



# NEPCSH-5000-MV SKID Solution User Manual



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## Revision History

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# 1 Manual Instruction

## 1.1 Foreword

To our distinguished customers, first of all, thank you for selecting NEPCSH-5000-MV Power Conversion System (hereinafter referred to as the MV-PCS) developed by Shenzhen CLOU Electronics Co., Ltd.

In order to fully play the outstanding performances of the product and avoid personal injury or any damages related to the product, please read the manual carefully before installation.

If you have any doubts or questions about the installation of the product, please feel free to contact us.

Notes:

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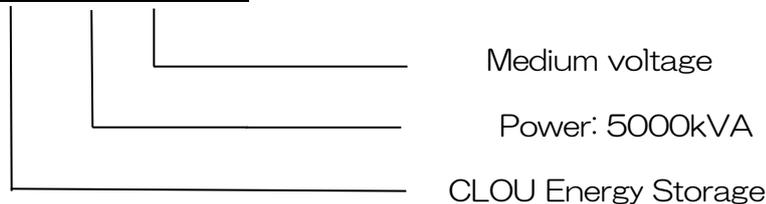
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## 1.2 Model Specification

Name: Power Conversion System

Model: NEPCSH-5000-MV



Developed by: Shenzhen CLOU Electronics Co., Ltd.

## 1.3 Target Group

This manual is for technical personnel who are responsible for the transport, installation, commissioning and other operations of the MV-PCS. Only qualified personnel can perform the installation, maintenance and troubleshooting of the MV-PCS. Unauthorized persons should not perform any operation to the MV-PCS and should be away from the MV-PCS to avoid potential hazards. Qualified personnel are:

- Equipped with certain electrical, electrical wiring and mechanical knowledge and familiar with electrical and mechanical principle diagram.
- Familiar with the construction and working principle of the energy storage system.
- Familiar with the construction and working principle of the MV-PCS upstream and downstream equipment.
- Trained specifically for electrical device operation, installation and commissioning.
- Able to cope with the dangerous and emergency situations during installation and commissioning.
- Familiar with the country/regional standards and specifications.

- Familiar with this manual.

## 1.4 Symbol Explanation

In order to ensure personal and equipment safety during operation and maintenance, some relevant installation information is provided in this manual and highlighted by corresponding signs.

 danger	This symbol indicates a hazard with high risks of being dead or injured if not avoided.
 warning	This symbol indicates a hazard with medium risk of being dead or injured if not avoided.
 be careful	This symbol indicates a hazard with risks that could result in equipment failure or property losses if not avoided.

The symbols below may be pasted on the electrical parts of the station. Make sure to understand the following symbols before installation.

	This symbol indicates high voltage inside. Do not touch!
	This symbol indicates high surface temperature. Do not touch!
	This symbol indicates that do not touch live parts until 5 minutes after disconnection.
	This symbol indicates the protective earth (PE) terminal, which should be firmly grounded to ensure personal safety.
	This symbol indicates that the installation manual and maintenance manual are available for reference.

## 2 Safety Instruction

### 2.1 System Overview

The SKID solution consists of battery energy storage system, power conversion system (including transformer), metering and monitoring devices and power distribution system. NEPCSH-5000-MV PCS can be perfectly applied in large and medium-sized energy storage power station. The converter can store the grid power in the battery, and also convert the battery DC power into AC power synchronized with the grid, and the AC power can be put into the grid by the supporting of isolation transformer and power distribution system. More details are shown in Figure 2-1.

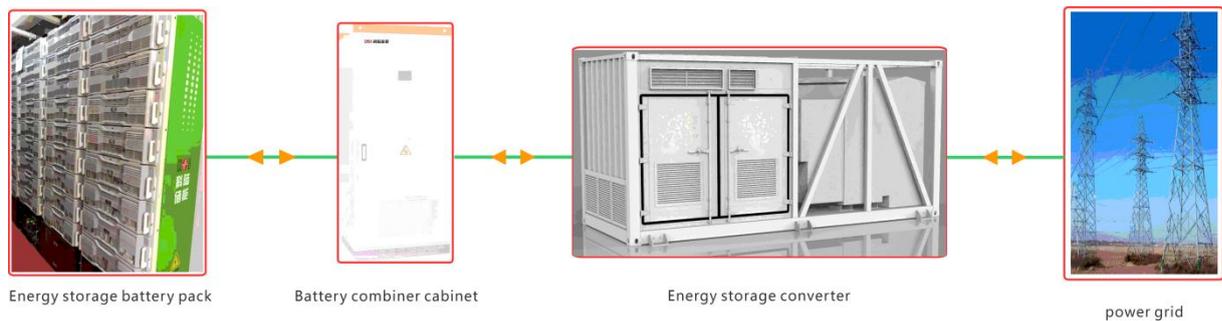


Fig.2-1 Components of energy storage system

### 2.2 Security Cautions

#### 2.2.1 Personnel Safety Precautions

##### 2.2.1.1 Risk of electric shock when touching conductive parts

The high voltage in the MV-PCS may cause electric shock. Be sure to install the MV-PCS with the power disconnected, and follow the steps below when doing so.

- 1) Disconnect the following components:
  - The breaker on the PCS' s AC side
  - The breaker on the PCS' s DC side
  - The external power supply of PCS
  - The internal power supply of PCS
- 2) Make sure the PCS won' t get reconnected.
- 3) Make sure there is no voltage exists.
- 4) Make sure the equipment is firmly grounded.

##### 2.2.1.2 Risk of electric shock from incompletely discharged capacitors

- 1) Dangerous voltages may exist in PCS even if the main AC and DC switches are disconnected.
- 2) Please wait at least 5 minutes after the PCS is powered off.
- 3) Make sure there is no voltage exists.

##### 2.2.1.3 Risk of electric shock caused by damaged PCS

Please make sure the PCS is not damaged. If it' s damaged, it will cause electric shock, people will get injured or even be dead. Do check it regularly.

##### 2.2.1.4 Risk of electric shock caused by improper operation

Failure to follow the operating and safety instructions may result in serious injury.

- 1) Please do follow the methods described in this manual.
- 2) Please follow all the safety instructions.
- 3) Please follow the circuit diagram during electrical connecting.
- 4) Please keep the manual and related documents at hand and available at all times.

#### 2.2.1.5 Thermal hazards

- 1) Some components' temperature will rise during operation. Please be careful.
- 2) Please wear safety gloves during operation and maintenance.

### 2.2.2 Equipment Safety Precautions

#### 2.2.2.1 Unauthorized modifications may cause damage to the PCS

Do not operate the PCS when the cabinet door is open.

#### 2.2.2.2 Unauthorized personnel can't open the door.

Make sure to remove the key from the lock and key switch, and keep it in a safe place.

#### 2.2.2.3 High humidity may damage the power units

Please do not power on the PCS when the air humidity is over 95%.

#### 2.2.2.4 Electrostatic discharge may damage the module

- 1) Please follow the protective regulations of ESD and wear protective gloves during maintenance.
- 2) Discharge static electricity by touching grounding parts (such as the PE connection part of the door).

## 2.3 Equipment Installation Qualification

Only staff trained and qualified with the relevant knowledge can perform operations on the PCS. Before installation, the staff should be familiar with this manual and other related document and follow the safety instructions.

## Chapter 3 Supply Document

### 3.1 Supply List

NEPCSH-5000-MV contains these items in the packing case:

Table 3-1 Supply list of NEPCSH-5000-MV

No.	Name	Quantity	Note
1	NEPCSH-5000-MV	1set	The key of cabinet door and other accessories are included.
2	User Manual	1pcs	-
3	Warranty Card	1pcs	-
4	Certificate	1pcs	-
5	Test Report	1pcs	-

### 3.2 Product Description

The NEPCSH-5000-MV consists of two 2.5MW converter systems (PA and PB) and one 5MVA oil-immersed transformer (transformer integrated with high-voltage protection system), and a RMU, and a low-voltage cabinet. All equipment is placed in a 20ft high container, the dimension of the container is 6058mm\*2896mm\*2438mm (W\*H\*D), the protection level is IP54, and the overall layout is shown in Fig. 3-1 below.

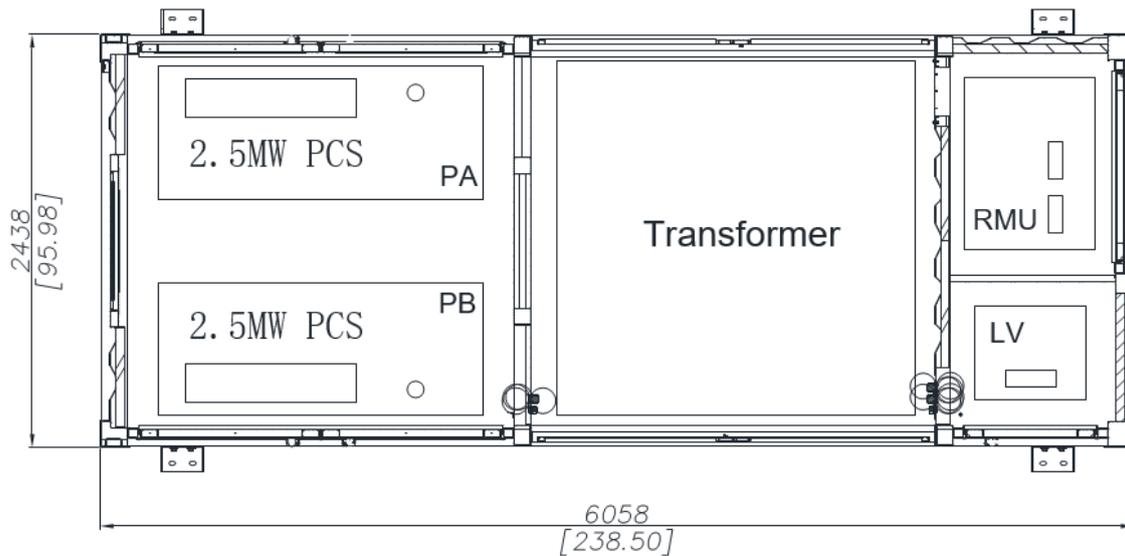


Fig.3-1 NEPCSH-5000-MV layout

### 3.3 Storage

If it is not to be installed immediately upon reception, the MV-PCS should be stored appropriately.

- Keep the desiccant in the package.
- Indoor storage, such as large warehouse or workshop.
- Store the MV-PCS on a dry, clean and solid ground with sufficient carrying capacity. The ground should be flat without water, bumps or vegetation cover.
- Pay attention to ventilation and relative humidity without condensation.
- Check regularly, usually once a week, to see whether the package is in good condition, avoid insect and animal bites.
- Every six months, the package should be opened for inspection, repackaged and replace the desiccant.



be careful

When installing the equipment that has been stored for a long time, the door of the cabinet should be opened to check whether the equipment is in good condition. And it's necessary to test the equipment by a professional before installation.

## Chapter 4 Product Description

### 4.1 Outline Instructions

#### 4.1.1 Outline Dimension

The mechanical dimension of NEPCSH-5000-MV is 6058mm\*2896mm\*2438mm (W\*H\*D) and the weight is about 19000KG. The mechanical dimension is shown in Figure 4-1 (unit: mm).

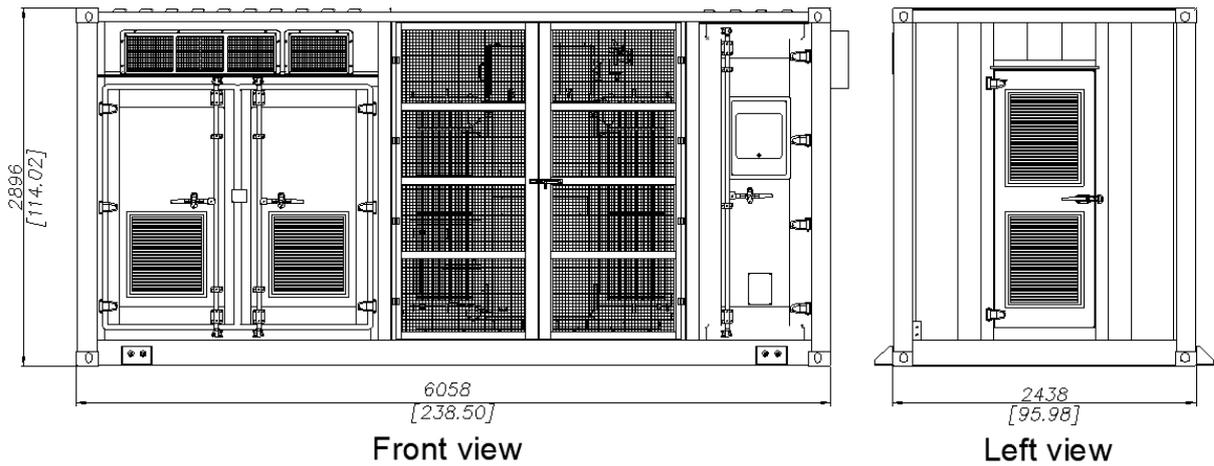


Fig.4-1 Outline dimension diagram

### 4.1.2 Cable Entry Design

All cables between the NEPCSH-5000-MV and the external devices are routed through the bottom of NEPCSH-5000-MV.

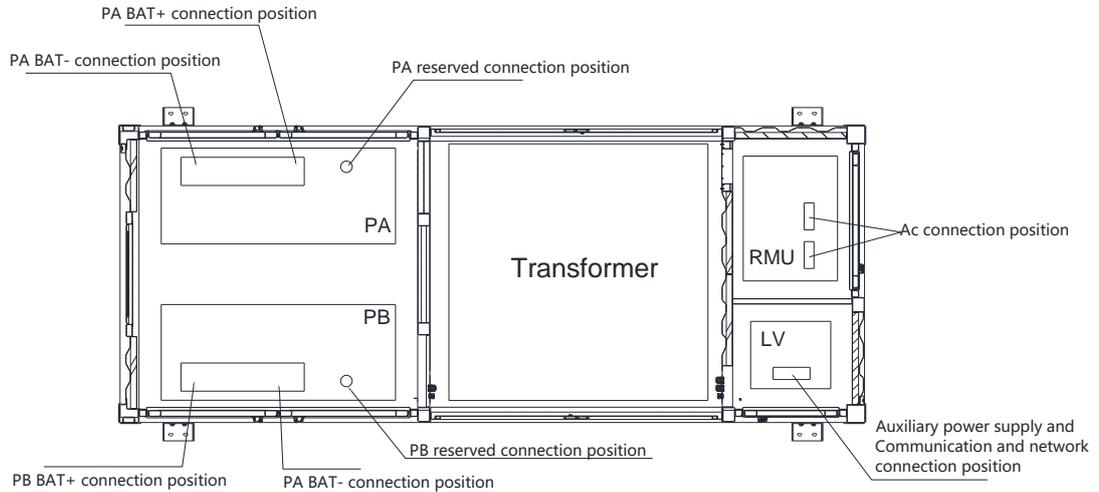


Fig.4-2 Cable entries of the NEPCSH-5000-MV

### 4.1.3 Ventilation Design

NEPCSH-5000-MV has a structural design with air in from the bottom and out to the top. The cold air enters from the front and back of the cabinet and blows out from the top after passing through the internal cooling equipment. The ventilation schematic is shown in Figure 4-3.

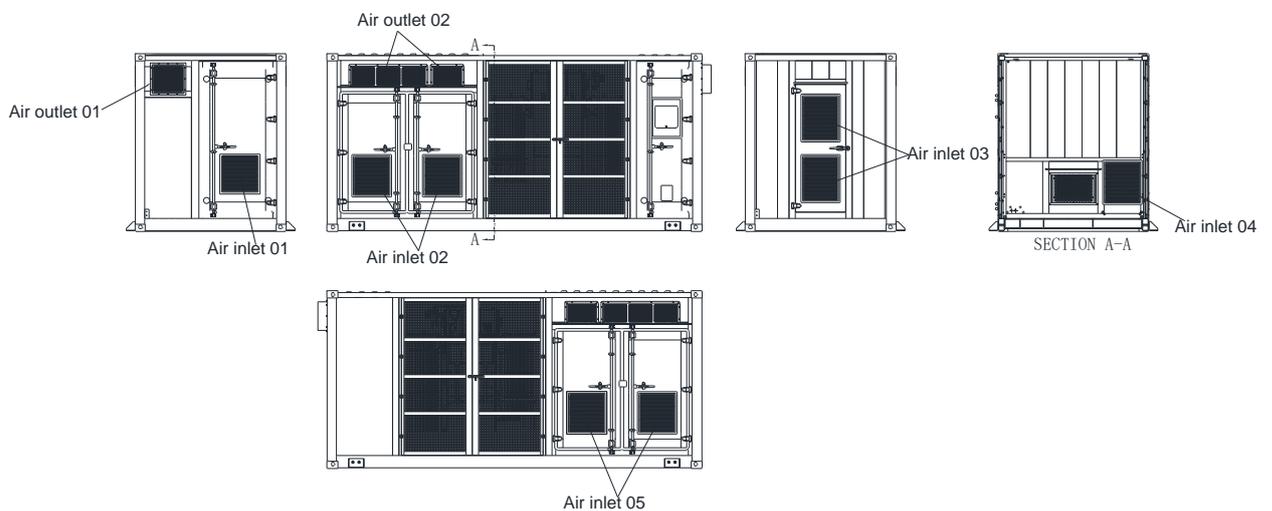


Fig.4-3 Equipment ventilation diagram

## 4.2 Control and Monitoring Window

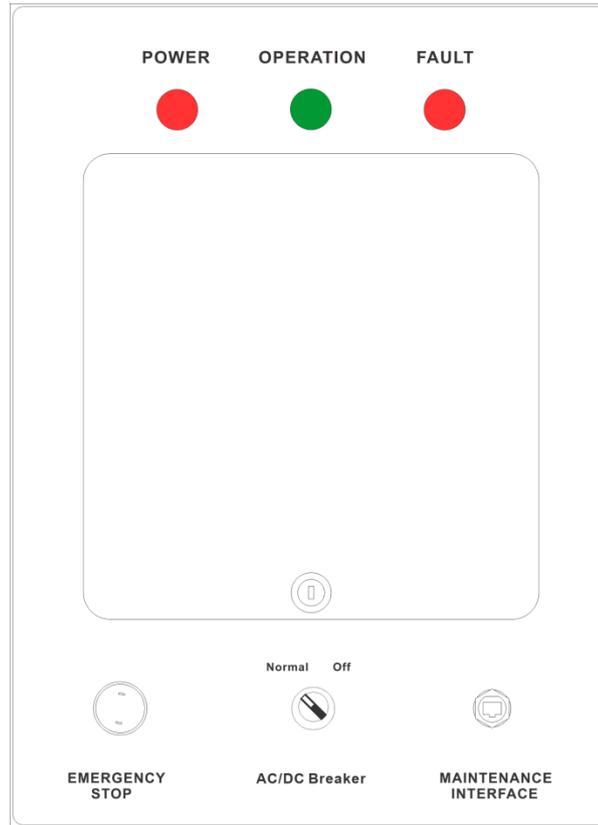


Fig.4-4 Control and monitoring window

### 4.2.1 LED

LED indicators are mounted on the top of the PCS to indicate the operating status. The descriptions of the LED indicators are shown in the table below.

Table 4-2 LED description

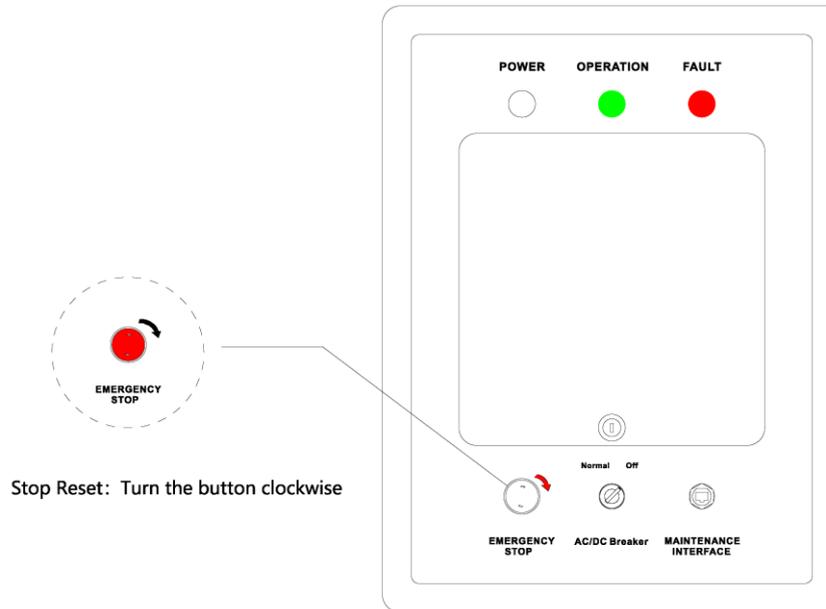
Name	Color	Description
Power	Red	The AC side power is normal.
Operation	Green	The inverter is in operation status.
Fault	Red	There is a fault.

### 4.2.2 LCD

Users can review the operation information of PCS through the touch screen and also achieve some control functions. Specific functions are listed as follows:

- 1) Control PCS operation
- 2) Display real-time operating data
- 3) Display fault information
- 4) Adjust operating parameters
- 5) View history records

### 4.2.3 Emergency Stop Button



The PCS will immediately stop working once this button is pressed. To restart it, please follow the procedure:

- 1) Turn the emergency stop switch counterclockwise to release the locked state.
- 2) Push the AC breaker to "OFF" first, then to "ON".
- 3) Push the DC breaker to "OFF" first, then to "ON".
- 4) PCS will start and run automatically when the start conditions are ready.

### 4.2.4 AC/DC Breaker

The AC/DC switch button is supposed to be in position (Normal), and it means that the AC/DC switch can be connected. And if you need to disconnect the AC/DC switch, turn the switch button to position (OFF), then the AC/DC side main circuit power supply can be disconnected.

 danger	If the DC side is charged, the input terminals are still charged after disconnecting the AC/DC switch!
 be careful	The AC/DC switch can only be closed when the AC/DC switch button is in position 1 (Normal).

### 4.3 Main Circuit Diagram

The main circuit of NEPCSH-5000-MV is shown in Figure 4-5.

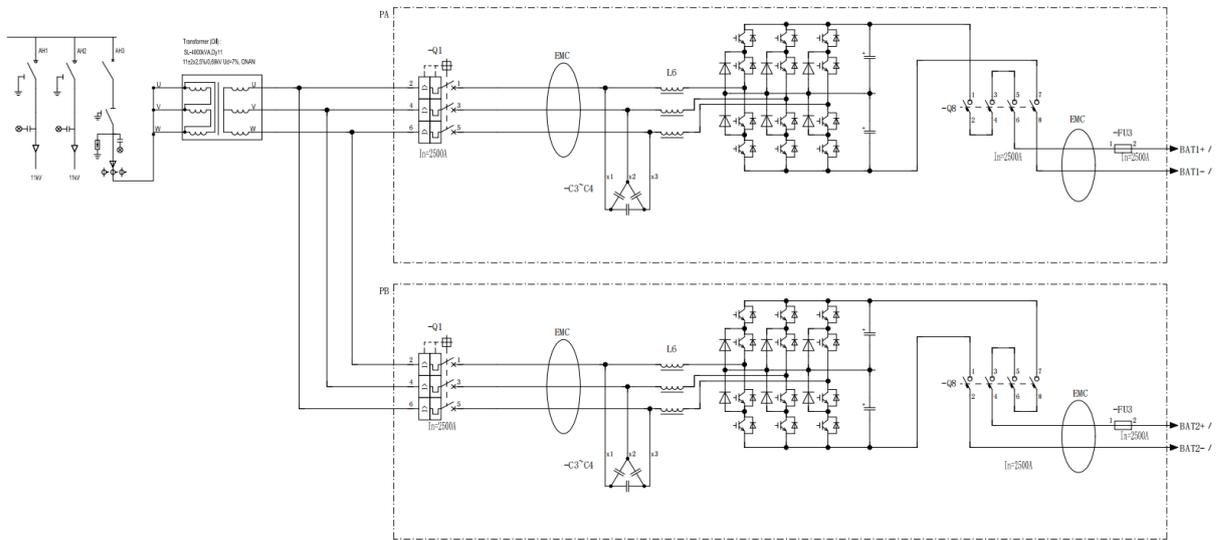


Fig.4-5 Main circuit diagram

### 4.4 Derating Curves

When the ambient temperature ranges from  $-30^{\circ}\text{C}$  to  $45^{\circ}\text{C}$ , PCS can work continuously under nominal power. But if it ranges from  $45^{\circ}\text{C}$  to  $55^{\circ}\text{C}$ , PCS working power will derate 3% of the  $P_n$  for every  $1^{\circ}\text{C}$  increasing. When the temperature reaches  $60^{\circ}\text{C}$ , PCS protection mode turns on.

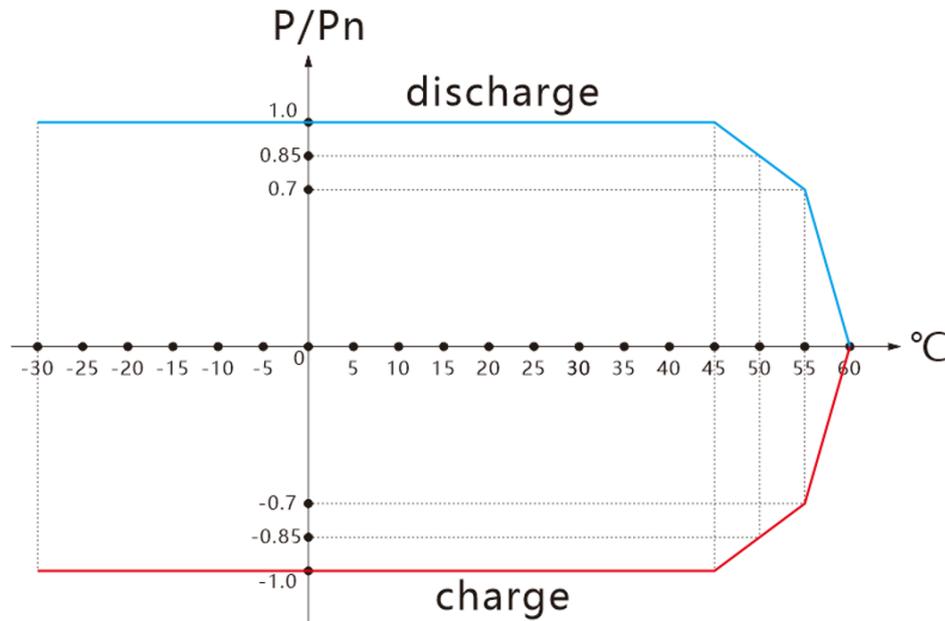


Fig. 4-6 Temperature derating curve

When the altitude ranges from 0 to 2km, PCS can work continuously under nominal power. But if it ranges from 2 to 4km, PCS working power will derate 6% of the  $P_n$  for every 1km rising. And if it's over 4km, PCS protection mode turns on.

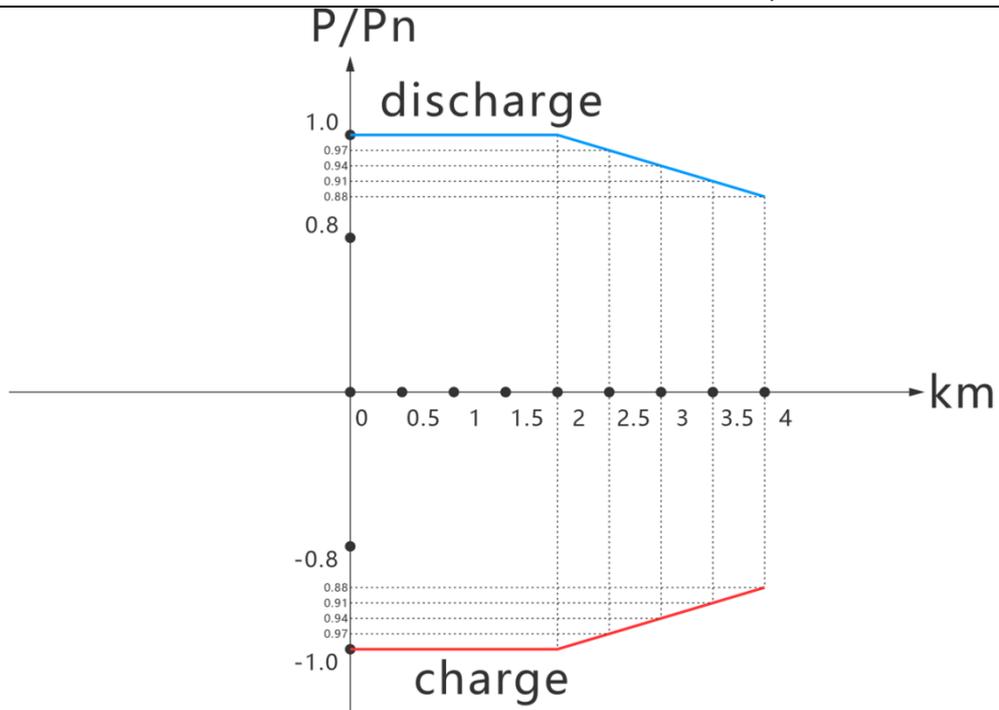


Fig. 4-7 Height above sea level derating curve

## 4.5 Working Mode

The working modes of NEPCSH-5000-MV are “Start”, “Run”, “Standby”, “Failure”, “Emergency stop”, etc. The instructions are as follows:

### 4.5.1 Start

This mode refers to the completion of the initial installation of the PCS, the DC input and AC output terminals are correctly connected, all breakers are closed, and the PCS is ready to be connected to the grid for power generation.

This mode only appears when the equipment gets ready for the first time. The PCS continuously detects whether the energy storage battery has sufficient energy for grid power generation. When it is ready to go, the PCS will switch from the start mode to run mode.

### 4.5.2 Run

In this mode, the NEPCSH-5000-MV PCS converts the stored DC power into AC power for integration into the grid. At the same time, the PCS outputs energy in maximum power mode or according to the grid power dispatch command to support the grid.

### 4.5.3 Standby

After PCS running for a while, if the DC side current is quite low (approximately 0A) for a period of time, it will switch to standby mode. During standby mode, the PCS will continuously detect whether the energy storage battery has sufficient energy to reconnect to the grid for power generation. Once the “start” requirements are satisfied and last for about 1 minute, the PCS will switch from standby mode to run mode.

### 4.5.4 Failure

The PCS will stop running and enter “Failure” mode once energy storage system fails, and the reasons of the failure will be displayed on the touch screen for users to review. Meanwhile, the system continuously monitors whether the fault is eliminated. If not, it will stay at the “Failure” mode. If it is eliminated and other operating conditions are

satisfied, the PCS will be reconnected to the grid after 2 minutes.

#### 4.5.5 Emergency Stop

Once the emergency signal is received, the AC/DC breaker will be disconnected and the PCS will stop working. If the inverter needs to be restarted, the emergency signal should be cancelled, and then push the AC/DC breaker into “OFF”. When the start requirements are satisfied, the PCS will start automatically.

### 4.6 PCS Protective Functions

The main protective functions of the PCS are as follows:

#### DC input overvoltage protection:

- DC input over current protection
- DC input polarity reverse connection protection
- DC side anti-surge protection
- PCS anti-reverse protection
- Fault earthing protection
- Insulation protection
- Overvoltage/under voltage protection
- Over/under frequency protection
- Overload and short-circuit protection
- Surge protection
- Resonance-proof protection of filter circuit
- Error connection protection of phase sequence
- Anti-islanding protection
- Low voltage/zero voltage ride through function
- PCS heating and dehumidifying function
- PCS over temperature protection
- Power loss protection of control power

#### The main detections are as follows:

- Control power failure detection
- SPD failure detection
- Cooling fan failure detection
- Breaker status detection
- Temperature detection of IGBT module
- Temperature detection of electric reactor

### 4.7 Transformer Protective Functions

- High oil level alarm
- Low oil level alarm
- High oil temperature alarm
- Light gas alarm
- Heavy gas tripping
- Pressure valve tripping

### 4.8 MV Switchgear Protective Functions

- High set three-phase non-directional over current protection
- Low set three-phase non-directional over current protection
- Low set non-directional earth-fault protection
- High set non-directional earth-fault protection
- SF6 low pressure alarm

## 4.9 Pre-charge Strategy

Both PCS and battery system have DC pre-charge function, which automatically completes the pre-charge of busbar capacitor. The specific pre-charging commands are as follows:

### 4.9.1 PCS DC Precharge Logic

After the battery system is powered on, the PCS is turned on. When the PCS detects that the battery voltage is normal and the DC busbar is under-voltage, or if the battery voltage and the DC busbar voltage have a large deviation, the DC pre-charge contactor will pre-charge the busbar voltage. After precharging for 20s, when the DC busbar voltage gets normal and the deviation from the battery voltage is within a reasonable range (60V by default), it means that the DC precharging is completed, and then the main circuit breaker is automatically connected, the precharging contactor is disconnected. Otherwise, it means that the pre-charge has failed, and the system turns to failure status.

### 4.9.2 Battery System Precharge Logic

After the battery system is powered on, the DC pre-charge contactor is switched on to pre-charge the PCS busbar capacitor. After 10s of precharging, when the voltage deviation is less than 30V, the main circuit contactor is closed and the DC precharged contactor is disconnected.

Note: If the PCS and battery system are mutually redundant, the pre-charge failure of either side will not affect the normal operation of the system. And when the PCS is powered off, if the DC isolating switch is closed by mistake, the system will go with the battery-side precharge circuit.

## Chapter 5 Installation Design

### 5.1 Installation Requirements

To ensure that the equipment can work normally, the installation environment and requirements are as follows:

- Since the protection level of NEPCSH-5000-MV is IP54, please place it in the environment that comply with the protection level.
- Ensure good ventilation around the equipment.
- Ensure the installation environment is clean.
- The equipment will have some noise during operation, so install it as far as possible from the residents.
- Make sure that the installation floor is flat and will not cause any shaking to the device during working.
- The installation position needs to be properly decided, because the LED light and LCD screen must be easily observed.
- Ensure that the ambient temperature is within the required range (-25°C~50°C).
- Leave enough space between the machine and the wall, to ensure ventilation, heat dissipation, installation, maintenance, and safe escape.

### 5.2 Installation Design

Please consult the company' s engineers for the designing requirements of the control room used to install the NEPCSH-5000-MV.

The NEPCSH-5000-MV should be installed in a control room, besides, the floor, space, cable trench, air duct, ventilation equipment and protective measures should be strictly designed and should meet the following requirements.

#### 5.2.1 Floor Requirements

NEPCSH-5000-MV needs to be installed on a flat and fire retardant floor or on a structure supported by steel channels. No sinking or tilting is allowed.

Make sure the floor foundation is strong, safe and reliable, capable of bearing the weight of the equipment.

#### 5.2.2 Space Requirements

When installing the NEPCSH-5000-MV, an appropriate distance must be kept between the wall and other equipment to meet the narrowest space request for maintenance channel, escape route and ventilation.

There should be a distance of at least 2500mm around the installing location, to ensure installation, heat dissipation and maintenance. ( The spacing shall be determined according to the environmental conditions of the specific project)

#### 5.2.3 Cable Trench Design

NEPCSH-5000-MV wiring in and out from the bottom. It' s strongly suggested that the cable connection between NEPCSH-5000-MV and external devices wired in the cable trench, making it convenient for maintenance and installation. In addition, the electrical control room needs to be pre-installed with concrete cable trench, or the floor needs to be placed with steel bracket to raise the installation surface for laying cables.

The design and construction of cable trench shall be in accordance with related standards, and the weight and dimension of the PCS shall also be taken into full consideration.

The cross section of cable trench is shown in Figure 5-2. The customer may decide the quantity of cable brackets based on their needs. When laying the cables, the communication cable, control cable and power cable must be separated from each other. Besides, the AC circuit and DC circuit need to be laid separately for convenient installation and maintenance, also reduce the interference on communication and control signals.

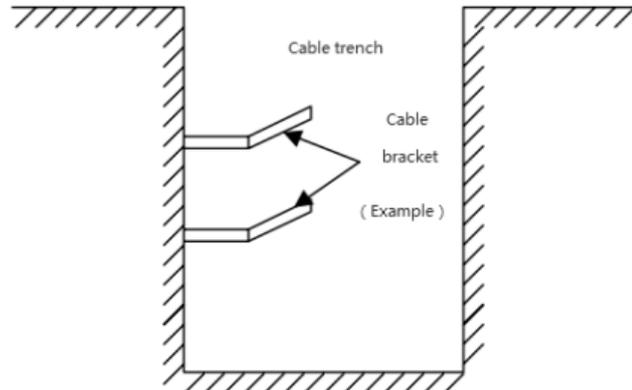


Fig. 5-2 Section diagram of cable trench

#### 5.2.4 Ventilation Requirements

Since there will be temperature rising during the operation of NEPCSH-5000-MV, the high temperature will affect the electrical performance. Moreover, it may cause damage to the PCS. Therefore, heat dissipating must be considered during designing the control room, to ensure safe and efficient operation.

##### ➤ Ventilation Environments

In order to meet ventilation requirements of NEPCSH-5000-MV, its installation environment must meet the following conditions:

Do not install the NEPCSH-5000-MV in places with poor ventilation and low air flow. Larger ventilation volume can be obtained by adding air supply grille or fan.

Sufficient fresh air should be supplied from the air inlet.

Ensure air quality. If the suspended matters such as sand and dust are too much, measures should be taken to improve air quality. (e.g., add a filter to the air supply grille)

##### ➤ Ventilation

The operating temperature needs to be controlled within the allowed range. So proper ventilation equipment must be added for heat dissipation.

The electrical control room should be equipped with ventilation equipment to improve heat dissipation. This can be realized by adding exhauster (such as a fan or air conduit, etc.).

The direction of air outlet shall be determined by the practical local wind direction.

Pay attention to dust-proof and rain-proof.

The dimension of air conduit shall be designed by professionals according to the outlet air volume.

#### 5.2.5 Other Protections

The NEPCSH-5000-MV needs to be installed in dry and clean environment. Besides, water leakage must be taken into consideration.

It can also be installed in an industrial environment which satisfy the EMC requirements and noise level requirements.

The sliding plate of wire out/in holes should be put to the corresponding positions, also polyurethane foam can be used to seal the gap to prevent rats biting.

Direct sunshine irradiation must be avoided, otherwise high temperature will affect the performance.

### 5.3 Wiring Specifications

The cables used in the system can be generally divided into power cable, power line and data line.

When laying the communication cable, keep it away from the power cable, and it should be as short as possible.

The power cable, power line and data line must be separately laid in different cable trenches to avoid long-distance parallel wiring, and reduce electromagnetic interference.

The distance among power cable, power line and data line should be longer than 0.2m.

More detailed recommendations are shown in table 5-1.

Table 5-1 Distance between signal line and power cable

The length of parallel cable (m)	Min. distance (mm)
200	0.3
300	0.5
500	1.2

Data lines should be enclosed with the ground, or laid with other some supports, such as beams, steel channels and metal rails.

### 5.4 The Fastening and Protection of Cable

#### 5.4.1 The Fastening of Cable

In order to prevent the connector, plug from loosening, which may cause poor contact, high temperature, or even fire, the screws used to fasten the wiring copper needs to satisfy the following torque requirements:

Screw Size	M4	M5	M6	M8	M10	M12	M16
Torque (N · m)	2	3.5	7	12	24	48	96

#### 5.4.2 Cable Protection

Cable protection includes the protection for communication cable and power cable. The protection methods are as follows:

➤ **The protection of communication cable**

Since the communication cable is very thin, it's easy to break under stress or fall off from the connecting terminal during construction. Therefore, it is highly recommended to connect the power circuit before communication cable. Besides, it's better to lay the communication cable in the cable trench, but if there is no cable trench, fasten the cable with belt.

Heating elements and strong electric field circuit cables should be avoided when routing.

➤ **The protection of power cable**

Since strong current exists in the power cable, scratches and damages on insulation cable need to be avoided, otherwise it may lead to short circuit. The power cable should also be perfectly

fastened.

## 5.5 Installation Procedure

The overall installation procedure of NEPCSH-5000-MV is shown in Figure 5-3 and explained in Table 5-2.

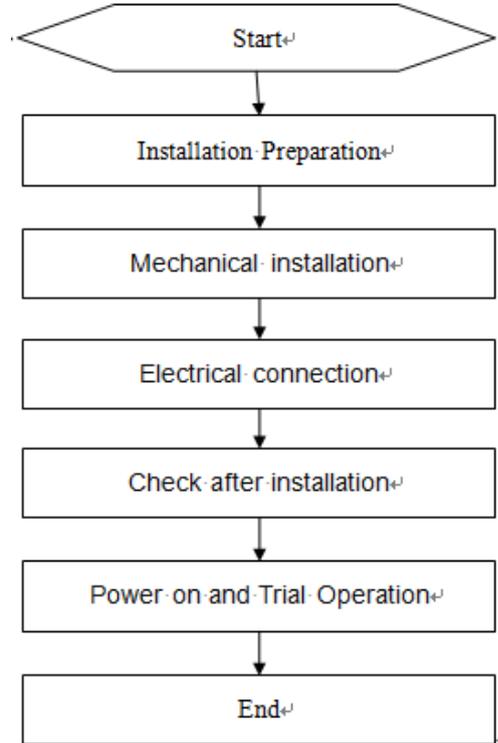


Fig. 5-3 Installation procedure

Table 5-2 Installation procedure specification

Steps	Specific information	Chapter reference for
Preparation before installation	Preparations needs to be completed before installing NEPCSH-5000-MV	6.Installation Preparation
	Check whether all accessories are available	
	Check whether the installation tools and other parts are available	
Mechanical installation	Mechanical installation includes:	7.Mechanical installation
	Transport of MV-PCS	
	Installation and fixing of MV-PCS	
Electrical connection	Electrical connection includes:	8.Electrical connection
	Open the front door and remove the protective cover	
	DC side connection	
	AC side connection	
	Ground connection	
Check after installation	Communication line connection	9.Installation Checklist
	Check items includes:	
	Mechanical installation check	
	Electrical installation check	
Power on and Trial Run	Others	10.Trail Operation
	Trial run includes:	
	Check before trial run	
	Preparation before startup	

	First Run steps	
	Complete the trial run	

## Chapter 6 Installation Preparation

### 6.1 Check before Installation

Check whether all accessories delivered are complete in accordance with the packing list in the packing.

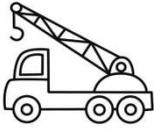
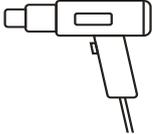
- NEPCSH-5000-MV (1 set)
- Key (1)
- Certificate (1)
- Warranty Card (1)
- Manual (1)
- Factory Inspection Report (1)

Although careful test and inspection have been conducted before delivery, damages may still occur during the transportation. Therefore, please check the MV-PCS carefully before installation and contact the shipping company or Shenzhen CLOU Electronics Co., Ltd. if any damages are found, pictures of damaged parts will be truly helpful.

## 6.2 Installation Tools and Parts

Tools and components that are needed during the installation:

- Lifting crane, forklift (with enough load capacity)
- Torque wrench
- Screw driver
- Wire stripper
- Hydraulic tong & crimping pliers
- Alcohol blast burner (heat blower)
- Multi-meter

 <p>Lifting Crane</p>	 <p>Fork Lift</p>	 <p>Torque Wrench</p>
 <p>Wire Stripper</p>	 <p>Screw driver</p>	 <p>Alcohol blast burner (heat blower)</p>
 <p>Multi-meter</p>	 <p>Hydraulic tong</p>	 <p>Crimping pliers</p>

## Chapter 7 Mechanical Installation

### 7.1 Cautions

MV-PCS containers are transported to the project site by the freight company, and site manager will be notified in advance to negotiate delivery and unloading. After delivery, MV-PCS containers are moved to the final location and need to be operated by professional engineer.


Warning

During the entire process of loading, unloading and transportation, the container operation safety regulations of the country/region where the project is located must be followed!

- All equipment used in the operation should be maintained.
- All personnel engaged in loading, unloading and bolting should receive corresponding training, especially safety training.


Caution

In the whole process of loading, unloading and transportation, it is necessary to keep in mind the mechanical parameters of the MV-PCS container:

- W\*H\*D : 6058mm\*2896mm\*2438mm
- Weight : 19000KG

The transportation of MV-PCS containers needs to satisfy the following conditions:

- All doors of MV-PCS containers are locked tightly.
- According to the site conditions, select the appropriate crane or lifting tool. The selected tools must have sufficient load-bearing capacity, arm length and radius of rotation.
- If you need to move on slopes, etc., additional traction devices may be required.
- Clear all obstacles, such as trees, cables, etc., that exist or may exist during the movement.
- MV-PCS containers should be transported and moved under better weather conditions.
- Warning signs or warning tapes must be installed to prevent non-workers from entering the lifting and transportation area to avoid accidents.

### 7.2 Hoisting

#### 7.2.1 Safety Precautions


Warning

In the whole process of MV-PCS container lifting, the safety operation regulations of the crane must be strictly followed.

- No one is allowed to stand within 5m~10m of the operating area. In particular, it is strictly forbidden to stand under the MV-PCS during the hoisting process.
- In case of severe weather conditions, such as heavy rain, fog, strong wind, etc., the

hoisting must be stopped.

When hoisting MV-PCS containers, the following requirements must be satisfied:

- The site safety must be ensured when hoisting.
- A professional instructor is needed during the whole process.
- Each sling can carry a load of over 10 tons.
- Ensure that all sling connections are safe and reliable, and the lengths of the slings connected to the corner fittings are equal.
- The crane should have sufficient arm length and radius of rotation.
- The length of the sling can be adjusted appropriately according to the requirements.
- The MV-PCS containers must be stable and not deflected during the whole hoisting process.
- Hoisting the MV-PCS containers by connecting the four corner fittings.
- Some accessories may be needed to ensure the hoisting safety.

The following figure shows the crane operation during the lifting process. The dotted circle on the inner layer represents the crane operating range. When the crane is working, it is strictly forbidden to stand within the outer solid circle!

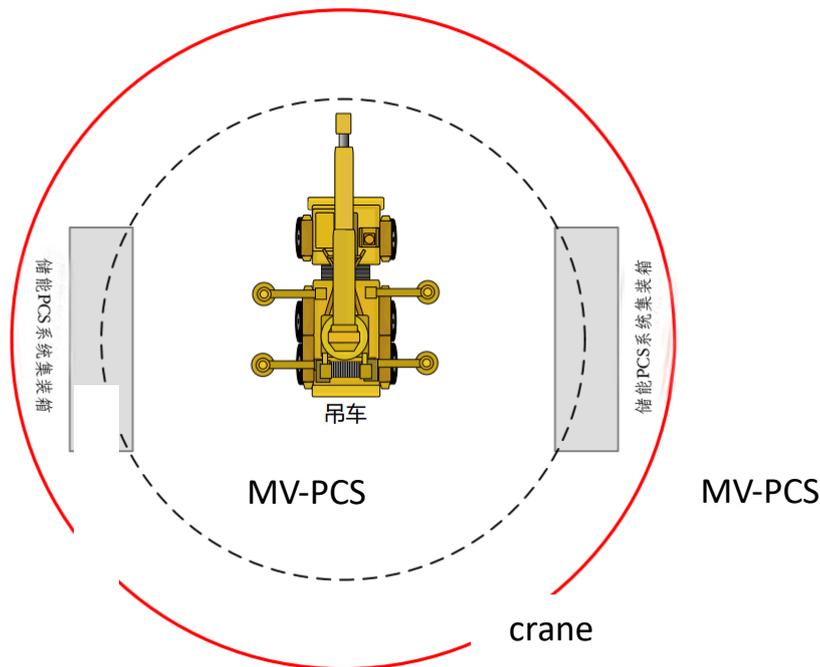


Fig.7-1 Schematic diagram of crane operation

## 7.2.2 Hoisting

In the process of lifting the MV-PCS container, each operation link should be carried out according to the following requirements:

- MV-PCS container should be lifted vertically, but it can't be dragged on the ground or on top of the lower container, in other words, it can't be dragged on any surface, either.
- The MV-PCS container should be suspended after being moved 300mm away from the supporting surface, and the connection between the spreader and the container should be checked. After confirming the connection is firm enough, it can be lifted.
- After the MV-PCS container is ready, it should be placed gently and landed steadily. It is absolutely forbidden to shake the spreader.
- The area where the MV-PCS container is placed should be solid, flat, well drained, and free of obstructions; on the site, the MV-PCS container can only be supported by the four bottom corner pieces. Due to the site conditions, please use non-vertical force to lift.

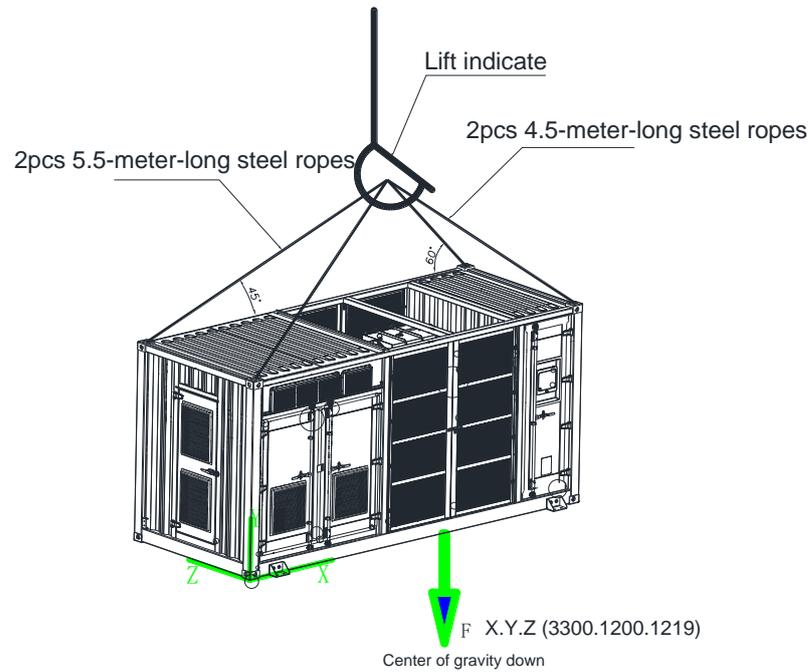


Fig.7-2 Hoisting from top fittings

### 7.2.3 Connectors Fasten

Using slings with hooks or U-hooks to hoist the MV-PCS container.  
The hoisting devices should be connected to the MV-PCS container correctly.

Lifting device	Hook	U-hook
Connections		
Notice	Insert the hook from inside to outside.	Lateral pin of the U-hook should be tightened.

## Warning

- When lifting and transporting, all safety operation standards and regulations of the country/region where the project is located must be strictly followed.
- Shenzhen CLOU Electronics Co., Ltd. will not be responsible for personal injury or property damage caused by violation of relevant requirements or other safety regulations.

## 7.3 Foundation

### 7.3.1 Selection of Installation Site

When choosing the installation site, the following principles must be followed:

- The climatic environment and geological conditions (such as stress wave emission, groundwater level) and other characteristics of the installation site should be fully considered.
- The surrounding environment is dry and well ventilated, away from flammable and explosive areas.
- The soil at the installation site needs to be firm. It is recommended that the relative density of the soil is  $\geq 98\%$ . If the soil is loose, measures must be taken to ensure the stability of the foundation.

### 7.3.2 Foundation Requirements

## Warning

The MV-PCS container is quite heavy, so the various conditions of the installation site (geological conditions, environmental and climatic conditions, etc.) should be investigated in detail before the foundation is constructed. Only on this basis can the foundation designing and construction work begin.

Unreasonable foundation construction plans will bring greater difficulties to the placement of MV-PCS container, door opening and closing, and the follow-up operation and maintenance. Therefore, the installation foundation must be designed and constructed in advance based on certain standards.

The following requirements need to be satisfied when constructing the foundation:

- The bottom of the foundation pits must be compacted and filled.
- The foundation should provide adequate load-bearing support for the PCS container. Besides, the foundation height should be relatively raised in case of erosion caused by rain and water. And we recommend that the height is at least 300 mm above the ground level.
- Build a cement foundation with proper cross-sectional area and height. The height of the foundation should be determined by the builder according to the site situation.
- Cable routing should be considered when constructing the foundation.

### 7.3.3 Recommended Foundation Construction

The following diagram is a foundation construction design for your reference.

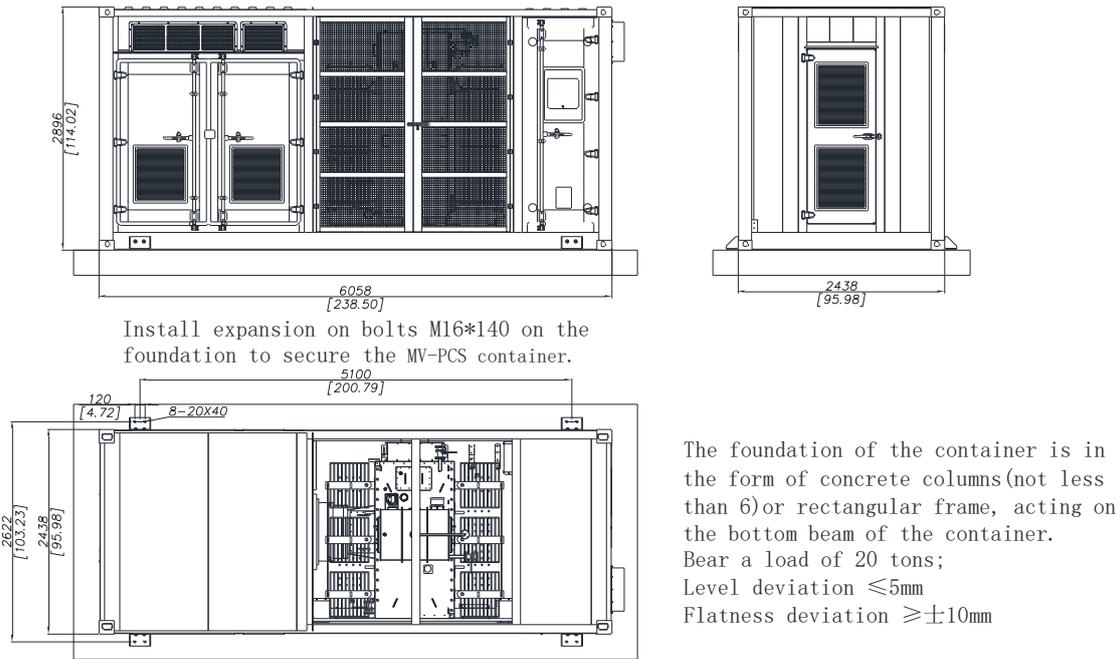


Fig.7-3 Foundation design diagram

- In excavation foundation, the foundation should be reinforced with rammed earth and wet loose soil. The highest point of the surrounding terrain should be chosen for the foundation construction site to prevent water damage.
- The grounding resistance is less than  $4 \Omega$ , we suggest using  $50 * 5 \text{ mm}$  galvanized flat steel, and the length depends on the site condition, the grounding point are located in the four symmetrical soldering;
- Adopt galvanized steel pipe for inlet and outlet cables, cable trenches are also good choice to lay cables, and detailed construction drawings are needed.
- Levelling instrument shall be used to ensure the foundation surface is level. The wall height should be higher than the highest local flood record.
- Drainage gutters must be arranged around the foundation and connected to the site drainage ditch nearby;
- This foundation drawing is only for reference, it should be modified to meet seismic and wind resistance requirement based on the exact weight of container.
- All embedded pipes need to be temporarily blocked at each end to prevent litters from entering, otherwise it is not conducive to cable laying later.
- When all electrical collection, the position of cable collection should be blocked, to prevent insects, rats or other small animals from entering.

### 7.3.4 Other Considerations

## Caution

The installation site should have a drainage system to prevent the bottom of the container or the equipment in the room from being submerged in water.

## Caution

No trees around the installation site to prevent container doors and air inlets from damages caused by falling branches or leaves.

## 7.4 Fixed Installation

After finishing constructing, wait for the foundation to be sufficiently dry, strong and flat, the MV-PCS container can be lifted to its arranged location.

Fixed solution 1:

The channel at the bottom of the container should be firmly welded to the steel plate buried under the four corners of the foundation by using 6# angle steel. Once the welding is completed, the connection between the bottom of the container and the foundation should be sealed with proper sealing material and anti-corrosion measures are also needed.



Fig. 7-4 Fixed solution 1

Fixed solution 2:

In this case, 8 expansion bolts (M16\*140) are needed to fix the holes (at the bottom of the MV-PCS container) and the foundation together. After that, the MV-PCS container between the bottom of the container and the foundation should be sealed with proper sealing material and anti-corrosion measures are also of great importance.

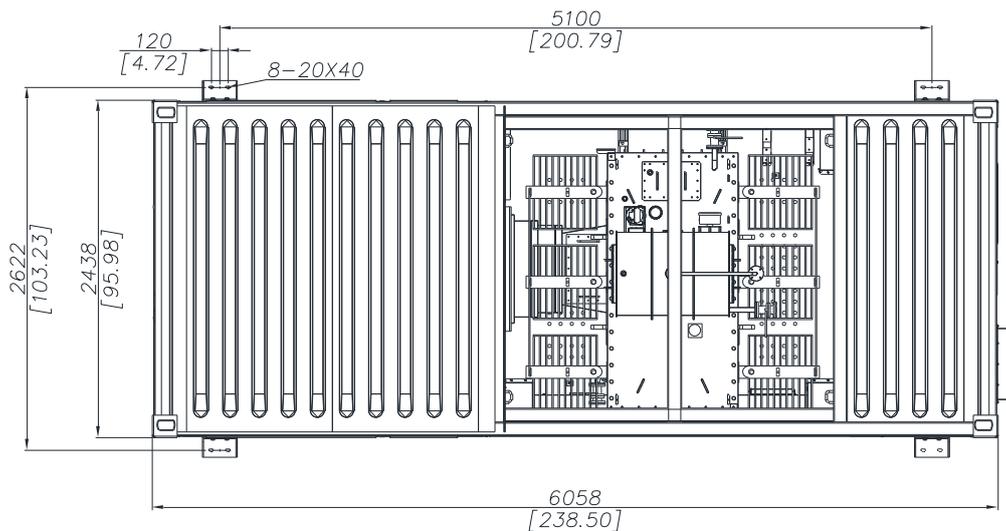


Fig. 7-4 Fixed solution 2

# Chapter 8 Electrical Connection

## 8.1 Safety Instructions

- Don't touch conductive parts.
- Ensure the AC/DC side is uncharged before installation or maintenance.
- Since the temperature of some parts on the equipment is relatively high, do not place it together with inflammable and explosive materials.
- The MV-PCS system can only be connected to the grid after the local Utility permits.
- All electrical installations must comply with the local installation standards.

 be careful	Only professional electricians or staff with professional qualification can conduct electrical installation.
---	--

## 8.2 Wiring Diagram

The wiring diagram of NEPCSH-5000-MV is shown in Figure 8-1, which needs to be strictly followed.

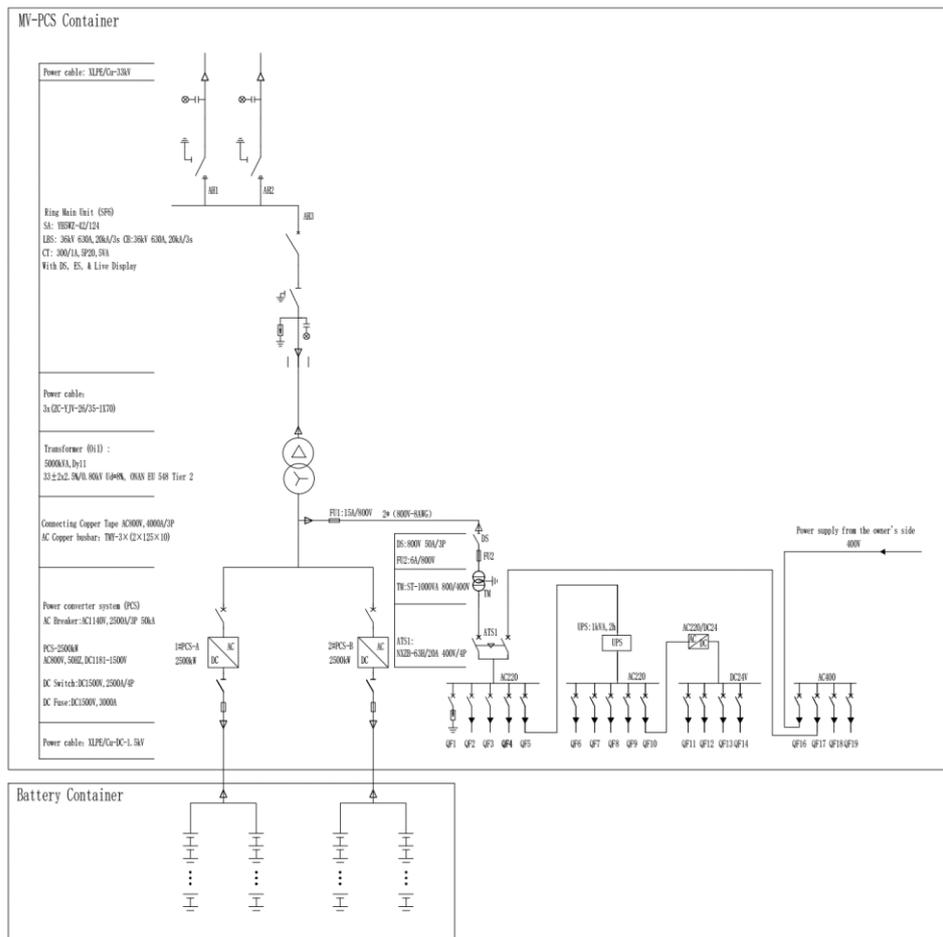


Fig. 8-1 Wiring diagram

## 8.3 Cable Requirements

Table 8-1 Cable Requirement

Cable	Identifier	Wire diameter	Terminal aperture	Bolt specification	Maximum number of cables
Energy storage battery packBAT1+	BAT1+	185-300mm <sup>2</sup>	17mm	M16*50	6 pcs
Energy storage battery packBAT1-	BAT1-	185-300mm <sup>2</sup>	17mm	M16*50	6 pcs
Energy storage battery packBAT2+	BAT2+	185-300mm <sup>2</sup>	17mm	M16*50	6 pcs
Energy storage battery packBAT2-	BAT2-	185-300mm <sup>2</sup>	17mm	M16*50	6 pcs
Yellow-green ground	PE	95-150mm <sup>2</sup>	9mm	M8*25	2 pcs
Communication Cable	CANH/CANL/CANG	0.5-2.5mm <sup>2</sup>	-	-	1 pcs
BMS E-stop	X1.6/X1.7	0.5-2.5mm <sup>2</sup>	-	-	1 pcs
Auxiliary power supply	X7.1/X7.2/X7.3	4-6mm <sup>2</sup>			1 pcs
Output U	C1U	95-300mm <sup>2</sup>	-	EN50180-C400	1 pcs
Output V	C1V	95-300mm <sup>2</sup>	-	EN50180-C400	1 pcs
Output W	C1W	95-300mm <sup>2</sup>	-	EN50180-C400	1 pcs
Output U	C2U	95-300mm <sup>2</sup>	-	EN50180-C400	1 pcs
Output V	C2V	95-300mm <sup>2</sup>	-	EN50180-C400	1 pcs
Output W	C2W	95-300mm <sup>2</sup>	-	EN50180-C400	1 pcs

## 8.4 Preparations before Electrical Wiring

### 8.4.1 Open the Front Door

The PCS cabinet door is equipped with a door lock. When it' s locked, an  $\Phi$  key is required to open the cabinet door.

### 8.4.2 Ensure that the AC and DC Main Circuit are Disconnected

The locations of the PCS key components are shown in Figure 8-2.

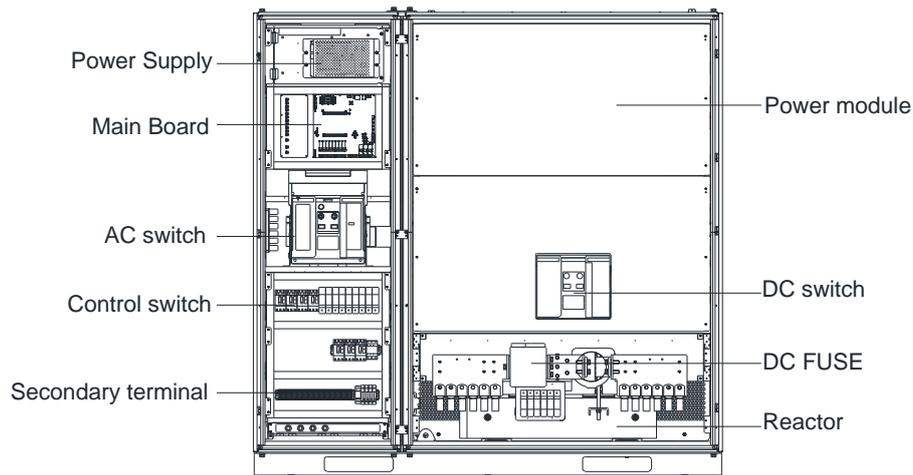


Fig. 8-2 Locations of key components layout

### 8.4.3 Open the Wiring Hole

Outlet holes for DC cables, communication cables, AC cables and grounding cables are reserved at the bottom of the SKID container. Open the sealing plate and you can see the square connection holes. After wiring, the gap should be sealed with polyurethane foam to prevent animals from entering.

## 8.5 Cable Wiring

### 8.5.1 Cable Wiring Sequence

There are 4 external connection interfaces on the PCS:

Ground wiring

AC side wiring

Energy storage battery wiring

Communication wiring

 warning	Please connect the cables in accordance with the correct order to avoid accidents.
--	--

Connecting steps: Ground wiring → AC side wiring → Energy storage battery wiring → Communication wiring

 warning	1. Do not connect all the AC switches at the same time. 2. Before powering on the AC side, ensure that the AC switches are at off state.
 warning	1. Do not connect all the DC switches at the same time. 2. Before powering on the DC side, ensure that the DC switches are at off state.

### 8.5.2 Wiring Rules

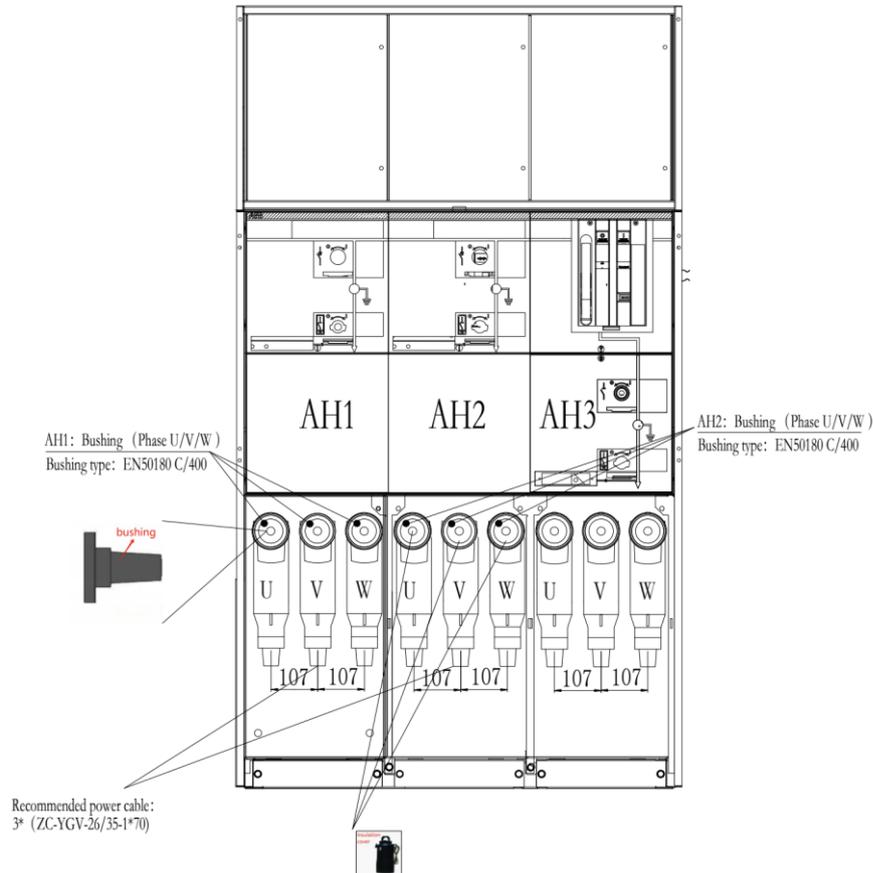
#### 8.5.2.1 Ground wiring

Ensure that the grounding copper bar of the PCS is perfectly connected to the public

grounding device provided by the power station. The sectional area of grounding cable should be no less than  $95\text{mm}^2$ , and the contact resistance should be less than  $4\Omega$ .

### 8.5.2.2 AC side wiring

For AC side wiring, the superior breaker should be disconnected first, then use a multi-meter to confirm that there is no electricity existed before wiring. Connect the cables in strict accordance with the phase sequence marked on the connection cable.



Note:

- 1) If the AH2 cabinet does not need to be put into use, keep the load switch of AH2 open and the grounding switch of AH2 closed.
- 2) It is recommended that customers install installation caps to cover the high-voltage cable conduit, then put a notice label or lock AH2 cabinet.
- 3) For the last one MV-PCS skid whose RMU does not need to connect with other MV-PCS skid's RMU, client may only connect with AH1, while AH2 bushing should be covered by 630A insulation cover.

Fig. 8-3 AC side connection terminal diagram

### 8.5.2.3 Energy storage battery wiring

For the wiring of the energy storage battery, be sure to disconnect the superior circuit breaker and the protective circuit breaker first to avoid any possible electric shock, short circuit and other safety accidents; please connect the energy storage battery according to the positive and negative symbols on the copper plate (BAT+ should be connected to the positive terminal, BAT- should be connected to the negative terminal).

After the PCS superior breaker is disconnected, you may use a multi-meter to measure the voltage value at the lower end of the DC breaker to confirm whether the voltage and polarity are correct.

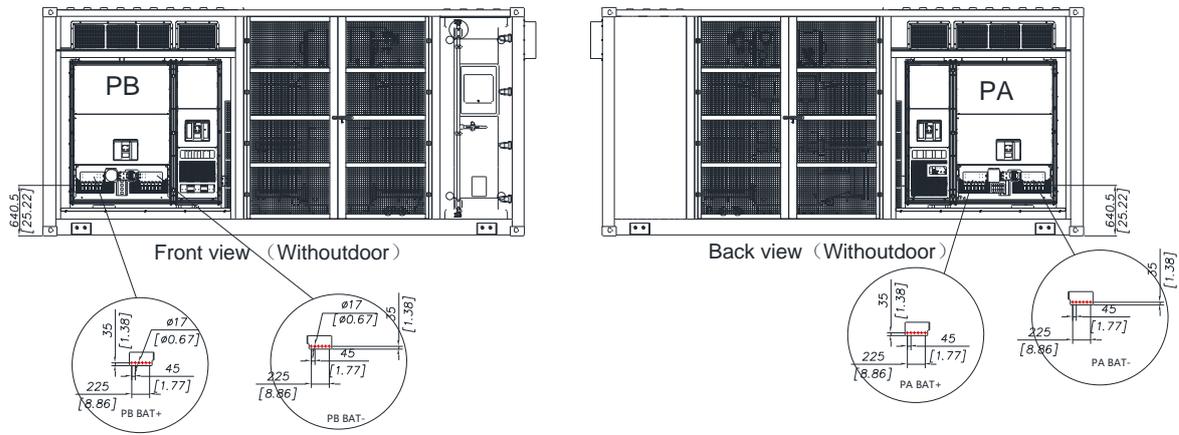


Fig.8-4 DC side connection terminal diagram

## 8.5.2.4 Communication wiring

PCS provides CAN and Ethernet communication interfaces, the location is shown in Figure 8-5/6.

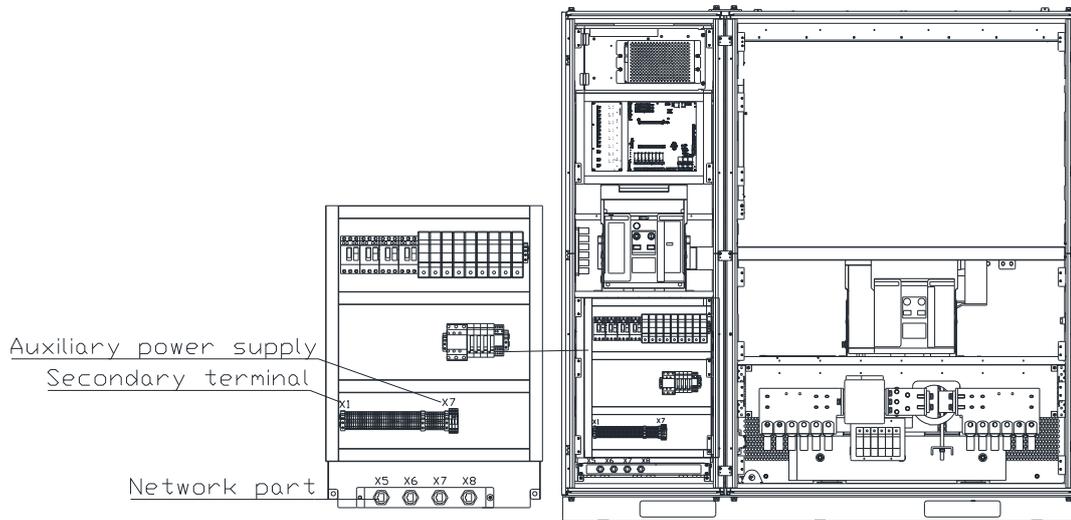


Fig.8-5 Communication connection terminal diagram (PA)

Cable number	Description
X1:12 (CANH)	CAN communication interface
X1:13 (CANL)	
X1:14 (CANG)	
Ethernet X5 ( P1 )	IEC 61850 (Reserved)
Ethernet X6 ( P5 )	IEC 61850 (Reserved)
Ethernet X7 ( P4 )	Modbus TCP
Ethernet X8 ( P3 )	Modbus TCP

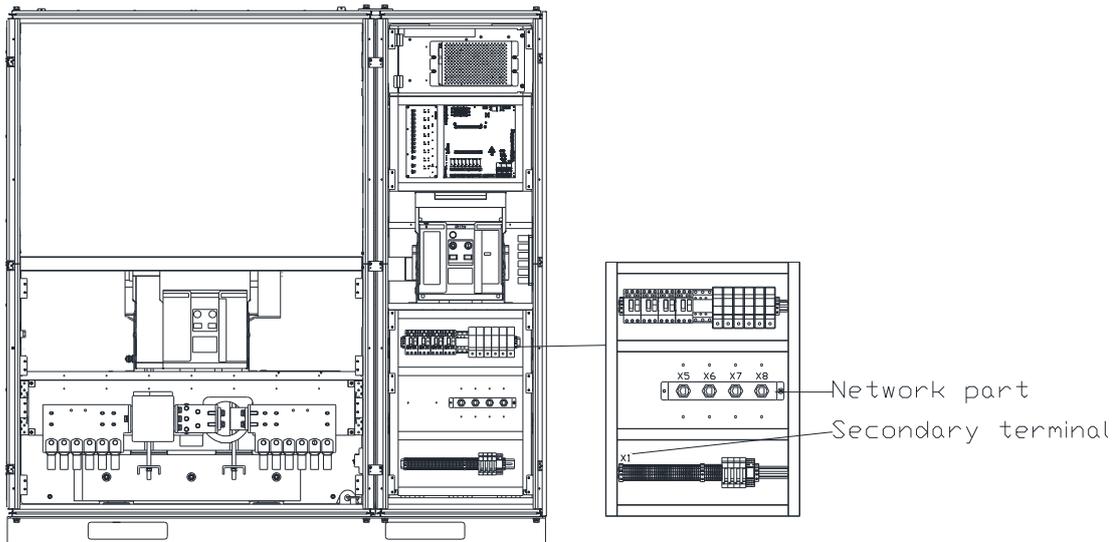


Fig.8-6 Communication connection terminal diagram (PB)

Cable number	Description
X1:12 (CANH)	CAN communication interface
X1:13 (CANL)	
X1:14 (CANG)	
Ethernet X5 ( P1 )	IEC 61850 (Reserved)
Ethernet X6 ( P5 )	IEC 61850 (Reserved)
Ethernet X7 ( P4 )	Modbus TCP
Ethernet X8 ( P3 )	Modbus TCP

### 8.5.3 Power-on Inspection

After all the cable connection work is completed, please strictly follow the steps below for power-on inspection.

	The DC breaker in the PCS can be connected after confirming that the polarity and voltage are correct, and the difference between the busbar voltage and the DC input voltage does not exceed DC30V.
--	--

Step1: Check whether BAT+ and BAT- are correctly connected.

Step2: Turn on the AC input power, check whether the AC voltage and phase sequence are correct.

Step3: Keep the AC/DC main switch (Q1/Q8) at off state and the rest of the switches at on state.

Step4: Confirm that if the voltage of energy storage battery and AC voltage are normal by the touch screen again.

Step5: Disconnect the equipment AC/DC power after all checks are passed.

Step6: Close the door and lock it.

## Chapter 9 Installation Checklist

Before operation, the MV-PCS installation should be checked by at least two staff according to the following checklist.

### Checklist of Mechanical Installation

- No deformation or damage on the MV-PCS
- Fixed bottom and reliable support for the MV-PCS
- Enough space left around the MV-PCS
- Temperature, humidity and ventilation comply with requirements
- Smooth flow for cooling air
- The cabinet of the MV-PCS is sealed and complete

### Checklist of Electrical Installation

- Fixed and complete grounding of the MV-PCS
- Grid voltage matched with rated input voltage of the MV-PCS
- Correct phase sequence, tightening torque complied with the requirement
- DC input correctly connected to the negative and positive terminals, tightening torque complied with the requirement.
- Correct communication wiring and reasonable distance with other cables
- Correct and clear cable markers
- Complete and reliable insulated protective cover, and the warning marks are clear and fixed.

### Others

- All useless conductive parts should be tightened up with insulated tape.
- No tools, components or conductive dust produced by hole-drilling left inside of the cabinet.
- No humidity or freezing occurred in the inside of the cabinet.

## Chapter 10 Trail Operation

### 10.1 Trail Operation Requirements

Before the trail operation, the installation of MV-PCS should be thoroughly checked, especially whether the voltage of DC/AC terminals meets the requirements, and

whether the polarity and phase sequence are correct.

Make sure that all connections meet the requirements of relevant standards and specifications and that the system is well grounded. Since grounding resistance plays a vital role in system safety, make sure the grounding resistance meets the requirements before the first trial operation.

## 10.2 Check before Trial Operation

### 10.2.1 Check the AC Input

Before running the PCS, make sure the AC input voltage, frequency, phase sequence meet the design requirements.

### 10.2.2 Check the Energy Storage Battery Units

Check the energy storage battery before running the PCS, making sure the open circuit voltage  $V_{oc}$  and polarity meet the design requirements.

### 10.2.3 Check the PCS

Check the following items before powering on the PCS:

- Step1: Check the installation and wiring of PCS according to the Installation Checklist in Chapter 9.
- Step2: Make sure the AC and DC breakers (Q1 and Q8) are at OFF state.
- Step3: Make sure the emergency stop button has been released and can operate normally.
- Step4: Make sure all switches in the cabinet are at ON state (except Q1 and Q8) , the power supply is normal, and there are normal AC and DC voltage displayed on the touch screen.

### 10.2.4 Check the PCS Voltage

Check the AC&DC side voltage

- Make sure the AC input sequence (A, B, C, GND) is correct.
- Test and record the AC open circuit voltage and frequency.
- Check the DC side voltage
- Make sure the DC input polarity is correct.
- Test and record the DC open circuit voltage.

## 10.3 Startup and Running

### 10.3.1 MV Switchgear Power On

1). Before power on, check and confirm that all load switches, isolation switches, circuit breakers, and grounding switches of the medium voltage switchgear are in the open state (note: if AH2 cabinet is not put into use, its load switch should be kept open and the grounding switch should be kept closed);

2). Close the AH1 load switch, and the high-voltage bus is now live;

3). Close the isolation switch of AH3, and then close the circuit breaker of AH3. At this time, the transformer is live. Note that the transformer is in an unloaded state. If the transformer is being put into use for the first time, it is necessary to pay close attention to its operating status if any abnormal.

4). If AH2 needs to output power to the next MV-PCS or MV station, close the load switch of AH2 at this time.

### 10.3.2 BESS Power On

Check BESS user manual.

### 10.3.3 Confirm the PCS Startup Conditions

Check the real-time information displayed on the HMI, such as whether the AC/DC voltage and frequency are consistent with the measured values.

Check the real-time fault information displayed on the HMI (function - operation information - abnormal status), and clear all faults if any.

Note: Please refer to “Chapter 11 Touch Panel Operation Instructions” for detailed instructions of the touch screen.

### 10.3.4 PCS Power On

Access the Power On/Off screen via the touch screen to view more operating modes. If the battery needs to be charged and discharged from the grid, select “grid-connected (PQ mode)” mode. If there is no grid, and need to run off-grid to power the load, select “off-grid (VF mode)” mode.

Positive active power indicates that the battery is discharging to the grid, and negative active power indicates that the battery is being charged from the grid.

Click “Start” to power on the PCS.

After receiving the power on command, PCS automatically performs the steps of DC pre charging, DC load switch closing, and AC circuit breaker closing, completing the power on of PCS.

## 10.4 Power OFF

### 10.4.1 PCS Power Off

Enter the Start/Stop page via touch screen, click “Stop” to power off the PCS.

After receiving the shutdown command, PCS automatically performs the steps of disconnecting the AC circuit breaker and disconnecting the DC load switch, and the shutdown of PCS is completed.

Once the emergency signal is received, the AC/DC breaker will be disconnected and the PCS will stop working. If the inverter needs to be restarted, the emergency signal should be cancelled, and then push the AC/DC breaker into “OFF”. Click “Stop” on the touch screen to reset the error, then start again.

### 10.4.2 BESS Power Off

Check BESS user manual.

### 10.4.3 MV Switchgear Power Off

1). Manually disconnect the AH3 circuit breaker, then manually disconnect the AH3 isolation switch, and manually close the AH3 grounding switch. At this point, the main transformer power is disconnected.

2). If AH2 cabinet is live, ensure the next MV-PCS skid has been powered off and disconnected, then manually disconnect the AH2 load switch and then manually close the AH2 grounding switch.

3). Note that the busbar of the MV switchgear is still live at this time, then manually disconnect the AH1 load switch. If maintenance and repair of MV-PCS skid is required, manually close the AH1 grounding switch after ensuring that the upper level high-voltage switch is open and the circuit is not electrified. If it is not for maintenance

and only a regular power outage is required, the AH1 grounding switch will remain open.

 danger	During on-grid operation, if the superior breaker of the AC panel hasn't been disconnected, then the AC output terminal still remains charged after the AC breaker is disconnected!
 danger	If the superior breaker of energy storage system hasn't been disconnected and remained charged, the DC input terminal still remains charged after the breaker of energy storage system is disconnected.
 danger	The bus capacitor and filter capacitor may stay charged after shutdown, please measure the DC residual voltage with a multi-meter before any operation.

# Chapter 11 HMI Operation Instructions

The human-machine interface (abbreviated as HMI) adopts MT8106Iq(1024X600) Weinview touch screen to monitor and control the PCS. It also features with such functions as data display, user operation, running control, fault alert and historical data record.

## 11.1 Operation Instructions

The appearance of touch screen is shown in Figure11-1;

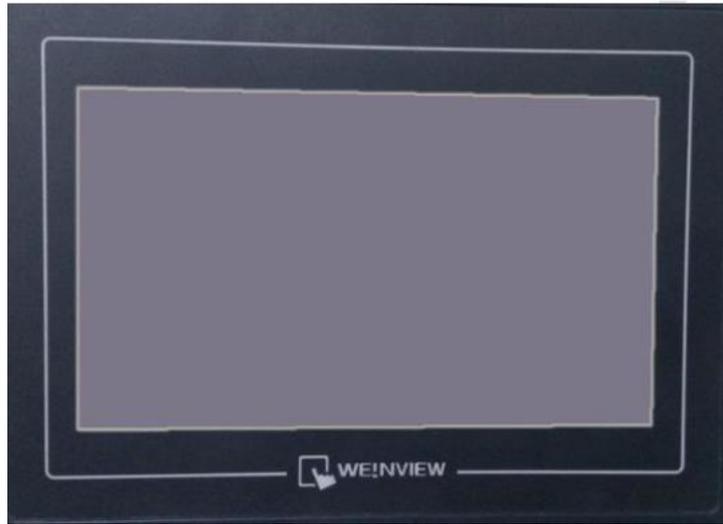


Fig.11-1 Appearance of touch screen

### Cautions on operation :

Please don't conduct several operations at the same time.

- Operate via the touch screen: only touch one operation control each time.
- Operate via the keyboard: don't press two buttons at the same time.

Note: Operation control refers to the input box or button.

 warning	Don't touch the screen by sharp objects and impose excessive pressure on the screen by hard objects. These two behaviors will largely shorten the service life of the screen, or even damage the whole system. Use a finger or touch pen to operate on the HMI screen.
--	---

## 11.2 HMI Input

The touch screen is an industrial resistive touch screen, which can be calibrated according to user habits when touching.

- Touch the corresponding input objects to entry in operation interface.
- Use screen keyboard of HMI to input new value in input field.
- Touch the button for operation.
- Open the list by touching the selection field and then touch the required item in the list.
- Touch the check box for activation or cancellation.
- Touch the option button to select.
- Use  button to confirm the selection or  button to stop.
- Use  button to close the screen.

## 11.3 Onscreen Keyboard Input

The screen keyboard can move the location of menu bar. Touch  to confirm the entry and then close the keyboard.

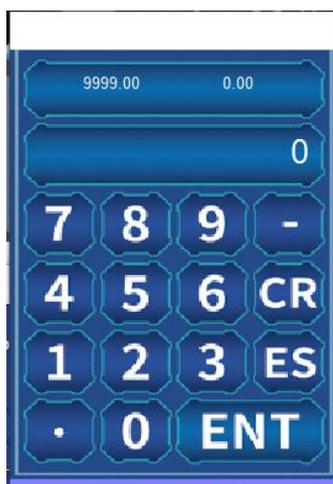


Fig. 11-2 Screen keyboard

## 11.4 Stipulations of Agreement

In the grid-connected operating application, in order to make the system work properly, first, define the following settings:

Active power: Positive number indicates that power is being generated to the grid, which means, the battery is in discharging state, and negative number indicates that grid power is being consumed, which means the battery is in being-charged state.

Reactive power: Positive numbers means inductive reactive power and negative numbers means capacitive reactive power.

Current: Positive number indicates that power is being generated to the grid, which means the battery is in discharging state, and negative number indicates that grid power is consumed, which means the battery is in being-charged state.

## 11.5 Interface Introduction

### 11.5.1 Main Interface

The system enters the main interface by default after startup, as shown in Figure 11-3.

This interface can display the key parameters and power generation of the equipment during operation.

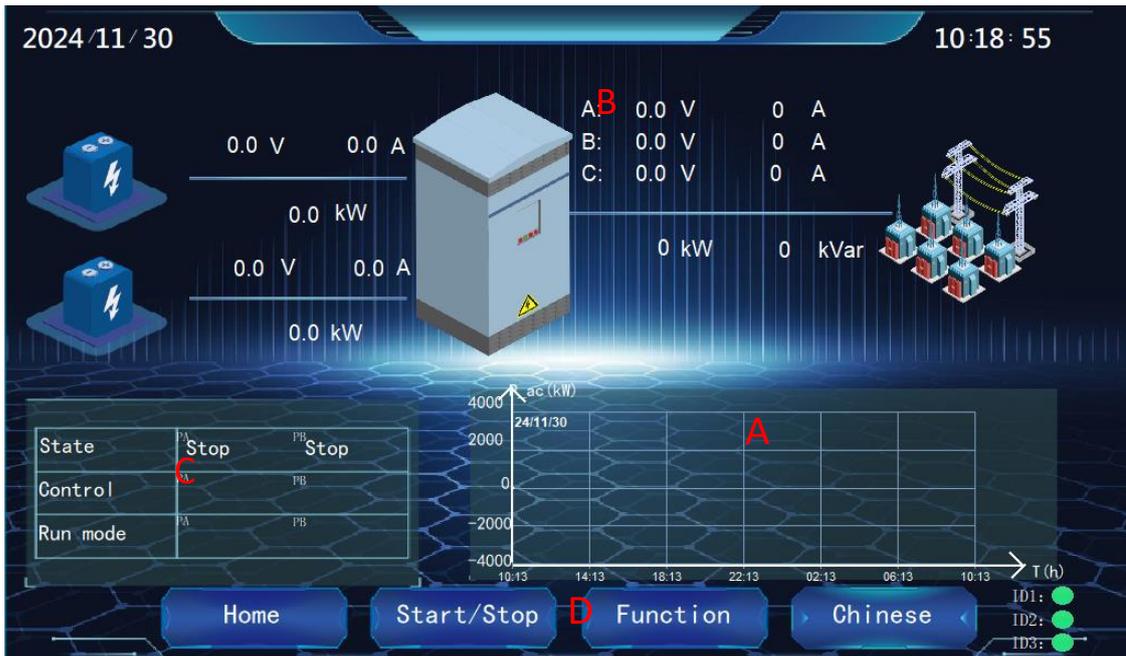


Fig. 11-3 Main interface

- A. Power curve;
- B. Display important parameters;
- C. The diagram of communication status and operating time display the actions of switch;
- D. Main menu, 4 buttons included to monitor and control the PCS;

### 11.5.2 Real-time Information Interface

Click the PCS icon on the main interface to jump to the running information interface.

#### 11.5.2.1 Running information interface

You can enter into the real-time information interface by click “PCS Data” in the running information page.

The real-time information on the interface:

- Battery voltage, current, power.
- AC voltage, current, power, frequency.
- The temperature of IGBT.
- Power factor.

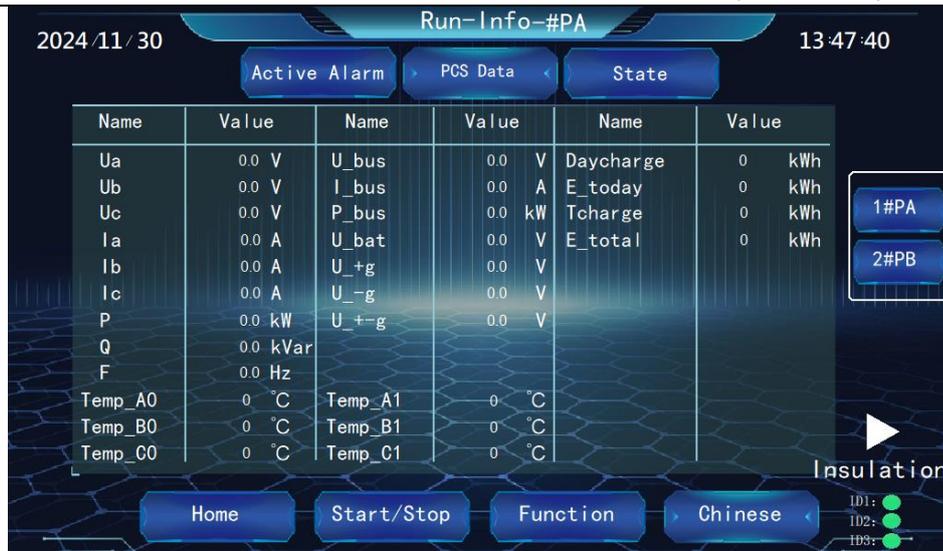


Fig.11-4 Real-time information interface

### 11.5.2.2 Error state interface

Click the “Active Alarm” to enter into the error state interface, when the PCS fails, the error information will be displayed on the error state interface.

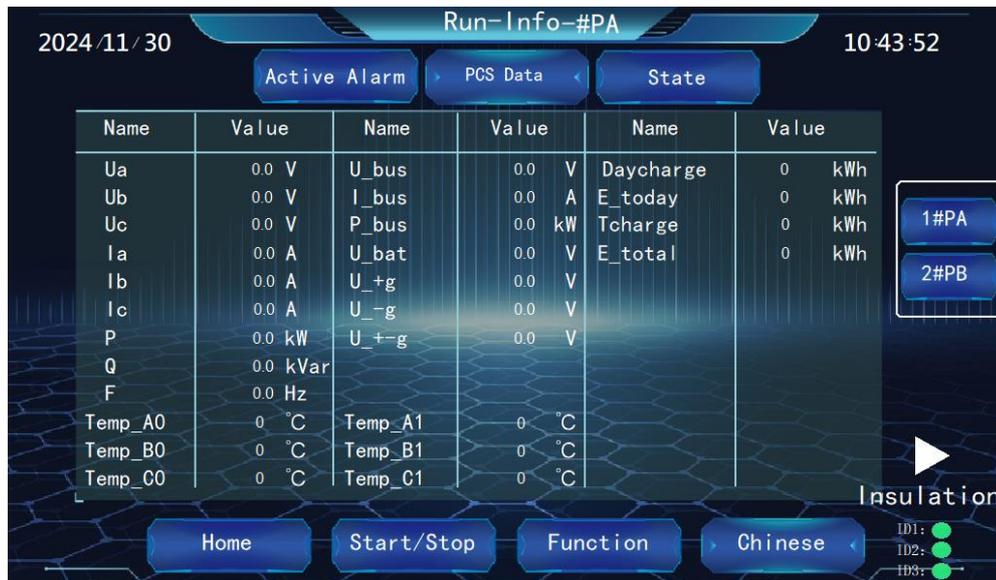


Fig.11-5 The error state interface

## 11.5.2.3 Breaker/fuses information interface

Click” State” to enter into the breaker/fuses information interface.

The information on the interface:

- The information of AC/DC breaker.
- The information of Surge protective device.
- The information of main fuses.
- The information of main contactors.
- The information of heating system for IGBT.
- The information of heat dissipation system for IGBT.



Fig.11-6 The breaker/fuses information interface

### 11.5.3 Power Curve interface

Click the power curve to enter into the power curve interface, or click the “P/T Graph” to enter it.

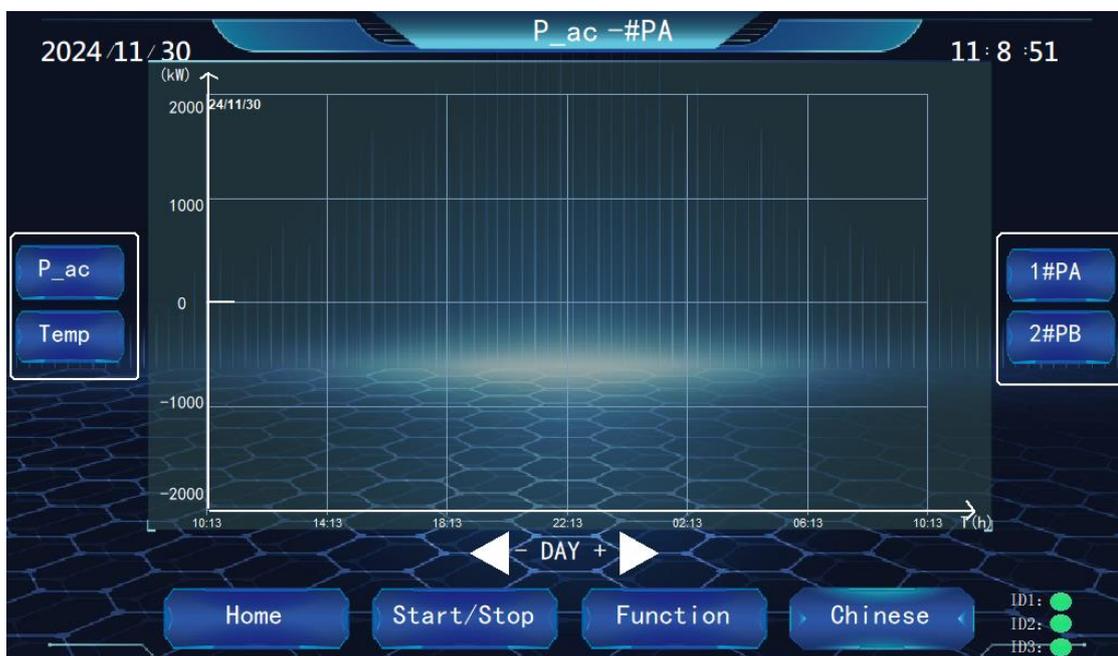


Fig.11-7 Power curve interface

### 11.5.4 Start/ Stop Interface

Click the Start/Stop to jump to Start/Stop interface, which is shown in Figure 11-8:



Fig.11-8 Start/Stop interface

Local mode (Local): The highest priority, the power value can only be set through the touch screen or the host computer.

Remote mode (REMOTE): the second highest priority, the power value can only be set through EMS or LC.

Off-grid mode (VF mode), off-grid operation mode; grid-connected mode (PQ mode), grid-connected operation mode.

Click “PQ mode” button to enter into the power setting interface and set the active power ( $P_{ac}$ ) and reactive power ( $Q_{ac}$ ), as shown in Figure 11-9.



Fig.11-9 Power setting interface

### 11.5.5 Function List Interface

Click the “Function “ button on the main interface to function interface,

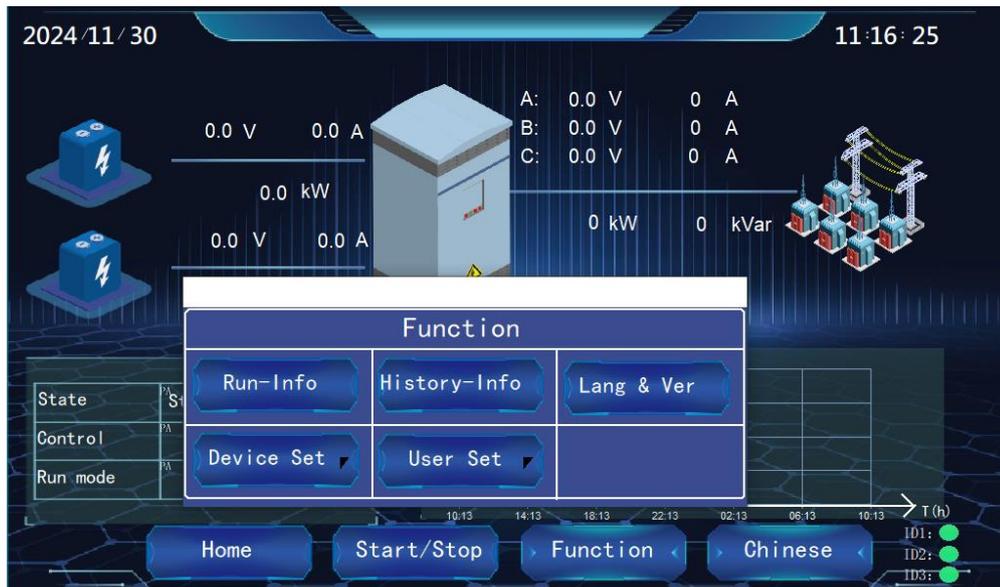


Fig.11-10 Function list interface

### 11.5.6 History Information Interface

When fault occurs, click ‘History Faults’ on the function interface to history information interface, and the PCS history faults can be checked, as shown in Fig.11-11.

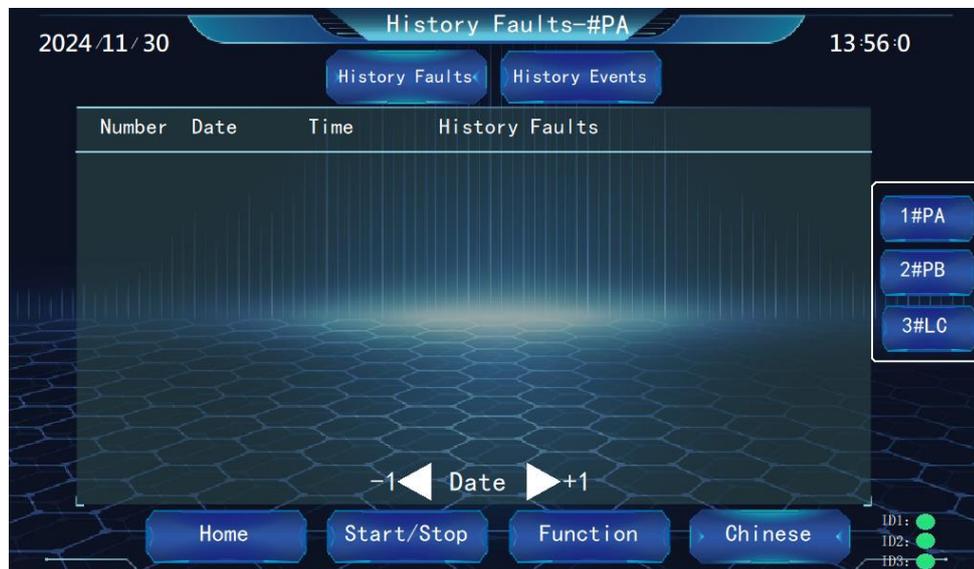


Fig.11-11 History faults interface

After PCS stops, click “History Events” on the function interface to history information interface, then the PCS history events can be checked, as shown in Figure 11-12.

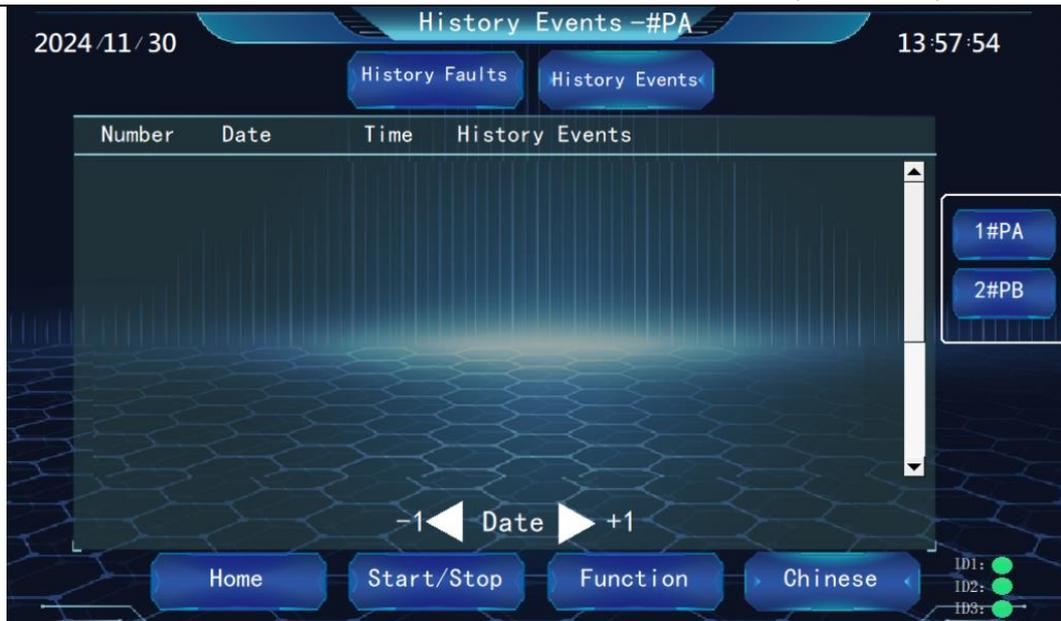


Fig.11-12 History events interface

### 11.5.7 Temperature Curve

On the left side of the power curve, click 'Temp' to enter the IGBT temperature curve, as shown in Figure 11-14.

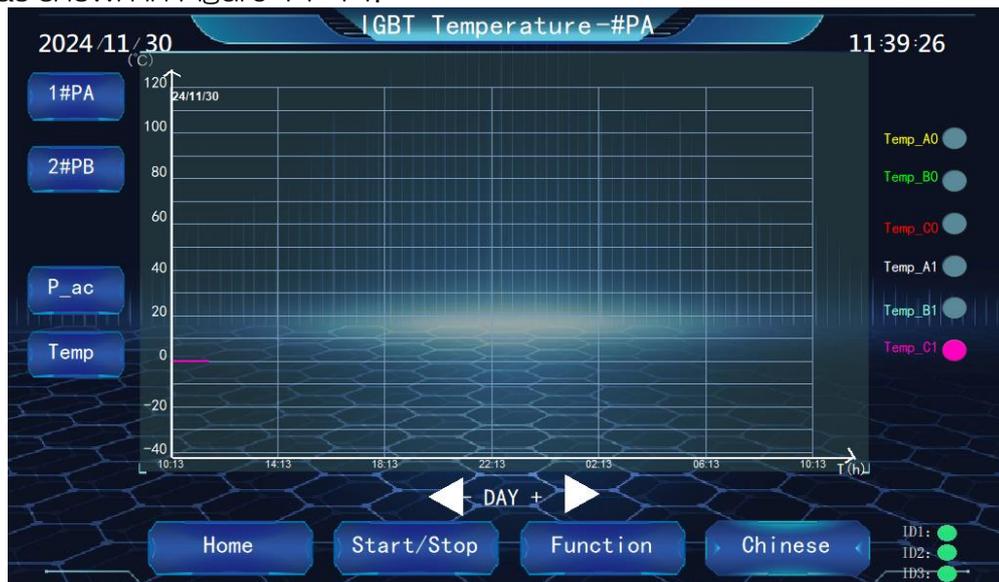


Fig.11-13 IGBT temperature curve

On the right side, click Temp\_A0 to light the button, the curve will showed. If you click again, the button will be gray, the curve will no display.

### 11.5.8 Device Set

Click 'Device Set' on the 'Function' interface and input the password 400 to enter the device setting interface, as shown in Figure 11-14.

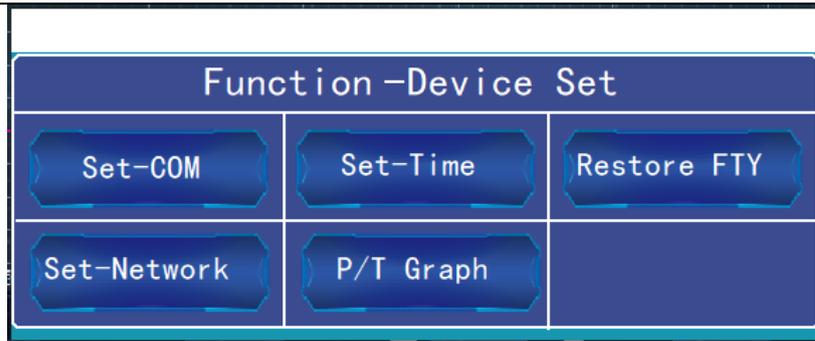


Fig.11-14 Parameters setting interface

The input password is: 400

In the device parameter interface, click 'Set-Time' menu to enter the time setting page, as shown in Figure 11-15.



Fig.11-15 Time setting interface

Click the "Set-Network" button to enter the IP setting page. Change the IP, then click "ok" button to complete IP Settings.



Fig.11-16 Set-NetWork interface

### 11.5.9 User Configuration Interface

Steps to configure user information are:

Click "Function" in the main interface, then select "User Set". And the following interface will pop out and then input parameters via screen keyboard, as shown in Figure 11-17.

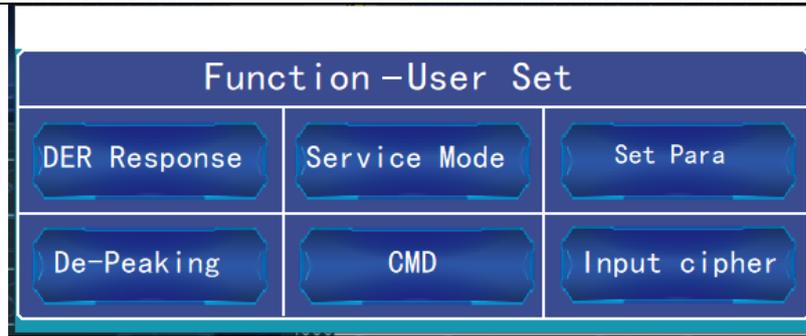


Fig.11-17 User configuration interface

The input password is : 1111

### 11.5.10 Protection Parameters Interface

Click the 'Protection Parameters' to enter protection parameter interface, as shown in Figure11-18.

The basic protection parameters of the PCS can be set in this interface.

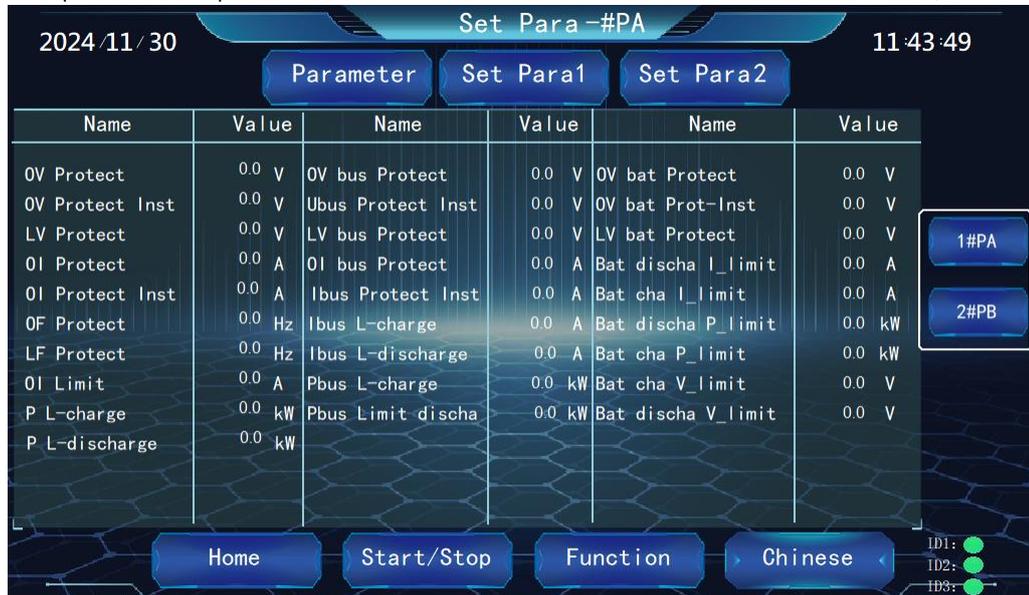


Fig.11-18 Protection parameters interface

### 11.5.11 Running Parameters Interface

Click the 'Running Parameters' to running parameter interface, as shown in Figure11-19.

The basic running parameters of the PCS can be set in this interface.

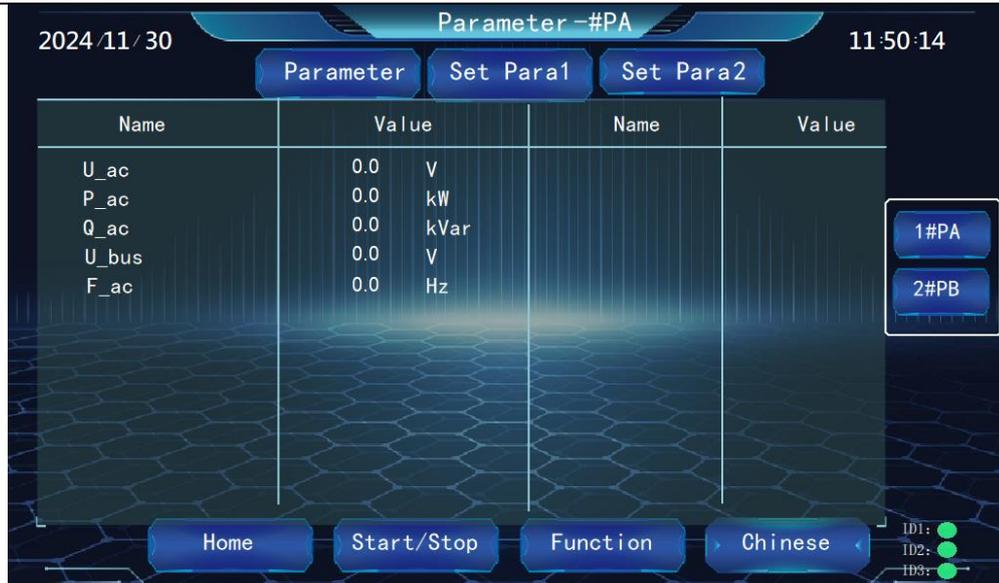


Fig.11-19 Running parameters

### 11.5.12 Peaking setting

Click the 'De-Peaking' to enter peaking interface, as shown in Figure11-20.



Fig.11-20 De-Peaking interface

Set the peak cutting and valley filling time, the device will run at the set time and power.

### 11.5.13 Language and version

Click the 'Lang & Ver' to enter language and version interface, as shown in Figure11-20.

The interface will show the versions and switch language between Chinese and English.



Fig.11-21 Lang&amp;Ver interface

## Chapter 12 Appendix

### 12.1 Technical Parameter

System Type	NEPCSH-5000-MV-IEC
PCS DC side	
Max. DC voltage	1500V
Min. DC voltage	1181V
DC voltage range for nominal power	1181 - 1500V
Max. DC current	2328A*2
No. of DC inputs	2
PCS AC side	
Nominal AC power (at 45 °C)	2500 kVA*2
Max. AC current	1804 A*2 @ 45 °C / 1985A*2 @ 30 °C
Nominal AC voltage	800V
Grid frequency range	50 Hz/45-55 Hz,60 Hz/55-65 Hz
Max. THD of current	< 3 % (at nominal power)
DC current injection	< 0.5 % I <sub>n</sub>
Power factor at nominal power / Adjustable power factor	>0.99 / 0.99 leading - 0.99 lagging
Adjustable Reactive power	[-100%~100%]
Number of Phases	3Ø
Transformer	
Nominal Power	5000 kVA
MV/LV	0.8 kV / 11 - 35 kV
Connection group	Dy11
Cooling method	ONAN
Oil type	Oil
Protection	
DC input protection	Load break switch + fuse
AC output protection	Circuit breaker
Overvoltage category	DC Type II / AC Type III
Grid monitoring / Ground fault monitoring	Yes / Yes
Insulation monitoring	Yes
Overheat protection	Yes
General Data	
Dimensions (W*H*D)	6058mm *2896mm *2438mm
Weight	About 19000kg
Degree of protection	IP 54 (Oil tank IP68)
Operating ambient temperature range	-30 to 55°C (> 40°C derating)
Allowable relative humidity range	0 - 95 % (non-condensing)

Noise emission	<75dB
Cooling method	Temperature controlled forced air cooling
Max. operating altitude	4000 m (> 2000 m derating)
Display	Touch screen
Certification	EN IEC 62477-1, IEC 61000-6-2/4, EN 50549-1/2
Communication	Standard: RS485, CAN, Ethernet Optional: IEC 61850 Goose, IEC 104

## 12.2 Quality Warranty

Shenzhen CLOU Electronics Co., Ltd. will give free maintenance or change the product for free if some faults occurred during the warranty period.

### Invoice:

The customer is required to present the invoice and date of purchasing during the warranty period. Meanwhile, trademarks displayed on the product should be clear and readable; otherwise, Shenzhen CLOU Electronics Co., Ltd. reserves rights not to provide quality guarantee.

### Conditions:

The unqualified products need to be handled by the company after changing.

The customer should give some appropriate time for troubleshooting.

### Exempt from duties:

Under these conditions, Shenzhen CLOU Electronics Co., Ltd. reserves rights not to provide quality guarantee.

- The overall unit or parts beyond the warranty period.
- Damaged during transportation
- Inappropriate installation, modification or operation.
- Operate in harsh environment beyond the regulations in the manual.
- Damages caused by the person beyond Shenzhen CLOU Electronics Co., Ltd. during installation, maintenance, change and disassembly.
- Damages or faults on the PCS caused by using non-standard or not CLOU' s parts or software.
- Any installation and use beyond the scope of relevant international standards.
- Damage caused by abnormal natural environment.

As for damages or faults caused by the situation above-mentioned, if customers request for maintenance service, we can provide paid service if agreed by the company. Without prior notice if there are any changes in the manual, please subject to the latest documents.

### Software licensing

The company does not take any responsibility for the losses caused by the

software products provided with the products.

- It is forbidden to use some or all data in the firmware or software developed by the company for commercial purposes in any way.
- It is forbidden to decompile, decrypt or otherwise destroy the original program design of the software developed by the company.

### 12.3 Contact information

If you have any questions or doubts on the product, please feel free to contact us.

Add: CLOU Building, Hi-tech Industry Park North, Baoshen Road South, Shenzhen, China.

Tel : 86-0755-33309999

[www.clouglobal.com](http://www.clouglobal.com)