Installation Manual

PWG Series Bi-directional PV+ Storage PCS

Sinexcel

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Installation Manual

Version: V2.0

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Table of Contents

1 Information on this Document

1.1 Validity

This document is valid for the following device models with or without STS module:

- PWG2-50K
- PWG2-100K
- PWG2-50K-NA
- PWG2-100K-NA
- PWG2-50K-EX
- PWG2-100K-EX

Model definition

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

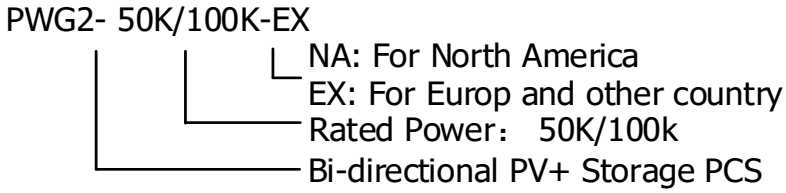


Fig.1-1 Product model definition

For example:

PWG2-100K: 100kW Bi-directional Hybrid PCS

Check the type label for the production version of PCS.

The illustrations in this document have been reduced to be necessary and may differ from the real product.

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 and how to operate the battery
- 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 PWG series 50~100kW Bi-directional Hybrid Storage Inverter (PCS).

Before installation, please read this user's manual carefully.

The PCS 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 PCS cannot be used for any circumstance or application related to life support device.

This manual contains important instruction for Models of PWG series that shall be followed during installation and maintenance of the PCS.

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

When storage battery is connected to PCS, there may be DC voltage at input port. Please pay attention to it during operation or check the battery system user manual

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

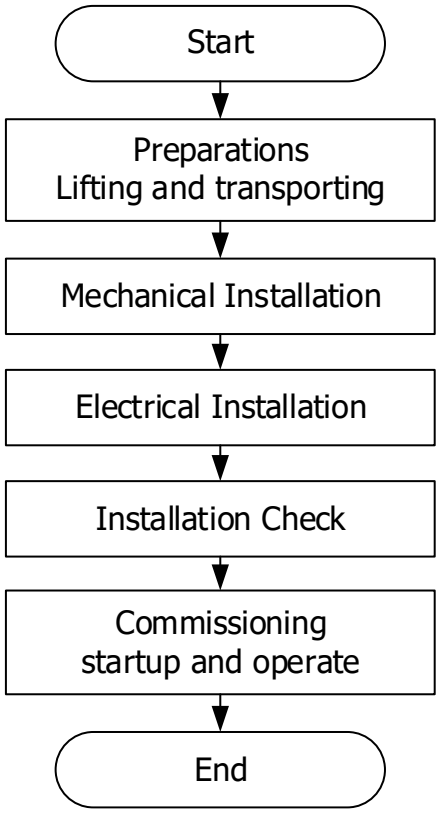


Fig. 3-1 Installation Process

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 storage inverter:

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		
Certificate of quality	1 copy	

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 PCS due to uneven support surface
Placing the PCS on an uneven surface can cause bending, which causes the PCS door to no longer close properly.
This can cause moisture and dust to seep into the PCS.
Do not place the PCS 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 PCS.

4.2 Transporting the PCS

4.2.1 Transport and storage

The module of the PCS are installed in the PCS cabinet rack during shipping. 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.

4.2.2 Transporting

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

Fig. 4-1 Moving PCS

WARNING

Before the rack is moved, please ensure that the module is fixed stably.

4.3 Unpacking the PCS

Please take care to protect the PCS inside the package when unpacking.

NOTICE

PCS 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.

DANGER

Electric shock hazard caused by DC cable

The DC cable connected to the battery is live. Contact with live cables can cause electrocuted death or serious injury shock.

Before connecting the DC cable, make sure that the DC cable has no voltage.

Wear appropriate personal protective equipment for all work on the product.

WARNING

Danger to life due to electric shock when entering the storage system

Damage to the insulation in the storage system can result in fatal ground currents. May cause a fatal electric shock. Ensure that the insulation resistance of the storage system exceeds the minimum.

Minimum value：The insulation resistance is: 14kΩ.

The PCS must be installed in a closed electrical operating area.

The product is to be installed in a high traffic area where the fault is likely to be seen.

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 rack of the storage inverter 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 storage inverter is forced air-cooling. Every module has an independent ventilation route. The module 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. A blower is recommend to be installed in the machine room so as to ensure that the heat emitted from the storage inverter 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 storage inverter can be discharged outside the machine room.

5.2.4 Operation space

The installation space of the PCS 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 module insertion and extraction, normal heat dissipation and user’s operation.

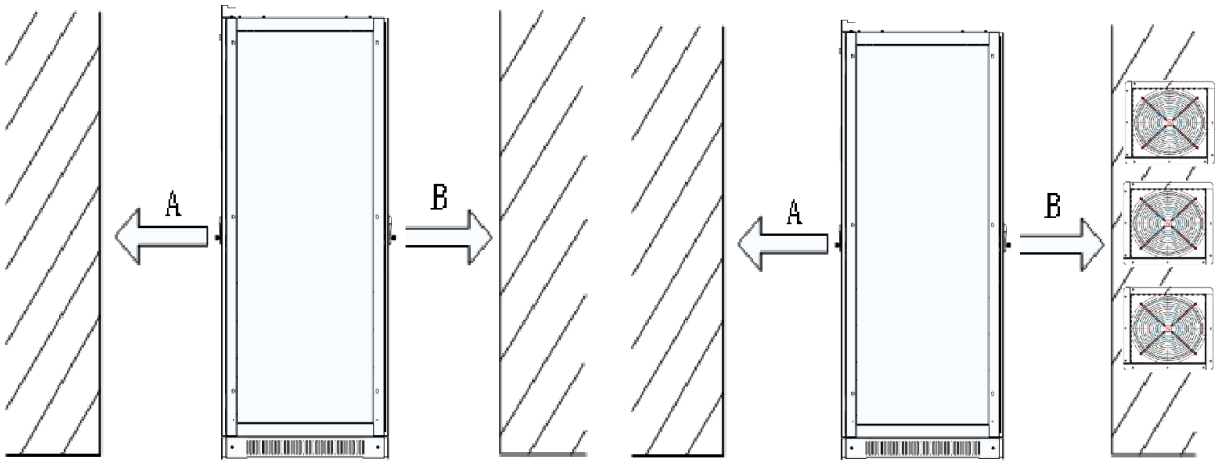


Fig. 5-1Front and back installation space of storage inverter(Please seen Chapter 5.5 Installation in container for the recommend fan location)

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 insert and extract the module and operate the breaker.
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 PCS side steel plate and container wall is no less than 50mm to ensure that the PCS can be installed inside the container.

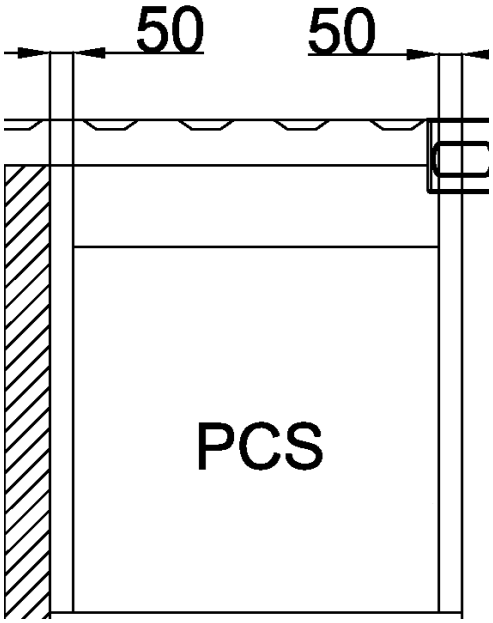


Fig. 5-2 Side installation space of storage inverter

5.2.5 Other requirements

1) Waterproofing

The ingress protection grade of the rack of the Bi-directional Hybrid Storage Inverter 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 PCS is shown in figure below.

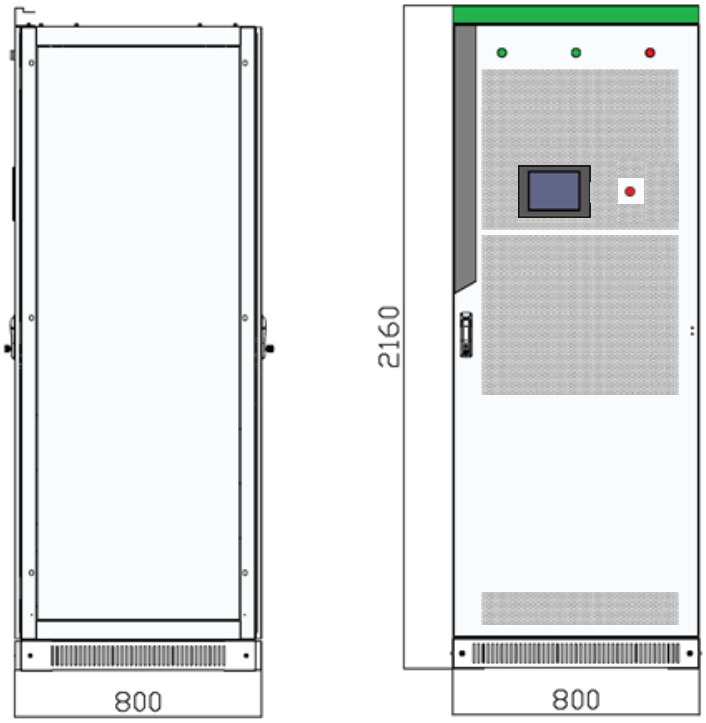


Fig. 5-3 Overall dimensions of PCS

The PWG2-50K/100K cabinet, width: 800mm, height: 2,160mm (without lifting rings); depth: 800mm.

The height of the green lintel is 60mm and it can be taken down if there is no sufficient height into the room.

The PWG2-50K/100K series Bi-directional Hybrid Storage Inverter is without lifting rings and can't be lifted.

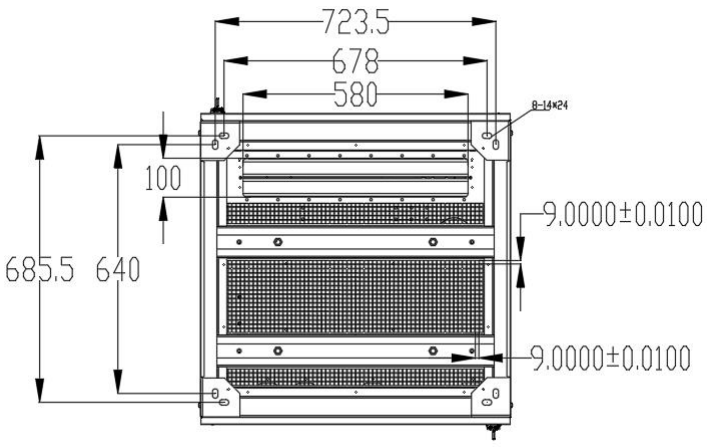


Fig. 5-4 PWG2-50K rack wiring hole in bottom view

There are two hole in each corner, only one hole need to mount bolts, the other hole is used as a spare.

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. 5-5 Fix the rack to the channel steel

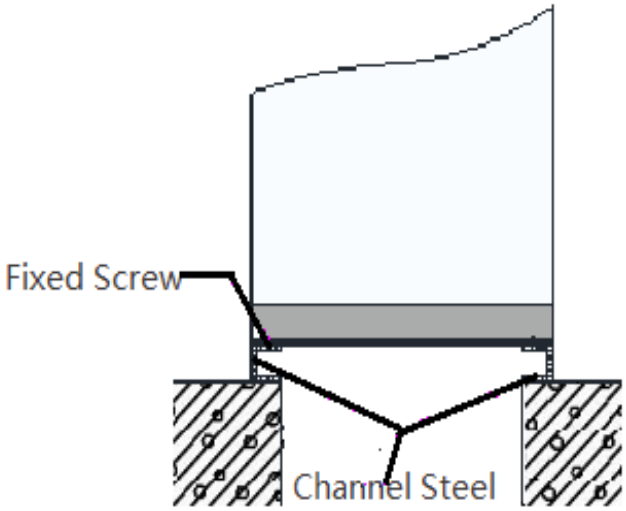
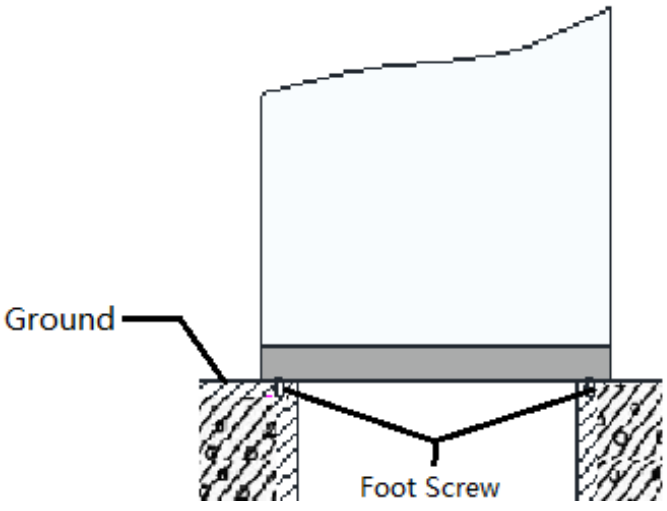


Fig. 5-6 Fix the rack to the concrete floor



When the rack is fixed to the concrete floor, make holes on the floor and fix the rack to the concrete floor with expansion screws.

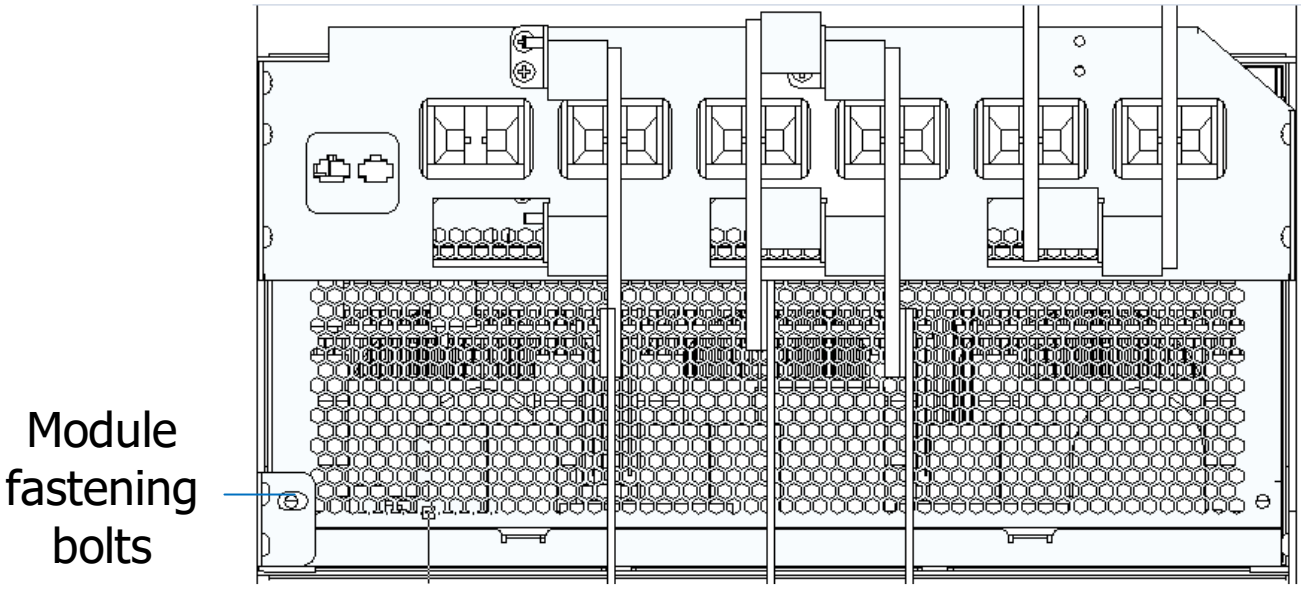


Fig. 5-7 Module fastening bolt position in the back side of each module

After confirming the above items and finished and tested, open the back door of the PCS and remove the module fastening bolts.

NOTICE

Note: Make sure that the module fastening bolts on the back side of power module have been removed before moving the converter into the container.
Can contact the manufacture to confirm.

5.5 Installation in container

5.5.1 Container internal layout distance

Internal layout can be customized design according to customer's requirements. Please contact the manufacture to know the internal layout for specific project.

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

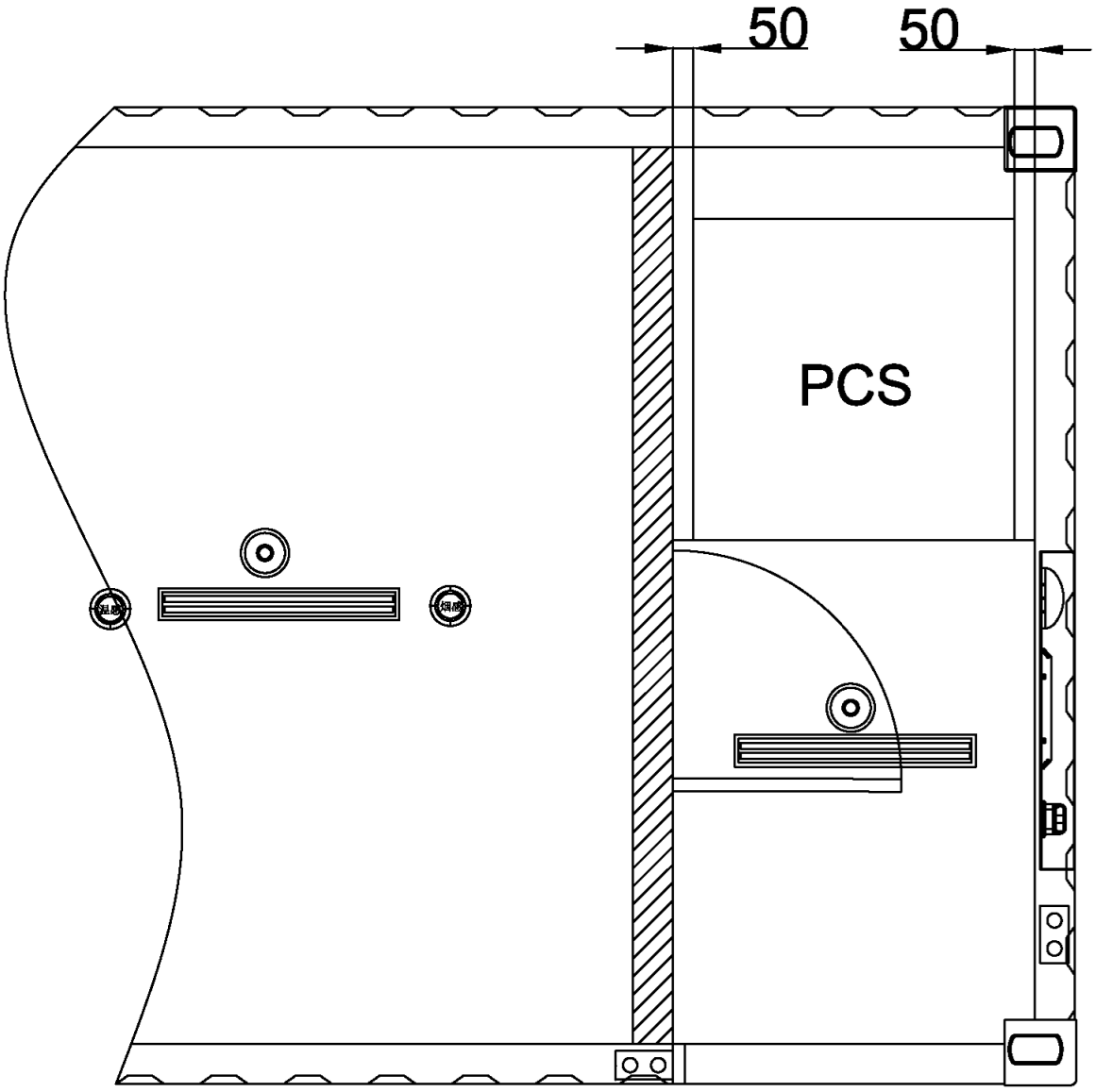


Fig. 5-8 The distance between PCS and container wall

5.5.2 Fan installed inside the container

When the fan is installed inside the container, its on the inner side of container door near the ventilation thermal outlet of the PCS.

The Dimension of the Fan and installation position below is just an examples. Please contact manufacture to confirm the Fan position for certain project.

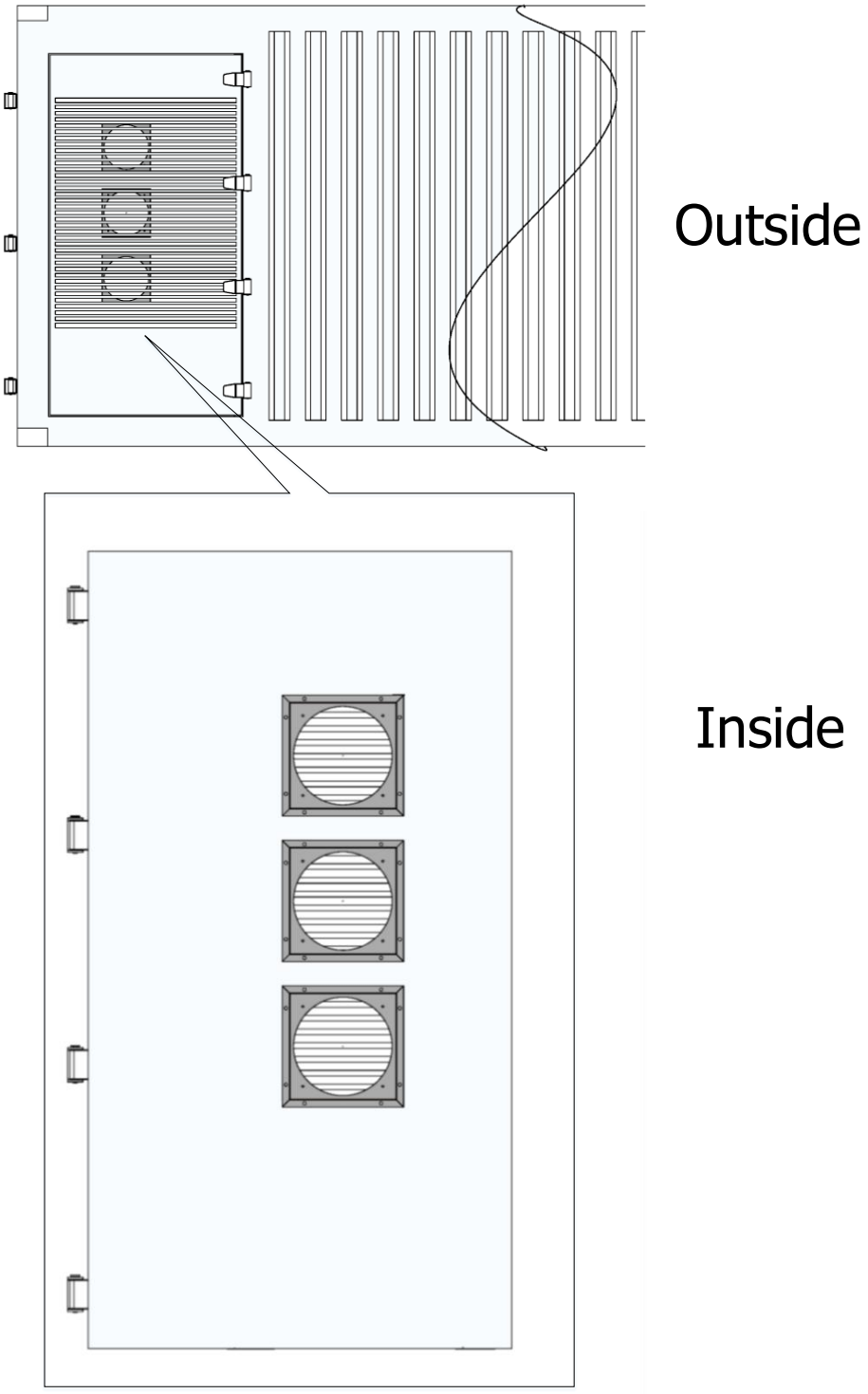


Fig. 5-9 The Fan on the inner side of container wall

5.5.3 Fan installed outside the container

The standard external fan module is recommended and easy to install.
When the fan is installed outside the container, its on the outward side of container door near the ventilation thermal outlet of the PCS.

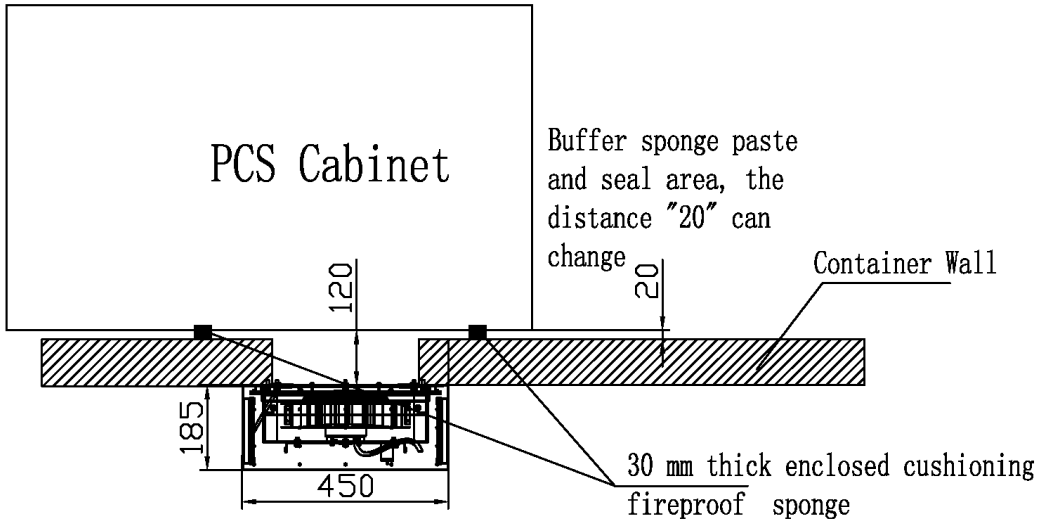


Fig. 5-10 Container external fan drawing

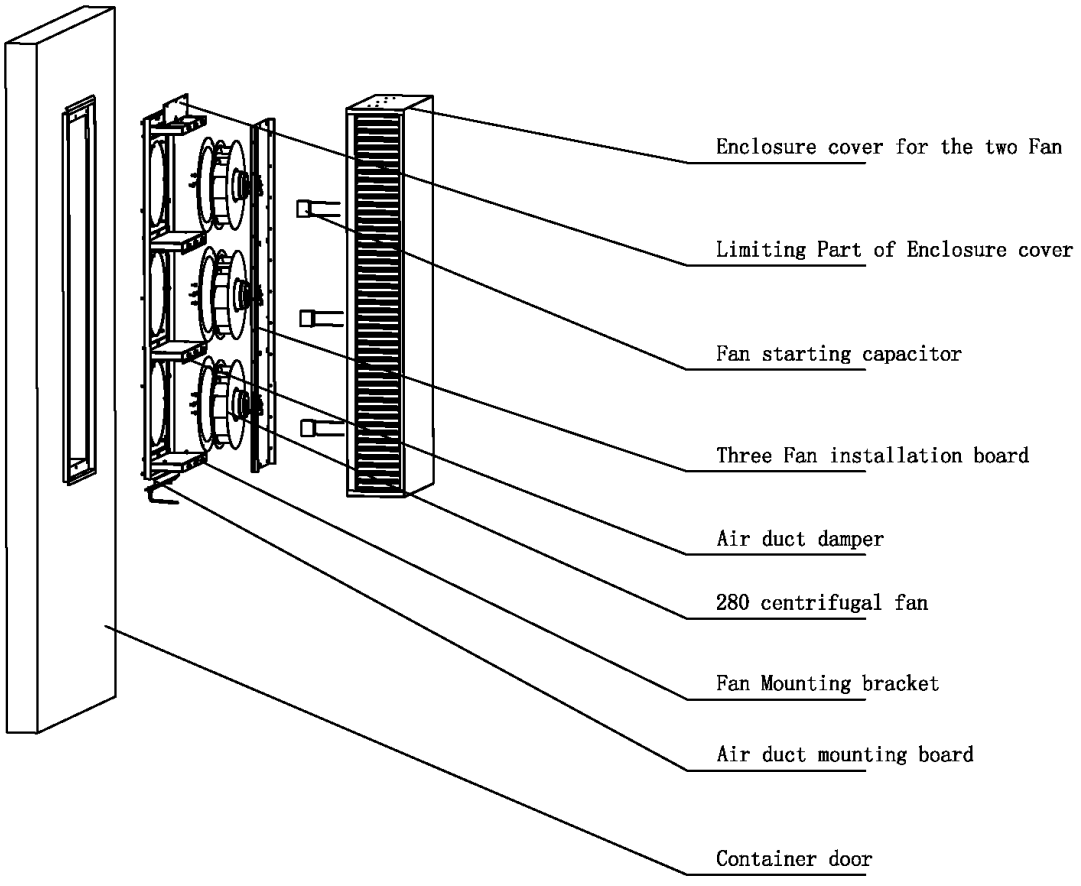


Fig. 5-11 Components of Container external fan

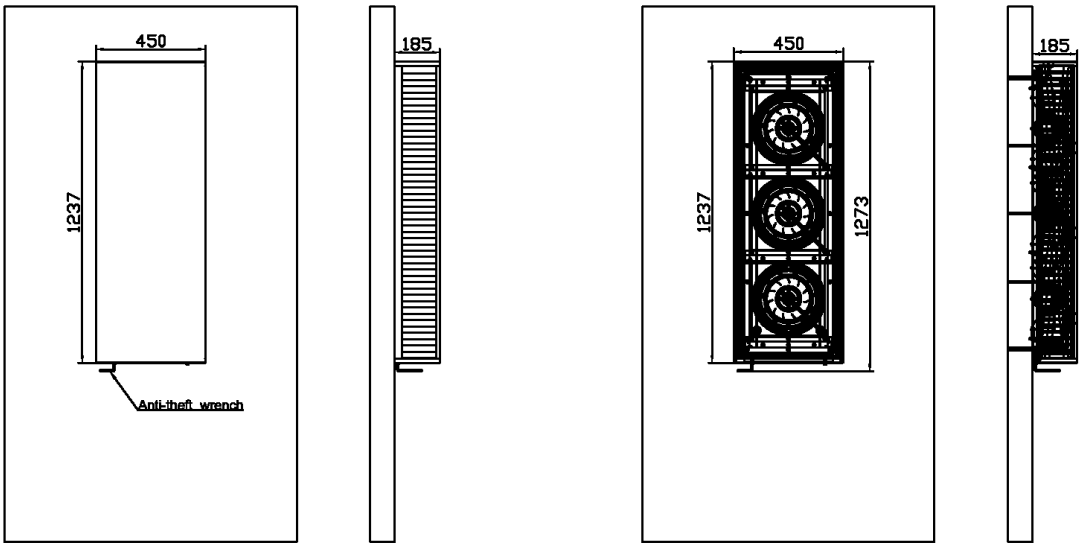


Fig. 5-12 Three external fan on the outward side of the door

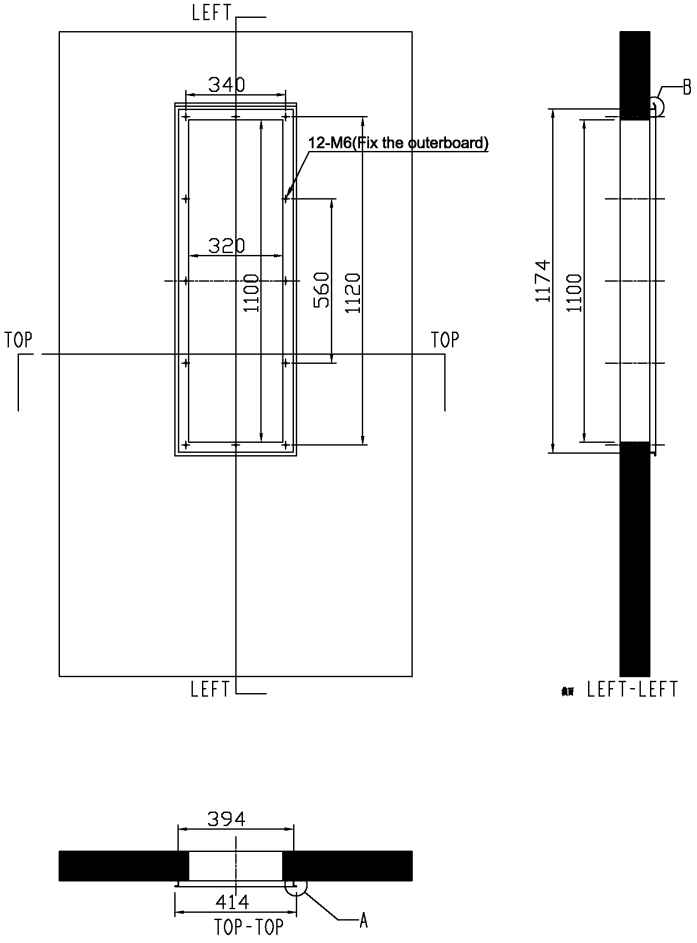


Fig. 5-13 Fan Cover and door dimension

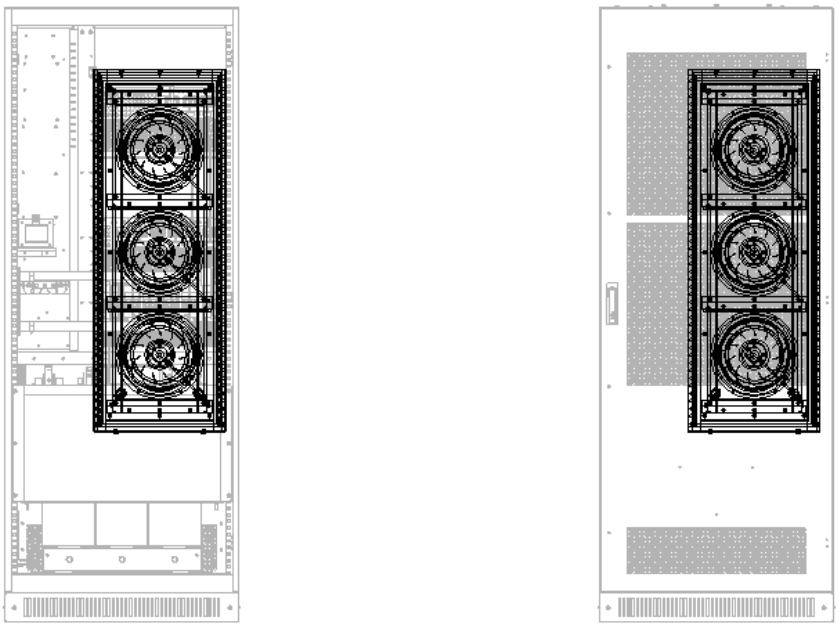


Fig. 5-14 PWG2-50K series Fan and its corresponding Module; Relative position of Fan and back door

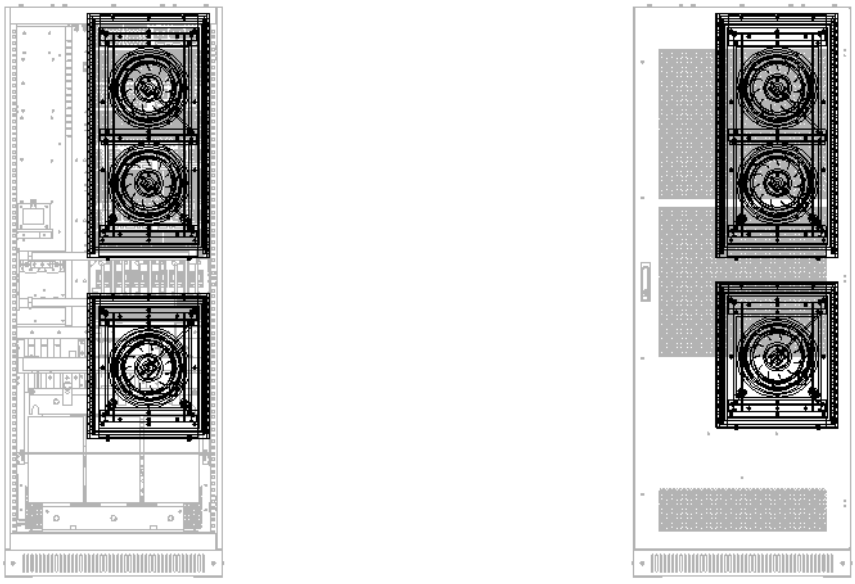


Fig. 5-15 PWG2-100K series Fan and its corresponding Module; Relative position of Fan and back door

5.5.4 Air duct design

Air duct can be customized design according to customer's requirements. Please contact the manufacture to know the air duct design for specific project.

Model	System air demand	Ventilation air volume	Fan	Module	Inlet air area	Outlet air area
PWG2-50K series	2500 M³H	3200 M³H	3	1	0.12 ㎡	0.24 ㎡
PWG2-100K series	3750 M³H	4800M³H	3	1	0.18 ㎡	0.34 ㎡

This ventilation volume requirement is also applicable to the indoor installation.

5.5.5 Installation of Fan module

Fan module (including fans and fan covers) need to be disassembled when the container commissioning and transportation. The steps for disassembling and waterproofing the corresponding fan and hood are as follows:

Step 1. Fasten the fan assembly with the screw to the container.

Step 2. Lock the hood fixture with screws, do not tighten, so that it can be adjusted later.

Step 3. After connecting the cable, hang up the fan cover, adjust the fan cover fixing bracket of the step 2 to the appropriate position and fasten it.

Then fasten the fan cover with the anti-theft screw with flat elastic pad,

Then fix the Four-sided t joint the fan cover and the container body with waterproof glue.

Then the installation is finished.

The removal steps can be reversed from step 3 to step 1.

6 Electrical Installation

6.1 Electrical Connections

6.1.1 Input requirement

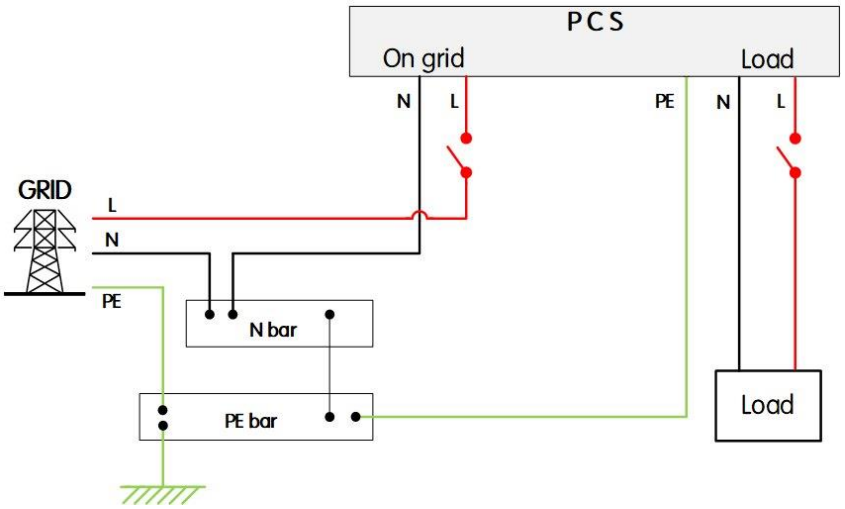
DC voltage of the PCS should be within the input voltage range, or the PCS will be unable to operate. When configuring the quantity of batteries in each string, the maximum charging voltage and minimum discharging voltage should be fully considered. For details, please consult our technical person.
The battery system working with the PCS should be equipped with DC switch and is recommended to be certified by CSA E61233 or UL1973. And the charging/discharging voltage should be between the input voltage range. It should also be equipped with DC air switch and the BMS certified by CSA No. 0.8 or UL991+UL1998. While connecting with exte

NOTICE rnal battery pack, please make sure DC and AC switches are disconnected.

For the multi-string models. Every DC input circuit branch in PCS should be able to operate independently. For multi-string models (e.g. PWS1-500KTL-XX), each DC input is independent from the other and should be connected with individual battery system. The batteries need to be connected to each branch port.

6.1.2 Output requirement

The output of the PCS is 3-phase and 4-wire. When designing energy storage system, The PCS has been equipped with an isolation transformer, the voltage of its output side can directly be connected to the low-voltage utility grid. The neutral continuity is maintained internal to inverter. TN connection is adopted as shown in the picture below:



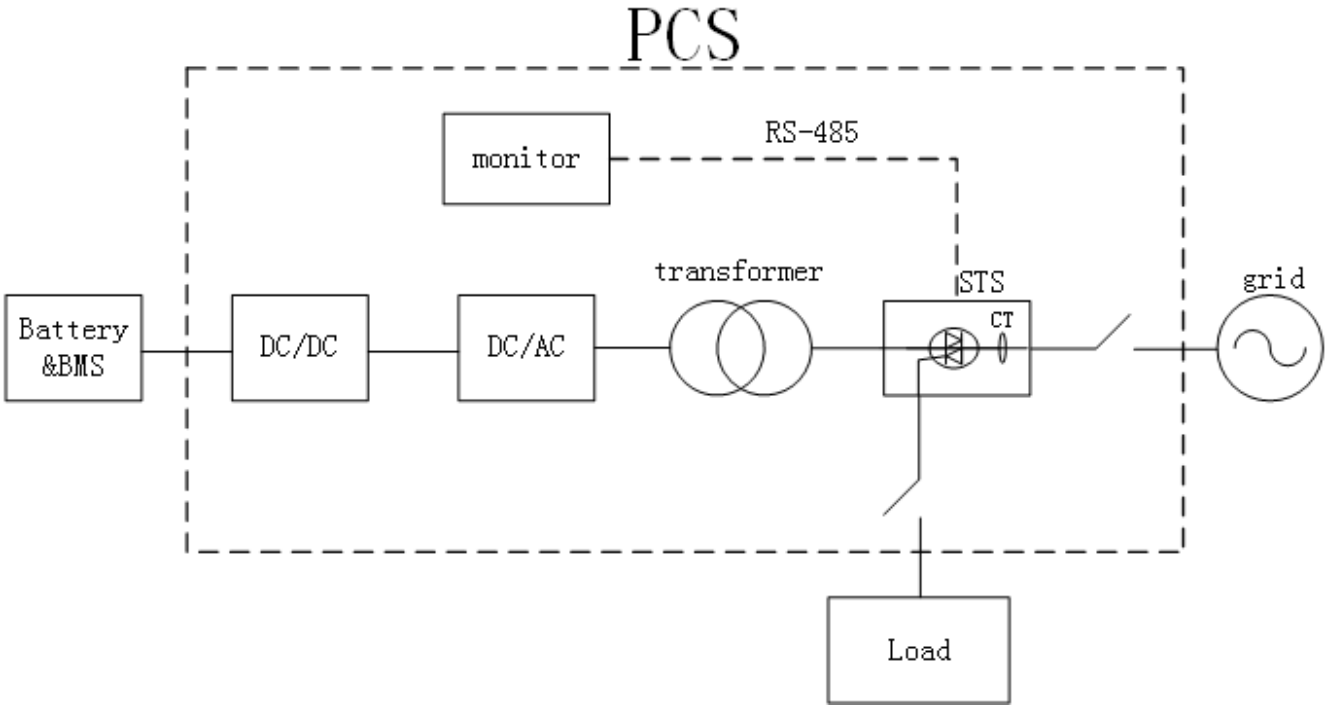


Fig. 6-1 Neutral Continuity

As for the RCD in the system, our PCS is integrated with isolated transformer. It is recommended to install a Type A RCD with 300mA on the AC and load side.

Since PWG cabinet can have built-in STS module. Regards to Generation control function, it's realized by a STS installed at the central metering place. The STS measured the currents as well as the voltages at the grid connection point, and send the data to the PCS' s RS485 port. PCE receives the power data at the grid connection point and compares it with Generation control require, if the measured power is larger than Generation control require, PCE will implement immediately.

6.1.3 Wiring mode

The wiring mode of the PCS is down inlet and down outlet, the incoming and outlet wiring holes located in bottom of the PCS cabinet. The cables put into the cable trough via the wire holes at the base. Open the front door and dismantle the dam-board to seen wiring of the cooper bars. As for wiring requirements, single cables or multiple cables with proper wire diameter should be selected. It is suggested that the current in 1mm^2 wire should be ≤3A.

The wiring methods should be in accordance with the National Electrical Code or other local standards, ANSI/NFPA 70 are to be used for NA version.

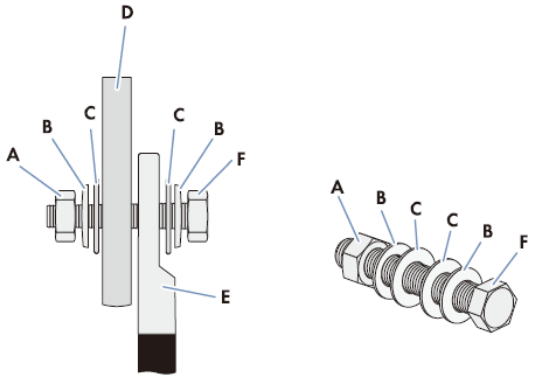


Fig. 6-2 Design of the connection with one one-hole terminal lug

Position	
A	Nut M12
B	Spring washer
C	Fender washer
D	Connection BUS bar
E	Tin-plated one-hole terminal lug
F	Screw M12

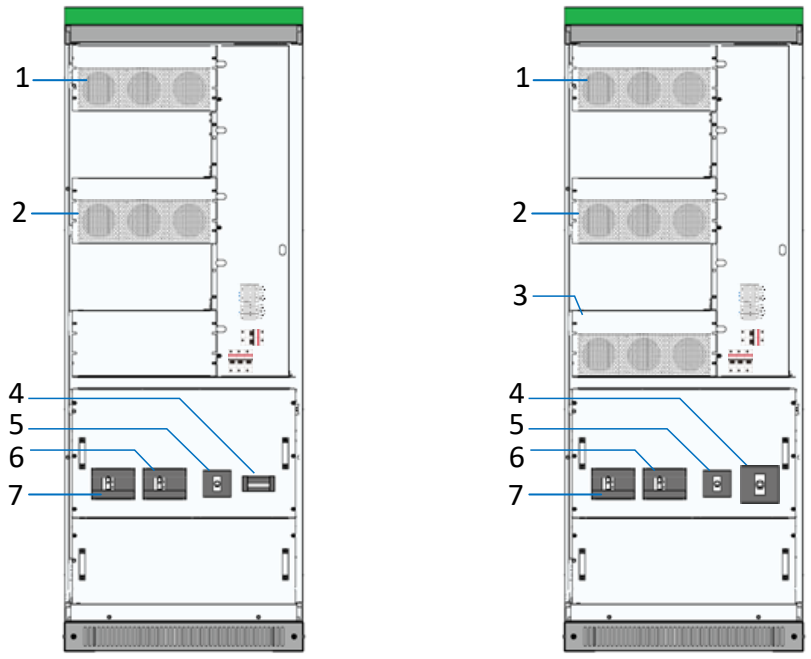


Fig. 6-3 PWG2-50K rack wiring components without STS module with STS module

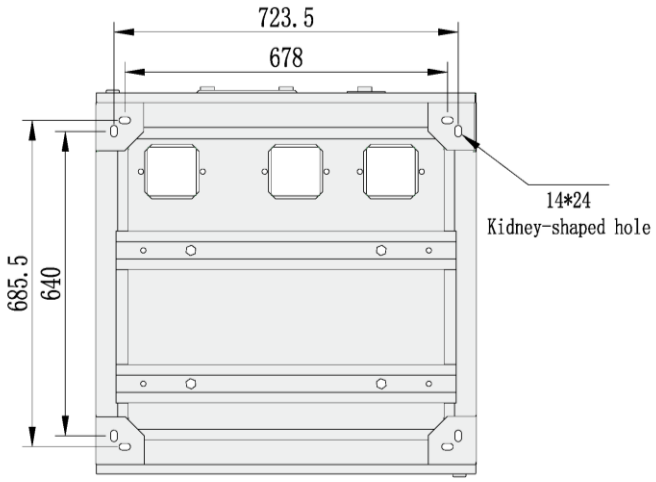


Fig. 6-4 PWG2-50K rack wiring hole and corresponding copper bars

Position	Designation	Description
1	PCS-DC (1~2 module(s))	
2	PCS-AC (1~2 module(s))	
3	STS module	Switching device
4	Manual soft start switch	Only for the model without STS, no need for wiring.
Or	AC breaker (Grid)	Only for the model with STS

5	AC breaker (Grid)	Only for the model without STS
Or	AC breaker (load)	Only for the model with STS
6	Battery breaker	
7	PV DC breaker	

Open the dam-board beside the switch and then can seen the wiring copper bar as shown below.

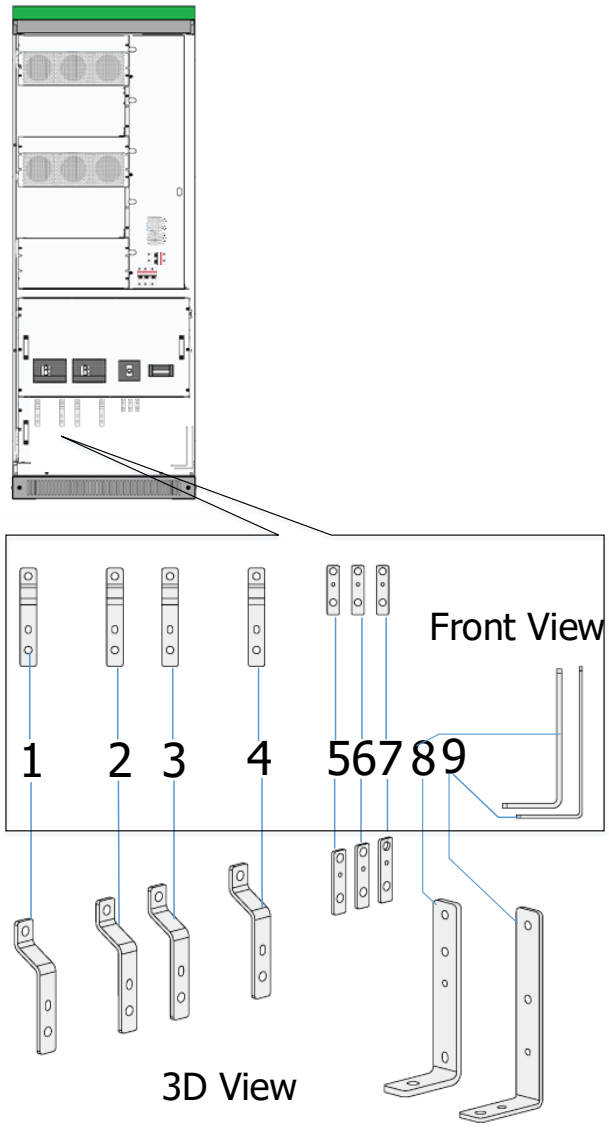


Fig. 6-5 PWG2-50K series wiring copper bars designation without STS module

Table 6-3 PWG2-50K wiring copper bars description

Position	Designation	Description
1	PV +	PV positive port, dimension is shown as below.
2	PV -	PV negative port
3	Battery +	Battery positive port
4	Battery -	Battery negative port
5	A (Grid)	Phase A, dimension is shown as below.
6	B (Grid)	Phase B
7	C (Grid)	Phase C
8	N	Phase N
9	Grounding	

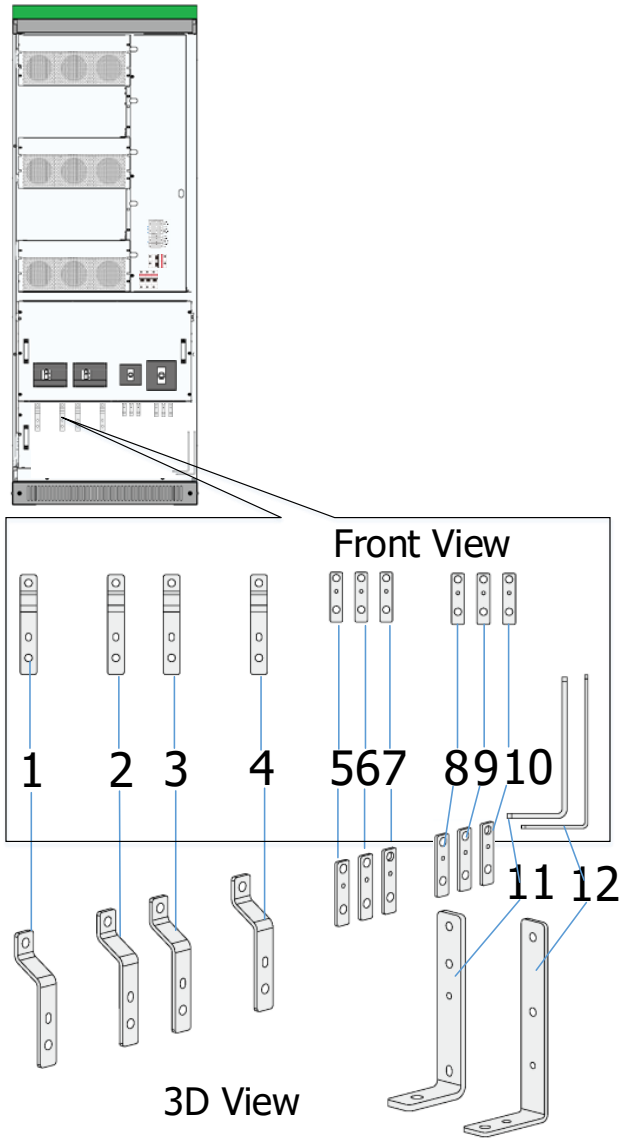


Fig. 6-6 PWG2-50K series wiring copper bars designation with STS module

Table 6-4 PWG2-50K wiring copper bars description

Position	Designation	Description
1	PV +	PV positive port, dimension is shown as below.
2	PV -	PV negative port
3	Battery +	Battery positive port
4	Battery -	Battery negative port
5	A (Load)	Phase A, dimension is shown as below.
6	B (Load)	Phase B
7	C (Load)	Phase C
8	A (Grid)	Phase A
9	B (Grid)	Phase B
10	C (Grid)	Phase C
11	N	Phase N
12	Grounding	

Fig. 6-7 PWG2-50K series DC wiring copper bar dimension

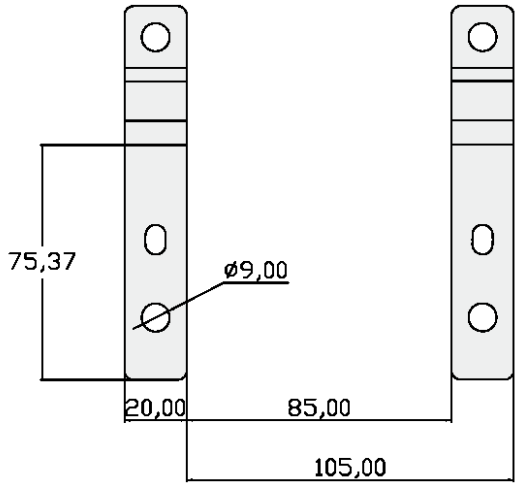
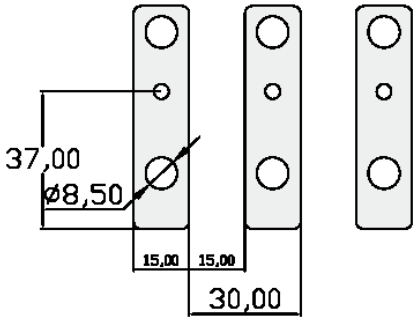


Fig. 6-8 PWG2-50K series AC wiring copper bars dimension



6.1.4 System grounding

The grounding of power modules/PCS connection with the rack go through hangers on the module.
As for rack grounding, the rack bottom is installed with grounded cooper bars. During wiring, refer to the following table for cable diameter. The grounding resistance should be less than 4Ω.

WARNING

Notice that the AC output neutral is not connected to ground.

Table 6-5 Grounding PE cable description

Rated power	Copper PE line section recommendation (mm²)	
50kW	≥16	
100kW	≥25	
Rated power	Screw Specification	Tightening Torque Recommendation (kgf.cm)
50kW	M8	108~132
100kW	M10	234~286

WARNING

Rack and modules need to be grounded reliably! The grounding resistance should be less than 4Ω.

6.1.5 DC port wiring

1) Use a multi-meter to measure the voltage of storage battery port, and ensure that the voltage is within input voltage range of PCS.
2) Disconnect DC switch. Wiring operation can be conducted after using a multi-meter to measure and

confirm that there is no voltage between positive and negative poles of DC input.
3) Connect the positive pole of storage battery to "DC+" of DC input of DC switch.
4) Connect the negative pole of storage battery to "DC-" of DC input of DC switch.
5) Confirm wiring firmness.

Rated power	Copper DC line section recommendation (mm²)	
50kW	≥25	
100kW	≥50	
Rated power	Screw Specification	Tightening Torque Recommendation (kgf.cm)
50kW	M8	108~132
100kW	M10	234~286

DANGER

Disconnect DC distribution switch and ensure that there is no dangerous voltage in the system during wiring.

NOTICE

The positive and negative poles of batteries cannot be connected inversely. Before wiring, a multi-meter needs to be used for measurement.

6.1.6 AC port wiring

1) Use a phase-sequence meter for measurement, and ensure that the phase consequence of wires should be a positive consequence.
2) Disconnect AC output distribution switch in PCS.
3) Use a multi-meter to measure and ensure that the cables connected to the terminals are electrically neutral.
4) While grid-tied, A(L1)/B(L2)/C(L3) phases of AC output distribution switch of utility grid and PE are respectively connected to A(L1)/B(L2)/C(L3) phases of utility grid and PE.
5) If on-grid/off-grid switching function is to be achieved, extra power distribution unit and wires need to be added.
6) Confirm wiring firmness.

Rated power	Copper AC line section recommendation (mm²)	
50kW	≥25	
100kW	≥50	
Rated power	Screw Specification	Tightening Torque Recommendation (kgf.cm)
50kW	M8	108~132
100kW	M10	234~286

WARNING

Ensure that there is no dangerous voltage at connection points during wiring.

NOTICE

All wires are connected to the wiring terminals externally from the wiring holes at the bottom of PCS. After wiring, fireproofing mud should be used to seal the wiring holes.

6.1.7 Wiring of terminal strips

Except power cable connection in the whole PCS, there are also auxiliary power connection, input and output of some node signals. All of them are led to the terminal strips with cluster cables in the rack. The port definition of external wiring for terminal strips is shown in figure below.

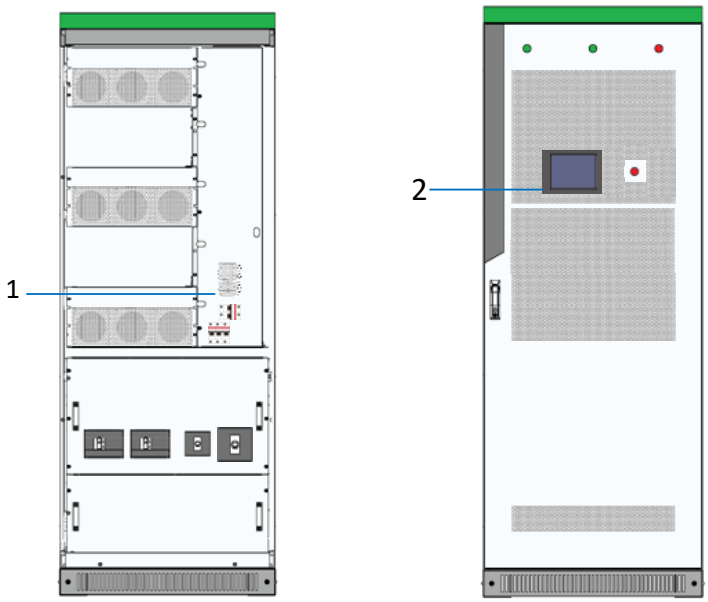
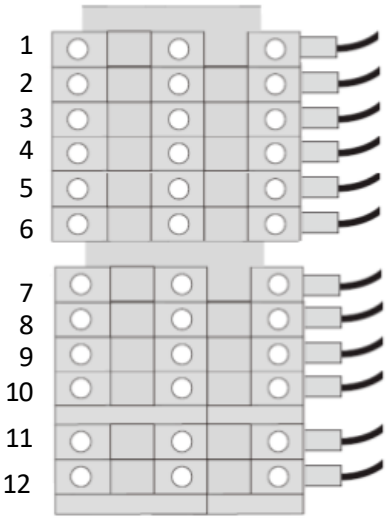


Fig. 6-9 Wiring and communication interface position

Table 6-6 Communication interface description

Interface position	Description	Explanation
1	Terminal strip ports	RS485 , CAN, DI, DO, AUX power Shown as 6.3.7 Wiring of terminal strips
2	Touch Screen	Ethernet port Shown as 6.2 Communication interface



Input Signal Loop		
	1	DI 1
	2	DI 1M
	3	DI 4
	4	DI 4M
	5	DI 5
	6	DI 5M
External Communication Loop		
	7	CAN_H
	8	CAN_L
	9	485_A
	10	485_B
External EPO Input		
	11	
	12	

Fig. 6-10 Definition of terminal strip ports

BMS Faults Signal
External EPO Normal Close
Reserved
To external CAN
To external RS485
External EPO Normal Open

Input Signal Loop		
	1	DI 1
	2	DI 1M
	3	DI 4
	4	DI 4M
	5	DI 5
	6	DI 5M
External Communication Loop		
	7	CAN_H
	8	CAN_L
	9	485_A
	10	485_B
External EPO Input		
	11	
	12	

Fig. 6-11 Definition of terminal strip ports

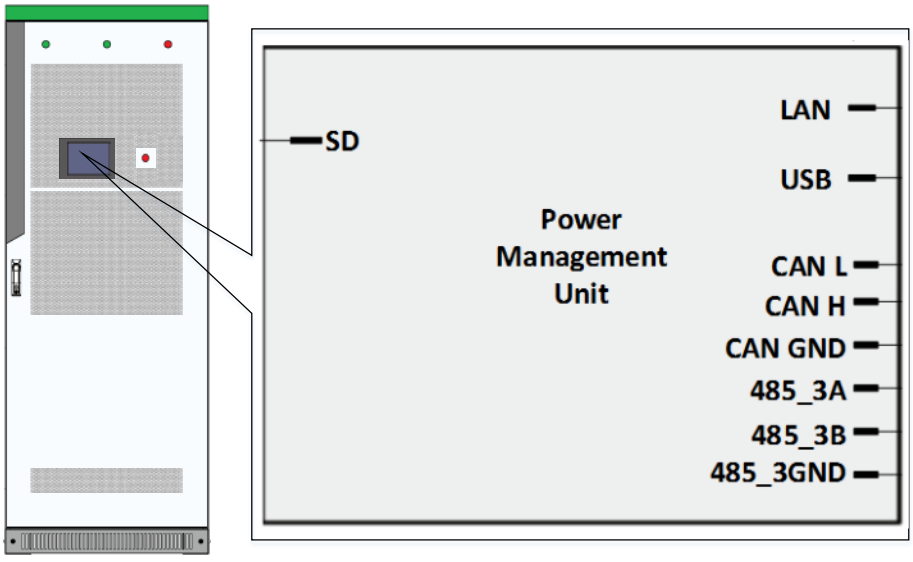


Fig. 6-12 Definition of touch screen communication ports

The LAN (Ethernet) port is used for communication. The USB port is used for system update or the logs export. The other communication ports in the back of touch screen has been wired to the wiring terminal strip ports.

6.2 Communication interface

The PCS supports Modbus protocol, adopts RS485 and Ethernet communication interface and facilitates users to conduct background monitoring for the PCS and realizes remote signaling, remote metering, remote control and remote regulating of storage inverter.

Equipment	Wiring Method
EMS	RS485 or Ethernet (Protocol is based on MODBUS TCP/IP or MODBUS RTU compatible with SUNSPEC/MESA) Defaulted as RS485 MODEBUS RTU. Use Ethernet when the system require fast control. When the EMS need to communicate in CAN method, a CAN to Ethernet communication protocol converter is required.
BMS	RS485 or Ethernet or CAN (Protocol is based on MODBUS TCP/IP or MODBUS RTU compatible with SUNSPEC/MESA) Defaulted as CAN When the BMS need to communicate in Ethernet method, an Ethernet to CAN communication protocol converter is required.
Another PCS	CAN
PV inverter	Through external EMS
Smart meter	Through external EMS
Air Conditioning	Through external EMS
fire control	Through external EMS
Water Level Gauge	Through external EMS
Diesel Generators	Through external EMS

Table 6-7 Communication interface with other equipment

6.2.1 Connecting the EMS over RS485 or Ethernet

Sinexcel's PCS has several different communication interfaces: Ethernet, RS-485 and CAN.

When connecting to the Sinexcel or other brand EMS, the communication port is default as RS 485 as shown below.

The Ethernet communication port can also used to connecting EMS according to the requirements for certain project.

RS 485 Port

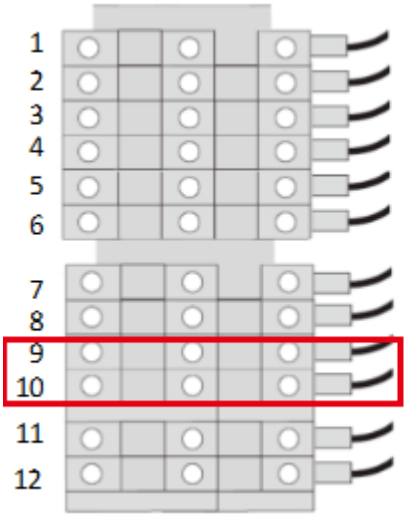
The front door of the storage inverter is embedded with touch screen Management Unit. User interface can be seen at its back. The position of RS485 communication interface in the back of HMI (Touch Screen). It is led to terminal strip ports 9 and 10. Users can transfer serial port signal to the one which can be processed by PC via interface converter (such as RS485 transferred to RS232). The storage inverter could be set and commissioned alone via background software. It can read operation and warning information. Corresponding settings, startup and shut down operations can be conducted.

Ethernet Port

The monitoring panel integrates Ethernet port with position numbered as RJ25 that can be seen in the back of the touch screen. It supports Modbus TCP/IP protocol and has its own IP address. Ethernet connection requires a switch router, and fixed IP needs to be set. Connecting cables are twisted pair (namely network cable). The internet ports of multiple the storage inverter are connected to the switch router, and the switch

router is connected to remote control computer. The state of the storage inverter can be monitored and controlled in real time after setting IP address and port number in the monitoring computer.
The communication protocol of Sinexcel EMS and PWG is the file below:

Energy storage monitoring and k

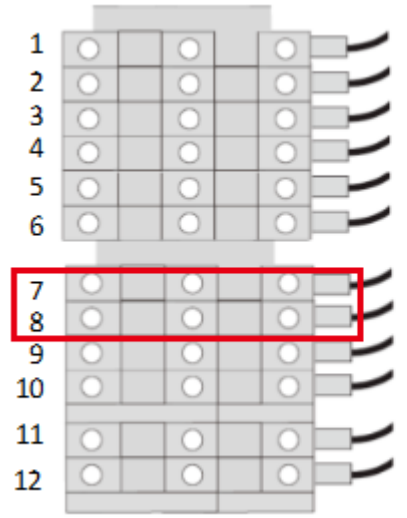


Input Signal Loop		
	1	DI 1
	2	DI 1M
	3	DI 4
	4	DI 4M
	5	DI 5
	6	DI 5M
External Communication Loop		
	7	CAN_H
	8	CAN_L
	9	485_A
	10	485_B
External EPO Input		
	11	
	12	

Fig. 6-13 PCS RS485 communication terminal

6.2.2 Connecting a BMS over CAN

When directly connecting to the BMS, the communication port is default as CAN as shown below.
If the BMS use Ethernet communication port, a Ethernet-CAN protocol converter is needed . That Ethernet-CAN protocol converter should be bought by the user and its beyond Sinexcel's scope of supply.
The PCS communicates with battery management unit (BMS) to monitor battery state information, give an alarm and provide fault protection for battery according to the battery state and improve the safety of storage battery. It supports CAN communication. In particular, the position number of CAN communication interface can be seen in the back of HMI (Touch screen). It is led to terminal strip ports 7 and 8.



Input Signal Loop		
	1	DI 1
	2	DI 1M
	3	DI 4
	4	DI 4M
	5	DI 5
	6	DI 5M
External Communication Loop		
	7	CAN_H
	8	CAN_L
	9	485_A
	10	485_B
External EPO Input		
	11	
	12	

Fig. 6-14 PCS CAN communication terminal

6.3 Check after installation

After installation of PCS, 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.

7 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 module fastening bolts is removed	□
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 PCS and the air tunnel is through.	□
Electrical installation	√
The PCS (including cables) is grounded properly and the earthing electrodes are constructed properly.	□
The AC line voltage matches the nominal output voltage of the PCS	□
The external MV or LV AC transformer is suitable for use with the PCS	□
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 DC power cable connections at DC+ and DC– and their tightening torques are correct.	□
The AC and DC power cable wiring holes are sealed properly.	□
The auxiliary and control cables are routed away from the power cables	□
The external control connections to the PCS 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.	□

8 Operation

8.1 Safety during Operation

NOTICE

DC side operation is disturbed due to incorrect parameter settings

When setting the mode of the AC side, please make sure that the control parameter is consistent with the grid requirement.

8.2 Power On Procedure

Power on for the first time:

1): Confirm the DC and AC cable firmly connected according to the check list in the Installation Manual.

2): Measure the insulation withstand voltage according to the international or local standard. The following insulation withstand voltage should be measured

Positive pole "+" to ground "GND"; Negative pole "-" to ground "GND".

3): Measure the grid AC voltage; Battery DC voltage; PV string DC voltage.

4): If the grid AC voltage; Battery DC voltage; PV string DC voltage within the normal range as shown in technical specifications, then close the switch in sequence.

Power on every time:

1): Check whether the EPO button in reset state.

2): Close the switch in sequence.

Firstly close the AC switch, after the AC switch all closed then close the DC switch.

The switch operation sequence is shown as bellow:

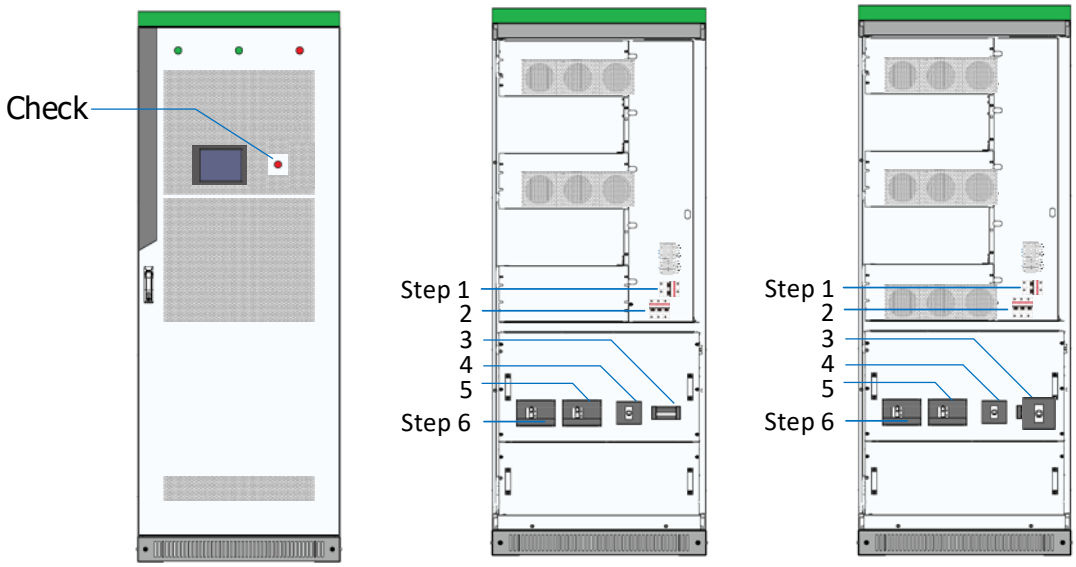


Fig. 8-1 Power on sequence without STS module with STS module

Fig. 8-2 Power on sequence for the model without STS：

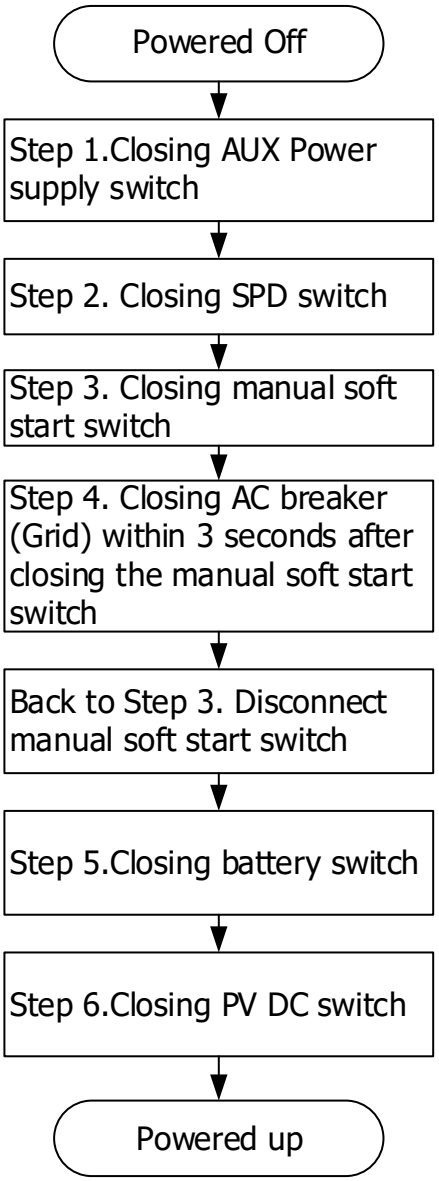
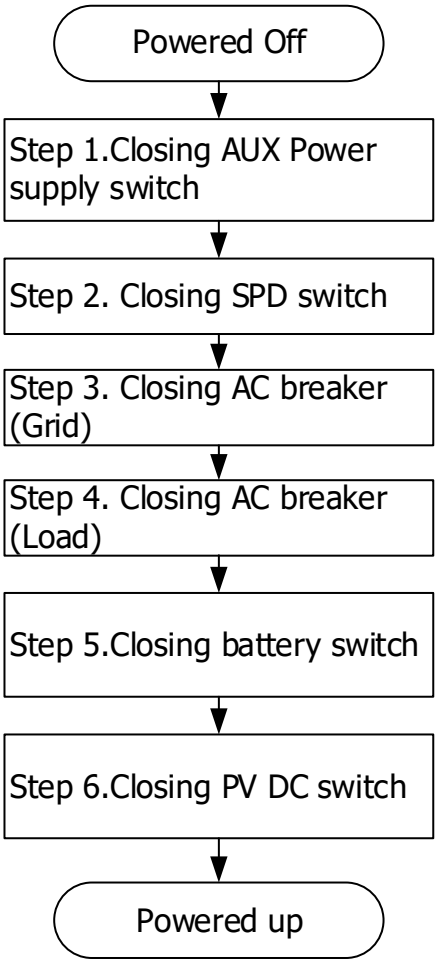


Fig. 8-3 Power on sequence for the model with STS：



8.3 Setting Procedure before startup

8.3.1 Touch screen power on

After auxiliary power of the storage inverter is connected, THE HMI is on. At this moment, an initializing interface will appear. It shows that **"The system is booting, please wait ……"**. After system booting, the interface will disappear.

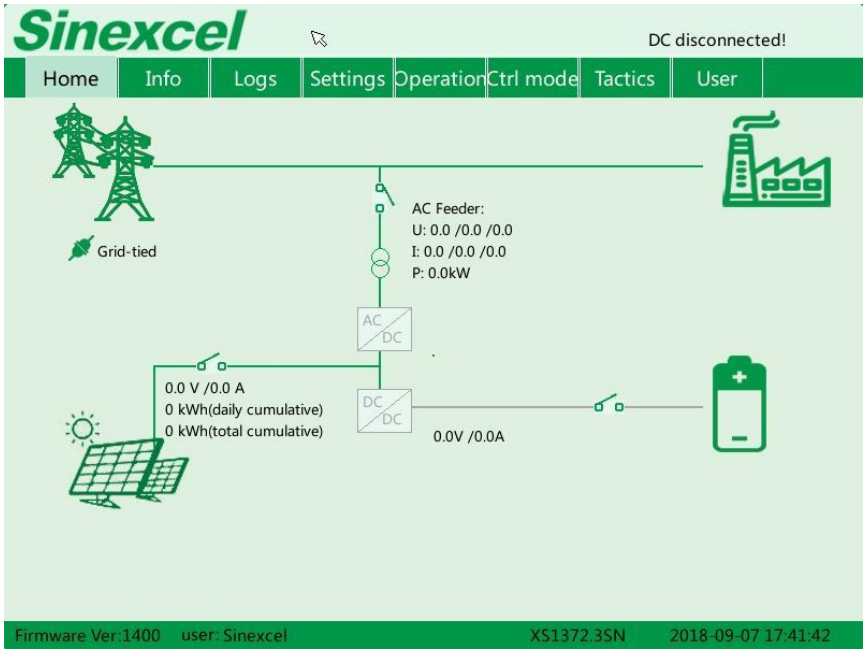


Fig. 8-4 Main Interface Sample

Note: The Firmware version of PCS is a fixed value of 1400, which will be displayed in the lower left corner of the HMI.

8.3.2 Log into the control Interface

1. Select **"User"**, Log into the control interface on touch screen with password.
2. User can get the password from the authorized person/ party / agency/ etc.

The login password 123456789 can obtain administrator authority.

8.3.3 Country Grid Code Setting

1. Select **"User"**, Log into the control interface on touch screen with password.
2. Select **"Settings"**>**"Cabinet Type"**
3. The cabinet type is fixed. However, the **"Certification"** can be set to different country and the **"Standard reference"** can be set to be compatible with different standard requirement. For example, AS4777 for New Zealand and Australia region A/B/C.

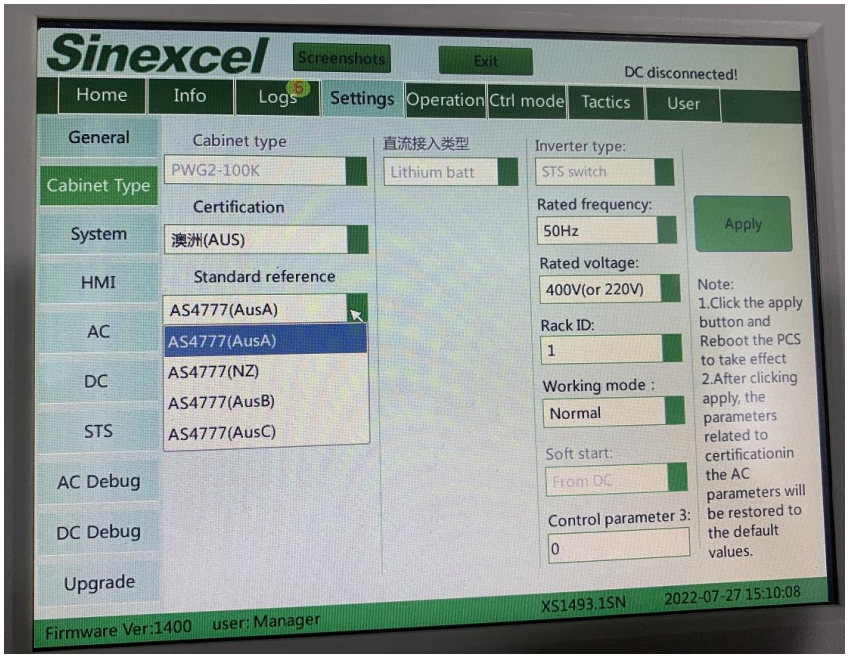


Fig. 8-5 Main Interface Sample

8.3.4 Select Control Mode

Main menu structure can be different in different "**Ctrl Mode**".

Configuring the control mode

4. Select **"User"**, Log into the control interface on touch screen with password.
5. Select "**Ctrl Mode"** > **"Manual Operate"**

Then the **"Settings"** is visible.

8.3.5 General Settings

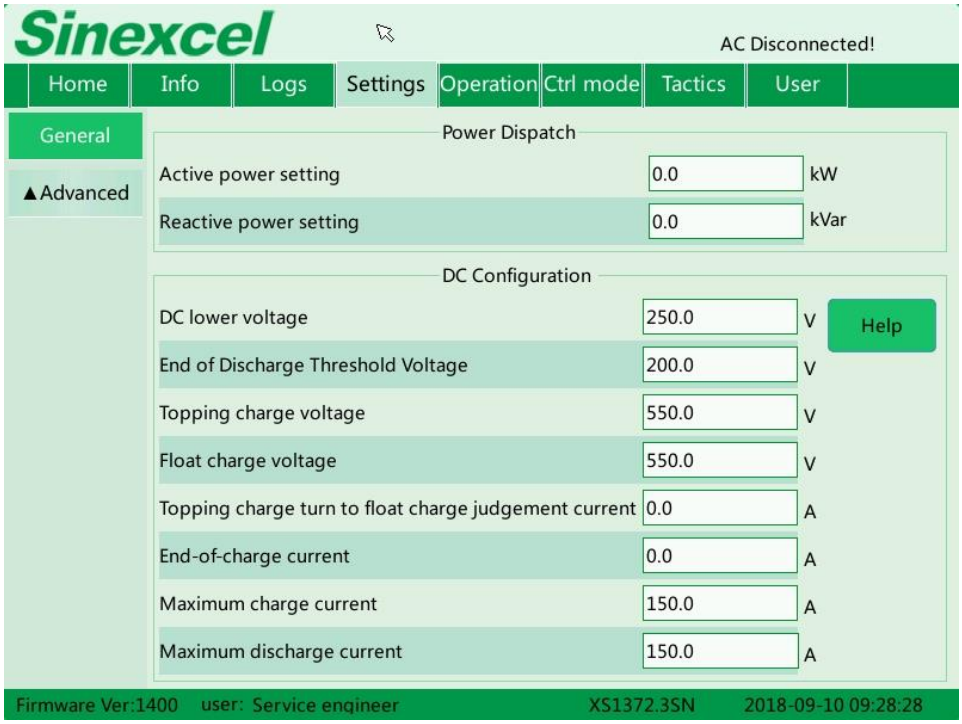


Fig. 8-6 Setting Interface Sample

There are General Setting and Advanced Setting, the commonly used setting is in the **"General"**
Users should set the **"DC Configuration"** according to the voltage and current requirement of BMS.

8.3.6 Communication setting

Procedure:
1. Select **"User"**> Input password> **"OK"**>**"Login"**. (Log into the PCS user interface)
2. Select **"Ctrl mode"**> **"Manual Operate"**.
3. Select **"Setting"**> **"Advanced"**>**"HMI"**>**"IP"** to set the IP of PCS. Enter the static IP address that you want to use to access the PCS.
4. Then click **"OK"** to save or click **"ESC"** to discard changes.
5. To change the gateway IP address of your network, enter the IP address in **"Gateway"**.
6. To change the subnet mask of your network in the field Subnet mask, enter the **"Subnet mask"**.
7. To change the Modbus address of your PCS, enter the **"Modbus address"**.
8. To change the baud rate of MODBUS communication, enter the **"RTU baud rate".**

8.4 Manual Startup Procedure

Check before startup
1. Select **"User"**, Log into the control interface on touch screen with password.
2. Select "**Ctrl Mode"** > **"Manual Operate"**
3. Select **"Operation",** the detailed menu explanation can be seen in Appendix.
4. Select **"Operation" >"System Startup"**

8.5 Automatic Startup Procedure

1. Select **"User"**, Log into the control interface on touch screen with password.
2. Select "**Ctrl Mode"** > **"Automatic Operate"**

8.6 Remote Startup Procedure

1. Select **"User"**, Log into the control interface on touch screen with password.
2. Select "**Ctrl Mode"** > **"Remote Control"**
3. Then with other control equipment to start the PCS remotely.

8.7 Shutdown Procedure

During normal operation of storage inverter, the following steps can be conducted if shutdown is required.
Remote shutdown procedure
1. The PCS is working in remote control mode and then with other control equipment to stop the PCS remotely.
Manual shutdown procedure
1. "**Ctrl Mode"** > **"Manual Operate";**
2. **Select "Operation"** >**"System Stop"** to manually stop the PCS.

8.8 System Power Off

When PCS is in "Stop" mode, can cut off the DC and AC power and power off the system
1): Manually or remote control the system stop.

2): Disconnect the AC switch.
3): Disconnect the Battery DC breaker, then disconnect the PV DC breaker.

8.9 Emergency shutdown

When the storage inverter system is abnormal, press the emergency shutdown button "EPO" on the rack door and the PCS will instantly stop running.

WARNING

To prevent personal injury, please use a multi-meter to measure the voltage at input terminal if case maintenance or opening is conducted. After ensuring that there is no mains supply, relevant operation can be conducted!

After about 15 minutes, the upper cover plate can be opened after DC BUS bar capacitance fully discharges (refer to warning label on module case surface).

9 Troubleshooting

9.1 Safety during Troubleshooting

DANGER

Danger of electric shock due to high voltage on the product
There may be high voltages on the product under fault conditions. Touching real-time components can lead to danger or death
Serious injury due to electric shock.
Observe all safety information when operating the product.
Wear appropriate personal protective equipment for all work on the product.
If you are unable to resolve the interference with this document, please contact the manufacture.

9.2 Export fault record

Insert a USB flash disk into the USB port in the back of the touch screen.
When need to send the logs to the manufacture to analyze.
1. Select **"User"**, Log into the control interface on touch screen with password.
2. Select "**Ctrl Mode"** > **"Manual Operate"**
3. Select **"logs"** > **"Export Logs"**>**"Download All Logs"**

9.3 Faults caused by improper parameter settings

Table below shows the faults that caused by improper parameter setting.
User could reset the parameter under the instruction in Appendix and then the faults can be automatically solved.

NOTICE

Alarm classification:
Fault: shutdown.
Warning: alarm but not shut down;

Alarm Clearance method:
Auto: After the cause of the alarm disappears, the alarm is automatically cleared.
Manual: After the cause of the alarm disappears, you need to manually send an alarm clear command.
Power Off: After the causes of the alarm disappear, you need to power off and restart.

Alarm Classification + Clearance Method **(abbreviate to A.C. + C.M.):**
Fault + Auto
Fault + Manual
Fault + Power Off
Warning + Auto
Warning + Power Off

Failure Name	A.C.+C.M.	Reason
AC bus over voltage	**Fault + Auto**	PCS AC bus voltage is higher than the overvoltage protection setting
AC bus under voltage	**Fault + Auto**	PCS AC bus voltage is lower than the under voltage protection setting
AC bus over frequency	**Fault + Auto**	PCS AC bus frequency is higher than over frequency protection setting
AC bus under frequency	**Fault + Auto**	PCS AC bus frequency is lower than the under frequency protection setting
Grid over voltage	**Fault + Auto**	Only for the models with STS, the grid voltage is higher than the overvoltage protection setting
Grid under voltage	**Fault + Auto**	Only for the models with STS, the grid voltage is higher than the overvoltage protection setting
Grid over frequency	**Fault + Auto**	Only for the models with STS, the grid frequency is higher than the over frequency protection setting
Grid under frequency	**Fault + Auto**	Only for the models with STS, the grid frequency is lower than the under frequency protection setting
DC input over voltage	**Fault + Auto**	PCS DC voltage is higher than the upper voltage limit
DC input under voltage	**Fault + Auto**	PCS DC voltage is lower than the lower voltage limit or DC voltage is not connected
DC bus over voltage	**Fault + Auto**	The voltage on the DC bus capacitor is too high during module working
DC bus under voltage	**Fault + Auto**	The voltage on the DC bus capacitor is too low during module operation
Battery under energy	**Fault + Auto**	1. The BMS is emptied when in off-grid state; 2. The DC voltage is lower than the discharge termination voltage of <DC parameter> in the off-grid state;
Parameter mismatch	**Fault + Auto**	1. The parameter setting of <DC parameter> is unreasonable; 2. When the system is running in the off-grid condition, the number of AC modules running is more than the number of DC modules running.

Table 9-1 Faults caused by improper parameter setting

9.4 Detailed Troubleshooting

The detailed troubleshooting can be got from the manufacture or retailer.

10 Maintenance

10.1 Safety during Maintenance

DANGER

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.
Always disconnect the following devices from the outside before performing any work:

- grid voltage fed by the grid
- internal power supply
- DC voltage of the battery
- additional external voltage, such as control signal from the control room

Make sure that the disconnected device cannot be reconnected.
After turning off the inverter, wait at least 15 minutes before turning it on to discharge the capacitor complete.
Before operating the drive, make sure that all devices are completely voltage free.
Cover or isolate any adjacent live components.

NOTICE

Property damage due to dust intrusion and moisture infiltration
Ingress of dust or moisture can damage the product and affect its function.
Perform maintenance work only when the environment is dry and free of dust.
The product is only allowed to wiring or assembly and disassembly operate when the product is turned off.
Connect the external power supply after finish installing the product.
If the installation or commissioning process is interrupted, install all dam panels, close and lock the rack.
The product must always be closed for storage.
Store the product in a dry, covered area.

10.2 Maintenance Schedule and Consumables

10.2.1 Operation environment requirements

Device operation environment must comply with the operation environment required for the device:

Allowable environment temperature: -20~55℃ (power de-rating for 45 ℃above)

Allowable relative humidity: 0~95% (non-condensing)
Allowable maximum elevation: 3,000m
Note: When exceeding the maximum elevation, the PCS will have de-rating output.
Please consult customer service center for specific de-rating coefficient.

10.2.2 Electrical and fixed connection inspection

After being put into operation, conduct regular inspection on device's electrical and fixed part connection. Such inspection is advisably conducted every three months. Record for each inspection should be made.

Rack grounding connection;
Module grounding connection;
Electrical connection for DC input;
Electrical connection for AC input;
Electrical connection for auxiliary power supply;
Electrical connection for communication cables.
AC/DC switch, SPD and fan.
Access monitored fault information.

10.2.3 Clearing and cleaning

Before the device is put into operation, the dust and sundries in its cooper bars, terminals and mesh openings should be cleaned.
After the device is put into operation, the dust in machine room should be cleaned regularly. Check whether the ventilating and air exhaust facilities in machine room are normal. They are advisably cleaned once every three months.

10.3 Maintenance Work

Unfavorable environmental conditions shorten maintenance intervals
Location and environmental conditions can affect maintenance intervals. Pay attention to cleaning and corrosion protection
It may need to be more frequent, depending on the conditions at the installation site.
If the DC power distribution parts is affected by adverse environmental conditions, it is recommended to shorten maintenance interval.
Sinexcel recommends an optical inspection in regular periods to determine maintenance requirements

Consumables and maintenance materials
Only those consumables and maintenance materials are usually not included in standard equipment list.
Professionals or electrically qualified person listed standard tools and materials such as torque are taken for granted.

Wrench, single contact voltage tester are available for all maintenance operations.

Maintenance work under the voltage supply.

See the information in HMI
Read error messages and warnings
Check DC Switchgear
Check the AC disconnect device
Check the fan

Maintenance under no voltage conditions

See the information in HMI
Performing a visual inspection
Cleaning the ventilation panels
Cleaning air ducts and ventilation ducts
Check internal
Check the bolt connection of the power cord.
Check label
Check latches, door stops and hinges.
Check the SPD (Surge Protecting Device)

11 Battery Compatibility

11.1 Battery Chemistry Compatibility

The pre-engineered battery energy storage inverters provided by Sinexcel have optimized the mathematical model of different kinds of batteries in the DC algorithm, supporting batteries that are based on various chemistries. Currently, the main stream battery in the market including LFP, NMC, NCA, AGM, Flow Battery and Super Capacitor. Sinexcel is able to support all these types of batteries. As the development of technology, different types of advanced batteries will come up to the stage and Sinexcel will keep following the trend.

11.2 Battery Temperature Monitoring

The temperature of the battery is sampled by the BMS supplied by the battery manufacturer. Usually, the local controller or EMS will be communicating with BMS and PCS respectively. The BMS will sample the battery temperature and upload it to the EMS.

As a redundancy protection, PCS can also communicate with BMS. However, the PCS can not process the temperature reading. Currently, only the BMS will be monitoring the temperature of the battery and if there is any fault detected by the BMS, whether it's over-voltage or over-temperature fault. It will report a fault to the PCS and PCS will stop charging the battery to prevent further damage to the system.

The EMS and PCS can be communicating through Ethernet and 485. As for PCS and BMS, they are connected through CAN or 485.

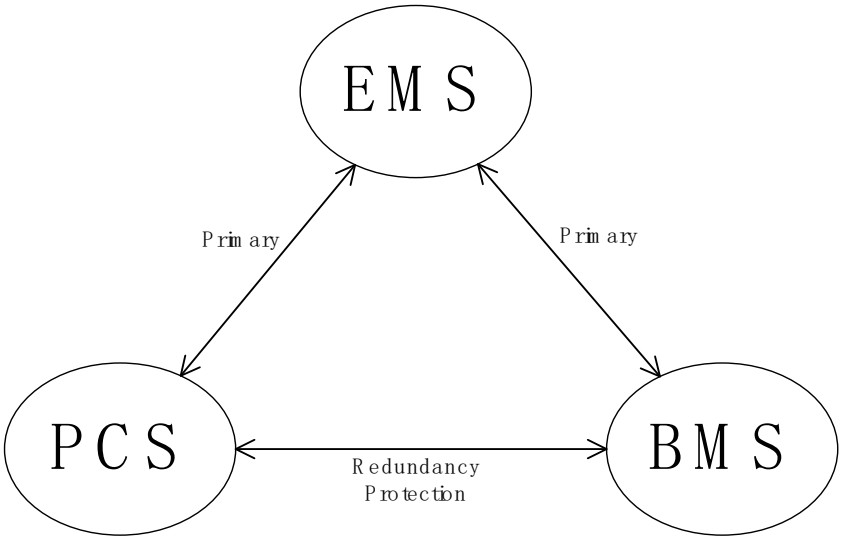


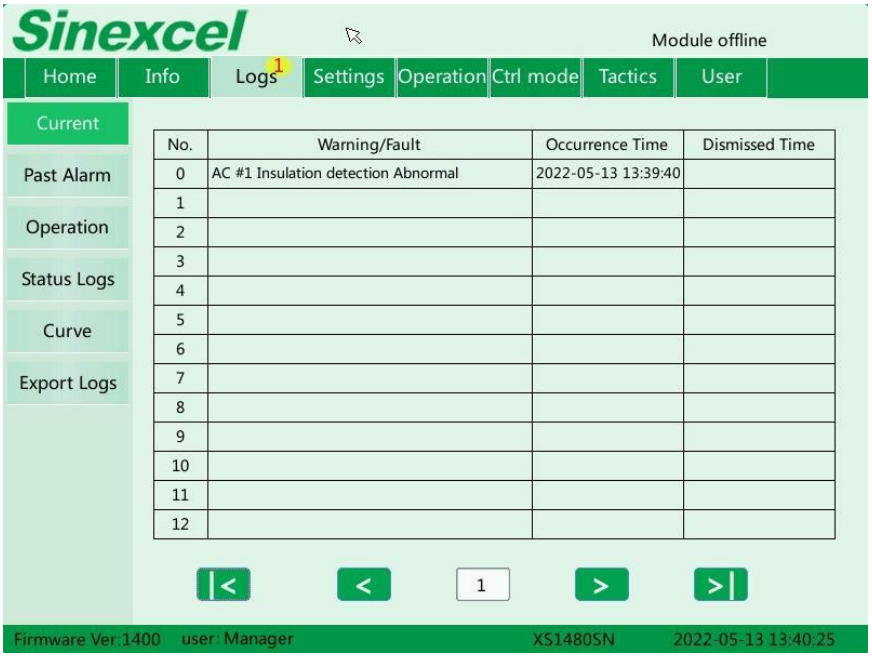
Fig. 11-1 EMS control logic

An inverter with storage connections will need to provide a means for temperature compensation of the battery charge voltages. This is particularly important for use with lead acid batteries in warm climates, to avoid damage to battery banks by overcharging in hot weather, and related hazards due to release of hydrogen gas and cell rupture. Most stand-alone inverters control this function via a remote temperature sensor which is attached to the battery bank.

The PWG2-50k-EX and PWG2-100k-EX do not include a connection terminal for a remote battery temperature sensor. If installing PWG2-50k-EX or PWG2-100k-EX with lead acid batteries please check with Shenzhen Sinexcel Electric Co., Ltd. for advice regarding charge settings.

11.3 Battery Grounding Fault

When the battery leakage current exceeds the preset value, the monitoring device generates the following alarm.



12 Power Quality Response Modes

The inverter provided by Sinexcel support multiple Power Quality Response Modes. This can be set on the LCD screen on the inverter.

For Active Power Control Mode, Sinexcel inverter support Fixed Power Mode, Volt-Watt Mode, Freq-Watt Mode, V-W&F-W Mode.

For Reactive Power Control Mode, Sinexcel inverter support Fixed Power Mode, Fixed PF Mode, Volt-VAr Mode, PF Curve Mode.

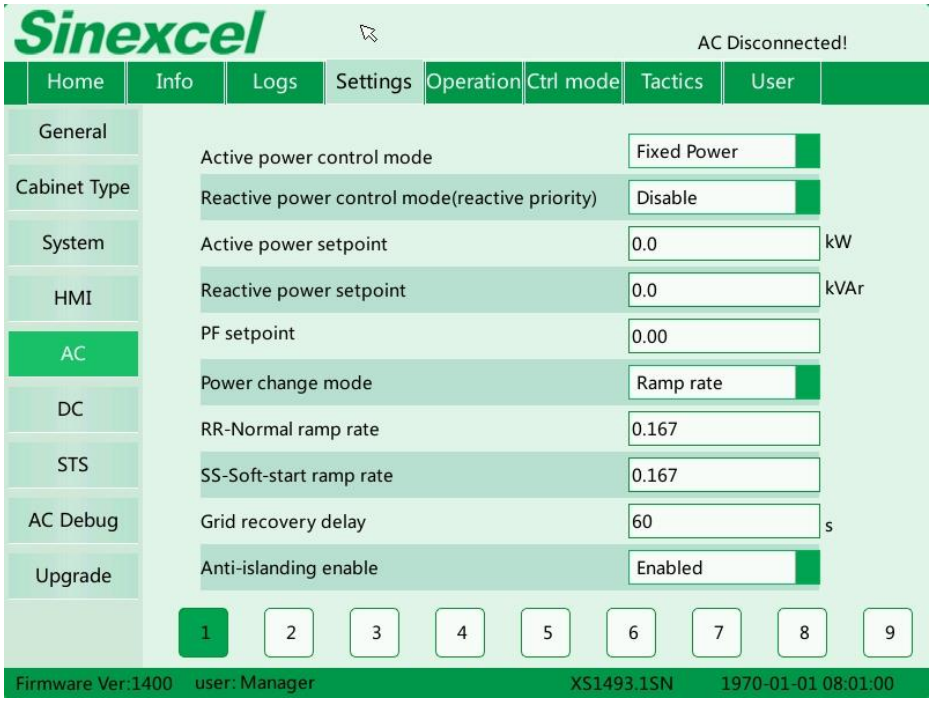
Active power control mode and reactive power control mode can be used in combination freely. If active power control mode and reactive power control mode are used at the same time, PCS supports reactive power priority.

12.1 Active power control mode

A.Fixed Power

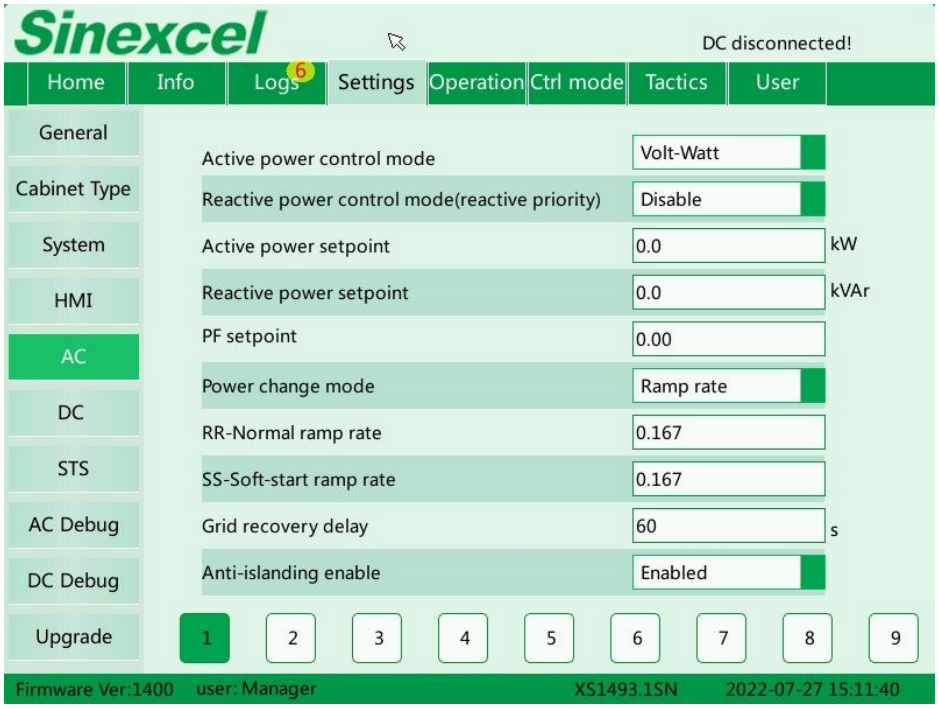
After user log into the system**>"Setting">"AC">"Active Power Control Mode">"Fixed Power"**

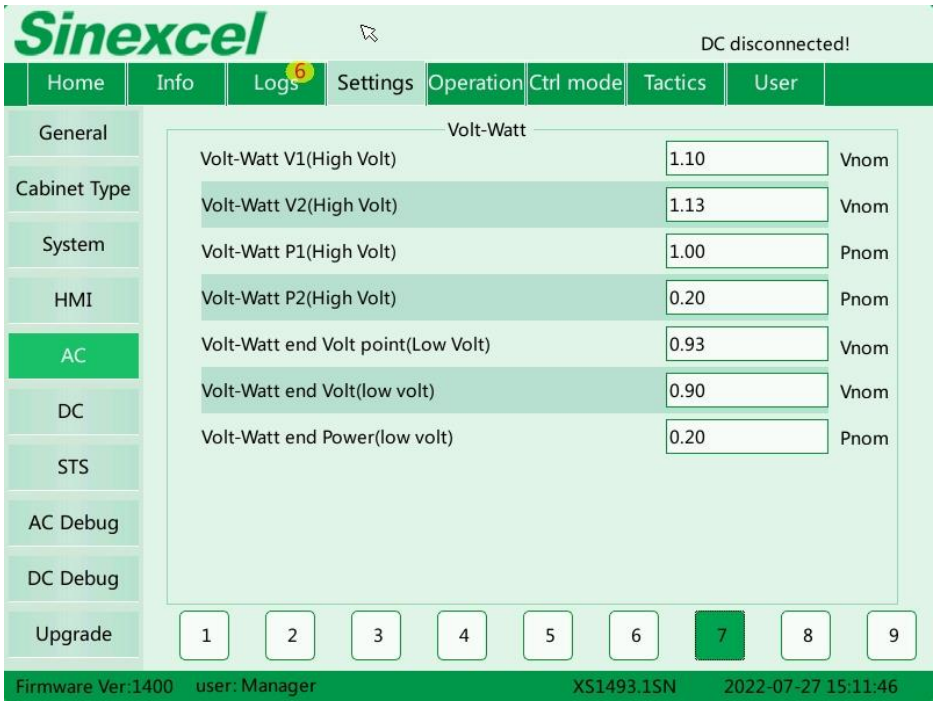
and **”Settings”>”AC”>”Reactive Power Control Mode”>”Disable”,** then pcs will output power according to the set active power value.



B.Volt-Watt

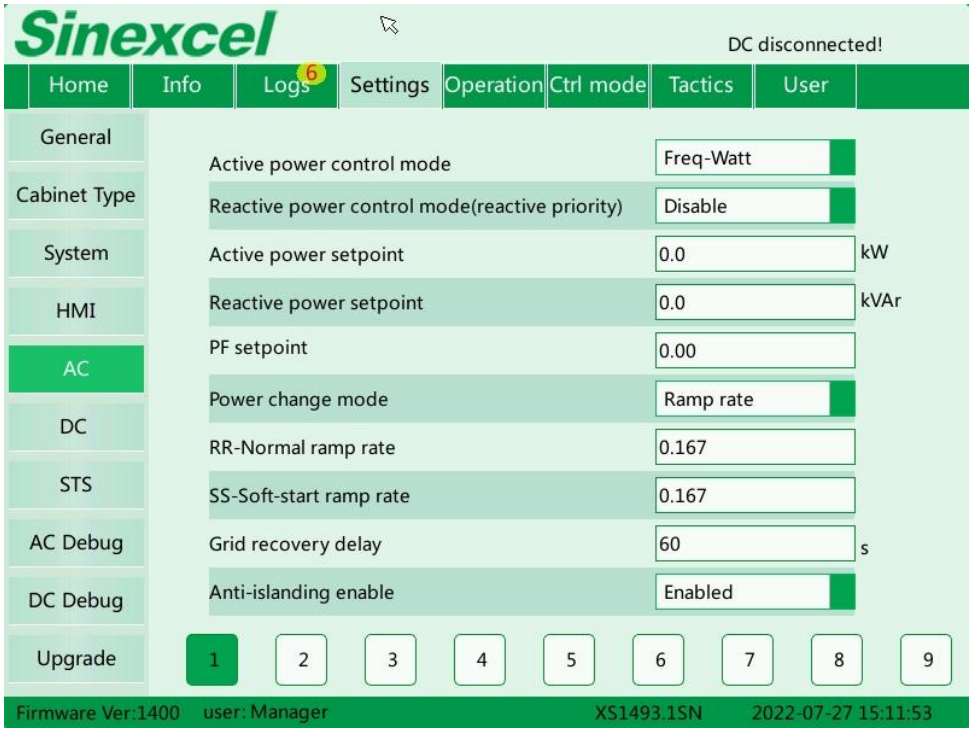
After user log into the system**>”Setting”>”AC”>”Active Power Control Mode”>”Volt-Watt”** and ”Settings”>”AC”>”Reactive Power Control Mode”>”Disable”

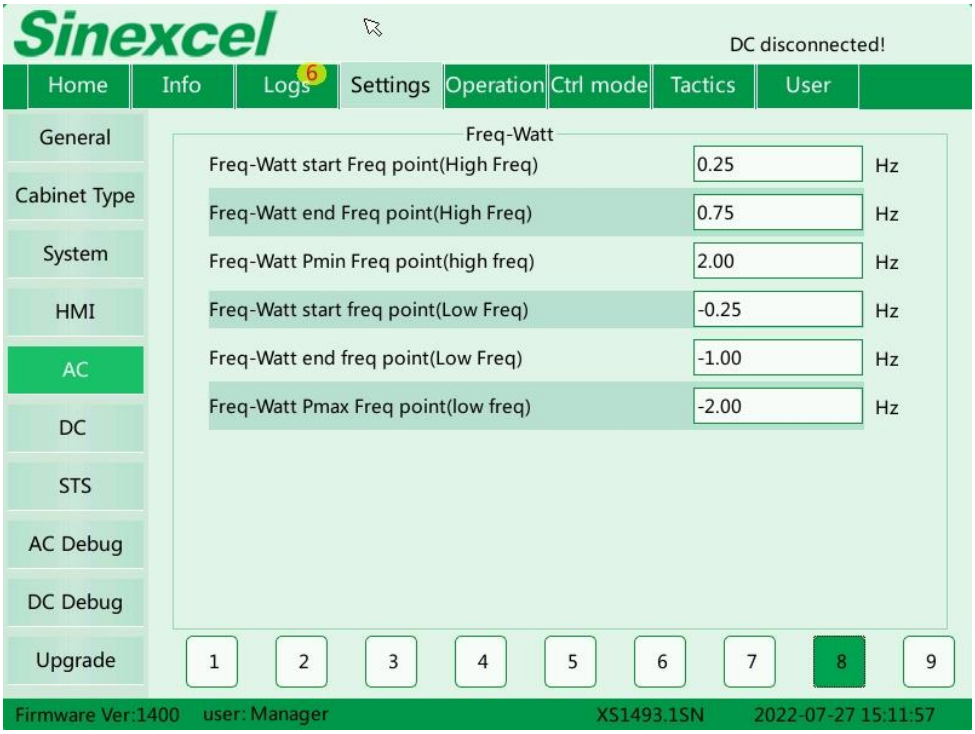




C. Freq-Watt

After user log into the system**>"Setting">"AC">"Active Power Control Mode">"Freq-Watt"** and **"Settings">"AC">"Reactive Power Control Mode">"Disable"**

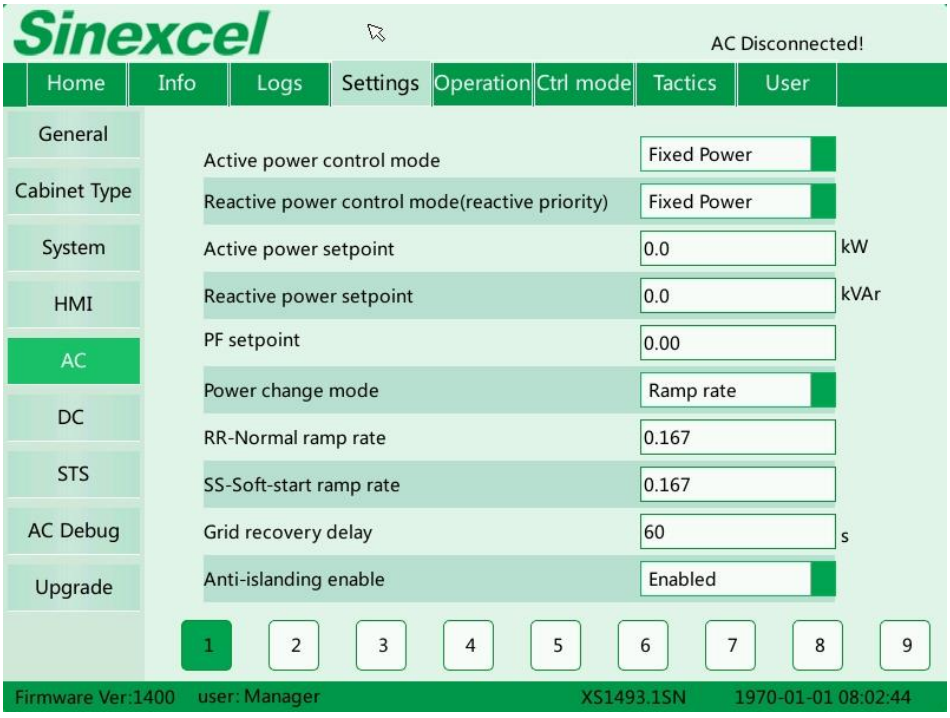




12.2 Reactive power control mode

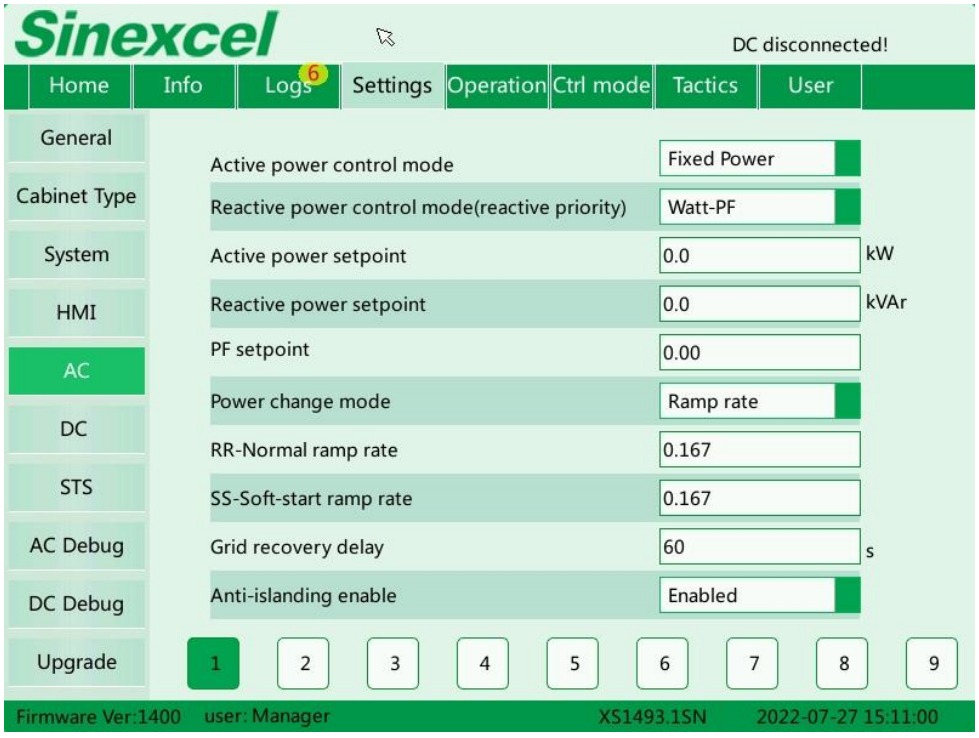
A.Fixed Power

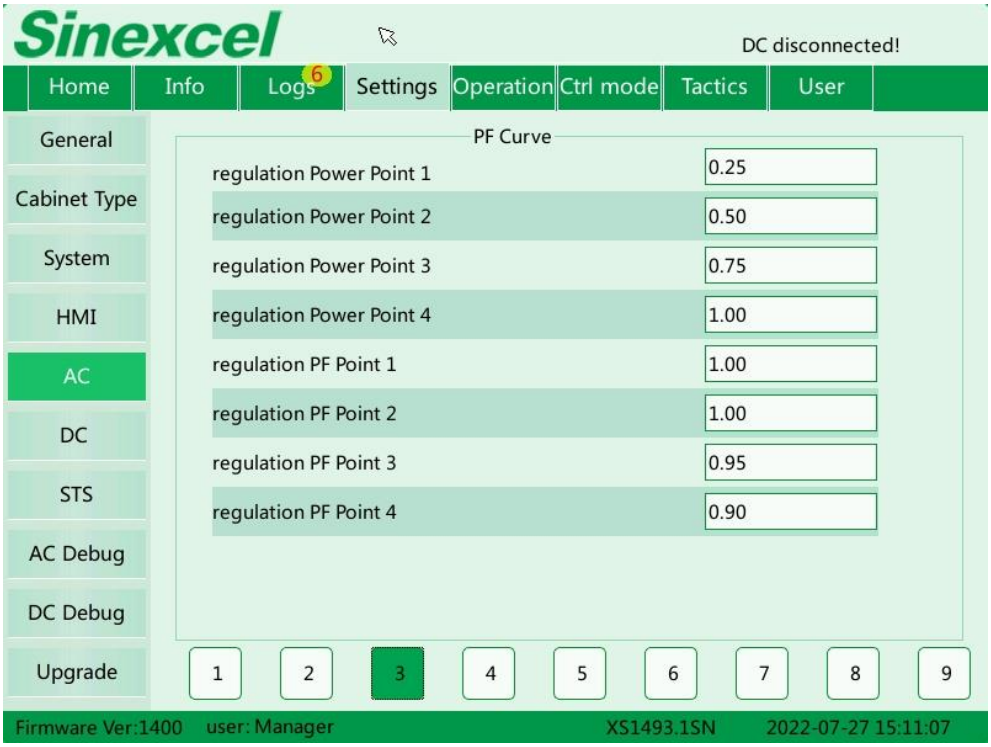
After user log into the system**>"Setting">"AC">"Active Power Control Mode">"Fixed Power"** and **"Settings">"AC">"Reactive Power Control Mode">"Fixed Power"**



B. Watt-PF

After user log into the system**>"Setting">"AC">"Active Power Control Mode">"Fixed Power"** and **"Settings">"AC">"Reactive Power Control Mode">"Watt-PF"**

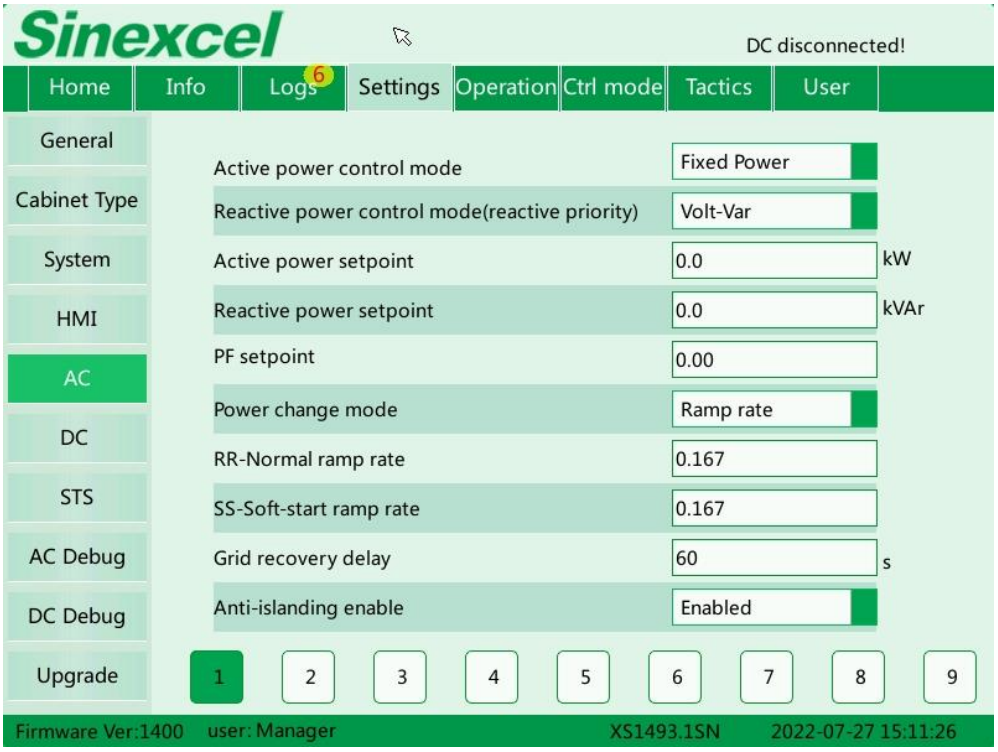


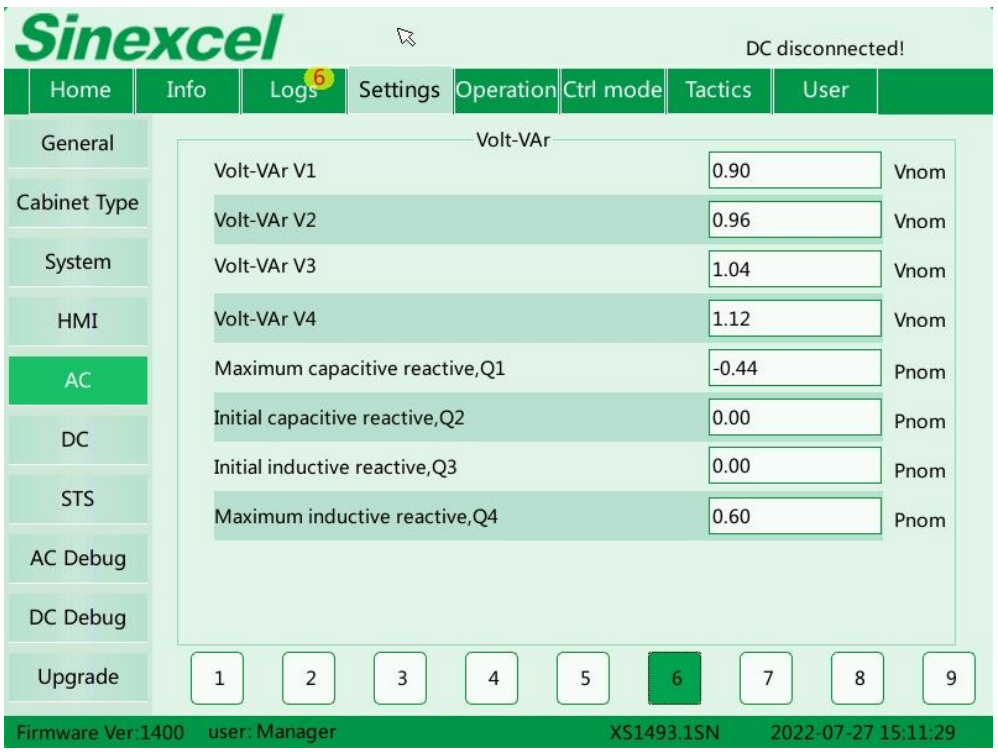


C.Volt-Var

After user log into the system**>"Setting">"AC">"Active Power Control Mode">"Fixed Power"**

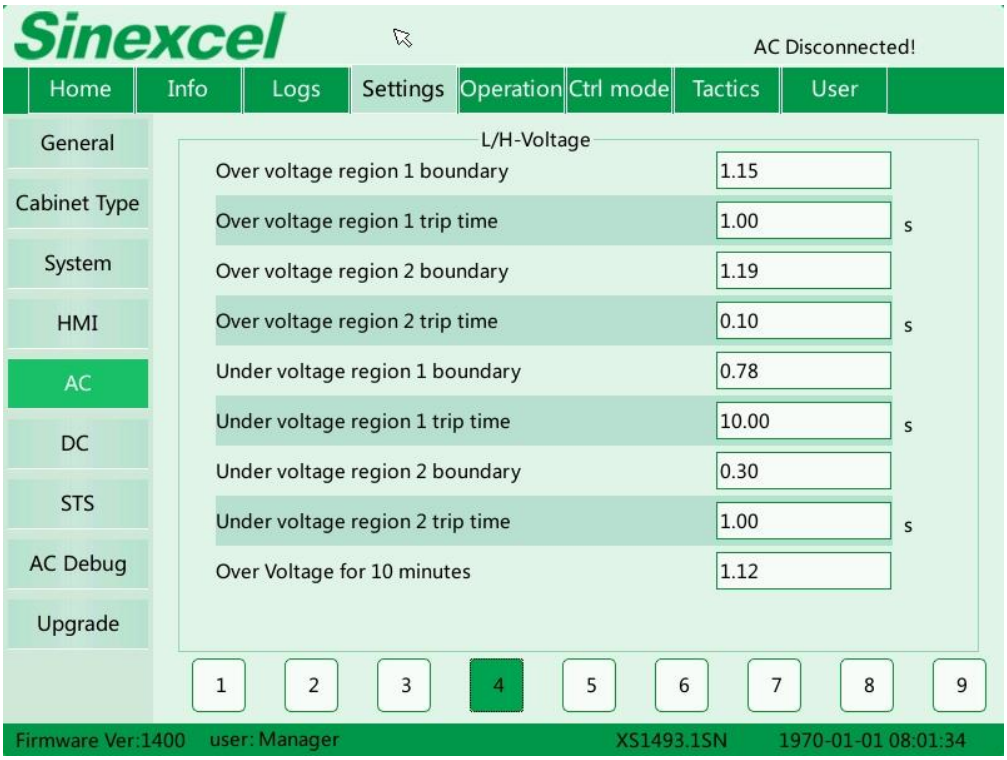
and **”Settings”>”AC”>”Reactive Power Control Mode”>”Volt-Var”**

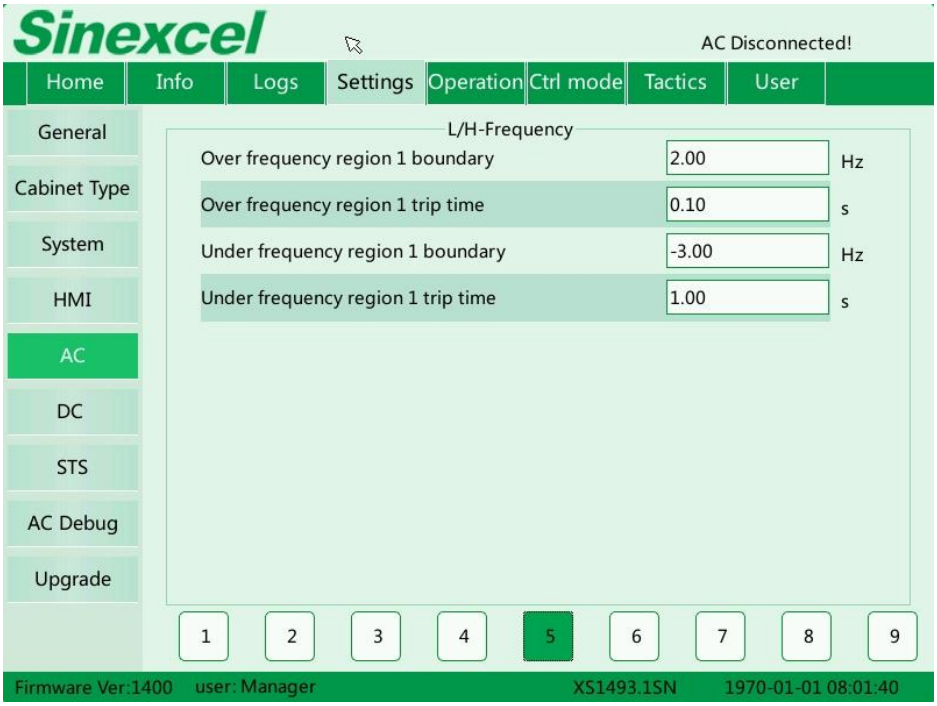




13 Grid Protection Setting

The inverter supports the grid protection function. You can set the corresponding over/under voltage protection and over/under frequency protection set points by entering PCS monitoring.





14 Australian Consumer Law Mandatory Wording

Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitl ed to a replacement or refund for a major failure and compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure

15 Statements

Earth fault statements

This inverter complies with IEC 62109-2 clause 13.9 for earth fault alarm monitoring.

If an Earth Fault Alarm occurs, the fault "Grounding fault" will be displayed on the LCD screen, the red light will be on, and the fault can be found in the history of the fault.

16 DRM

16.1 DRM Board(X7 Board) Terminal Description

Sinexcel EX version PCS is integrated with DRM Board for DRM function. The definition of the port is shown as below:

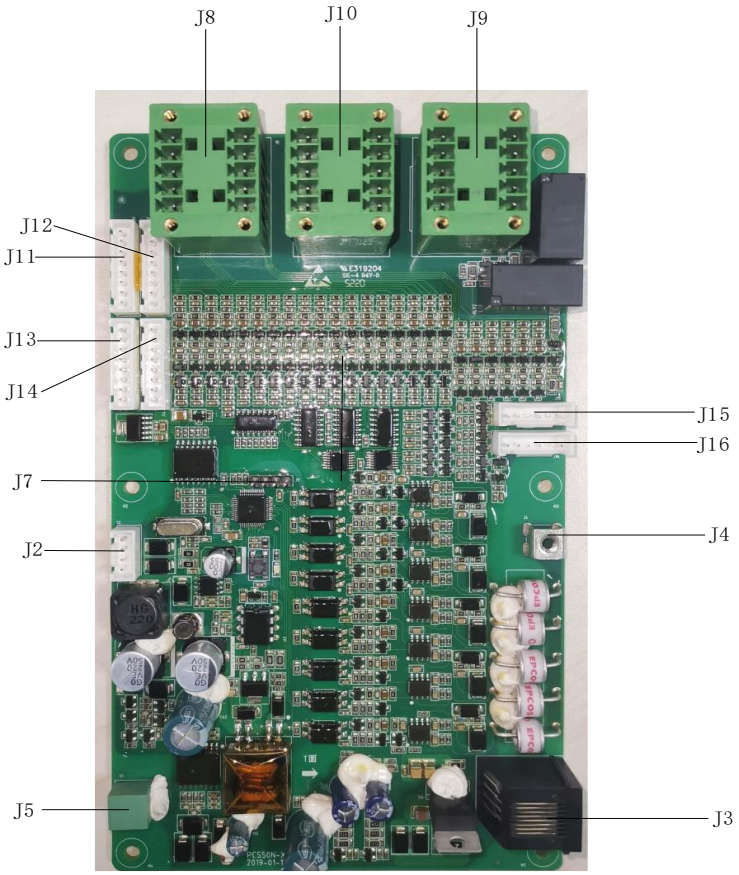


Fig. 15-1 DRM Port Definition

Port	Definition	Port	Definition
J2	SCI Port. Communication between X7 board and U2 board	J10	I/O port. Output dry contact(1-4)
J3	LAN port. For External DREM Connection	J11	I/O port. Input dry contact(13-16)
J4	Earthing	J12	I/O port. Input dry contact(9-12)

J5	485 port. For communication between other parallel connected device	J13	I/O port. Input dry contact(21-24)
J7	Reprogramming joint	J14	I/O port. Input dry contact(17-20)
J8	I/O port. Input dry contact(5-8)	J15	I/O port. Output dry contact(4-6)
J9	I/O port. Output dry contact(7-8)	J16	I/O port. Output dry contact(1-3)

Table. 15-1 DRM Port Definition

16.2 DRM Board(X7 Board) Installation

The Installation of this board is installed from the back. After removing the back cover of the inverter, the X7 board can be found on the left side. Installed on the structure with 6 M3-10 screws.

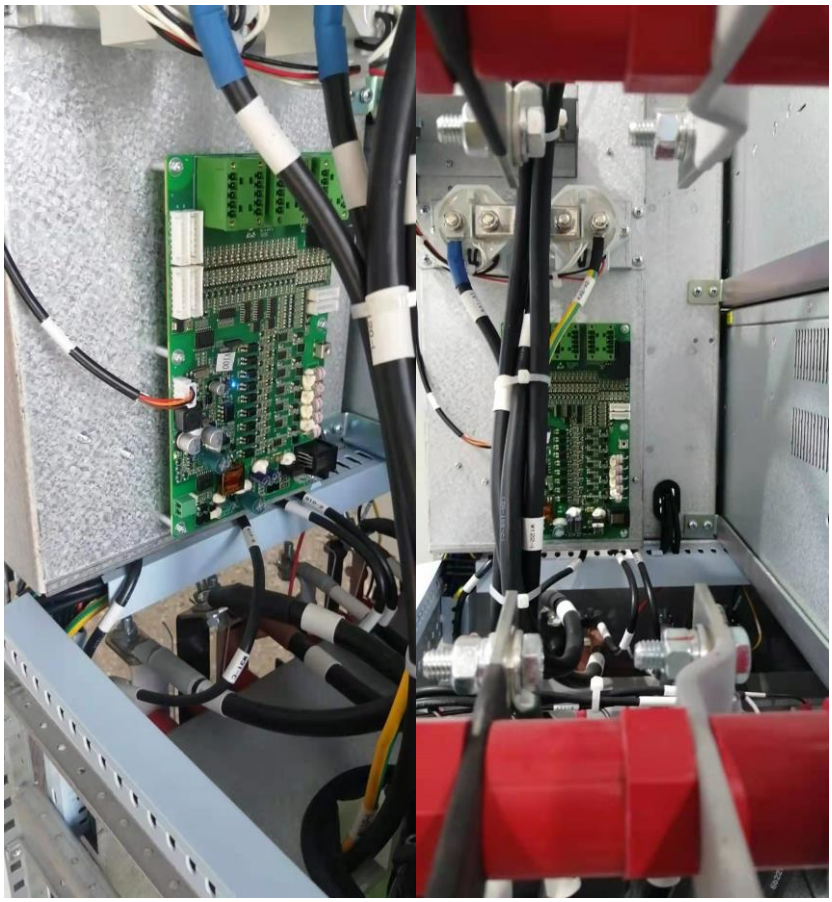


Fig. 15-2 DRM Board Installation

16.3 DRM Settings

DRM settings can be done as follow:

After user log into the system**>"Setting">"AC">"DRMs mode enable">"Enable" or "Disable"**

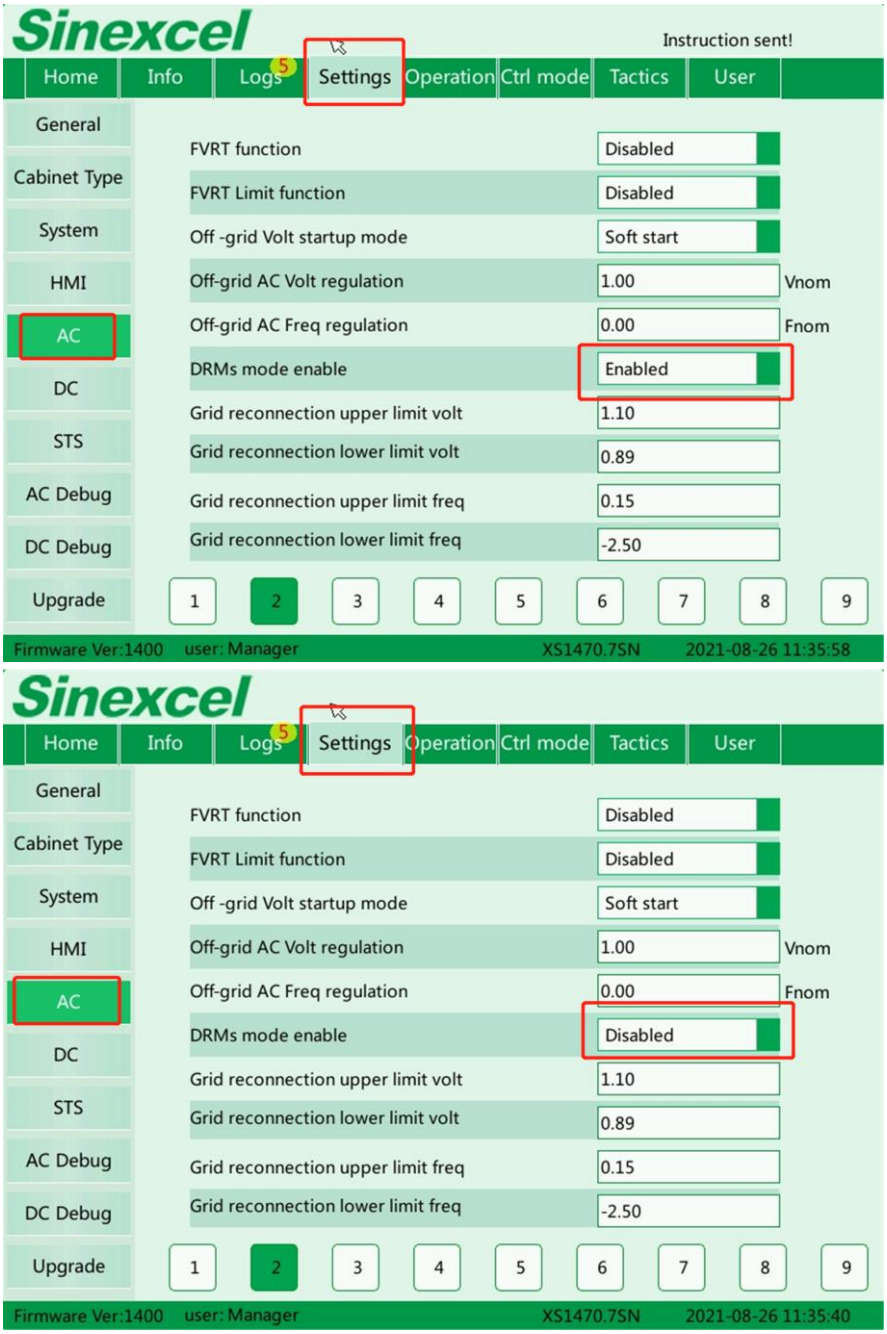
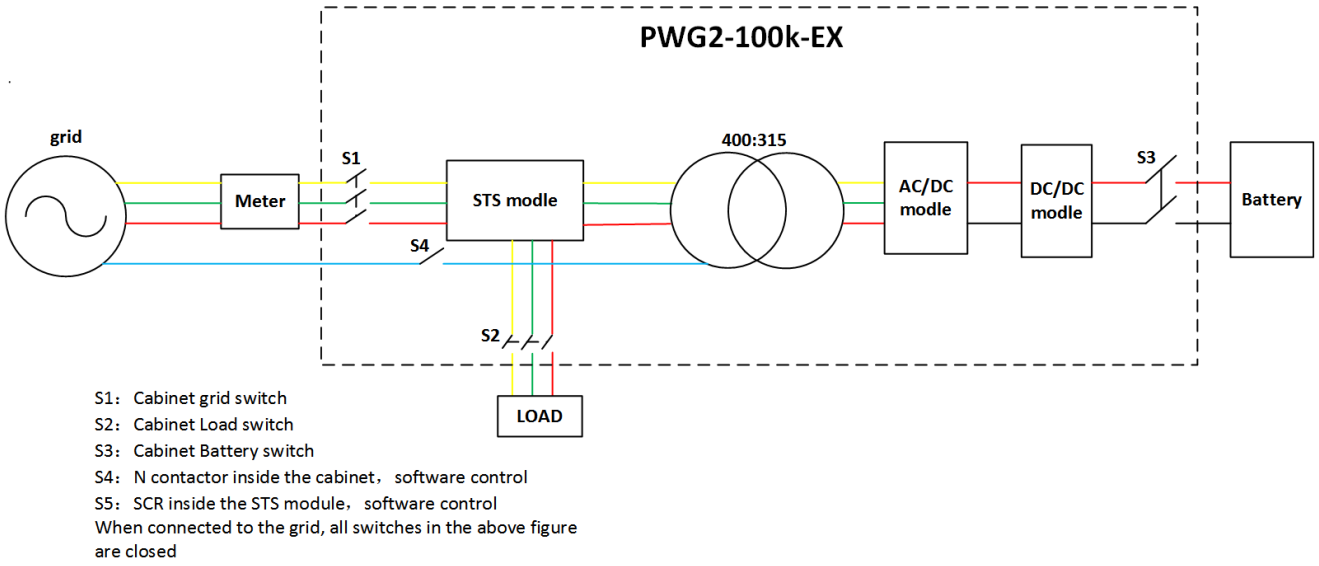


Fig.15-3 DRM Settings

Please DO NOT reprogram the DRM by the untrained personnel. If assistance needed, please contact Sinexcel Service Team.

17 Generation Limit and Export Limit Control



The meter brand is Shanghai ACREL Co.,Ltd and the meter model is PZ72(L)-E3/E4.

17.1 Limit generation function setting

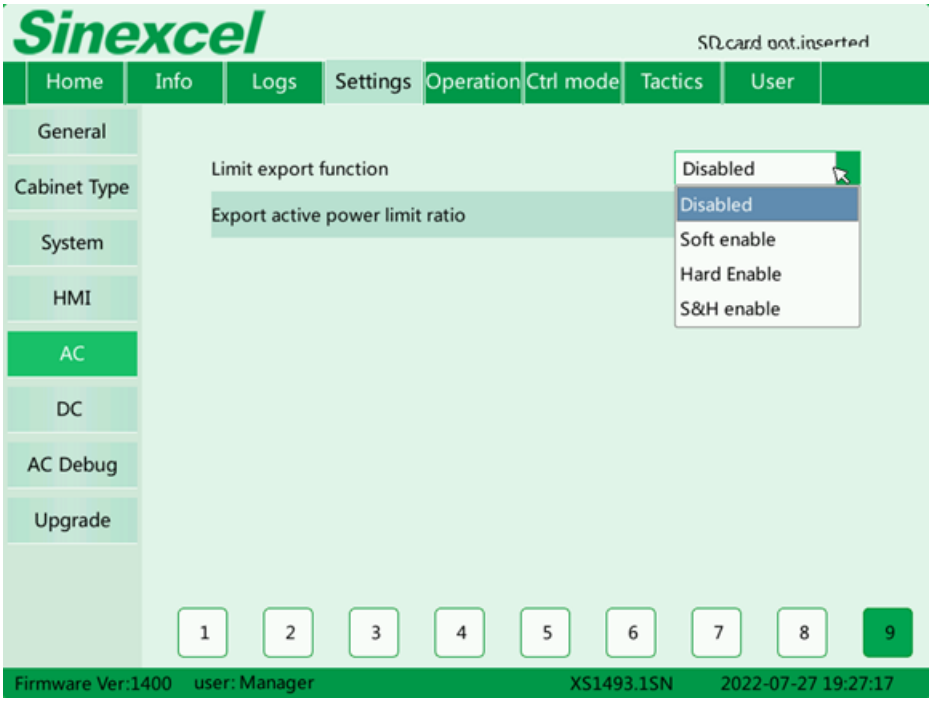
Limit generation function settings can be done as follow:

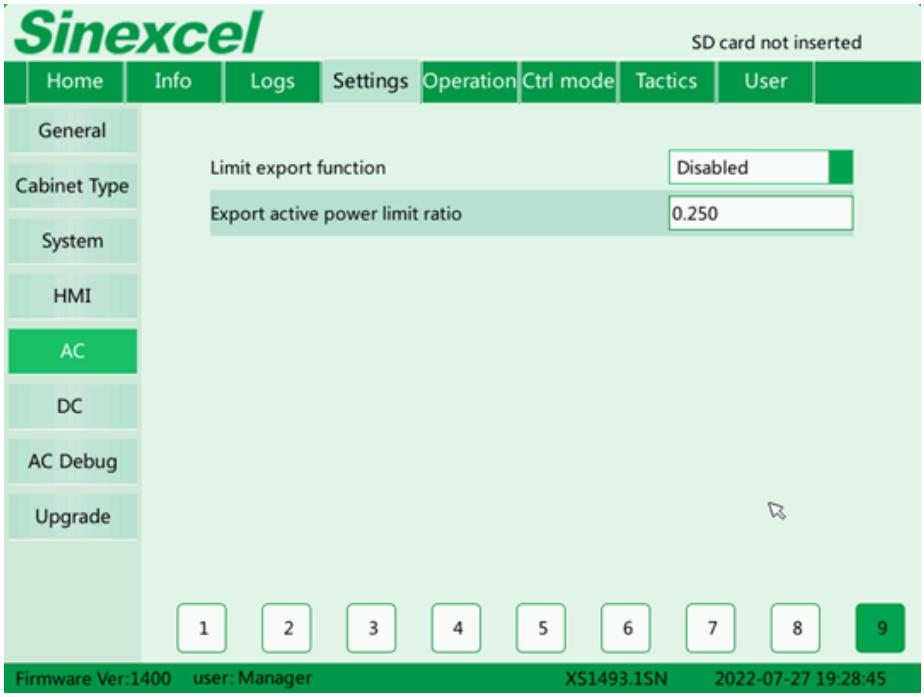
After user log into the system**>"Setting">"AC">"Limit export function">"Soft Enable" or "Hard Enable" or "S&H Enable" or "Disable"**

1.Soft limit: A limit that will cause the inverter or multiple inverter combination to reduce its outpu t, preventing generation greater than the limit.

2.Hard limit: A limit that when activated will cause the inverter or multiple inverter combination to disconnect (e.g. when the soft limit has not been met).

3.The soft limit may be utilized with the hard limit to minimize the number of disconnections due t o exceeding the hard limit. Where both hard and soft limits are used the requirements for hard lim it shall take precedence over the soft limit requirements.





18 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, or PV modules number and string type.
- 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

Appendix

Specification

Model	PWG2-50K-NA	PWG2-100K-NA	PWG2-50K-EX	PWG2-100K-EX
Utility-interactive Mode				
Battery voltage range	400V(250~520V)		400V(250~520V)	
Batter Rated DC Max Current	130A	260A	130A	260A
PV Voltage Range	520~900V (MPPT 520V~800V)		520~900V (MPPT 520V~800V)	
PV Maximum Voltage	900Vdc		900Vdc	
PV DC. Max Current (in case of completely consumption)	192A	384A	192A	384A
PV Max back feed current	5A	5A	5A	5A
PV MAX Power	100kWp	200kWp	100kWp	200kWp
AC voltage	480V(423V~528V)		400V(340V~460V)	
AC rated current	60A	120A	72A	144A
AC inrush current	72A 1min	144A 1min	86A 1min	172A 1min
AC max fault current	157A 80ms	315A 80ms	157 80ms	315A 80ms
Nominal apparent power	50kVA	100kVA	50kVA	100kVA
AC frequency	60Hz(59.5Hz~60.5Hz)		50/60Hz(±2.5Hz)	
Output THDI	≤3%	≤3%	≤3%	≤3%
AC PF	Listed: 0.8~1 leading or lagging (Controllable)		Listed: 0.8~1 leading or lagging (Controllable)	
	Actual: 0.1~1 leading or lagging (Controllable)		Actual: 0.1~1 leading or lagging (Controllable)	
Stand-alone Mode				
Battery voltage range	250~520V		250~520V	
Batter Rated DC Max Current	130A	260A	130A	260A

PV Maximum Voltage	900Vdc		900Vdc	
PV DC. Max Current (in case of completely consumption)	192A	384A	192A	384A
PV Max back feed current	5A	5A	5A	5A
PV MAX Power	100kWp	200kWp	100kWp	200kWp
AC output voltage	480V(±10% configurable)		400V(±10% configurable)	
AC rated current	60A	120A	72A	144A
AC inrush current	72A 1min	144A 1min	86A 1min	172A 1min
AC max fault current	157A 80ms	315A 80ms	157 80ms	315A 80ms
Nominal AC output power	50kVA	100kVA	50kVA	100kVA
AC Max Power	55kVA	110kVA	55kVA	110kVA
Output THDu	≤2%	≤2%	≤2%	≤2%
AC frequency	60Hz		50/60Hz	
AC PF	Listed: 0.8~1 leading or lagging (Load-depend)		Listed: 0.8~1 leading or lagging (Load-depend)	
	Actual: 0.1~1 leading or lagging (Load-depend)		Actual: 0.1~1 leading or lagging (Load-depend)	
Overload Capability	105%~115% 10min; 115%~125% 1min; 125%~150% 200ms		105%~115% 10min; 115%~125% 1min; 125%~150% 200ms	
Physical				
Cooling	Forced air cooling		Forced air cooling	
Noise	70dB		70dB	
Enclosure	NEMA / IP20		IP20	
Inverter Topology	Isolated		Isolated	
Max elevation	3000m/10000feet (> 2000m/6500feet derating)		3000m/10000feet (> 2000m/6500feet derating)	
Operating temp.	-20°C to 50°C (De-rating over 45°C）		-20°C to 50°C (De-rating over 45°C）	
Humidity	0~95% (No condensing)		0~95% (No condensing)	
Size (W*H*D)	800*2160*800mm		800*2160*800mm	
	31.5*85*31.5 inches		31.5*85*31.5 inches	
Weight	520kg	750kg	520kg	750kg
Installation	Floor standing		Floor standing	
Other				
Peak efficiency	95.50%	95.50%	95.50%	95.50%
CEC efficiency	-	-	-	-
Protection	OTP, AC OVP/UVP, OFP/UFP, EPO, AC Phase Reverse, Fan/Relay Failure, OLP, GFDI, Anti-islanding		OTP, AC OVP/UVP, OFP/UFP, EPO, AC Phase Reverse, Fan/Relay Failure, OLP, GFDI, Anti-islanding	
Islanding Protection	Allowing the frequency of the inverter to be inherently unstable in the absence of			

	a reference frequency(frequency instability).	
Configurable protection limits	Upper/Lower AC Voltage/Frequency limit, Battery EOD voltage.	Upper/Lower AC Voltage/Frequency limit, Battery EOD voltage.
Over voltage category	Ⅲ（AC） Ⅱ（Battery） Ⅱ（DC LInk）	
AC connection	3-Phase 4-Wire	3-Phase 4-Wire
Display	Touch Screen	Touch Screen
Communication	RS485,CAN,Ethernet	RS485,CAN,Ethernet
Isolation	Built-in Transformer	Built-in Transformer
Compliance	UL1741 /UL 9540, CPUC RULE 21, IEEE1547, CSA 22.2	CE LVD, IEC 62109, CE EMC, IEC 61000, AS61000 VDE 4105, VDE 0126-1 AS4777 PEA, MEA TOR Erzeuger

Acronyms

AC: alternative current.
DC: direct current.
ESS: energy storage system.
EMS: energy management system.
BMS: battery management system.
PCS: power conversion system.
EPO：Emergency Power Off
RCD: Residual Current Device