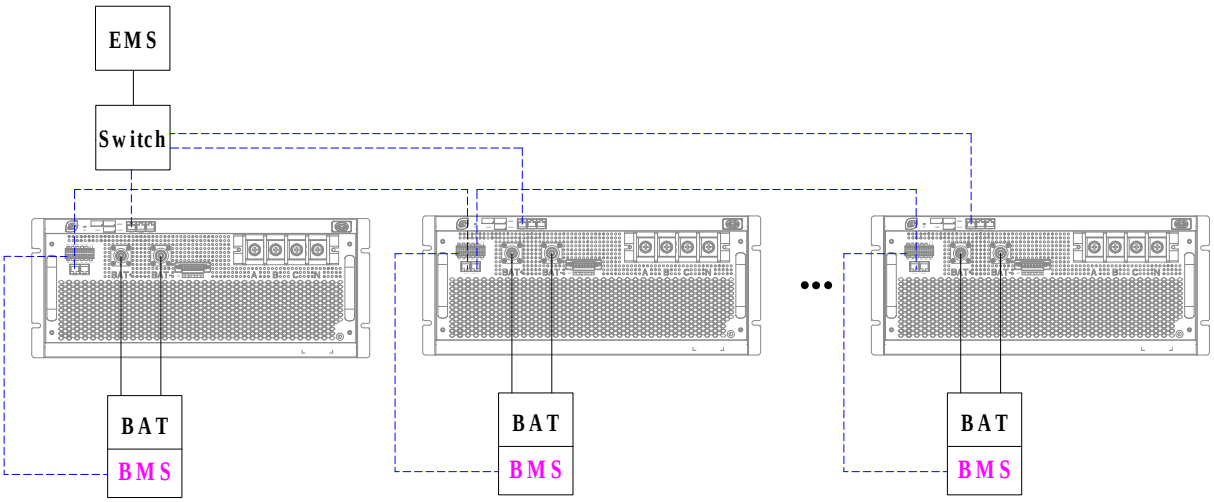
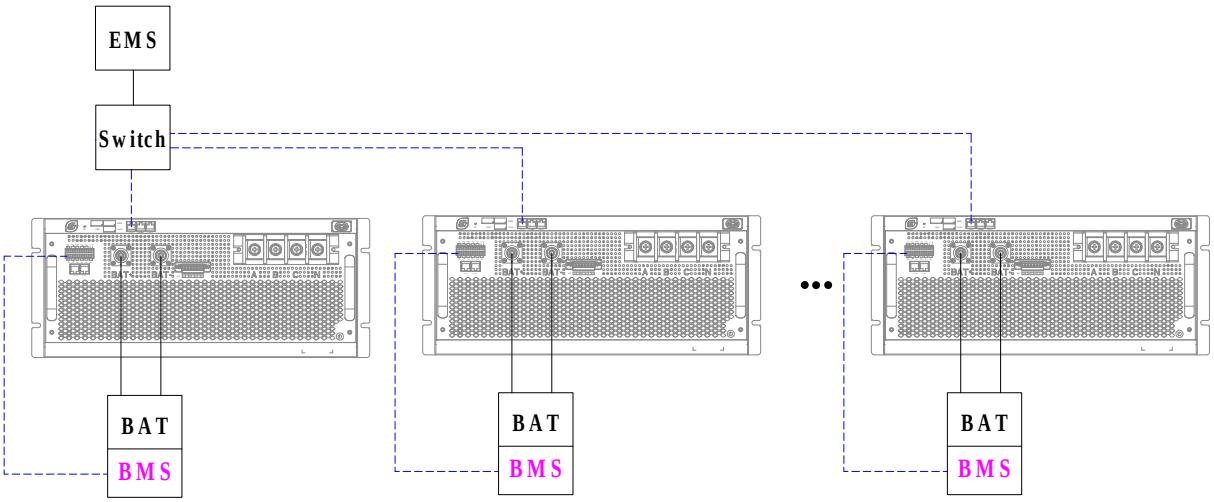


Figure6-2 One cluster one management pure off-grid scheme reference (VSG)



6.7.1.4 Common DC bus multi-machine off-grid scheme

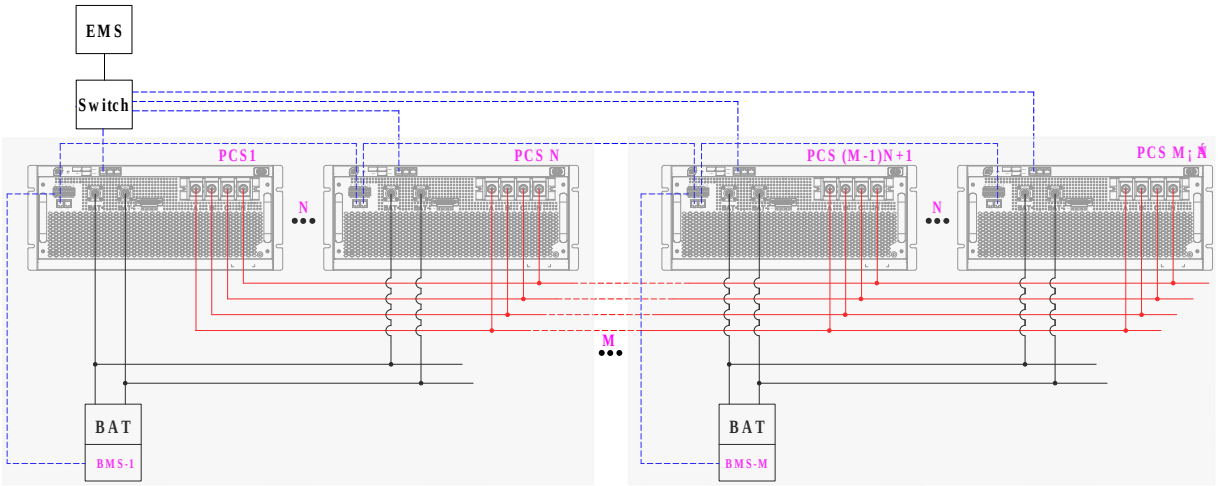
VF

- DC side with multiple groups sharing a common DC bus (M > 1): Supports up to 3 groups (M) in parallel operation, with a maximum of 3 units (N) per group. Converters within each group must share one BMS. Total number of PCS units shall not exceed 6.
- DC side with a single group sharing a common DC bus (M = 1): Maximum parallel units shall not exceed 4 (N), and converters within the group must share one BMS.

VSG

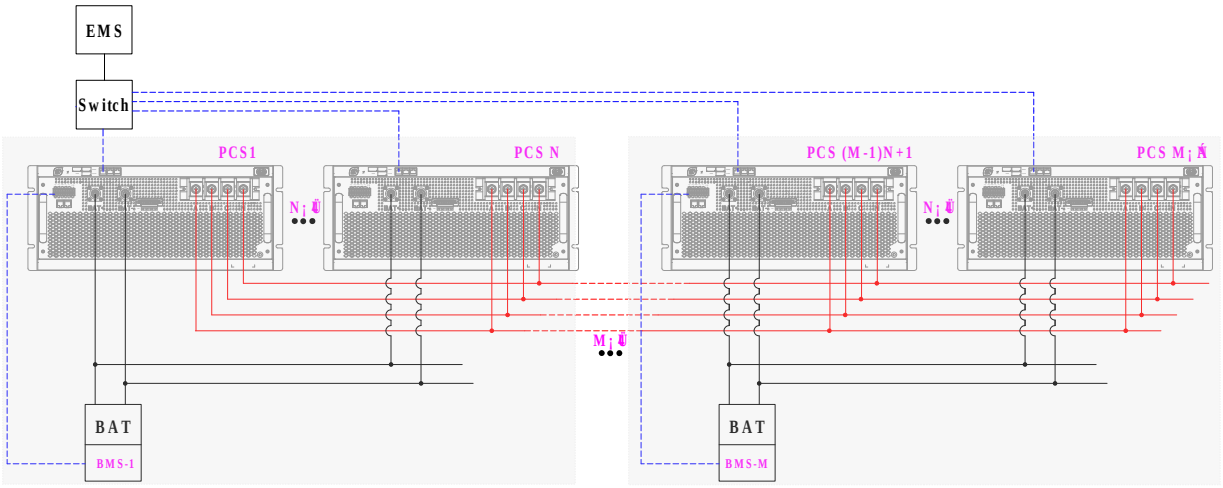
DC side supports up to 4 groups (M) in parallel operation, with a maximum of 4 units (N) per group. Converters within each group must share one BMS. Total number of PCS units shall not exceed 16.

Figure6-1 Common DC bus multi-machine off-grid scheme (VF)



N: Maximum number of PCS units within a single group.
M: Total number of groups sharing the common DC bus.
The total length of the PARA port parallel communication bus shall be

Figure6-2 Common DC bus multi-machine off-grid scheme (VSG)



N: Maximum number of PCS units within a single group.
M: Total number of groups sharing the common DC bus.

The above diagrams are presented as M×N matrices (in fully populated configuration). In actual projects, the number of PCS units in each group is allowed to be unequal (e.g., N_1=2, N_2=3), as long as the above total unit count and per-group maximum are met.

If the application requires more parallel units than specified above, please contact our pre-sales engineers promptly.

6.7.2 DIP - switch operation

Address Setting Requirements

When using 485 or CAN communication, make sure that the address settings are unique for each module on the same communication bus. Each module must be configured with a separate address for accurate identification by the EMS or BMS.

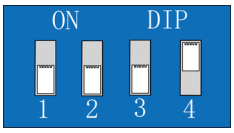
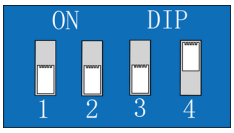
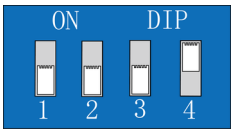
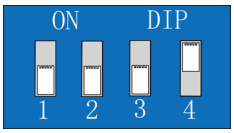
- Default Address Setting: Addresses for CAN and 485 communication are set by default via dip switches.
- Customized address setting: If you need different addresses for CAN and 485 communication, you need to set them through PCS upper computer (contact our after-sales engineers).

CAN bus matching resistor

For the modules at the first and last ends of the CAN bus, a 120Ω matching resistor needs to be accessed through the dial code to optimize the quality of bus signal transmission.

6.7.2.1 Single-machine scheme

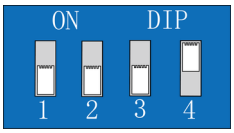
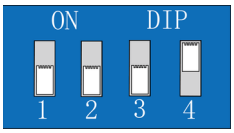
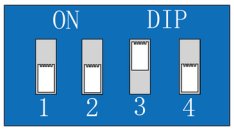
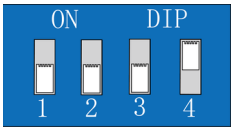
Table 6-1 dialing code schematic

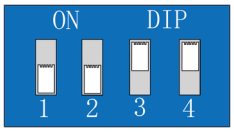
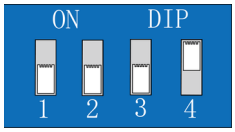
Descriptions	ADDR Dialing Indication	120Ω Dialing Indication
Communicate with EMS via TCP and with BMS via CAN; Assume: When the CAN address is 1		
Communicate with EMS via 485 and with BMS via CAN; Assume: When both 485 and CAN addresses are 1		

6.7.2.2 One cluster, one management, multi-machine on-grid scheme

Illustrate by example when the number of parallel PCS is 3.

Table 6-1 dialing code schematic

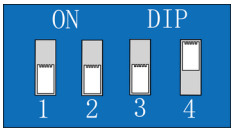
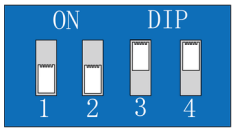
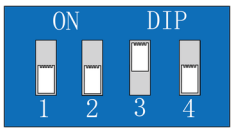
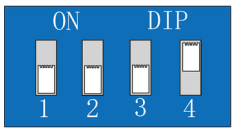
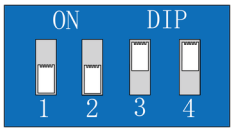
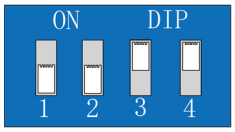
Descriptions	ADDR Dialing Indication	120Ω Dialing Indication
Communicate with EMS via TCP and with BMS via CAN; PCS 1: CAN Address 1		
Communicate with EMS via TCP and with BMS via CAN; PCS 2: CAN Address 2		

Communicate with EMS via TCP and with BMS via CAN; PCS 3: CAN Address 3		

6.7.2.3 One cluster, one management, multi-machine on/off-grid scheme

Illustrate by example when the number of parallel PCS is 3.

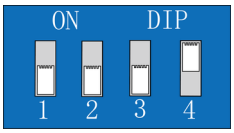
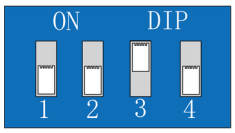
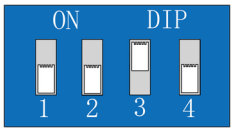
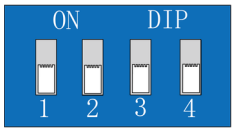
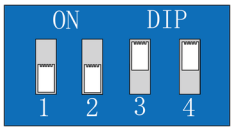
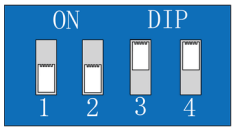
Table 6-1 dialing code schematic

Descriptions	ADDR Dialing Indication	120Ω Dialing Indication
Communicate with EMS via TCP and with BMS via CAN; PCS 1: CAN Address 1		
Communicate with EMS via TCP and with BMS via CAN; PCS 2: CAN Address 2		
Communicate with EMS via TCP and with BMS via CAN; PCS 3: CAN Address 3		

6.7.2.4 Common DC bus multi-machine off-grid scheme

Illustrate by example when the number of parallel PCS is 3.

Table 6-1 dialing code schematic

Descriptions	ADDR Dialing Indication	120Ω Dialing Indication
Communicate with EMS via TCP and with BMS via CAN; PCS 1: CAN Address 1		
Communicate with EMS via TCP and with BMS via CAN; PCS 2: CAN Address 2		
Communicate with EMS via TCP and with BMS via CAN; PCS 3: CAN Address 3		

6.8 Post-installation inspection

After installation, in order to avoid equipment damage and property loss, the following items must be inspected and measured again:

Table 6-1 Equipment inspection items

Serial number	Check items	Completion
1	Check the equipment for damage.	☐
2	Check the equipment is securely installed.	☐
3	The equipment must be placed and installed in a proper position to meet load-bearing and environmental requirements.	☐
4	The power line is correctly connected, the ground wire is well connected to the grounding network, and the construction unit is required to detect the grounding resistance value.	☐
5	Check whether the main line is connected incorrectly/the line sequence is reversed, and determine whether the difference will affect the safe operation of the energy storage system.	☐
6	Check the cable is intact and has no cracks or cuts.	☐
7	Check the cables are securely installed.	☐
8	Make sure that all communication lines are correctly connected and that there are no breaks or short circuits in the connection.	☐
9	Check the equipment for any excess metal items and make sure there are no construction relics.	☐
10	Check the PCS DC side and AC side upper level switch are in the "OFF" state.	☐

Table 6-2 Check items before power-on

Items	Check the scheme	Completion
Check the AC side	Disconnect the DC circuit breaker QF2; Close AC circuit breaker QF1; Use a multimeter AC voltage mode to measure the voltage between AC terminal "A", "B", "C", "N", if it is a three-phase three-wire connection, the detected voltage between "AB", "BC", "CA" should be 400/380V (rated); If it is a three-phase four-wire connection, the voltage between the detected "AN", "BN" and "CN" should be 230/220V (rated); If the measurement deviation is large, please disconnect the AC circuit breaker QF1 and re-check the AC side wiring.	☐
Check the	Disconnect AC circuit breaker QF1;	☐

DC side	Close DC circuit breaker QF2; Use a multimeter in DC voltage mode to measure the voltage between the DC terminals "BAT+" and "BAT-" of the PCS. If the voltage is consistent with the battery voltage and within the correct voltage range, the cables are correctly connected. Otherwise, disconnect the DC circuit breaker QF2 and check the cables to the DC side.	

7 First power-on and operation

7.1 Switching operation

7.1.1 Power on steps

Before starting up the PCS, it is necessary to check the following matters.

- The installation site environment complies with the requirements in Chapter 5 of this manual
- Verify that the PCS upper level DC switch is in the off position.
- The circuit breaker of the AC switchboard connected to the AC side of the PCS is in the off position.
- The connection of input and output power cables, communication cables, and ground cables complies with the requirements in Chapter 6 of this document.
- Check the positive and negative polarity of the DC cables and the normal phase sequence of the AC cables.
- Measure the voltage and frequency at the grid connection point before grid connection to ensure that the PCS grid connection specifications meet the requirements.
- The dust - proof film on the module air duct needs to be torn off.

After meeting the above conditions, follow the following steps to power on the PCS:

1. To provide power supply: close the AC/DC circuit breaker, power supply from the grid/battery, and the device power indicator lights up;

2. Background or EMS set the power-on mode: See *MonitorParameter_UserManual* for details.

If the startup is abnormal, you can connect the EMS or other background devices to the PCS and check the alarm information of the PCS (refer to this chapter for details). If the fault cannot be recovered, please contact your agent or our company in time.

7.1.2 Power off steps

⚠ DANGER

- To shut down the system, turn off the PCS and then disconnect the AC/DC circuit breaker;
- After the electrical line connected to PCS is disconnected for about 5 minutes, the device can be operated after the DC bus capacitor discharge in the module is completed.
- To prevent personal injury, if you want to maintain or open the chassis after powering off the machine, use a multimeter to measure the voltage at the wiring terminals and ensure that all components inside the machine are not charged before performing related operations.

The steps for powering off the machine are as follows:

1. Background or EMS set the power-off mode: See *MonitorParameter_UserManual* for details.
2. PCS stops operating and automatically disconnects the internal AC circuit and DC circuit;
3. If the PCS is in external power supply mode, the external power supply needs to be disconnected.

7.1.3 Emergency shutdown steps

In the event of an emergency, follow these steps:

1. Pressing the emergency stop button triggers the EPO alarm, the PCS shuts down, and automatically disconnects the AC and DC circuits inside the PCS.
2. If the PCS is in external power supply mode, disconnect the external power supply.

7.2 Fault diagnosis

PCS has perfect protection function and warning information, once the fault can be read through EMS related fault information. Before seeking service, users can self-check according to the prompts in the following table to analyze the cause of the fault and find out the solution. In the self-check, please do not disassemble the machine parts, if you can not solve the problem, please contact the agent or directly with our company.

NOTICE

Troubleshooting level Meaning:

- Fault: indicates that the PCS, grid, battery and other external conditions are abnormal, and automatically stops. Personnel need to troubleshoot the exception in time.
- Alarm: indicates that the PCS, grid, battery and other external conditions are abnormal, without stopping. Personnel need to troubleshoot the exception in time.

The fault reset mode is divided into automatic reset and manual reset.

- Automatic reset mode means that after a fault occurs, the system clears the fault at a certain interval. If the fault condition is eliminated, the system exits the fault state. If the fault condition still exists, the fault is reported again. The number of automatic reset times can be set by the function code. When the number of automatic reset times is used up, the fault will no longer be automatically reset until the user manually resets the system. The number of automatic reset times of the fault can be reloaded.
- Manual fault reset: After the cause of the fault is eliminated, shut down through the power - on/off register. PCS can resume operation only by performing a reset through the reset register.

Table 7-1 Equipment Check Items

ID	Fault name	Trigger mechanism	Troubleshooting
1	EPO signal	Usage 1 (Default): Normally closed by default. Closed: normal; Open: faulty; Usage 2 (Customized): Normally open by default. Open: normal; Closed: faulty.	Power - off reset.
2	IGBT hardware overcurrent faults	IGBT OCP fault.	Power - off reset.
3	Busbar hardware overvoltage faults	Hardware overvoltage of bus voltage.	Power - off reset.
5	Power module wave-by-wave current limiting fault	Power module wave-by-wave current limiting.	Power - off reset.
6	Balancing circuit wave-by-wave current limiting fault	Balancing circuit wave-by-wave current limiting.	Power - off reset.
17	24V power supply fault	Internal auxiliary power supply fault.	Power - off reset.
18	Fan fault	Fan blocking.	It can be reset automatically when the fault disappears and the power-on

			command is 1 (1 means power on, 0 means power off).
19	Single board connection fault	Internal connection fault.	Power - off reset.
23	Arrester fault	External dry contact signal abnormal	Power - off reset.
24	Inductor overheating fault	Inductor temperature is greater than the limit value.	It can be reset automatically when the fault disappears and the power-on command is 1 (1 means power on, 0 means power off).
25	IGBT module overheating	IGBT temperature is greater than the limit value.	It can be reset automatically when the fault disappears and the power-on command is 1 (1 means power on, 0 means power off).
26	Balancing circuit overheating fault	Balancing circuit temperature is greater than the limit value.	It can be reset automatically when the fault disappears and the power-on command is 1 (1 means power on, 0 means power off).
27	15V power supply fault	Internal auxiliary power supply fault	Power - off reset.
28	External fire alarm fault	Usage 1 (Default): Normally closed by default. Closed: normal; Open: faulty; Usage 2 (Customized): Normally open by default. Open: normal; Closed: faulty.	Power - off reset.
29	External BMS dry contact fault	Usage 1 (Default): Normally closed by default. Closed: normal; Open: faulty; Usage 2 (Customized): Normally open by default. Open: normal; Closed: faulty.	It can be reset automatically when the fault disappears.
31	Ambient over-temperature fault	Ambient temperature is greater than the limit value.	It can be reset automatically when the fault disappears and the power-on command is 1 (1 means power on, 0 means power off).
33	Grid overvoltage faults 3P3W system: line voltage Vab overvoltage;	Grid voltage is greater than limit value.	It can be reset automatically when the fault disappears.

	3P4W system: phase voltage Van overvoltage;		
34	Grid overvoltage faults 3P3W system: line voltage Vbc overvoltage; 3P4W system: phase voltage Vbn overvoltage;	Grid voltage is greater than limit value.	It can be reset automatically when the fault disappears.
35	Grid overvoltage faults 3P3W system: line voltage Vca overvoltage; 3P4W system: phase voltage Vcn overvoltage;	Grid voltage is greater than limit value.	It can be reset automatically when the fault disappears.
36	Grid undervoltage faults 3P3W system: line voltage Vab undervoltage ; 3P4W system: phase voltage Van undervoltage ;	Grid voltage is less than the limit value.	It can be reset automatically when the fault disappears.
37	Grid undervoltage faults 3P3W system: line voltage Vbc undervoltage ; 3P4W system: phase voltage Vbn undervoltage;	Grid voltage is less than the limit value.	It can be reset automatically when the fault disappears.
38	Grid undervoltage faults 3P3W system: line voltage Vca undervoltage; 3P4W system: phase voltage Vcn undervoltage;	Grid voltage is less than the limit value.	It can be reset automatically when the fault disappears.
39	Grid overfrequency fault	Grid frequency is greater than the limit	It can be reset automatically when the fault disappears.

		value.	
40	Grid underfrequency fault	Grid frequency is less than the limit value.	It can be reset automatically when the fault disappears.
41	Grid phase sequence error fault.	Grid phase sequence A, B, C in wrong order.	Power - off reset.Change phase sequence.
42	AC phase A overcurrent fault	AC phase A current is greater than the limit value.	It can be reset automatically when the fault disappears and the power-on command is 1 (1 means power on, 0 means power off).
43	AC phase B overcurrent fault	AC phase B current is greater than the limit value.	It can be reset automatically when the fault disappears and the power-on command is 1 (1 means power on, 0 means power off).
44	AC phase C overcurrent fault	AC phase C current is greater than the limit value.	It can be reset automatically when the fault disappears and the power-on command is 1 (1 means power on, 0 means power off).
46	AC current unbalance fault	Difference between A/B/C phase currents of a three-phase, three-wire system is greater than the limit value.	It can be reset automatically when the fault disappears and the power-on command is 1 (1 means power on, 0 means power off).
48	N line overcurrent fault	Module N line current is greater than the limit value.	It can be reset automatically when the fault disappears and the power-on command is 1 (1 means power on, 0 means power off).
49	Precharge bus overvoltage fault	Bus voltage is greater than the limit value during start-up phase.	It can be reset automatically when the fault disappears and the power-on command is 1 (1 means power on, 0 means power off).
50	Precharge bus undervoltage fault	Bus voltage is less than the limit value during start-up phase.	It can be reset automatically when the fault disappears and the power-on command is 1 (1 means power on, 0 means power off).
53	Bus overvoltage fault	Bus voltage is greater than the limit value in operation.	It can be reset automatically when the fault disappears and the power-on command is 1 (1 means power on, 0 means power off).
54	Bus undervoltage fault	Bus voltage is less than the limit value in operation.	It can be reset automatically when the fault disappears and the power-on command is 1 (1 means power on, 0 means power off).

55	Positive and negative bus unbalance fault	Positive bus and negative bus voltage difference greater than the limit value..	It can be reset automatically when the fault disappears and the power-on command is 1 (1 means power on, 0 means power off).
56	Battery undervoltage fault	Battery voltage is less than the limit value.	It can be reset automatically when the fault disappears.
58	Battery overvoltage fault	Battery voltage is greater than the limit value.	It can be reset automatically when the fault disappears.
59	DC pre-charge overcurrent fault	DC current is greater than the limit value during power-up phase.	It can be reset automatically when the fault disappears and the power-on command is 1 (1 means power on, 0 means power off).
60	DC overcurrent fault	DC current in operation is greater than the limit value.	It can be reset automatically when the fault disappears and the power-on command is 1 (1 means power on, 0 means power off).
61	Software overcurrent fault in balancing circuit	Current in balancing circuit during operation is greater than the limit value.	It can be reset automatically when the fault disappears and the power-on command is 1 (1 means power on, 0 means power off).
64	Battery reverse connection fault	Battery voltage is less than the limit value.	It can be reset automatically when the fault disappears.
65	AC pre-charge timeout fault	When charging, the predefined value is not reached in the specified time.	It can be reset automatically when the fault disappears and the power-on command is 1 (1 means power on, 0 means power off).
66	AC pre-charge phase A overcurrent fault	Precharge phase module overcurrent.	It can be reset automatically when the fault disappears and the power-on command is 1 (1 means power on, 0 means power off).
67	AC pre-charge phase B overcurrent fault	Precharge phase module overcurrent.	It can be reset automatically when the fault disappears and the power-on command is 1 (1 means power on, 0 means power off).
68	AC pre-charge phase C overcurrent fault	Precharge phase module overcurrent.	It can be reset automatically when the fault disappears and the power-on command is 1 (1 means power on, 0 means power off).
71	Leakage current fault	Leakage current is greater than the limit value.	Power-off reset, it is recommended to test if the system connection is normal.
72	DC component of current exceeds	DC component of current exceeds limit	Check whether the zero drift value of the current sampling is too large or

	limit fault		whether the actual current has a DC component.
73	Power mismatch fault	Set power does not match actual output power	Check whether the DC voltage of the PCS is too low or whether the grid voltage is too high.
81	Control board RAM fault	Control board RAM chip read/write error occurred	Contact manufacturer.
82	Control board EEPROM fault	EEPROM read/write error occurred	Contact manufacturer.
83	Control board AD zero drift fault	ADC analog sampling channel zero drift is excessive.	Contact manufacturer.
84	Control board background communication protocol fault	Communication protocol mismatch between DSPs.	Contact manufacturer.
85	Control board CAN communication protocol fault	Communication protocol mismatch between CAN.	Contact manufacturer.
86	Control board CPLD communication protocol fault	CPLD and DSP version mismatch.	Contact manufacturer.
87	Control Board DataLog Data fault	Control Board DataLog Data fault.	Contact manufacturer.
90	Software firmware mismatch fault	Software firmware mismatch fault.	Contact manufacturer.
92	BMS battery status fault	BMS status	View BMS status
93	STS communication fault	STS signal not detected by system.	It can be reset automatically when the fault disappears and the power-on command is 1 (1 means power on, 0 means power off).
94	BMS communication fault	BMS signal not detected.	It can be reset automatically when the fault disappears and the power-on command is 1 (1 means power on, 0 means power off).
95	Parallel system slave communication fault	No parallel signal detected.	It can be reset automatically when the fault disappears and the power-on command is 1 (1 means power on, 0 means power off).

96	EMS communication fault	No EMS signal detected.	It can be reset automatically when the fault disappears and the power-on command is 1 (1 means power on, 0 means power off).
97	Pre-charge switch closed fault	Pre-charge switch closed fault.	It can be reset automatically when the fault disappears and the power-on command is 1 (1 means power on, 0 means power off).
98	Pre-charge switch open fault	Pre-charge switch open fault.	It can be reset automatically when the fault disappears and the power-on command is 1 (1 means power on, 0 means power off).
99	Pre-charge switch closed status error	Pre-charge switch closed status error	It can be reset automatically when the fault disappears and the power-on command is 1 (1 means power on, 0 means power off).
100	Pre-charge switch open status fault	Pre-charge switch open status fault.	It can be reset automatically when the fault disappears and the power-on command is 1 (1 means power on, 0 means power off).
101	AC main switch closed fault	AC main switch closed fault.	It can be reset automatically when the fault disappears and the power-on command is 1 (1 means power on, 0 means power off).
102	AC main switch open fault	AC main switch open fault.	It can be reset automatically when the fault disappears and the power-on command is 1 (1 means power on, 0 means power off).
103	AC main switch closed status fault	AC main switch closed status fault.	It can be reset automatically when the fault disappears and the power-on command is 1 (1 means power on, 0 means power off).
104	AC main switch open status fault	AC main switch open status fault.	It can be reset automatically when the fault disappears and the power-on command is 1 (1 means power on, 0 means power off).
105	AC main switch sticking fault	AC main switch sticking fault.	Keep it powered on and contact the manufacturer timely. If it has powered off, do not power it on again.
106	DC main switch open circuit fault	DC main switch open circuit fault.	Keep it powered on and contact the manufacturer timely.
107	AC main switch open circuit fault	AC main switch open circuit fault.	Keep it powered on and contact the manufacturer timely.
113	Inverter overvoltage fault during off-grid operation. 3P3W system: line voltage Vab undervoltage ;	During off - grid operation, the inverter voltage is greater than the limit value.	It can be reset automatically when the fault disappears and the power-on command is 1 (1 means power on, 0 means power off).

	3P4W system: phase voltage Van undervoltage ;		
114	Inverter overvoltage fault during off-grid operation. 3P3W system: line voltage Vbc undervoltage ; 3P4W system: phase voltage Vbn undervoltage;	During off - grid operation, the inverter voltage is greater than the limit value.	It can be reset automatically when the fault disappears and the power-on command is 1 (1 means power on, 0 means power off).
115	Inverter overvoltage fault during off-grid operation. 3P3W system: line voltage Vca undervoltage; 3P4W system: phase voltage Vcn undervoltage;	During off - grid operation, the inverter voltage is greater than the limit value.	It can be reset automatically when the fault disappears and the power-on command is 1 (1 means power on, 0 means power off).
116	Grid islanding fault	Phase locking frequency is greater than the limit value.	It can be reset automatically when the fault disappears and the power-on command is 1 (1 means power on, 0 means power off).
118	System resonance fault	AC filter capacitor current is greater than the limit value.	It can be reset automatically when the fault disappears and the power-on command is 1 (1 means power on, 0 means power off).
121	High voltage ride-through timeout fault	High voltage duration is greater than the limit value.	It can be reset automatically when the fault disappears and the power-on command is 1 (1 means power on, 0 means power off).
122	Inverter undervoltage fault during off-grid operation. 3P3W system: line voltage Vab undervoltage ; 3P4W system: phase voltage Van undervoltage ;	During off - grid operation, the inverter voltage is less than the limit value.	It can be reset automatically when the fault disappears and the power-on command is 1 (1 means power on, 0 means power off).
123	Inverter undervoltage fault during off-grid	During off - grid operation, the inverter voltage is less than the	It can be reset automatically when the fault disappears and the power-on command is 1 (1 means power on, 0

	operation. 3P3W system: line voltage Vbc undervoltage ; 3P4W system: phase voltage Vbn undervoltage;	limit value.	means power off).
124	Inverter undervoltage fault during off-grid operation. 3P3W system: line voltage Vca undervoltage; 3P4W system: phase voltage Vcn undervoltage;	During off - grid operation, the inverter voltage is less than the limit value.	It can be reset automatically when the fault disappears and the power-on command is 1 (1 means power on, 0 means power off).
125	Off-grid mode no synchronization signal fault	During off-grid operation, no phase-locked synchronization signal detected	Keep it powered on and contact the manufacturer timely.
127	Off-grid output short circuit fault	During off-grid operation, inverter voltage is less than the limit value and output current more than the limit value.	Keep it powered on and contact the manufacturer timely.
128	Low voltage ride-through timeout fault	Low voltage duration is greater than the limit value.	It can be reset automatically when the fault disappears and the power-on command is 1 (1 means power on, 0 means power off).

8 Maintenance and Upkeep

8.1 Routine maintenance

Due to the influence of ambient temperature, humidity, dust and vibration, it will lead to the aging of the components inside the PCS, which may cause potential faults of the PCS or reduce the service life of the PCS. Therefore, it is necessary to carry out daily and regular maintenance work on the PCS.

⚠DANGER

- The input and output of the PCS are strong electricity, and necessary safety precautions must be taken before maintenance begins.
- Before maintenance, ensure that both the DC and AC power supplies have been disconnected.
- The PCS has an energy storage capacitor inside. After powering off the PCS, wait for more than 5 minutes to ensure that the PCS is in no power state before performing maintenance.
- To avoid unexpected dangers, in the process of maintenance, the maintenance personnel should wear insulating protective equipment.

- Before performing maintenance, you must strictly follow the correct operating procedures.
- Only qualified personnel are allowed to maintain the PCS.
- After the power supply is disconnected, hang a warning sign at the disconnected place to prevent anyone from powering on the PCS during maintenance.

⚠CAUTION

Pay attention to cleaning and corrosion prevention, in harsh environmental conditions should shorten the maintenance interval.

- More frequent maintenance may be required, depending on site conditions.

- If DC distribution components are susceptible to harsh environmental conditions, shorter maintenance intervals are recommended.
- Regular visual inspections are recommended to determine if maintenance is required.

⚠CAUTION

n the case where the PCS has not been in operation for a long time (more than 3 months), an EEPROM fault may occur during the first power-on. Such a fault can be cleared through the following steps:

1. Disconnect all power connections of the PCS.
2. Wait for at least 30 seconds.
3. Reconnect the power supply and power on. This process enables the device to reinitialize, thereby clearing the EEPROM fault.

In addition, for a converter that has not been in operation for a long time (more than 3 months), it is recommended to perform busbar capacitor activation operation before it is put back into use to ensure the normal operation of the device. The steps for busbar capacitor activation are as follows:

1. Start the PCS.
2. Issue a charging power command of 1kW.
3. Let the PCS operate at this power for 30 minutes.

This operation helps to restore the performance of the busbar capacitor and ensure the stable operation of the PCS.

Strictly follow the above operation requirements. Equipment abnormalities caused by non-standard operation are not covered by the manufacturer's free warranty.

⚠WARNING

If the PCS is stored idle for a long time, condensation may occur inside the equipment. Before powering on the equipment, dehumidification must be performed first (methods such as preheating and drying, or enabling the PCS can be used). If powered on directly without dehumidification, it may cause insulation failure, internal short circuits, and equipment damage. In high-humidity environments, it is recommended to perform power-on maintenance every 3 months to reduce the risk of condensation failure.

8.2 Daily inspection items

Routine inspection items shall be carried out according to the following points:

Table 8-1 Routine inspection items

Serial number	Daily inspection items	Confirmation
1	It is necessary to monitor the input, output voltage and current and operating status of the PCS in real time. Observe the PCS at a fixed point by a fixed number of people, and carry out maintenance in	☐

	time when abnormal converter operation or abnormal voltage and current are found.	
2	There is no abnormal sound in the PCS.	☐
3	There is no odor in the PCS.	☐
4	Read the internal temperature of the PCS and observe that the temperature is within the normal range.	☐

8.3 Regular check items

Regular three-monthly inspections focus on daily inspections and areas that are difficult to inspect during daily operation.

Table 8-1 Regular inspection items

Serial number	Routine check items	Confirmation
1	Check that the PCS is not damaged or rusty in appearance.	☐
2	Use the temperature measuring instrument to detect the internal temperature of the PCS without abnormality.	☐
3	Check that the ventilation, ambient temperature, humidity, dust and other environment around the PCS meet the requirements.	☐
4	Check whether the cables are aged or damaged without layers. If the cables are damaged, add insulation measures or replace the cables.	☐
5	Check that there are no signs of aging and burning on the wiring bolts, and shake them with your hand to confirm that they are tightened.	☐

9 Expand

9.1 On-grid and off-grid switching

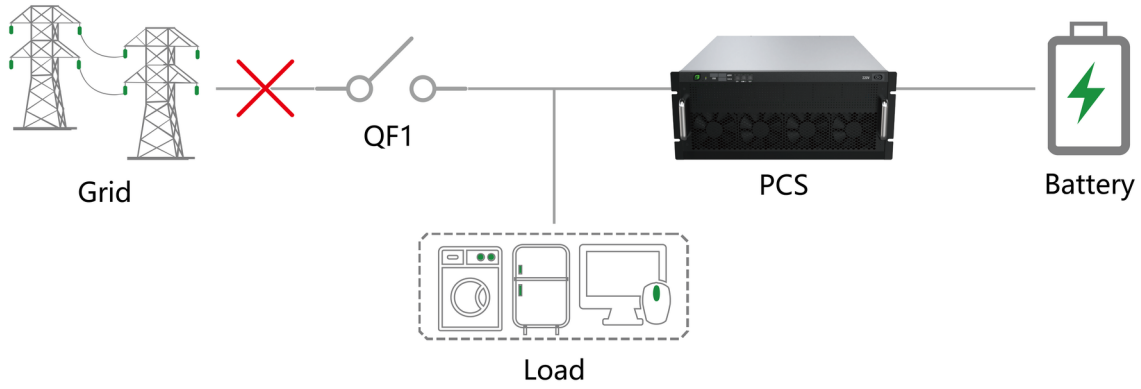
9.1.1 On-grid to off-grid steps

4. The power grid is powered off (the main grid switch QF1 is disconnected). Confirm that there is no power in the grid. The reference diagram is as follows.
5. Set the PCS shutdown command via the power - on/off register. Confirm that the PCS is in the shutdown state and manually reset it through the reset register.
6. Set the off - grid mode.
7. Start the PCS in off - grid mode.

Note 1: In off - grid mode, it is strictly prohibited to close the AC circuit breaker QF1.

Note 2: In off - grid mode, when an isolation transformer is equipped, the PCS side only supports three - phase three - wire connection.

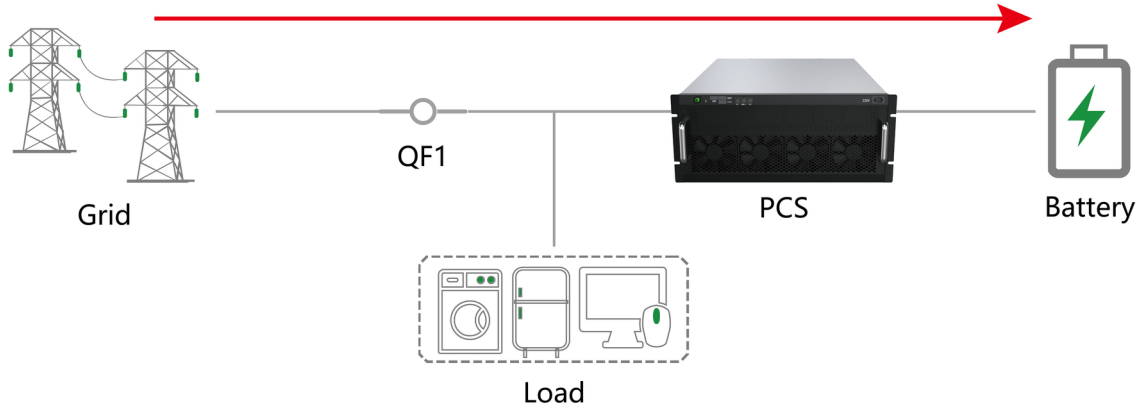
Figure9-1 On-grid to off-grid manually



9.1.2 Off-grid to on-grid steps

8. Set the PCS shutdown command via the power - on/off register, and confirm that the PCS is in the shutdown state.
9. Set the on - grid mode.
10. Connect the grid (close the main grid switch QF1).
11. Start the PCS in on - grid mode.

Figure9-1 Off-grid to on-grid manually



10 Addendum

Contract Statement

The products, services or features you purchase shall be subject to the commercial contracts and terms of the company, and all or part of the products and service features described in this document may not be within the scope of your purchase. Unless otherwise agreed in the contract, the Company does not make any express or implied representations or warranties in the content of this manual.

Copyright Statement

The copyright of this manual belongs to our company. No unit or individual shall copy, copy in part or copy in whole (including software, etc.), copy or distribute in any form or by any means. Our company reserves the right of final interpretation. This manual may be updated based on feedback from users or customers.

Quality assurance

If the product fails during the warranty period, our company will repair or replace it with a new product free of charge.

Evidence: During the warranty period, the company requires the customer to show the invoice and date of purchase of the product. At the same time, the trademark on the product should be clearly visible, otherwise the company has the right to deny the quality guarantee.

Replacement agreement: The unqualified products after replacement shall be dealt with by the company; The customer shall reserve a reasonable time for the company to repair the faulty products.

Liability exemption: The company reserves the right to void the warranty under the following conditions:

- The whole machine and parts have exceeded the free warranty period.

- Shipping damage.
- Incorrect installation, modification, or use.
- Operating in very harsh environments beyond those described in this manual.
- Failure or damage to equipment caused by installation, repair, alteration or disassembly not by our service personnel.
- Equipment failure or damage caused by the use of non-standard or non-procured parts or software from the company.
- Any installation and use beyond the scope specified in the relevant international standards.
- Damage caused by abnormal natural environment.

Product failure caused by the above circumstances, the customer request for maintenance services, after the company's service department to determine, can provide paid maintenance services.

In order to continuously improve customer satisfaction, the company's products and user manuals are under continuous improvement and upgrading. If there is a difference between the user manual and the product in your hand, it may be due to the version. Please refer to the specific product. If you still have questions, please contact the company.