Installation Manual

PWD-800K Series STS Cabinet

Sinexcel

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Installation Manual

Version: V1.1

Shenzhen Sinexcel Electric Co., Ltd.
Website: http://sinexcel.us/ or www.sinexcel.com
Add: Building 6, Area 2, Baiwangxin High-tech Industrial Park, No. 1002, Songbai Road, Nanshan District, Shenzhen
Postcode: 518055
Hotline: +86 0755-8651-1588

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1 Information on this Document

1.1 Validity

This document is only valid for PWD-800K STS cabinet PWD-800K

Model definition

This section introduces product model definition in this user's manual, as shown in Fig. 1-1:

PWD-800K: **P**：Power; **W**: Switch; **D**: Device; **800K**: Capacity

1.2 Target Group

The tasks described in this document can only be performed by professionals or other qualified persons. Qualified persons must have the following skills：

• Understand how the product works and how to operate the product

• Understand how the battery works, how to operate the battery and how the electricity distribution system designs

• Training on how to deal with the hazards and risks associated with installing and using electrical equipment installation

• Installation and commissioning of electrical equipment and installations

• Understand all applicable standards and directives

• Understand and follow this manual and all safety information

2 Safety Precautions

2.1 Important Safety instructions

This user's manual is about installation and operation of Sinexcel PWD-800K STS cabinet.

Before installation, please read this user's manual carefully.
The STS cabinet must be commissioned and maintained by the engineers designated by the manufacturer or the authorized service partner. Otherwise, it might endanger personal safety and result in device fault. Any damage against the device caused thereby shall not be within the warranty scope.
The STS cabinet cannot be used for any circumstance or application related to life support device.

DANGER

Any contact with copper bar, contactor and terminal inside the device or connected with the loop of utility grid might result in burning or fatal electric shock.
Don't touch any terminal and conductor connected with the loop of utility grid.
Pay attention to any instruction and safety documents about power on-grid.

WARNING

There might be an electric shock risk inside the device!
Any operation related to this device will be conducted by professionals.
Pay attention to the safety precautions listed in safety instruction and installation documents.
Pay attention to the safety precautions listed in operating and installation manual and other documents.

WARNING

Large leakage current
Before connecting input power supply, please ensure that the grounding is reliable.
The device must be grounded complying with the local electric codes.

WARNING

Don't touch electric parts within 15 minutes after power outage!
There is dangerous energy in capacitance storage. Don't touch device terminal, contactor and cooper bar and other electric parts within 15 minutes after disconnecting all device power supplies.

NOTICE

All maintenance and preservation inside the device require using tools and shall be conducted by trained person. The components behind the protective cover plate and dam board which are opened by tools cannot be maintained by users.
Please read this user's manual before operation.

2.2 Additional Information

Links to additional information can be found at http://sinexcel.us/ or www.sinexcel.com.

3 Installation design

3.1 Installation process

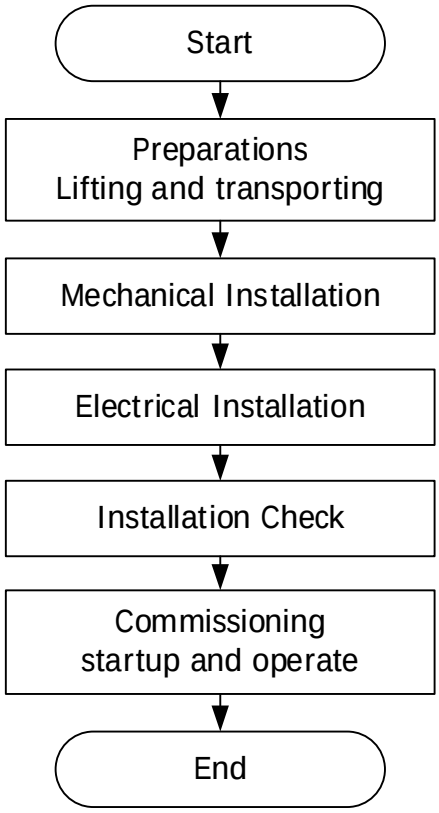


Fig. 3-1 Installation Process

Installation process description

Process	Explanation	Chapter
Preparation Lifting and transporting		4 Storing, lifting and transporting
Mechanical Installation		5 Mechanical Installation
Electrical Installation		6 Electrical Installation
Installation Check		7 Installation checklist
Commissioning startup and operate		8 Start-up and Operation

4 Storing, lifting and transporting

4.1 Scope of Delivery

Refer table below for packing list of rack of STS cabinet:

Table 4-1 Scope of Delivery

Item	Quantity	Remark
User's manual	1 copy	Electronic Document
Overall dimension and foundation installation diagram	1 copy	Electronic Document
Schematic diagram		
External terminal diagram		

The electronic document can be downloaded from Sinexcel's website or provided by Sinexcel's staff.

4.2 Safety during Transport

WARNING

If the lifted or suspended load falls over, falls or sways, there is a risk of crushing

Vibration or careless or hasty lifting and transport can cause the product to tip over or fall. This can result in death or serious injury.

All national transport standards and regulations must be respected.

Always transport the product as close as possible to the floor.

Avoid fast or uneven movement during transport.

Always maintain a sufficient safety distance from the product during transportation.

NOTICE

Damaged frame structure of the STS cabinet due to uneven support surface

Placing the STS on an uneven surface can cause bending, which causes the STS door to no longer close properly.

This can cause moisture and dust to seep into the STS.

Do not place the STS on an unstable, uneven surface, even for short periods of time.

The unevenness of the support surface must be less than 0.25%.

Do not use the installed kick plate to transport the STS.

4.3 Transporting the STS cabinet

4.3.1 Transport and storage

During device transport and storage, pay attention to the caution sign on the packing case. The selection of storing position should ensure that:

- There is no corrosive gas around it.
- There are over-wetting and high-temperature sources.

• It is not a dusty environment.
• It complies with the local firefighting requirements.

NOTICE

During rack transport and storage, stacking is not allowed. The device top cannot be placed with other articles.
The rack should be placed vertically at forward direction. Keep it upright and don't place it horizontally.

4.3.2 Transporting

When removing the STS unpacked from packing case, a forklift can be used to remove the whole STS. Users can lift the device bottom with a forklift . There is no lifting hole on its top.

Fig. 4-1 Moving STS Cabinet

WARNING

Before STS is moved, please ensure that the STS cabinet is fixed stably.

4.4 Unpacking the STS CABINET

Please take care to protect the STS cabinet inside the package when unpacking.

NOTICE

STS cabinet can't be inverted and the vertical tilt angle should not exceed 30 degree.

5 Mechanical Installation

5.1 Safety during Installation

DANGER

Risk of electric shock caused by live voltage
There is a high voltage in the live components of the product. Touching field components can result in death or seriousness electric shock damage.
Wear appropriate personal protective equipment for all work on the product.
Do not touch any live components.
Observe all warning messages in products and documents.
Obey all safety information from the battery manufacturer.

WARNING

Fire due to failure to observe torque specifications at real-time bolt connections
Failure to comply with the specified torque reduces the current carrying capacity of the live bolt connection, thereby reducing the contact resistance increase.
This can cause the components to overheat and catch fire.
Be sure to always tighten the live bolt connection using the exact torque specified in this document.
Use only the right tools when working on the device.
Avoid repeatedly tightening the live bolt connection as this may result in unacceptably high torque.

5.2 Installation requirements

5.2.1 Environment requirements

It is installed indoor. Direct sunshine, rain and ponding should be avoided.
The installation environment is clean. The air should not contain lots of dust.
The installation position should not be shaky.
Environment temperature should be within the temperature range listed in technical specification.
The installation position is convenient for observing touch screen.

5.2.2 Ground requirements

The STS cabinet needs to be installed on the flat ground. The weight-bearing of the ground for installation should be greater than 1,000kg/ m2.

5.2.3 Ventilation

The STS cabinet is forced air-cooling. The cabinet heat dissipation mode is air inlet in the front and air outlet in the rear. The cold air is inhaled from the mesh openings of front door of the rack. After heat absorption, the hot air is discharged from the mesh openings of rear door of the rack.

To ensure the quality of air inlet, please carry out installation according to the operation space requirement in chapter below, and a proper space should be reserved for air inlet and outlet. The blower and air condition are recommended to be installed in the machine room so as to ensure that the heat emitted from the STS cabinet can be discharged outside the room.

NOTICE

At the rear of the rack, heat dissipation should be guaranteed and ventilation equipment needs to be installed so as to ensure that the heat emitted from the STS cabinet can be discharged outside the machine room.

5.2.4 Operation space

The installation space of the STS cabinet should have a proper distance from its peripheral walls so as to ensure that the machine door can be opened and closed conveniently and there will be sufficient space for device maintenance, normal heat dissipation and user's operation.

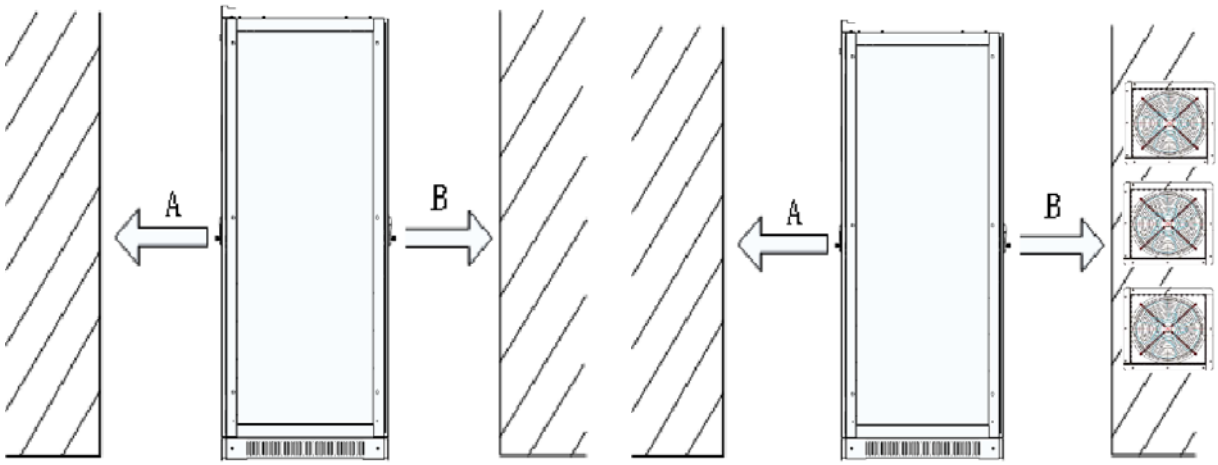


Fig. 5-1Front and back installation space of STS cabinet

Position	Description
A front	≥800mm, ensure that the front door of the rack can be fully opened. There is sufficient space for cold air to enter. Users can conveniently operate and maintain the cabinet.
B rear	≥800mm, ensure that the rear door of the rack can be fully opened. Please seen Chapter 5.5 for the air volume requirements and air duct design. Ventilation and heat dissipation should be ensured. Users can have sufficient space for maintenance.
Or	B rear ≥200mm when there are cooling fan near the rear door.

The distance between STS cabinet side steel plate and container wall is no less than 50mm to ensure that the STS cabinet can be installed inside the container.

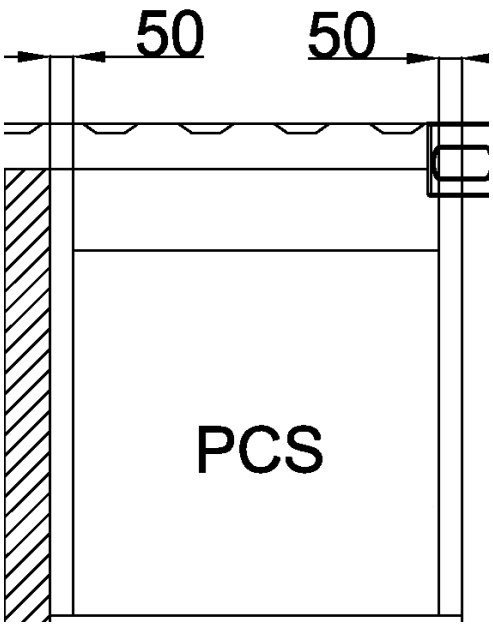


Fig. 5-2 Side installation space of STS cabinet

5.2.5 Other requirements

1) Waterproofing

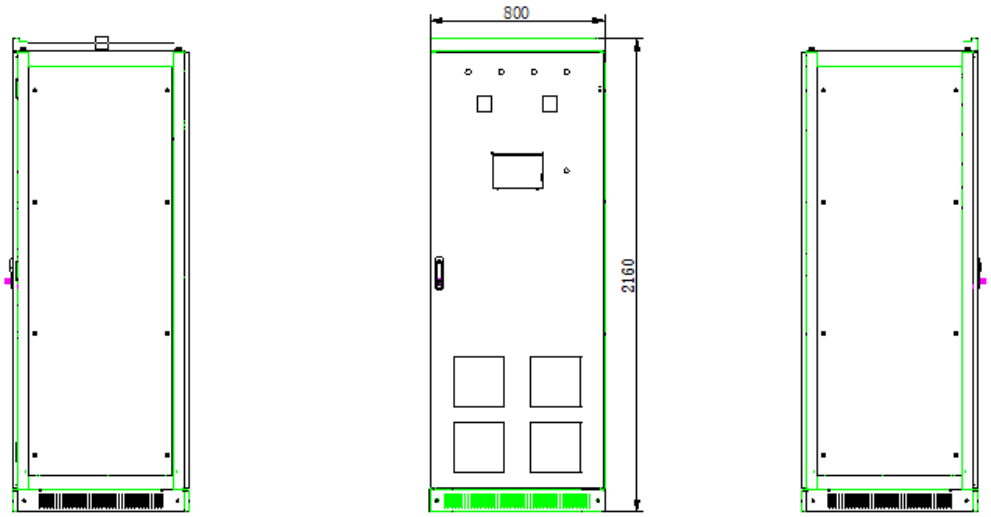
The ingress protection grade of the rack of the STS cabinet is IP20/NEMA1. It is only installed and used in a dry and clean room. Water leakage in room should be avoided so as to prevent the storage inverter from being damaged.

2) Rat-proofing

After wiring, fireproofing mud should be used to seal inlet and outlet holes so as to meet the rat-proofing requirement. Fireproofing mud is not provided by Sinexcel.

5.3 Mounting preparation

Drilling mounting holes is required in the foundation. The overall dimension of the STS cabinet is shown in figure below.



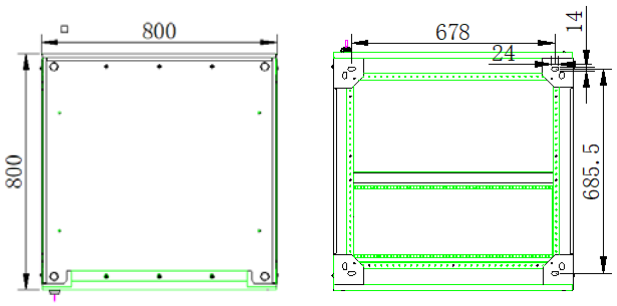


Fig. 5-3 Overall dimensions of STS Cabinet

The PWD-800K STS cabinet, width: 800mm, height: 2,160mm (without lifting rings); depth: 800mm.

The PWD-800K STS cabinet is without lifting rings and can't be lifted.

5.4 Rack installation

After the rack is removed to the installation position of BESS (battery energy storage system) with a forklift or a tool. Fine adjust the rack and remove it to the designed position, open the internal door of rack, use M10 or M12 screw to fix the rack.

When the rack needs to be fixed on the steel channel, Φ14 holes can be made in the steel channel. Fix the rack to the steel channel with screws.

Fig. 5-4 Fix the rack to the channel steel

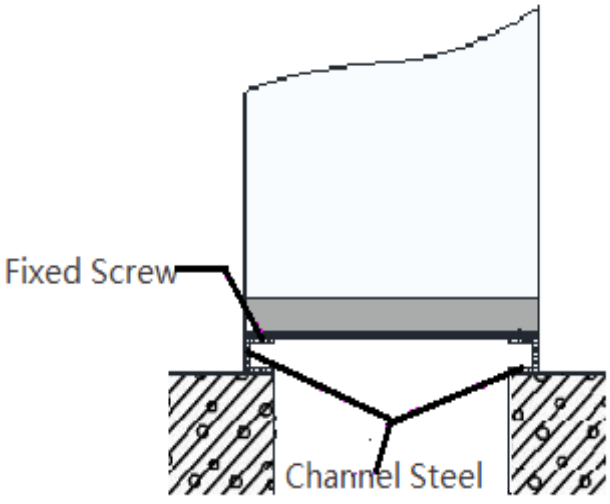
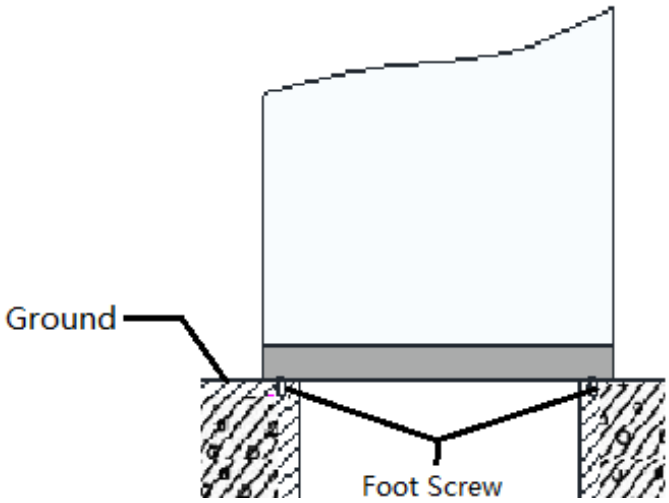


Fig. 5-5 Fix the rack to the concrete floor



6 STS cabinet introduction

6.1 system composition

PWD-800KW STS cabinet has three thyristor modules and monitoring components. The switch cabinet is equipped with a lightning protection device, a power grid load switch, a bypass load switch, a PCS circuit breaker and a load circuit breaker, and the below figure is a topology diagram of its constituent structure.

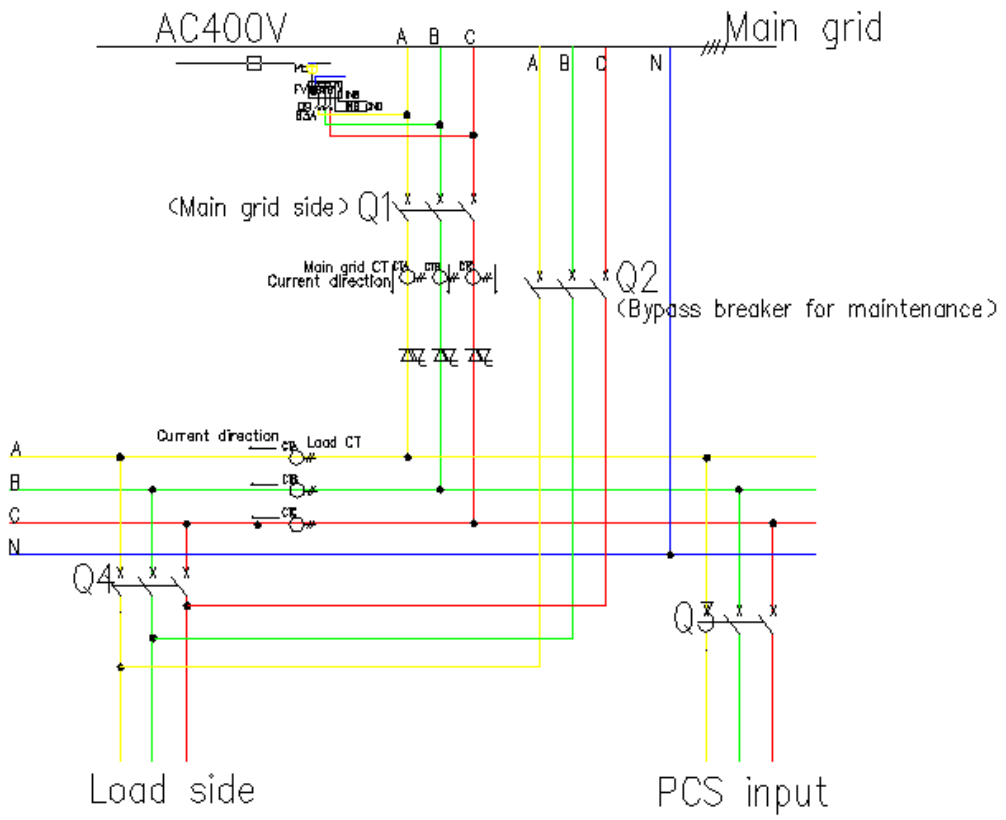


Fig. 6-1 STS electrical diagram

6.2 STS function principle

STS cabinet is composed by fast switch, high-precision detection, logical control and external communication. It is used to achieve automatic switching between on-grid and off-grid. The signal detection board inside STS cabinet will collect main grid's data in real time and transfer these data to controlling board. When the voltage in main grid's side fails, the controlling board will monitor it for half cycle. After confirming power off in main grid side, STS will cut off fast switch circuit and initiate on/off-grid switching command to PCS's monitoring system. When main grid recovers, STS will detect main grid's status (such as phase angle) and adjust PCS's output. When PCS output is the same as main grid, STS will close the internal circuit.

For STS cabinet, the communication port between PCS and STS cabinet which is used for the on/off-grid command's transmission is Ethernet port. For the built-in STS module inside PCS cabinet, it is CAN bus communication between STS and PCS. These both communication methods would be mapped by themselves and don't need to be controlled by the external controller, EMS or other third device. All on/off-grid operation would be done by themselves.

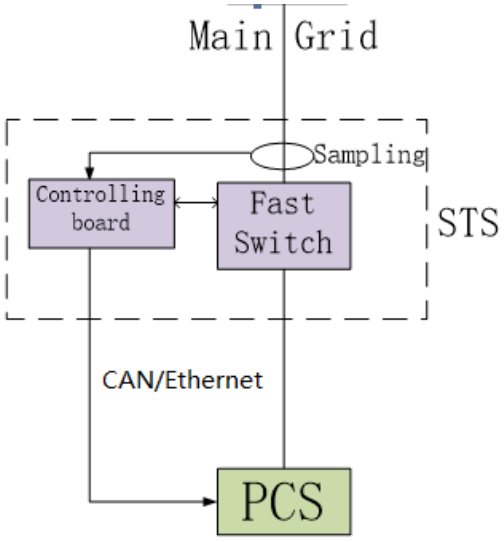


Fig. 6-2 STS structure

6.3 STS cabinet specification

Please refer to the STS cabinet's specification.

Rated capacity	800K
Rated voltage	400V
Input voltage range	-25%~15%
Output voltage range	-25%~15%
Rated input currrent	1212A
Max input current	1333A (110%)
Rated power	50Hz/60Hz
Frequency range	47~52Hz/57~62Hz
Switching time gap	<80ms
Efficiency	99.5%（Full load）
IP degree	IP20
Cool mode	Forced air cooling mode
Main grid input quantiy	1 branch
Bypass input quantity	1 branch
PCS input quantity	1 branch
Load input quantity	1 branch
Wiring mode	3 Phase 4 Wire

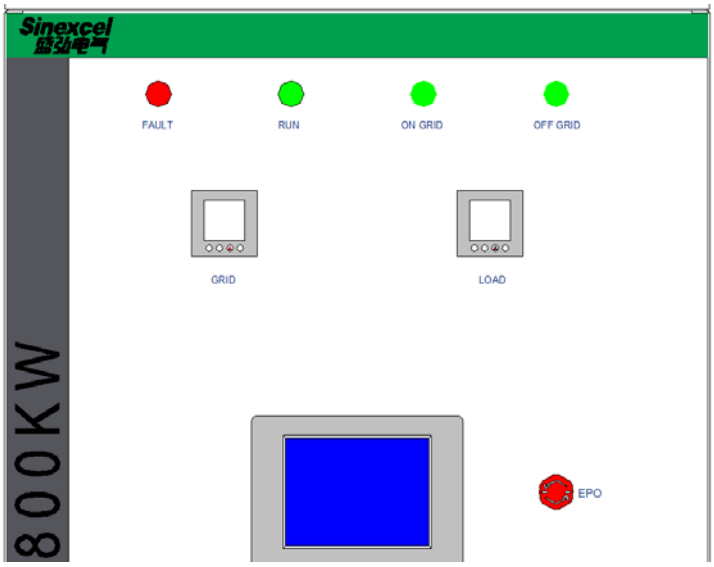


Fig. 6-4 STS front door appearance details

Item	Description	Quantity
Fault indicator	When fault appears, the fault indicator would be light.	1
RUN indicator	When STS cabinet runs normally, the RUN indicator would be light.	1
On grid indicator	When STS cabinet runs in on grid mode, the on grid indicator would be light.	1
Off grid indicator	When STS cabinet runs in off grid mode, the off grid indicator would be light.	1
Grid meter	Show the Grid's side voltage and current data	1
Load meter	Show the load's side voltage and current data	1
HMI	Touch screen for user's operation	1
EPO	Emergency power off putton for STS cabinet	1

6.4.2 STS cabinet internal appearance description

Take PWD-800KW as an example, after opening the front door, the internal plane layout as shown in the below figure, the main components include communication port and the AC breakers.

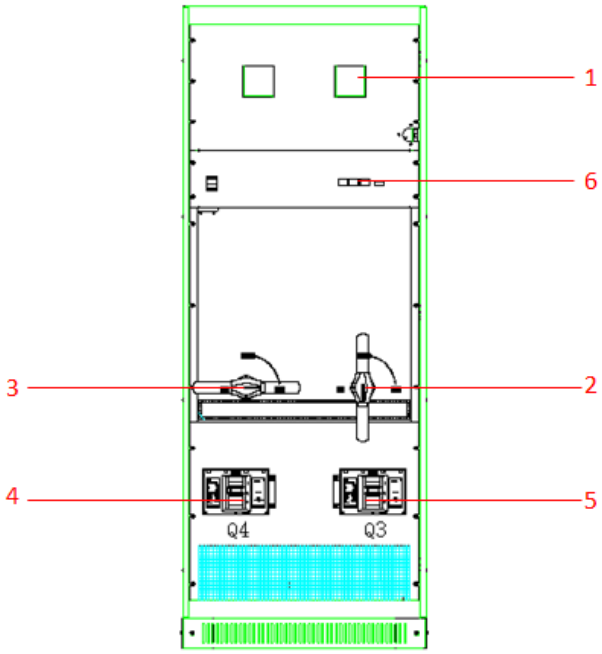


Fig. 6-5 STS internal appearance details

Item	Description	Quantity
1	Meter's installation hole position	2
2	Bypass breaker for maintenance of PCS	1
3	Main grid input breaker	1
4	Load output breaker	1
5	PCS connection breaker	1
6	External communication ports of STS cabinet, which need to work with the additiaonal communication PCB board together.	1

For this item 6, this is the communication port terminals board. Please refer to the following figure. STS's additional communication PCB board, which would act as the communication connection bridge in the middle of PCS and STS cabinet, would use the BUS connection with this below port.

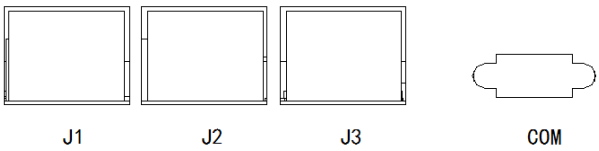


Fig. 6-6 STS communication port terminals board

6.4.3 STS cabinet’s electric connection

Please refer to the Load and PCS breaker’s wire connection terminals. The connection hole diameter in the copper bus is Φ14.

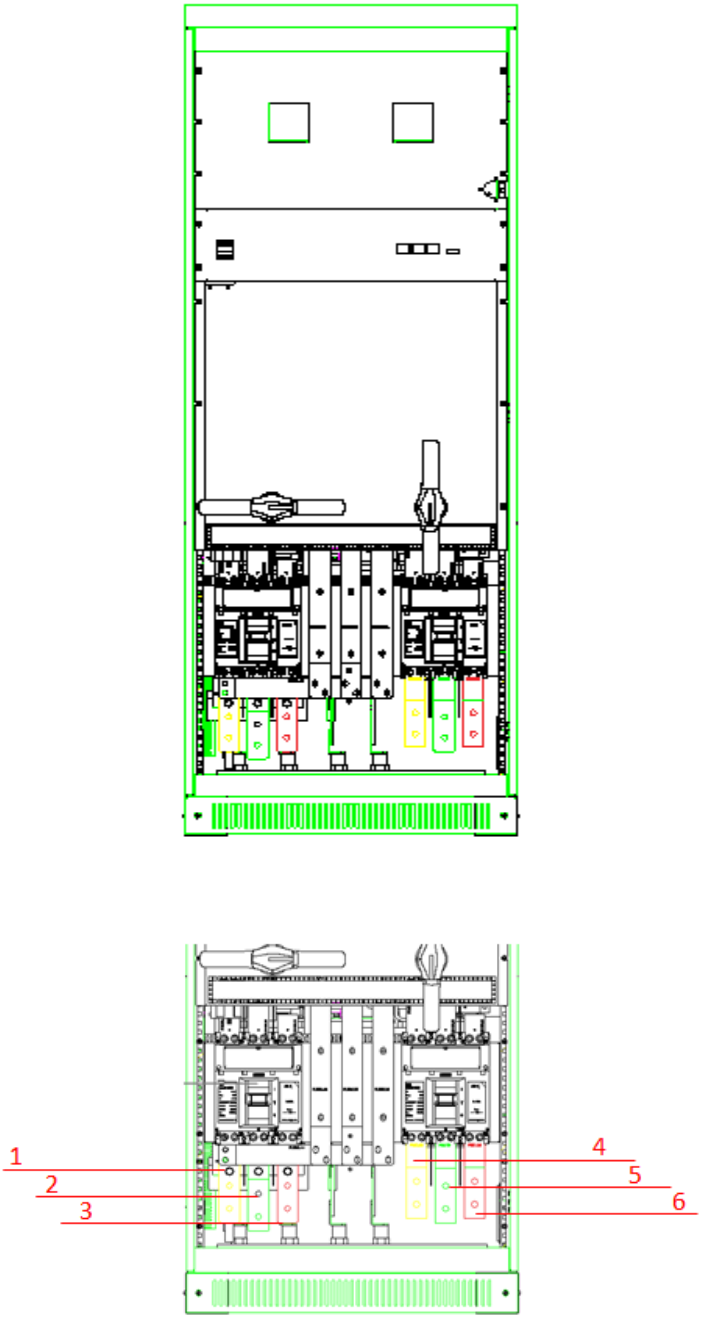


Fig. 6-7 wire connection terminals for load and PCS

Item	Description	Quantity
1	A phase for load	1
2	B phase for load	1
3	C phase for load	1

4	A phase for PCS	1
5	B phase for PCS	1
6	C phase for PCS	1

Please refer to the main grid and maintenance bypass breaker's wire connection terminals. The main grid and bypass's input all are connected to these below wire connection positions.

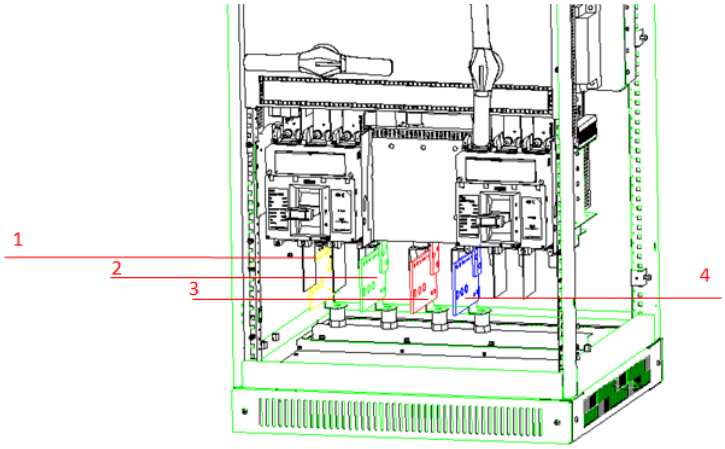


Fig. 6-8 wire connection terminals for main grid and bypass breaker

Item	Description	Quantity
1	A phase for maing grid and bypass's maintenance breaker	1
2	B phase for maing grid and bypass's maintenance breaker	1
3	C phase for maing grid and bypass's maintenance breaker	1
4	N phase for maing grid and bypass's maintenance breaker	1

6.5 STS cabinet's communication connection

STS cabinet has the Ethernet and RS485 communication ports, which could upload the its running status and fault information to the EMS or the background management system.

The STS communication with PCS would be connected by the additional communication boards, which would not occupy the communication ports which are used for the original background management system communication ports in the PCS and the STS cabinet.

6.5.1 RS485 communication

The front door of the STS cabinet is embedded with a touch-screen monitoring unit, the back of which can see the user interface. The bit number of the RS485 communication Interface on the monitoring board is J23. The user can convert the serial signal to the PC function processing signal (such as RS485 turn 232) through the interface converter, through the background software to the micro-network switching cabinet for single-machine debugging, read the micro-network switchboard operation information, alarm information, the corresponding settings and so on.

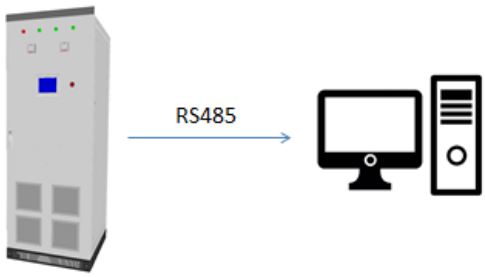


Fig. 6-9 RS485 communication from STS cabinet to EMS

6.5.2 Ethernet communication

The Monitoring Board also integrates the Ethernet interface at the same time, the bit number is J25, supports the Modbus TCP/IP protocol, has its own IP address, similar to a PC machine. Connection cable for twisted-pair wire (that is, network cable), will be a micro-network switch cabinet network port connection remote monitoring computer, in the monitoring computer set the corresponding IP address and port slogan, user can achieve real-time monitoring of STS cabinet.

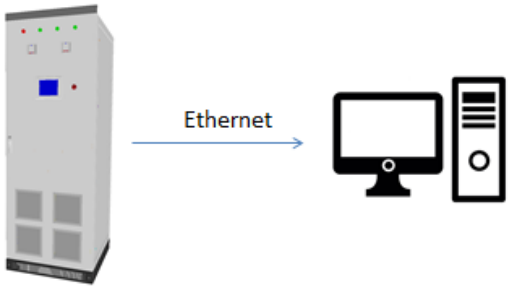


Fig. 6-10 Ethernet communication from STS cabinet to EMS

6.6 Real installation case

Please refer to the following real installation case picture.


PWD-800KW
PWS2-250KW

7 Check after installation

After installation of STS cabinet, inspection is conducted after the installation:

1) The device should be placed and should be installed reasonably, meeting safe distance requirements.

2) Wiring should be correct. Lower leading wire and ground screen are in good connection. The constructor is required to inspect the grounding resistance.

3) Compare ex-factory main wiring diagram provided by the manufacture and site wiring. Check whether there is any difference and judge whether such difference will affect the safe operation of energy storage system.

8 Installation checklist

After finishing the installation, check the list below:

Mechanical installation	√
There is sufficient free space in front and at the back of the unit.	□
The ambient operating conditions are within the range in specification.	□
The unit is properly fastened to the floor.	□
Nothing blocked the air ventilation of the STS cabinet and the air tunnel is through.	□
Electrical installation	√
The STS cabinet (including cables) is grounded properly and the earthing electrodes are constructed properly.	□
The AC line voltage matches the nominal output voltage of the STS cabinet	□
The insulation of the assembly is good and meet the code	□
The AC power connections at A, B and C and their tightening torques are correct.	□
The auxiliary and control cables are routed away from the power cables	□
The external control connections to the STS cabinet are correct	□
The cable connections at the junction box and their tightening torques are correct.	□
There are no tools, foreign objects or dust inside the cabinet.	□
All of the dam-boards and covers are in place. Especially the dam-board below the front door is installed.	□
All of the doors and door locks are in place.	□
Insulation withstand test	□
The grounding resistance should be less than 4Ω.	□

9 Contact

If you have technical problems with our products, please contact the service hotline. Please provide the following information to help you with the necessary assistance:

- Equipment model
- Serial number
- Battery type and number
- Communication type
- Firmware version
- Error number and error message

Shenzhen Sinexcel Electric Co., Ltd.
Website: http://sinexcel.us/ or www.sinexcel.com
Add: Building 6, Area 2, Baiwangxin High-tech Industrial Park, No. 1002, Songbai Road, Nanshan District, Shenzhen
Postcode: 518055
Hotline:+86 0755-8651-1588