

SKID Solution User Manual



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Chapter 1 Manual Instruction

1.1 Foreword

To our distinguished customers, first of all, thank you for selecting NEPCSH-3200/4000-MV Power Conversion System (hereinafter referred to as the PCS) developed by Sichuan CLOU New Energy Electric 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.

At the same time, our company also supply products including PV inverter, hybrid power conversion system, micro-grid system and etc. You are more than welcome to consult and negotiate.

Note

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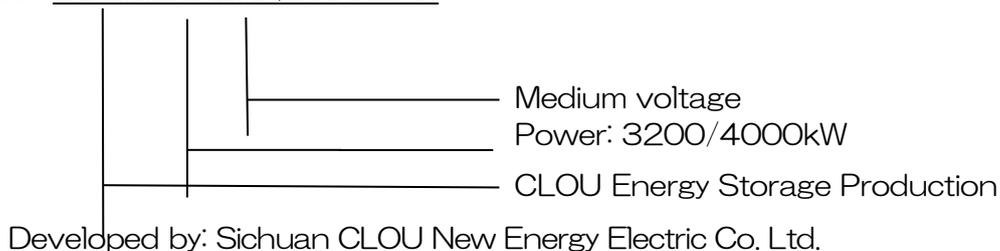
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1.2 Model Specification

Name: Power Conversion System

Model: NEPCSH-3200/4000-MV



Developed by: Sichuan CLOU New Energy Electric Co. Ltd.

1.3 Applicability

This manual is intended for personnel with some experience in the installation of this product or similar products. The operator should have some electrical, wiring and mechanical expertise to ensure proper installation as specified in this manual.

1.4 Symbol Descriptions

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

 danger	This symbol indicates a serious potentially hazardous situation that will result in death or serious injury if not installed or operated as required.
 warning	This symbol indicates a potentially hazardous situation that could result in death or serious injury if not installed or operated as required.
 be careful	This symbol indicates a potentially hazardous situation that could result in equipment failure or property losses if not installed or operated as required.

Please pay attention to the warning signs marked on the product. The specific descriptions are as follows:

	This sign indicates the presence of high voltage in the device. Touching may result in electric shock.
	This sign indicates that the temperature here is higher than the acceptable range for human body. Please do not touch it.
	This sign indicates that the internal capacitor takes 5 minutes to discharge after the PCS is turned off. Be careful and avoid electric shock.
	This sign indicates the protective earth (PE) terminal, which should be firmly grounded to ensure operator's safety.
	This sign indicates that the installation manual and maintenance manual are available for reference.

Chapter 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. NEPCS-4000-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.

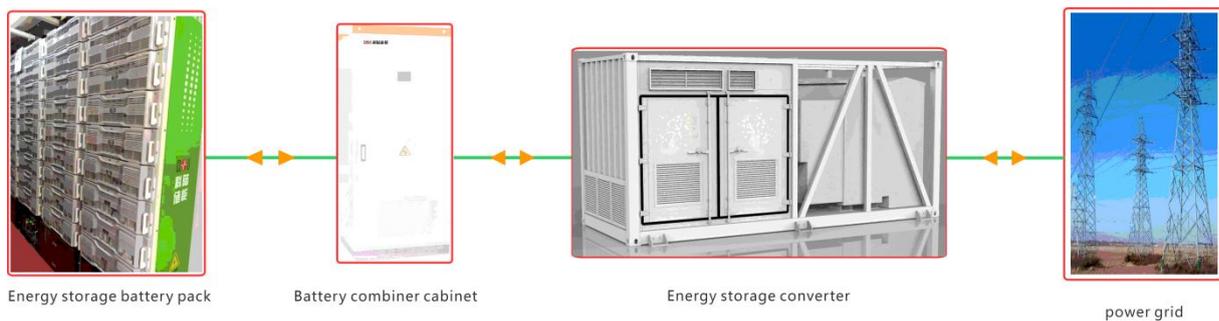


Fig.2-1 Components of energy storage system

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 PCS may cause electric shock. Be sure to install the PCS only with the power disconnected, and follow the steps below when doing so.

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

2.2.1.2 Risk of electric shock from incompletely discharged capacitors

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

2.2.1.3 Electric shock caused by damage on PCS

- Severe or fatal injuries may result from electric shock during operation if the PCS are damaged.
- Please operate the PCS only when the technical conditions and operation safety state permit.
- Please only operate the PCS when it' s not damaged, and do check it regularly.
- Check whether all external safety functions are available and make sure these functions are normal.

- Check for normal operation regularly.

2.2.1.4 Failure to comply with safety requirements may result in electric shock
Failure to follow the operating and safety instructions may result in serious injury.

- Please do follow the methods described in this manual.
- Please follow all the safety instructions.
- Please follow the circuit diagram during electrical connection.
- Please keep this manual safely near the PCS so it's available for maintenance.

2.2.1.5 Thermal hazards

- Some components' temperature may rise during operation. Please be careful during maintenance.
- Please wear safety gloves during.

2.2.2 Equipment Safety Precautions

2.2.2.1 Unauthorized modifications may cause damage to the PCS

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

2.1.2.2 Unauthorized person 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

- Please follow the protective regulations of ESD and wear protective gloves during maintenance.
- Discharge static electricity by touching grounding parts without painting (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 all operations on the PCS. Before installation, he/she should be familiar with this manual and follow the safety instructions.

Chapter 3 Supply Document

3.1 Supply List

NEPCSH-3200/4000-MV contains these items in the packing case:

Table 3-1 Supply list of NEPCSH-3200/4000-MV

No.	Name	Quantity	Note
1	NEPCSH-3200/4000-MV	1 pcs	The key of cabinet door and other accessories are included.
2	User Manual	1 pcs	-
3	Warranty Card	1 pcs	-
4	Certificate	1 pcs	-
5	Test Report	1 pcs	-

3.2 Product Description

The 3.2MW/4MW medium-voltage PCS consists of two 1.6MW/2MW converter systems (PA and PB) and one 3.2MVA/4MVA oil-immersed transformer (transformer integrated with high-voltage protection system). All equipment are placed in a 20-foot high container, the dimension is 6058mm*2896mm*2438mm (W*H*D), the protection level is Type 3R, and the overall layout is as below.

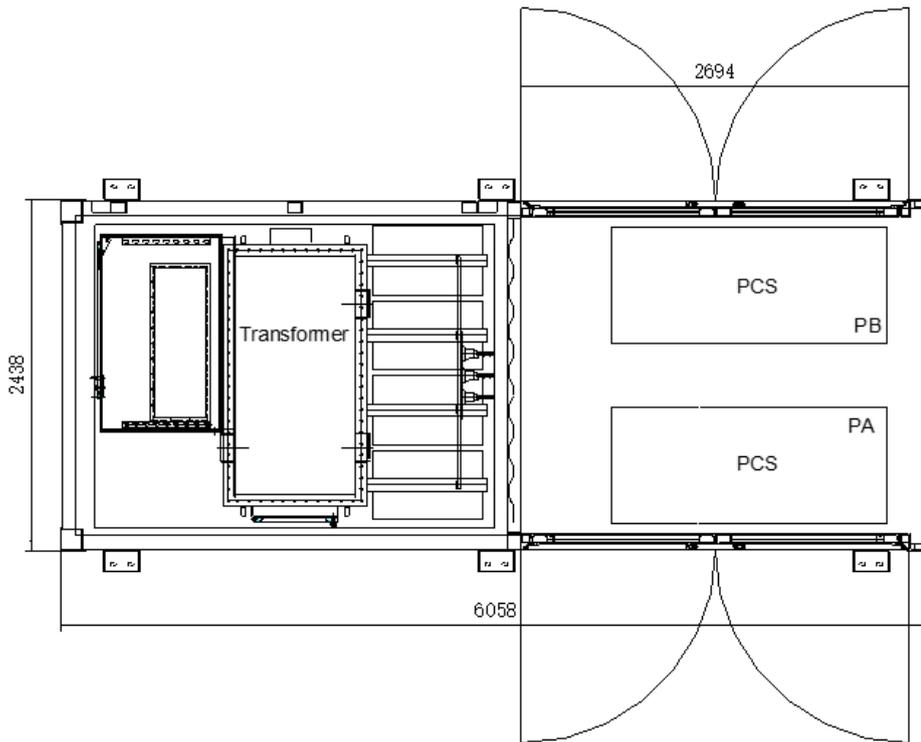


Fig.3-1 NEPCSH-3200/4000-MV layout

3.3 Storage

If the PCS will not be installed and operated immediately after delivery, the following instructions are of great importance for storage.

- Put the package back to its original state.
- Keep the desiccant in the package and do not discard it.
- Indoor storage.
- Pay attention to ventilation and moisture protection, and keep it away from water during storage.

- Pay attention to harsh environment, such as shock cooling, shock heating and collision.
- Check regularly, usually once a week, to see whether the package is in good condition, avoid insect and animal bites. If any damage found, replace it immediately.
- Every six months, the package should be opened for inspection, repackaged and replace the desiccant.

 be careful	<p>No storage without packing. No storage in conditions of direct solar radiation. No tilt or overlap. When installing equipment that has been stored for a long time, the door of the cabinet should be opened to check whether the equipment is intact before installation. And it' s necessary to test the equipment by a professional before installation.</p>
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Chapter 4 Product Description

4.1 Outline Instructions

4.1.1 Outline Dimension

The mechanical dimension of NEPCSH-3200/4000-MV is 6058mm*2896mm*2438mm (W*H*D) and the weight is about 18000kg. The mechanical dimension is shown in Figure 4-1 (unit: mm).

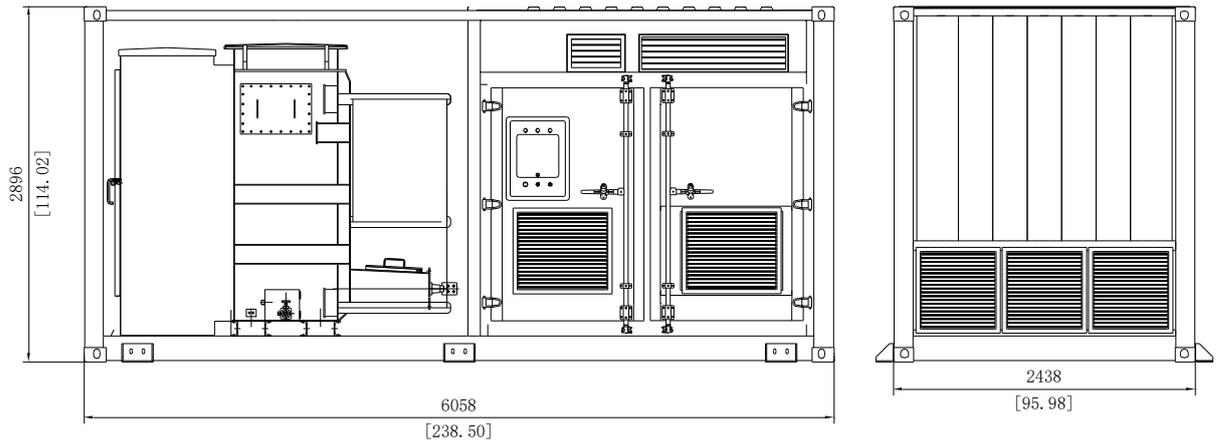
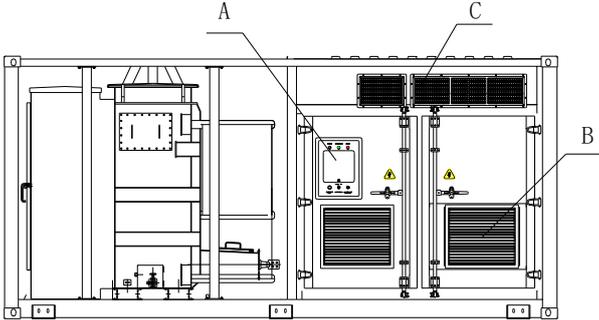
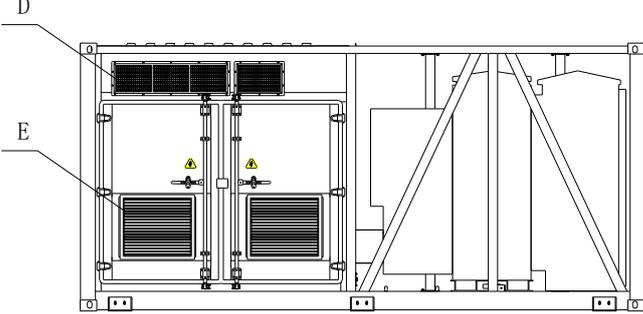
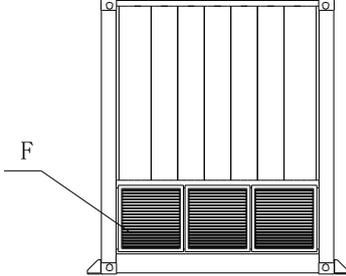


Fig.4-1 Outline dimension diagram

4.1.2 Ventilation Design

PCS views	Description
 <p>A technical line drawing of the front of a PCS enclosure. It shows two side doors on the left. In the center, there is a monitoring window labeled 'A' containing a control panel with indicator lights, a touch screen, and an emergency stop button. Below the window are two air inlets labeled 'B'. At the top, there are two air outlets labeled 'C'. The enclosure is supported by four legs.</p>	<p>Front view. The front of the PCS is equipped with a set of side doors. Part A is the PCS monitoring window, which contains indicator lights, touch screen and emergency stop button, main circuit AC/DC switch opening button and maintenance interface; B is the PCS air inlet; C is the PCS air outlet.</p>
 <p>A technical line drawing of the back of the PCS enclosure. It shows two air outlets labeled 'D' at the top and two air inlets labeled 'E' at the bottom. The enclosure is supported by four legs.</p>	<p>Back view. D is the PCS air outlet; E is the PCS air inlet.</p>
 <p>A technical line drawing of the right side of the PCS enclosure. It shows three air inlets labeled 'F' at the bottom. The enclosure is supported by four legs.</p>	<p>Right view F is the PCS air inlet.</p>

4.1.3 Cable Entry Design

All cables between the PCS and the external devices are routed through the bottom of PCS.

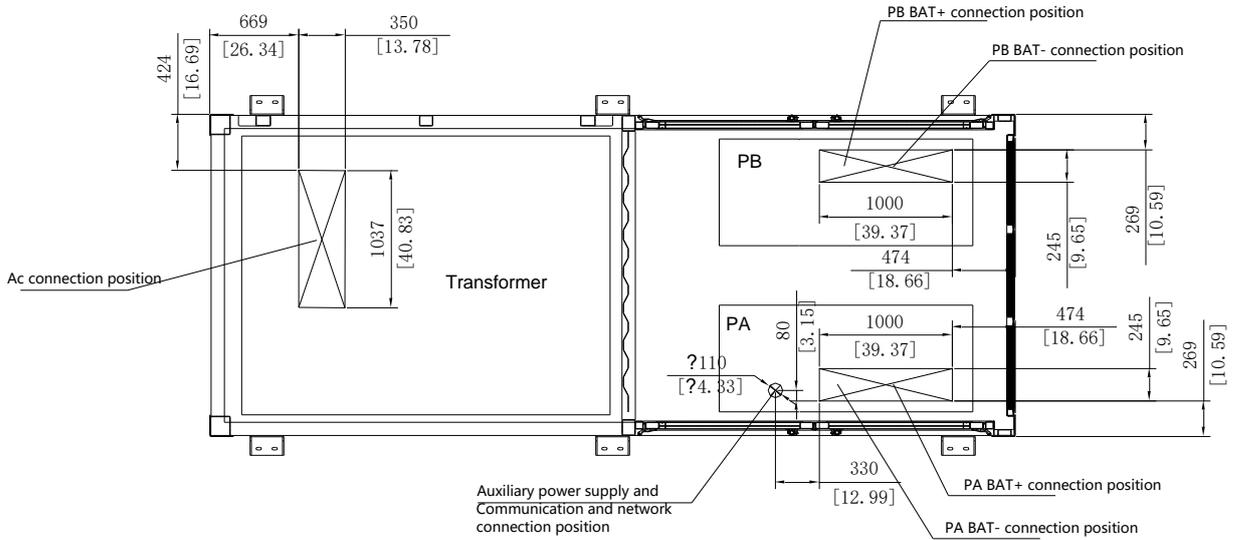


Fig.4-2 Cable entries of the PCS

4.1.4 Ventilation Design

PCS has a structural design with air in from the bottom and out from 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.

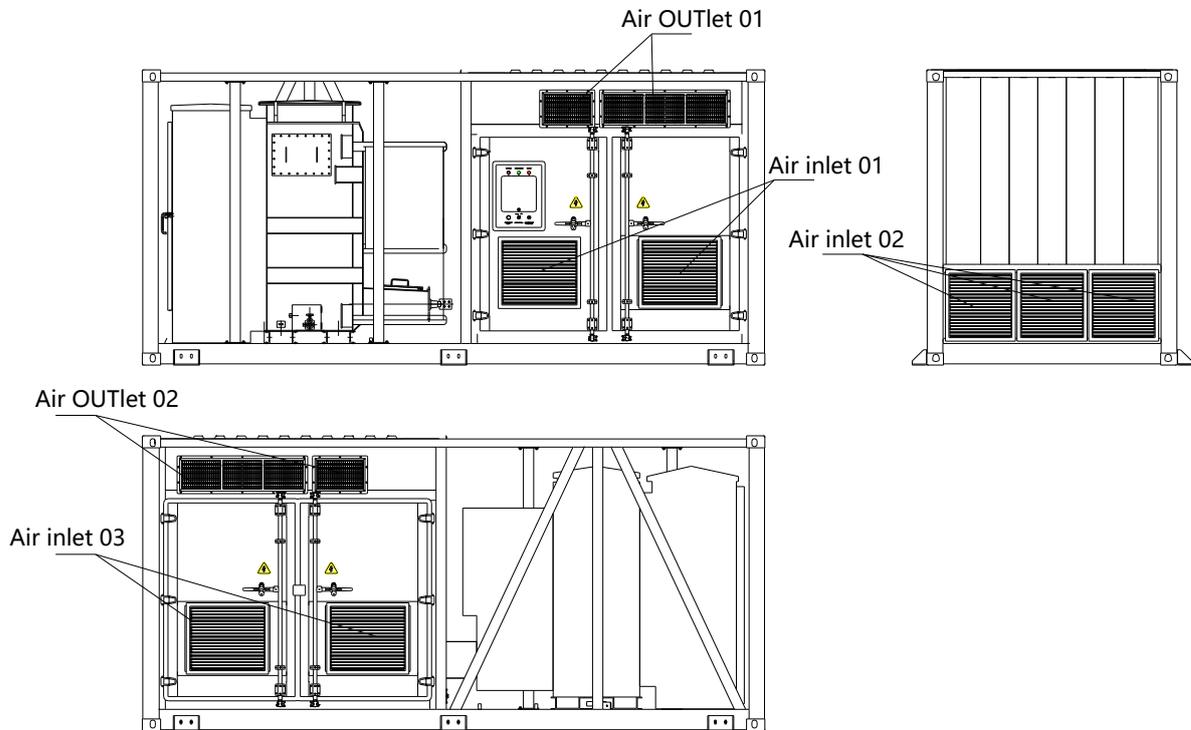


Fig.4-3 Equipment ventilation diagram

4.2 Control and Monitoring Window

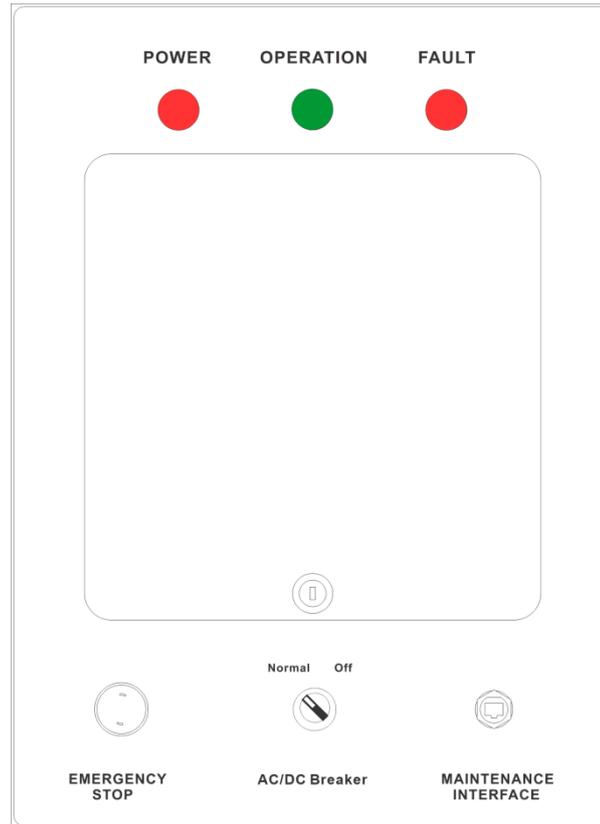


Fig.4-4 Control and monitoring window

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 view the operation information of PCS through the touch screen and also realize some control functions. Specific functions are as follows:

- Control PCS operation
- Display real-time operating data
- Display fault information
- Adjust operating parameters
- 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 procedures in sequence:

- 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 1 (Normal), and it means that the AC/DC switch can be closed. And if you need to disconnect the AC/DC switch, turn the switch button to position 2 (OFF) when the control power is normal, then the AC/DC side main circuit power supply can be cut off.

 <p>danger</p>	If the DC side is charged, the input terminals are still charged after disconnecting the AC/DC switch!
 <p>be careful</p>	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 DC current generated by the energy storage battery is converted into a high-frequency three-phase chopped voltage by the three-phase bridge converter of the NEPCSH-3200/4000-MV, then the DC current is filtered and converted into a sine wave by the filter. The main circuit of NEPCSH-3200/4000-MV is shown in Figure 4-5.

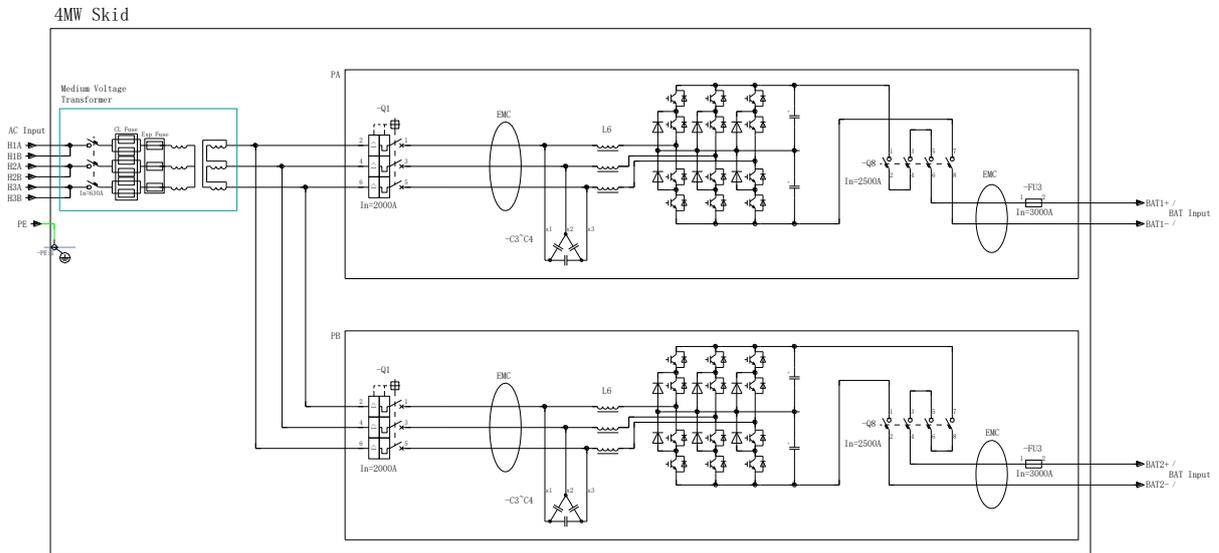


Fig.4-5 Main circuit diagram

4.4 Derating Curves

When the ambient temperature ranges from -30°C to 45°C , PCS can keep the nominal power output. And if the temperature ranges from 45°C to 50°C , PCS working power will derate 3% of the nominal power for every 1°C increasing. When the temperature is over 60°C , PCS enters into protection mode.

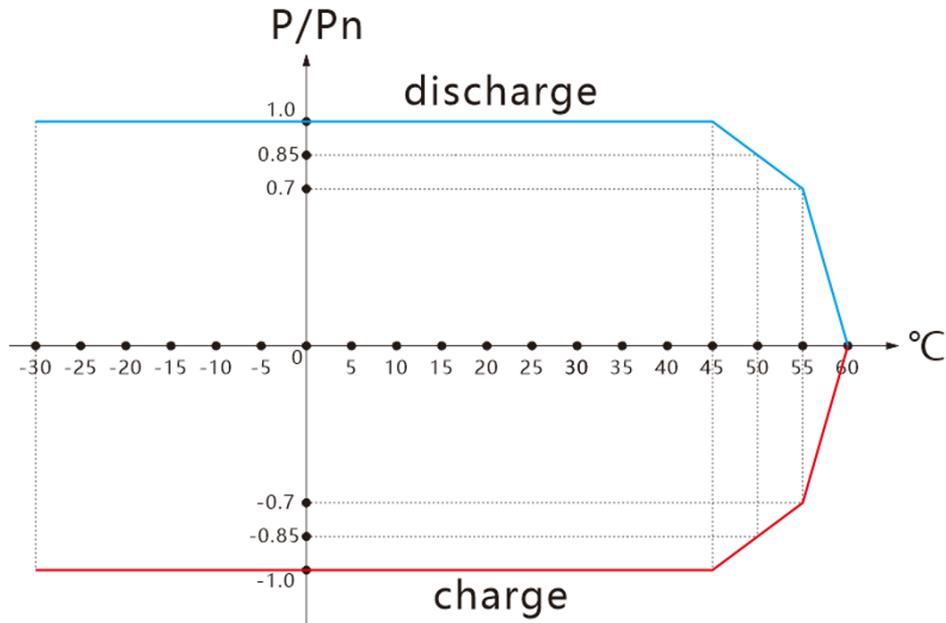


Fig. 4-6 Temperature derating curve

When the height above sea level ranges from 0 to 2km, PCS can keep the nominal power output. And when it ranges from 2 to 4km, the working power derate 6% of the nominal power for every 1km rising. And if it's over 4km, PCS enters into protection mode.

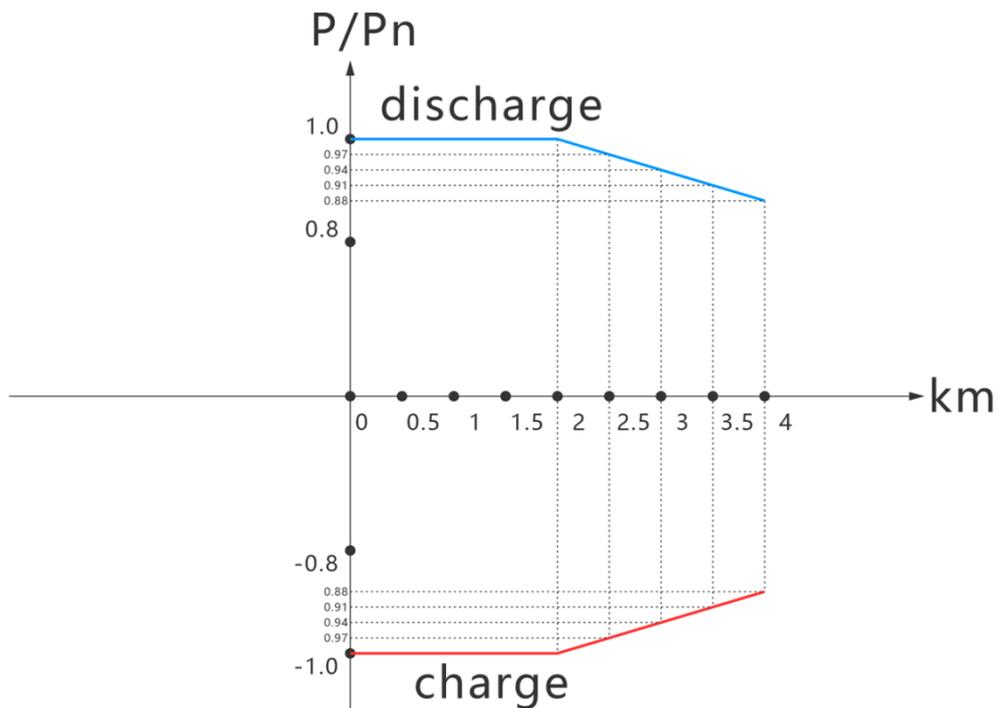


Fig. 4-7 Height above sea level derating curve

4.5 Working Mode

The working modes of NEPCSH-3200/4000-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 it is started 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-3200/4000-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 generate electricity for 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 power generation system fails, and the reasons of the failure will be displayed on the touch screen for the user to refer to. 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 to generate after 2 minutes.

4.5.5 Emergency Stop

Emergency Stop mode refers to pressing emergency stop button to power off the inverter. Once the button is pressed, the AC/DC breaker will be cut out and the PCS will stop working with nothing displayed on touch screen. If the inverter needs to be restarted, the emergency stop button should be released from locked state, and then push the AC/DC breaker into “OFF” , then “ON” . When the Start” requirements are satisfied, the PCS will start automatically.

4.6 Protective Functions

The main protective functions 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
- Grounding protection
- Insulation protection
- Overvoltage/under voltage protection of grid voltage
- Over/under frequency protection of power grid
- Overload and short-circuit protection on grid side
- Surge protection on grid side
- 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 detection items are as follows:

- Control power failure detection
- Lightning protector failure detection
- Cooling fan failure detection
- Contactor status detection
- Breaker status detection
- Temperature and humidity detection in PCS cabinet
- Temperature detection of IGBT module
- Temperature detection of electric reactor

4.7 Pre-charge Strategy

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

4.7.1 PCS DC Precharge Logic

After the battery system power-on self-checking is ready, the PCS is turned on. When the PCS detects that the battery voltage is normal and the DC bus is under-voltage, or in other words, the battery voltage and the DC bus voltage have a large deviation, the DC pre-charge contactor will be used to pre-charge the bus voltage. After precharging for 20s, when the DC bus voltage turns to normal and the deviation from the battery voltage is within a reasonable range (60V by default), it tells that the DC precharging is completed, and then the main circuit breaker is automatically closed, the precharging contactor is disconnected. Otherwise, it tells that the pre-charge has failed, and the system turns to failure state.

4.7.2 Battery System Precharge Logic

After the battery system power-on self-checking is ready, the DC pre-charge contactor is switched on to pre-charge the PCS bus capacitor. After 10s of precharging, when the voltage deviation is less than 30V, the main circuit contactor is pulled in 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 machine can work properly, the installation environment and requirements are as follows:

- Since the protection level of PCS 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 residents.
- Make sure that the installation floor is flat and will not cause any shaking.
- The installation position needs extra attention, because the LED light and LCD screen must be easily observed.
- Ensure that the ambient temperature is within the required range ($-30^{\circ}\text{C}\sim 55^{\circ}\text{C}$).
- 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 PCS.

The NEPCSH-3200/4000-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-3200/4000-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 PCS.

5.2.2 Space Requirements

When installing the PCS, 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 2000mm around the installing location, to ensure installation, heat dissipation and maintenance.

5.2.3 Cable Trench Design

NEPCSH-3200/4000-MV has its cable in and out from the bottom. It' s suggested that the cable connection between NEPCSH-3200/4000-MV and external devices should be 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. (As for details, please refer to the relevant design standards).

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, so it's convenient for installation and maintenance, also reduce the interference on communication and control signal circuit caused by power circuit.

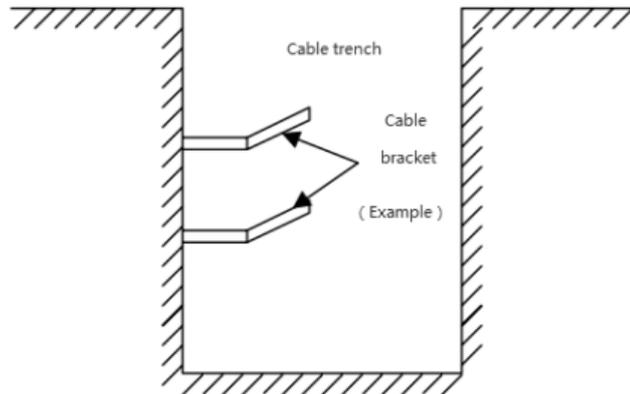


Fig. 5-2 Section diagram of cable trench

5.2.4 Ventilation Requirements

Since lots of heat will be generated during the operation of NEPCSH-3200/4000-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 of the control room, to ensure safe and efficient operation of the PCS.

➤ Ventilation Environments

In order to meet ventilation requirements of NEPCSH-3200/4000-MV, its installation environment must satisfy the following conditions:

Do not install the NEPCSH-3200/4000-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 level of suspended matter such as sand or dust is too high, measures should be taken to improve air quality. (e.g., add a filter to the air supply grille)

➤ Ventilation

In order to ensure the efficient and reliable operation of PCS, its 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.).

In order to ensure the balance of pressure, an additional fan may be added at the outlet of air conduit.

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.

For balancing the pressure, an extra fan can be added at the exit of air duct.

5.2.5 Other Protections

The NEPCSH-3200/4000-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.

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 the 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 due to increased contact resistance, the screws used to fasten the wiring copper needs to satisfy the following torque requirements:

Screw Size	M4	M5	M6	M8	M10	5/8in-11	M16
Torque (N · m)	2	3.2	7	16	34	148	148

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 avoid 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-3200/4000-MV is shown in Figure 5-3 and explained in Table 5-2.

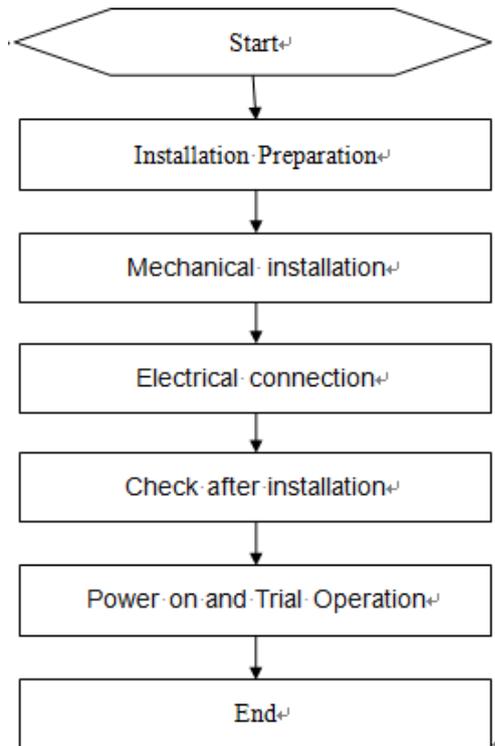


Fig. 5-3 Installation procedure

Table 5-2 Installation procedure specification

Steps	Specific information	Chapter reference for
Preparation before installation	Preparations needed to be completed before installing NEPCSH-3200/4000-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 PCS	
	Installation and fixing of 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 List
	Check items includes:	
	Mechanical installation check	
	Electrical installation check	
Power on and Trial Run	Others	10.Trail Run
	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.

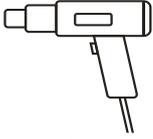
- NEPCSH-3200/4000-MV (1 set)
- Key (2)
- Certificate (1)
- Warranty Card (1)
- Manual (1)
- Factory Inspection Report (1)

Although careful test and inspection have been conducted on the PCS, damages may still occur during the transportation. Therefore, please check the PCS carefully before installation. Please feel free to contact the shipping company or Sichuan CLOU Energy Electric Co., Ltd. if any damages are found, pictures of damaged parts will be truly helpful.

6.2 Installation Tools and Parts

Tools and components needed during the installation are as follows:

- 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

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, 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 PCS container:

- W*H*D : 6058mm*2896mm*2438mm
- Weight : 16000kg

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

- All doors of PCS container 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.
- 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 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 boom or PCS during the hoisting process.
- In case of severe weather conditions, such as heavy rain, fog, strong wind, etc.,

the hoisting work must be stopped.

When hoisting a PCS container, the following requirements must be satisfied:

- The site safety must be ensured when hoisting.
- A professional instructor is needed during the whole process.
- The strength of the sling used should be no less than 12t.
- 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 PCS container must be stable and not deflected during the whole hoisting process.
- Hoisting the PCS 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!

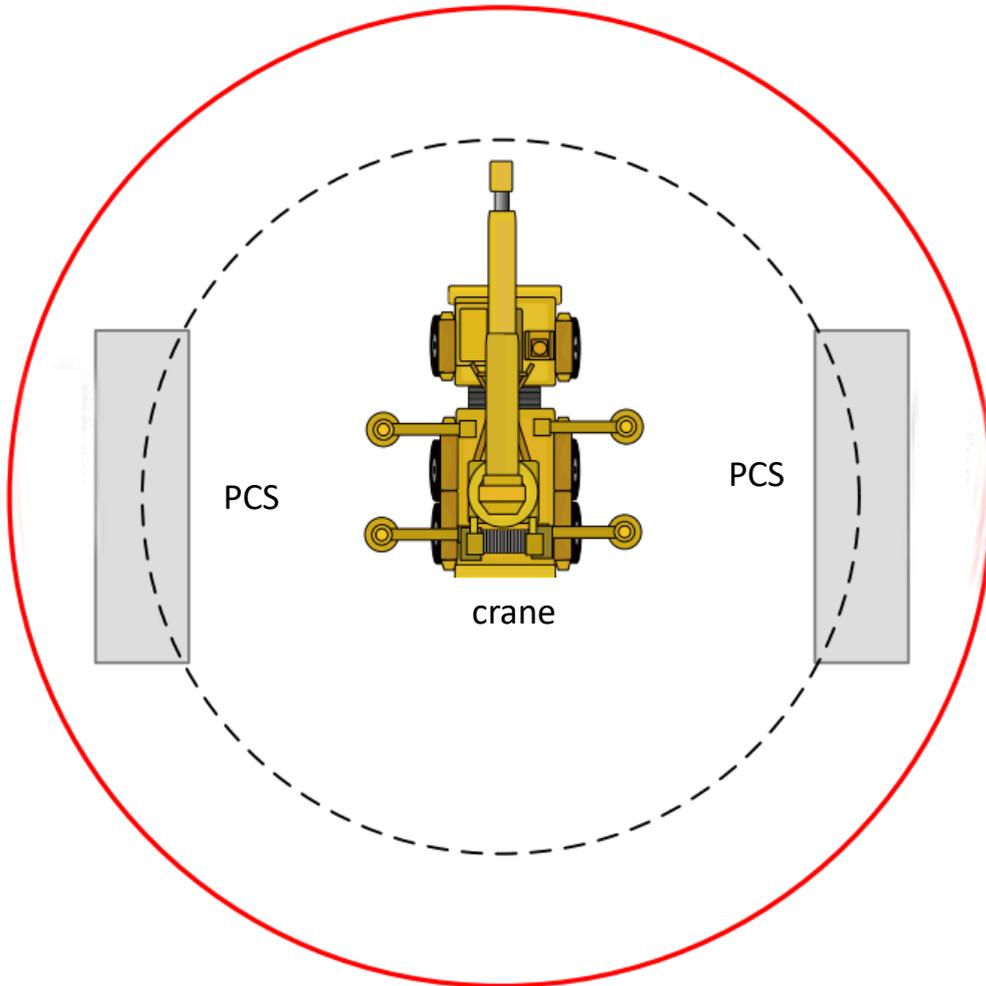


Fig.7-1 Schematic diagram of crane operation

7.2.2 Hoisting

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

- 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 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 PCS container is ready, it should be placed gently and landed steadily. It is absolutely forbidden to shake the spreader.
- The area where the PCS container is placed should be solid, flat, well drained, and free of obstructions: on the site, the PCS container can only be supported by the four bottom corner pieces. Due to the site conditions, please use non-vertical force to lift.

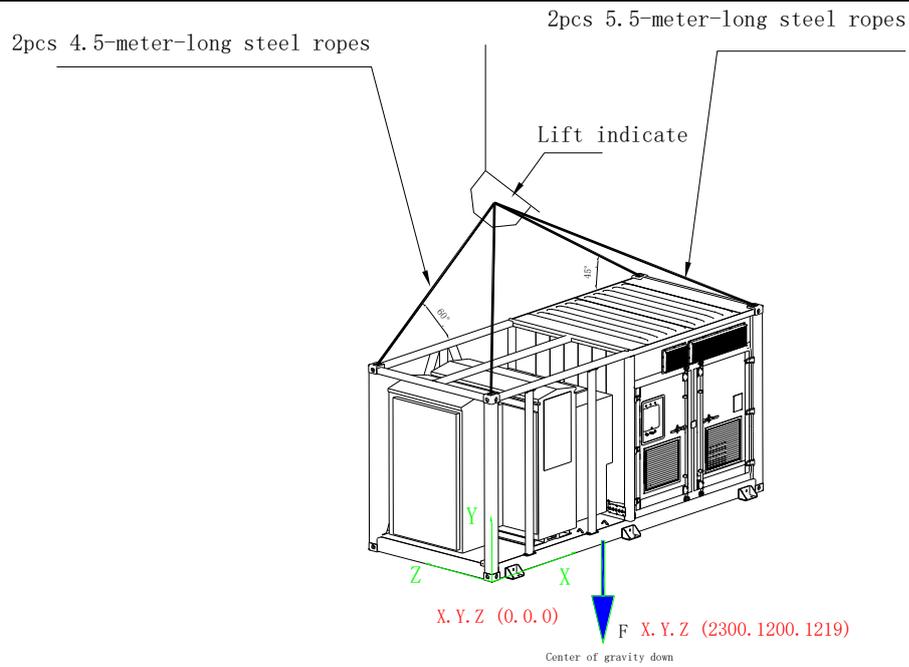


Fig.7-2 Hoisting from top fittings

7.2.3 Connectors Fasten

Using slings with hooks or U-hooks to hoist the PCS.
The hoisting devices should be connected to the PCS 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.
- Sichuan Clou New Energy Electric 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 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 PCS containers, 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 reference.

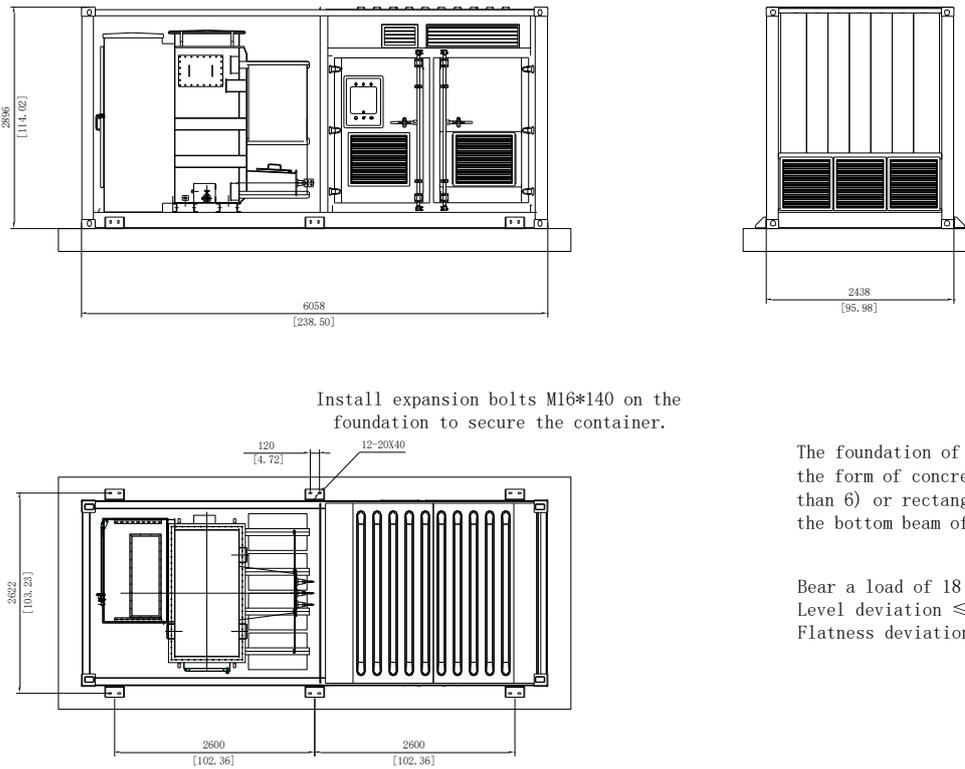


Fig.7-3 Foundation design diagram

- 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 4Ω , we suggest using $50 \times 5 \text{ mm}$ 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.

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.

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 NEPCSH-3200/4000-MV is relatively high, it's not allowed to place it together with inflammable and explosive materials.
- The 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-3200/4000-MV is shown in Figure 8-1, which needs to be strictly followed.

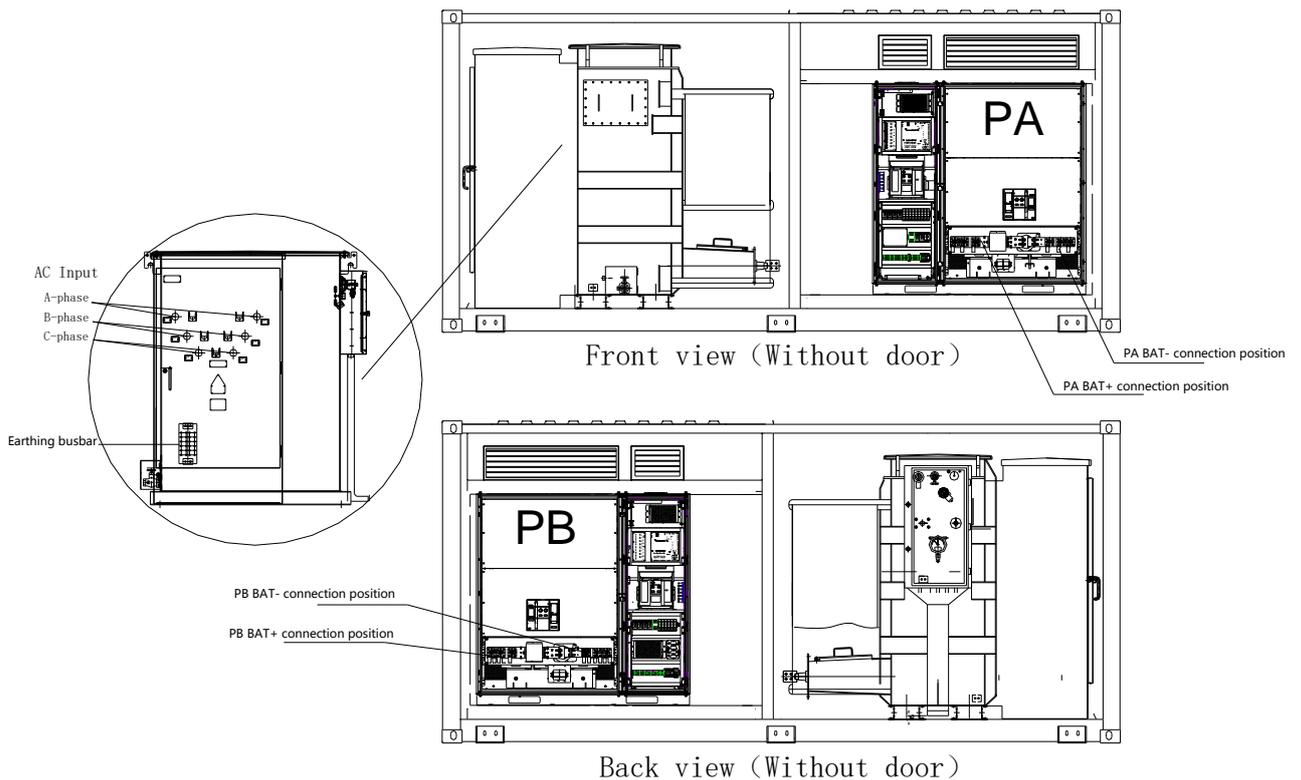


Fig. 8-1 Wiring diagram

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 ²	17mm	M16*60	6 pcs
Energy storage battery packBAT1-	BAT1-	185-300mm ²	17mm	M16*60	6 pcs
Energy storage battery packBAT2+	BAT2+	185-300mm ²	17mm	M16*60	6 pcs
Energy storage battery packBAT2-	BAT2-	185-300mm ²	17mm	M16*60	6 pcs
Yellow-green ground	PE	95-150mm ²	9mm	M8*25	2 pcs
Communication Cable	485A,485B CANH, CANL	0.5-2.5mm ²	-	-	1 pcs
Output A	H1A	70-150mm ²	-	5/8'-11	1 pcs
Output A	H1B	70-150mm ²	-	5/8'-11	1 pcs
Output B	H2A	70-150mm ²	-	5/8'-11	1 pcs
Output B	H2B	70-150mm ²	-	5/8'-11	1 pcs
Output C	H3A	70-150mm ²	-	5/8'-11	1 pcs
Output C	H3B	70-150mm ²	-	5/8'-11	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 Φ 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

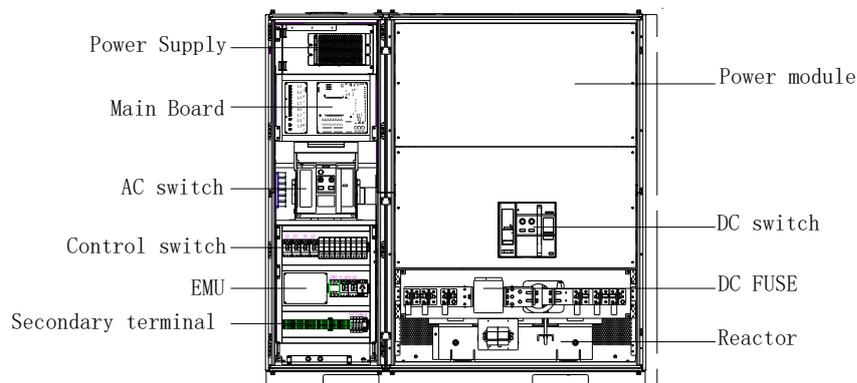


Fig. 8-2 Locations of key components layout

8.4.3 Open the Wiring Hole

Outlet holes for DC cables and communication cables are reserved at the bottom of the PCS, and the outlet holes for AC cables and grounding cables are reserved on the side. 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, or safety accidents may occur easily.
--	---

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

 warning	<ol style="list-style-type: none"> 1. Never manually connect the AC switches. 2. Before powering on the AC side, ensure that the AC switches are at off state.
 warning	<ol style="list-style-type: none"> 1. Never manually connect the DC switches. 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 reliably connected to the public grounding device provided by the power station. The sectional area of grounding cable should be no less than 16mm^2 , and the contact resistance should be less than 4Ω .

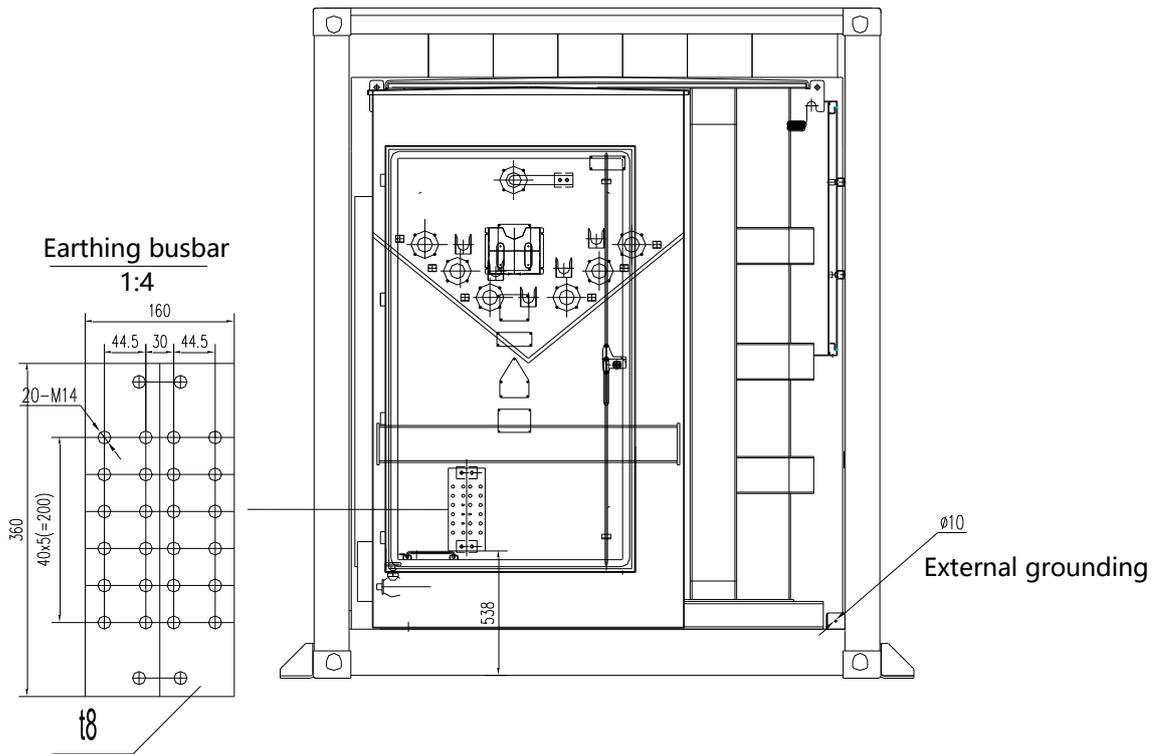


Fig. 8-3 Ground connection terminal diagram

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.

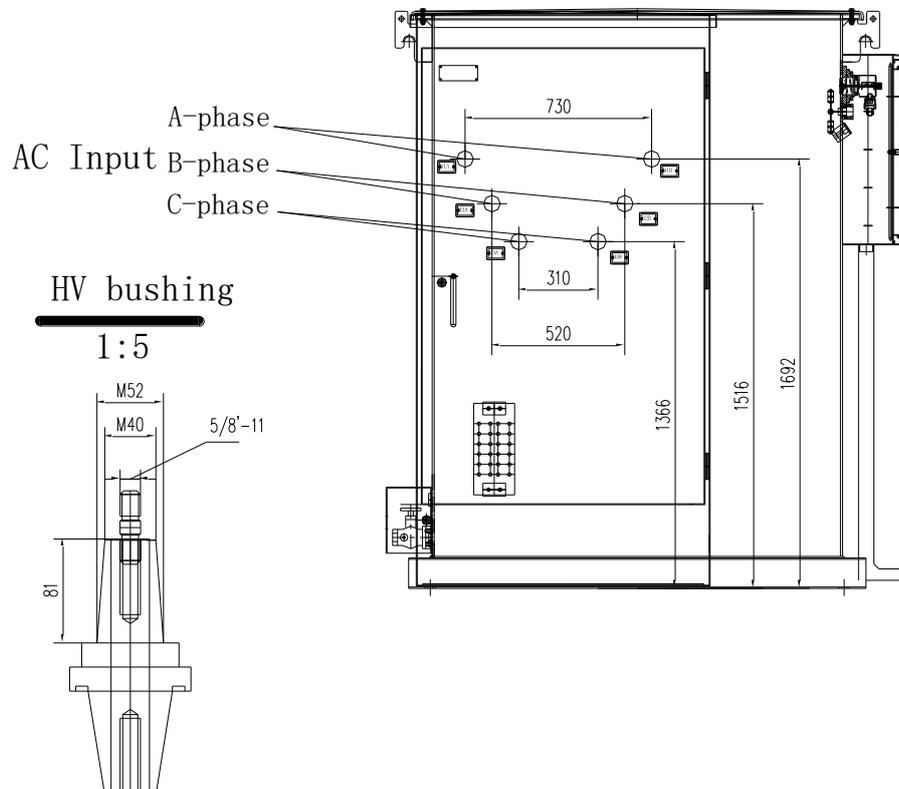


Fig. 8-4 AC side connection terminal diagram

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 strictly 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.

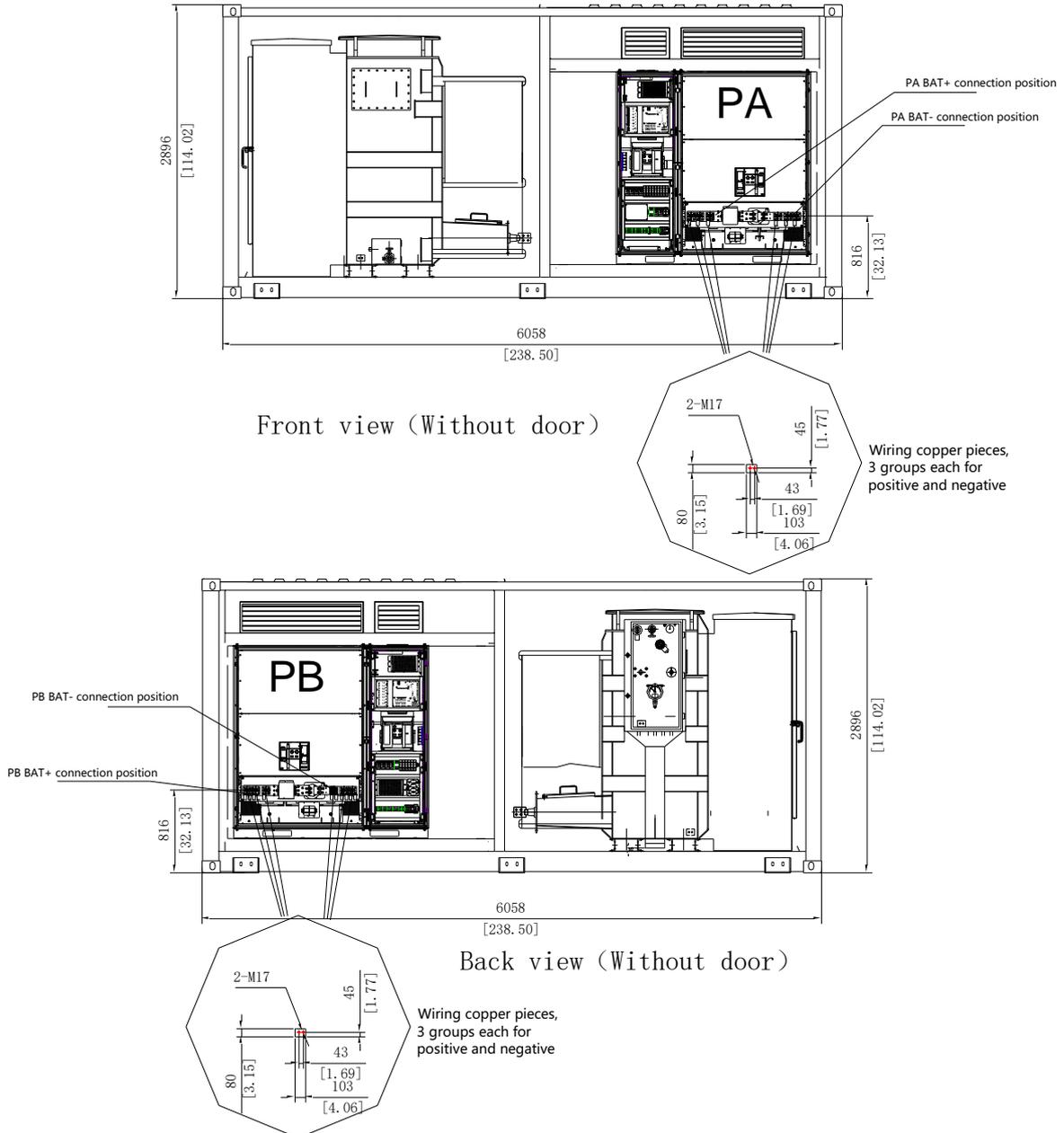


Fig.8-5 DC side connection terminal diagram

8.5.2.4 Communication wiring

PCS provides CAN, RS485 and Ethernet communication interfaces, the location is shown in Figure 8-6.

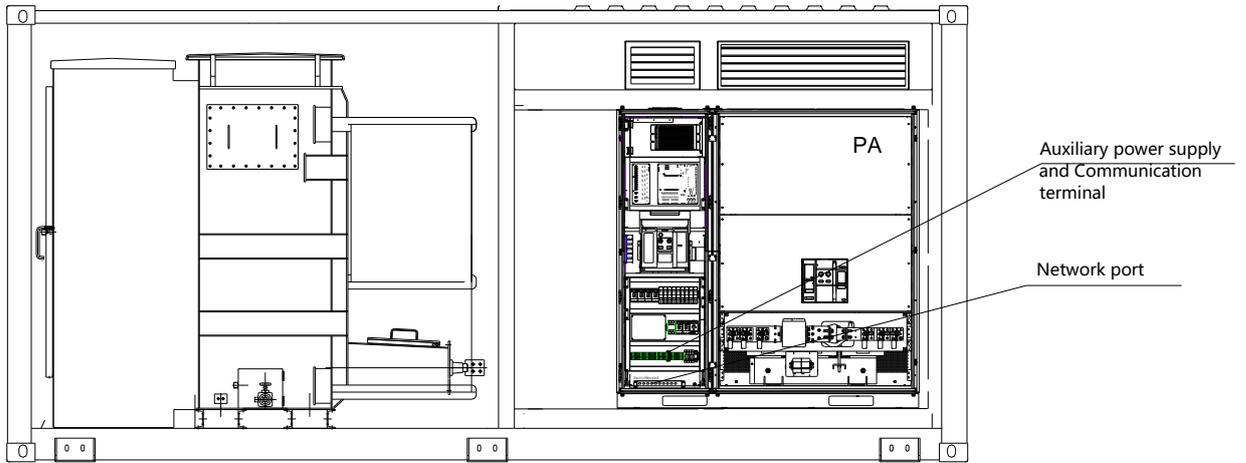


Fig.8-6 Communication connection terminal diagram

Cable number	Description
X8:8 (485A)	RS485 communication interface
X8:9 (485B)	
X8:10 (GND)	
X8:11 (CANH)	CAN communication interface
X8:12 (CANL)	
X8:13 (CNG)	

8.5.3 Power-on Inspection

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

 <p>be careful</p>	<p>The DC breaker in the PCS can be connected after confirming that the polarity and voltage are correct, and the difference between the bus voltage and the DC input voltage does not exceed DC30V.</p>
---	--

Step 1: Keep the AC/DC main switch (Q1/Q8) in the open state and the rest of the switches in the close state.

Step 2: DC input power to the equipment, check whether the DC voltage access is correct in terms of positive and negative polarity.

Step 3: Turn on the AC input power, check whether the AC voltage and phase sequence are correct.

Step 4: Check whether the equipment control power is powered (LED indicator should light up when it's powered).

Step 5: Confirm that if the voltage of energy storage battery and AC voltage are normal by the touch screen, again.

Step 6: Disconnect the equipment AC/DC power after all checks are passed.

Step 7: Close the door and lock it.

Chapter 9 Installation Checklist

Before operation, the 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 PCS
- Fixed bottom and reliable support for the PCS
- Enough space left around the PCS
- Temperature, humidity and ventilation comply with requirements
- Smooth flow for cooling air
- The cabinet of the PCS is sealed and complete

Checklist of Electrical Installation

- Fixed and complete grounding of the PCS
- Grid voltage matched with rated input voltage of the 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 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 OFF.
- Step3: Make sure the emergency stop button has been released and can operate normally.
- Step4: Make sure all switches in the cabinet are ON (except Q1 and Q8) , the power supply is normal, and there are 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 Confirm the 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.

10.3.2 Running

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” mode. If there is no grid, but need to run off-grid to power the load, select “off-grid” 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.

10.4 Power OFF

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

Enter the Power ON/OFF page via screen, click “Power OFF” to power off the PCS, and then reset the fault and DC breaker.

In an emergency, press the “Emergency Stop” button to turn off the PCS. Reset the “Emergency Stop” before restarting the PCS. Click “Stop” on the touch screen to reset the error, then start again.

 danger	During grid-connected 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 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 TK8070iH Weinview touch screen for monitoring and controlling 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 Figure 11-1;

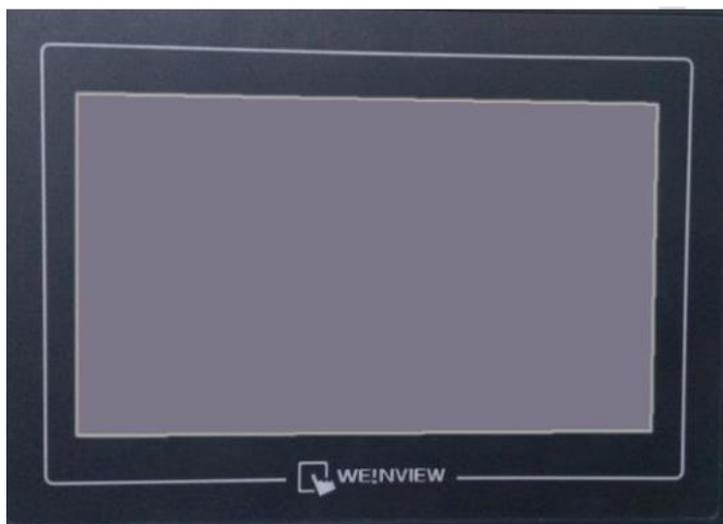


Fig.11-1 Appearance of touch screen

Cautions on operation :

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

- Operate via the touch screen: only touch one operation control for 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 operations will largely shorten the service life of the screen, 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 for entry.
- 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 the entry.
- 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, that is, the battery is in discharging state, and negative number indicates that grid power is consumed, that is, the battery is in being-charged state.

Reactive power: Positive numbers indicate inductive power and negative numbers indicate capacitive power.

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

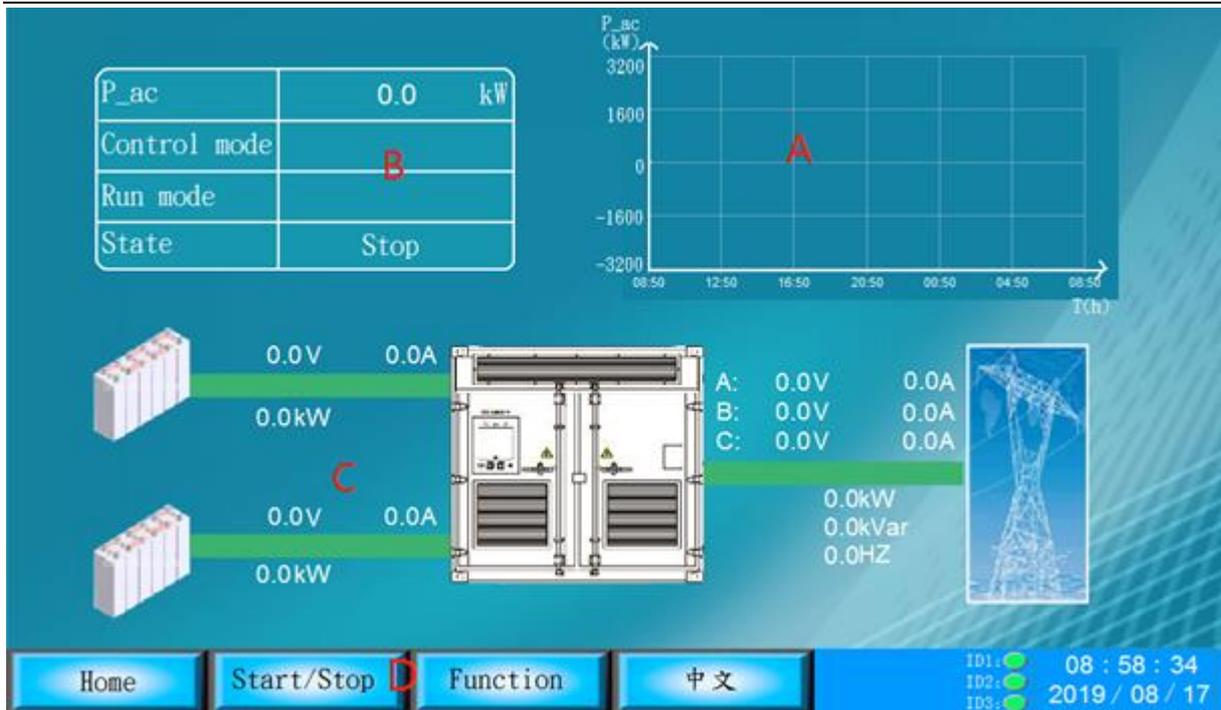


Fig. 11-3 Main interface

- 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  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.

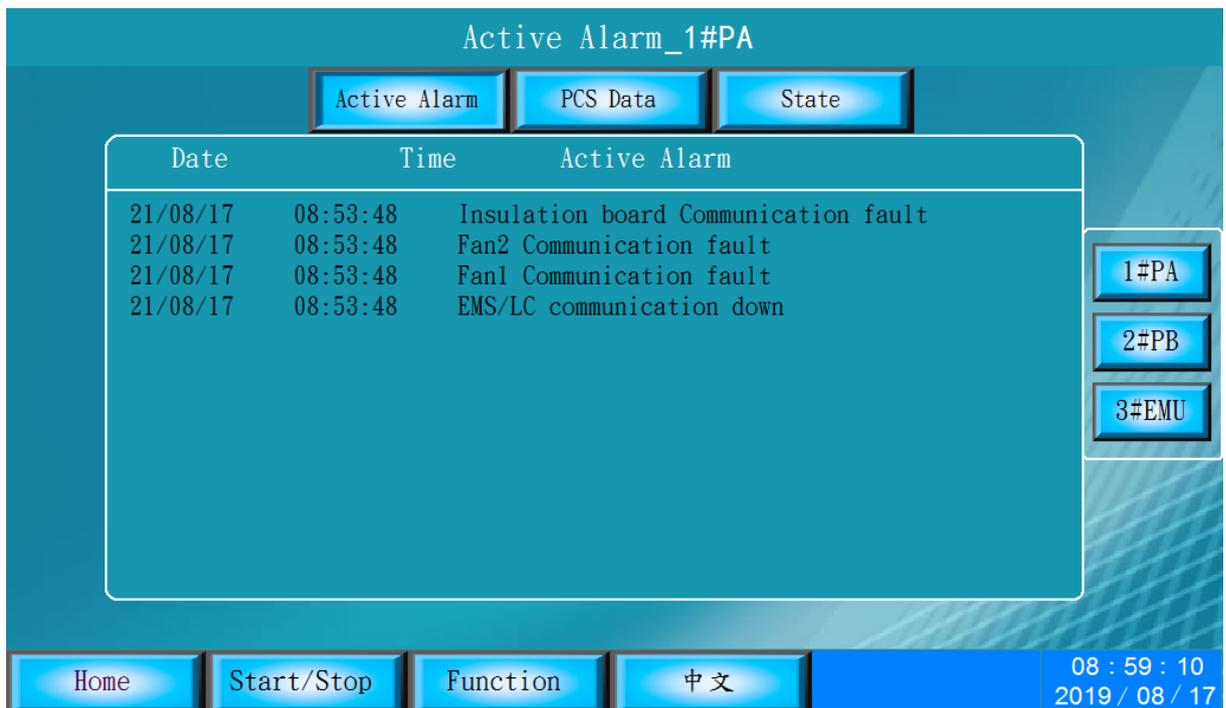


Fig.11-5 The error state interface

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 contactor.
- The information of heating system for IGBT.
- The information of heat dissipation system for IGBT.

State _1#PA

Active Alarm PCS Data State

Name—IN	Value	Name—OUT	Value
State9_0 Breaker_Q1/Q7/FU3	OFF	State11_0 Bus Precharge_KA5/6	OFF
State9_1 Arrester_F1/F2/Q2	OFF	State11_1 Contactor_KM1	OFF
State9_2 Contactor_KM1	OFF	State11_2 Reserved	OFF
State9_3 Reactor_hot_L6	OFF	State11_3 Reserved	OFF
State9_4 Reserved	OFF	State11_4 IGBT Fan_KM2	OFF
State9_5 EmergStop_SB1	OFF	State11_5 AC Breaker OFF_KA1	OFF
State9_6 Reserved	OFF	State11_6 DC Breaker ON_KA3	OFF
State9_7 Breaker_Q8	OFF	State11_7 DC Breaker OFF_KA4	OFF
State9_8 Reserved	OFF		
State9_9 Bus Precharge_KA5/6	OFF		

1#PA
2#PB
3#EMU

Home Start/Stop Function 中文

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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.



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; VSG mode (VSG mode), virtual synchronous operation mode, and also grid-connected mode (PQ mode), which is used by default in the field.

Click  PQ mode 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** on the main interface to jump to function interface,

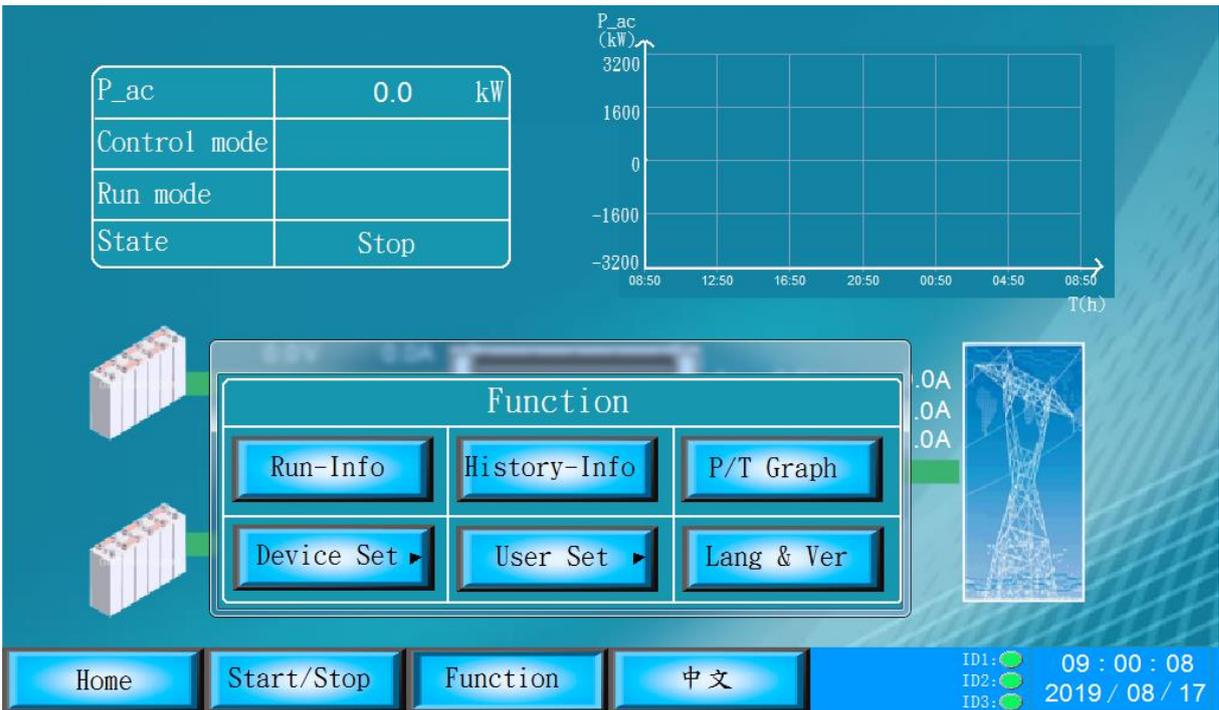


Fig.11-10 Function list interface

11.5.6 History Information Interface

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

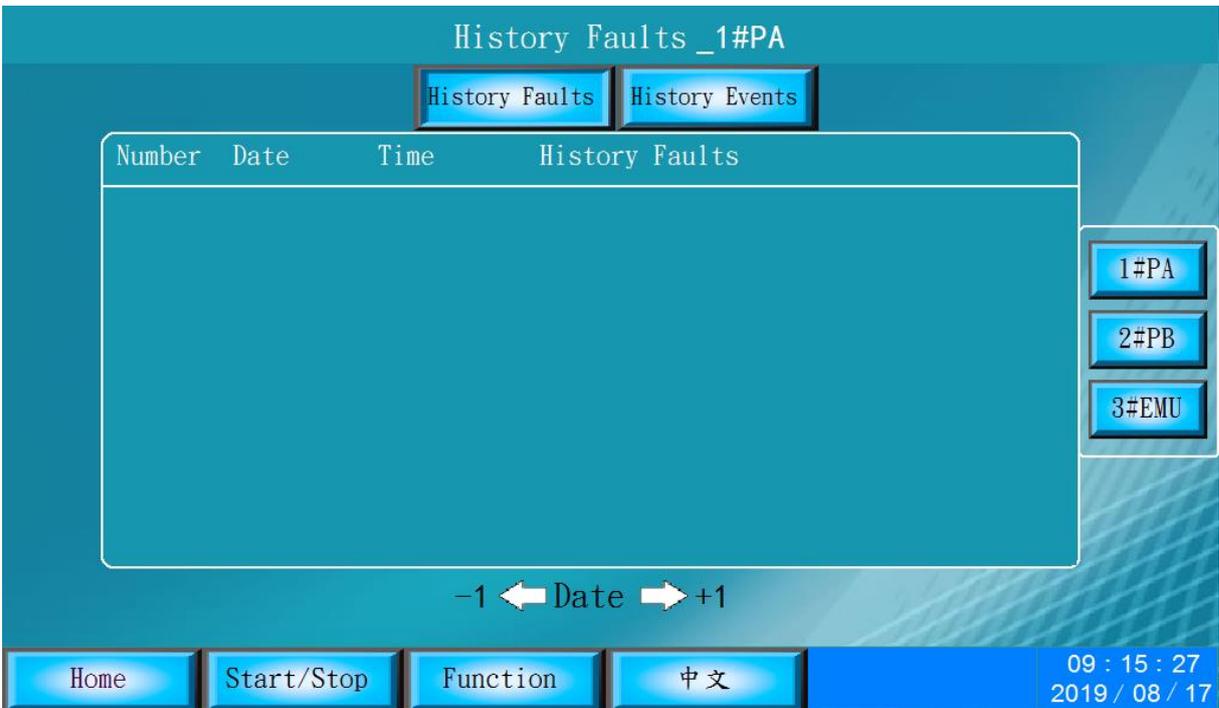


Fig.11-11 History faults interface

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

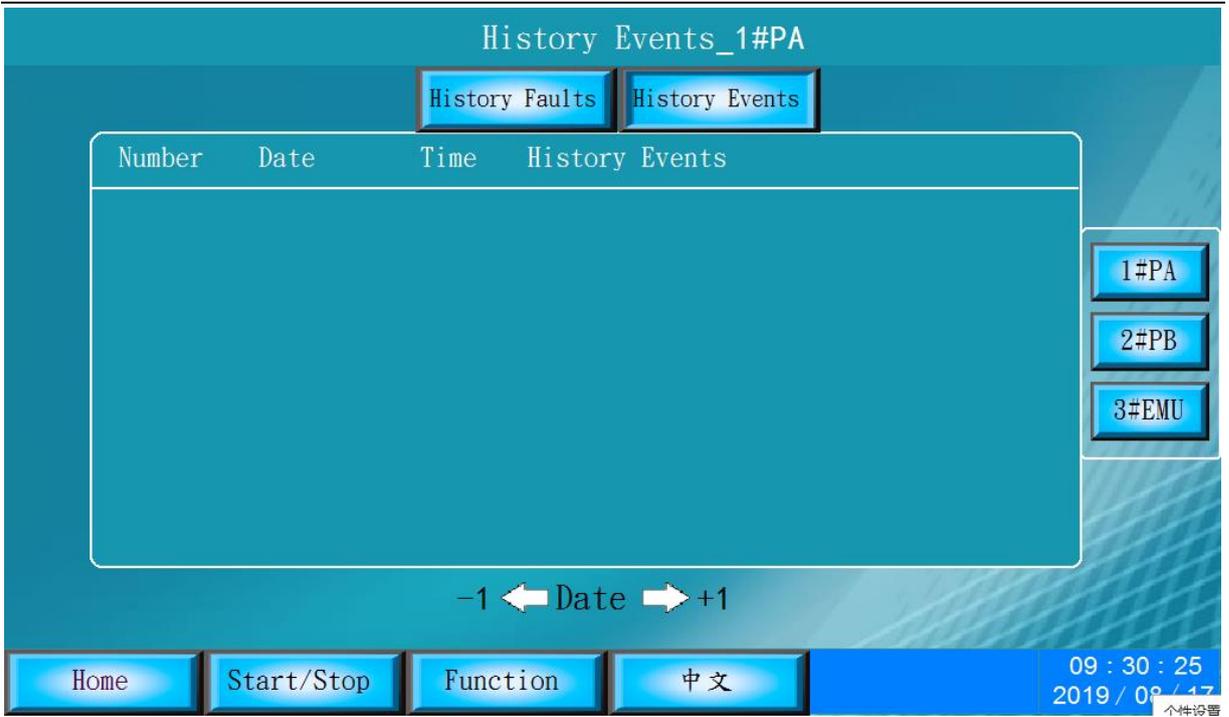


Fig.11-12 History events interface

11.5.7 Power and Temperature Curve

Click "Curve P/T"  to enter the active power curve interface,



Fig. 11-13 Active power curve

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

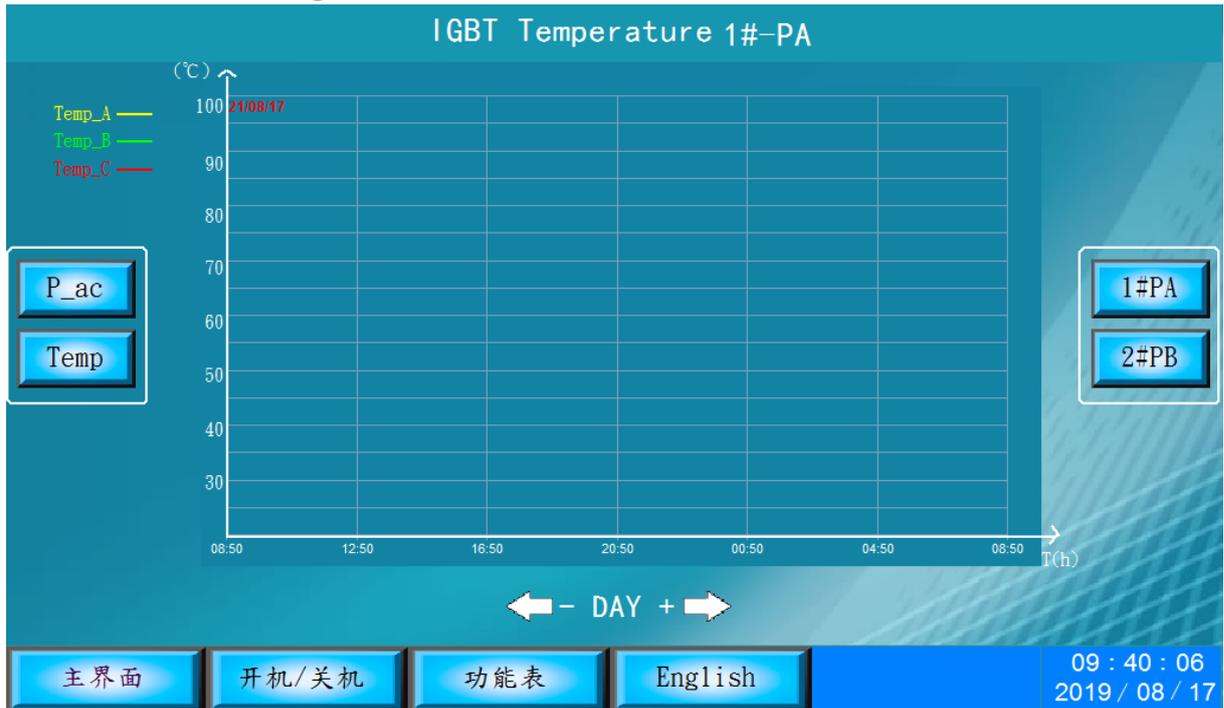


Fig.11-14 IGBT temperature curve

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 11-15.



Fig.11-15 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 11-16.



Fig.11-16 Time setting 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.

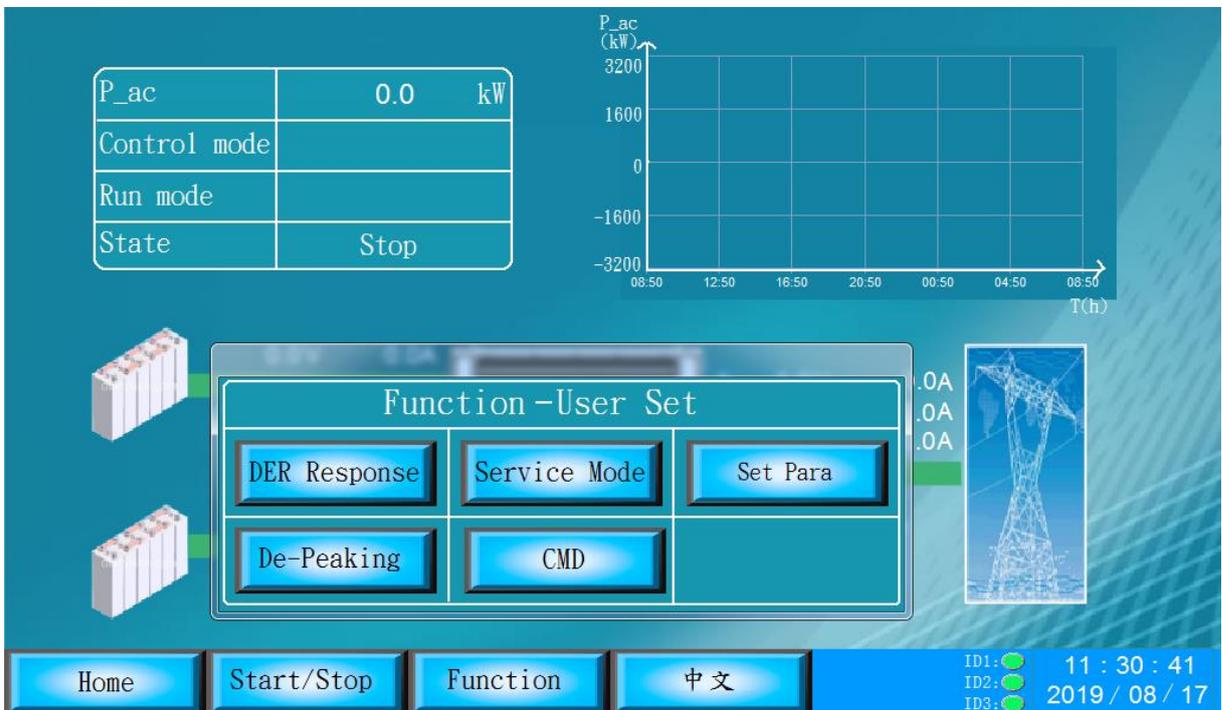


Fig.11-17 User configuration interface

The input password is : 1111

11.5.10 Protection Parameters Interface

Click the 'Protection Parameters' to enter protection parameter interface, as shown in Figure 11-18.

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

Name	Value	Name	Value	Name	Value
OV Protect	0.0 V	OV bus Protect	0.0 V	OV bat Protect	0.0 V
OV Protect Inst	0.0 V	OV bus Protect Inst	0.0 V	OV bat Protect Inst	0.0 V
LV Protect	0.0 V	LV bus Protect	0.0 V	LV bat Protect	0.0 V
OI Protect	0.0 A	OI bus Protect	0.0 A	Bat discha I_limit	0.0 A
OI Protect Inst	0.0 A	OI bus Protect Inst	0.0 A	Bat cha I_limit	0.0 A
OF Protect	0.0 HZ	OI bus Limit charg	0.0 A	Bat discha P_limit	0.0 kW
LF Protect	0.0 HZ	OI bus Limit discha	0.0 A	Bat cha P_limit	0.0 kW
OI Limit	0.0 A	OP bus Limit charg	0.0 kW	Bat cha V_limit	0.0 V
OP Limit charg	0.0 kW	OP bus Limit discha	0.0 kW	Bat discha V_limit	0.0 V
OP Limit discharg	0.0 kW				

Fig.11-18 Protection parameters interface

11.5.11 Running Parameters Interface

Click the 'Running Parameters' and jump to running parameter interface, as shown in Figure 11-19.

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

	1	2	3	4	5	6	7	8
Start time	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
End time	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
P(kW)	0	0	0	0	0	0	0	0
S(KVA)	0			PF cosΦ				0.00
BMS limit disch P	0			BMS limit charg P				0
De-Peak ON/OFF	<input type="radio"/> ON <input checked="" type="radio"/> OFF							

Fig.11-19 Running parameters

Chapter 12 Appendix

12.1 Technical Parameter

System Type	NEPCSH-3200-MV	NEPCSH-4000-MV
Max. DC voltage	1500 V	
Min. DC voltage	1000V	
DC voltage range for nominal power	1020 – 1500 V	
Max. DC current	1600A*2	2000A*2
No. of DC inputs	2 optional	
Nominal AC power(at 45 °C)	1600kVA*2	4000 kVA
Max. AC current	1617A*2	1674A*2
Nominal AC voltage	630V	690V
Nominal grid frequency	50Hz/60Hz	
Grid frequency range	45 ~ 55Hz/55 ~ 65Hz	
Max. THD of current	< 3 % (at nominal power)	
DC current injection	< 0.5 % In	
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	
Nominal power	3200 kVA	4000 kVA
MV/LV	34.5kV/0.63kV,24.94kV/0.63kV,23kV/0.63kV,21.6kV/0.63kV,13.8kV/0.63kV,13.2kV/0.63kV,12.47kV/0.63kV	34.5kV/0.69kV,24.94kV/0.69kV,23kV/0.69kV,21.6kV/0.69kV,13.8kV/0.69kV,13.2kV/0.69kV,12.47kV/0.69kV
Connection group	Yd11,Dy11,Dy1	
Impedance voltage	9%	
load switch rated current	630A	
Cooling method	ONAN,KNAN	
Transformer oil	FR3	
Insulation level	A	
DC input protection	Load break switch + fuse	
AC output protection	Circuit breaker	
Overvoltage protection	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	18000kg	
Degree of protection	Type 3R	
Operating ambient temperature range	-30 to 60 °C (> 45 °C derating)	
Allowable relative humidity range	0 – 95 % (non-condensing)	

Noise emission	<70dB
Cooling method	Temperature controlled forced air cooling
Max. operating altitude	4000 m (> 2000 m derating)
Display	Touch screen
Certification	UL1741,UL1741SA,IEEE1547
Communication	Standard: RS485, CAN, Ethernet ,optical fiber
AUX Power	3Ø/400V or 480V/MAX 8kW/10kVA(Fan 6kW,Reserved socket 1kW,Control system 1kW)
Shut down aux load	<200w

12.2 Quality Warranty

Sichuan CLOU Energy Electric 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, Sichuan CLOU Energy Electric 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, Sichuan CLOU Energy Electric 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 Sichuan CLOU Energy Electric 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.

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Tel : 028—85331355 85331385

Fax: 028—85331528

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