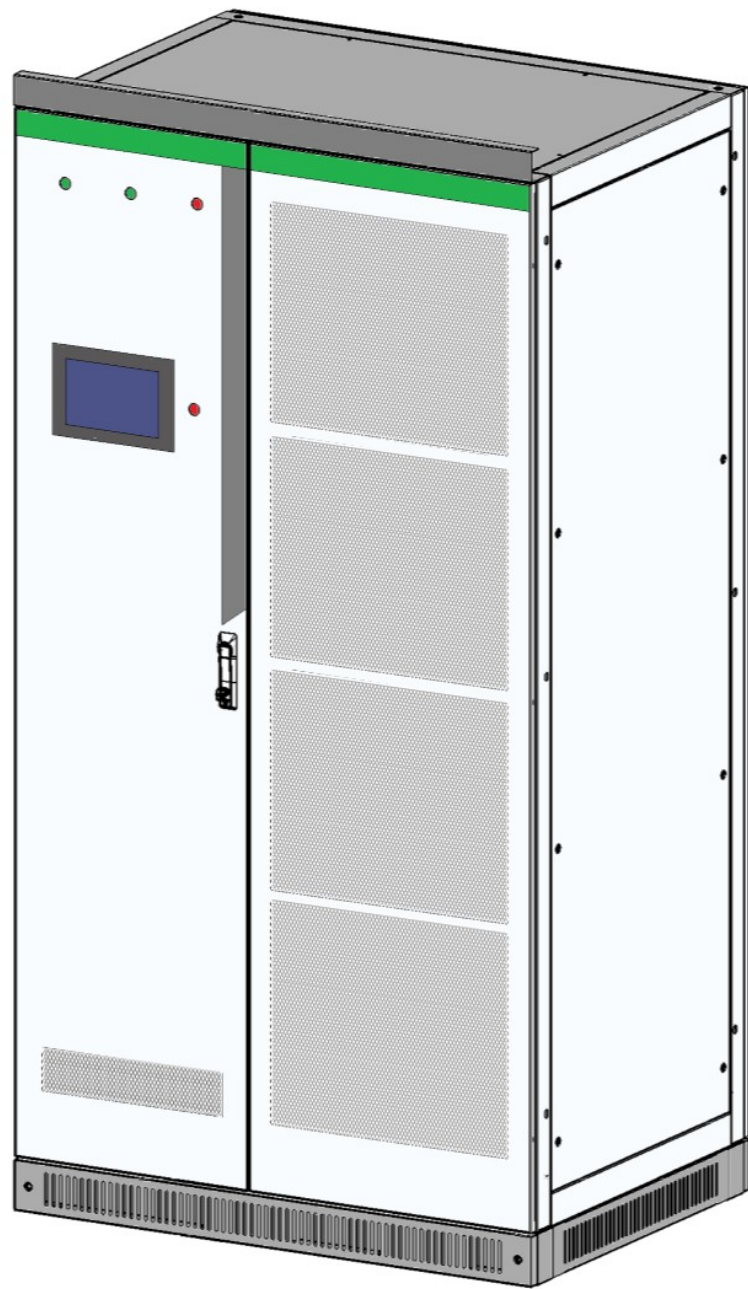


Installation Manual



PWS1-500K Series Energy Storage PCS



Sinexcel

PWS1-500KTL-EX-1M/2M/3M/4M/5M/6M/7M/8M

PWS1-500KTL-EX-M1/M2/M3/M4/M5/M6/M7/M8

Series Bi-directional Energy Storage PCS

Installation Manual

Version: V2.1

Shenzhen Sinexcel Electric Co., Ltd.

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1 Information on this Document

1.1 Validity

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

- PWS1-500K
- PWS1-500KTL
- PWS1-500KTL-EX-1M/2M/3M/4M/5M/6M/7M/8M
- PWS1-500KTL-EX-M1/M2/M3/M4/M5/M6/M7/M8

Model definition

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

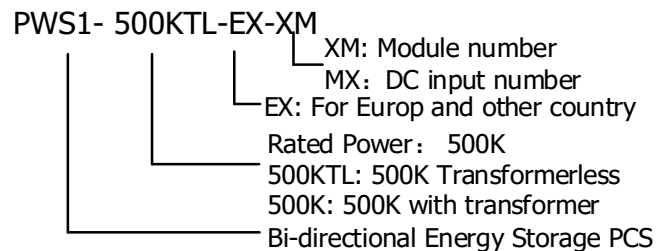


Fig.1-1 Product model definition

For example:

PWS1-500KTL: 500kW Bi-directional storage inverter without isolation transformer.

PWS1-500K: 500kW Bi-directional storage inverter with isolation transformer.

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 PWS1-500K series Bi-directional Storage Inverter (PCS).


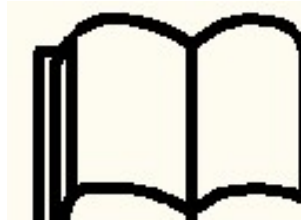
Before installation, please read this user's manual carefully.

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 PWS1 series that shall be followed during installation and maintenance of the PCS.

NO.	Symbol	Reference Standard	Description
1		IEC 60417-5036 IEC 60417-5416	Note the shock hazard, energy storage time release (discharge time is marked next to the symbol)
2		ISO 7000-0434	Watch out for danger

3		IEC 60417-5041	Watch out for hot surface
4		ISO 7000-1641	Refer to the operation manual



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 switchin off!

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

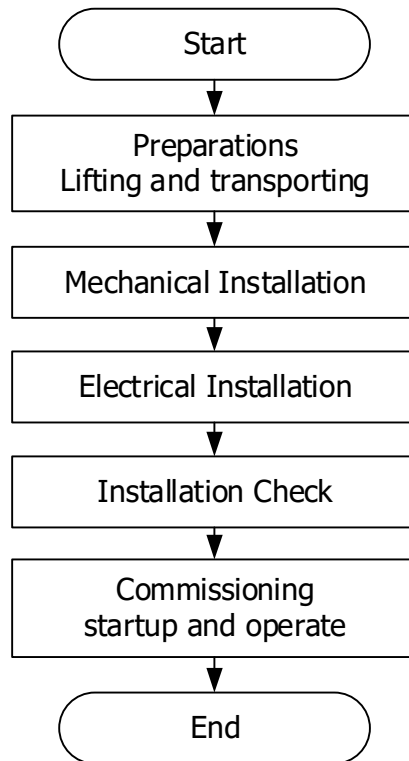


Fig. 3-1 Installation Process

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		
Schematic diagram	1 copy	Electronic Document
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 from the 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 electrocution, death or serious injury and 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 not accessible to public.



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 increasing the contact resistance.

This can cause the components to overheat and catch fire.

Be sure to always tighten the live bolt connection using the correct 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 on firm base.

Environment temperature should be within the temperature range listed in technical specification.

The installation position is convenient for observing the touch screen.

5.2.2 Ground requirements

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

5.2.3 Ventilation

The storage inverter has 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 section below. Proper space should be reserved for air inlet and outlet. A exhaust is recommend to be installed in the 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.

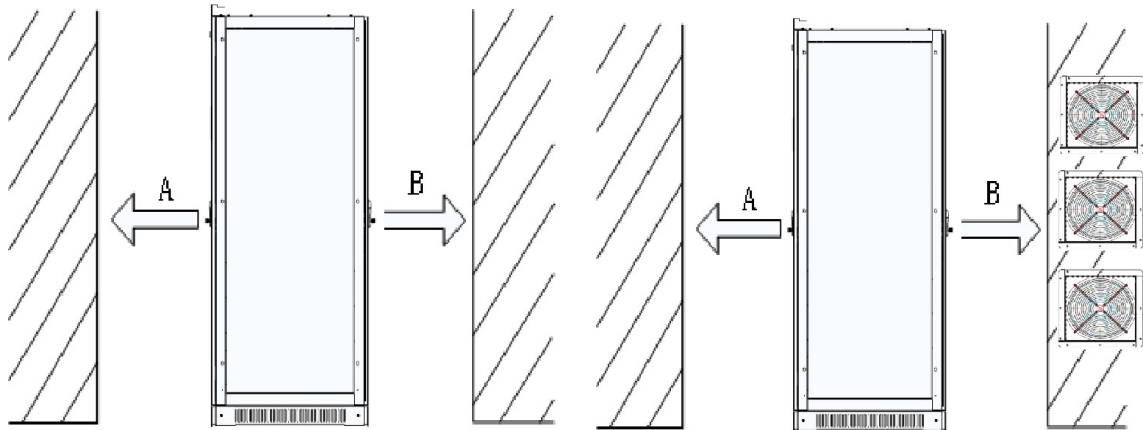


Fig. 5-1 Front and back installation space of storage inverter (Please see Chapter 5.5 Installation in container for the recommend fan location)

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 see 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 $\geq 200\text{mm}$ 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.

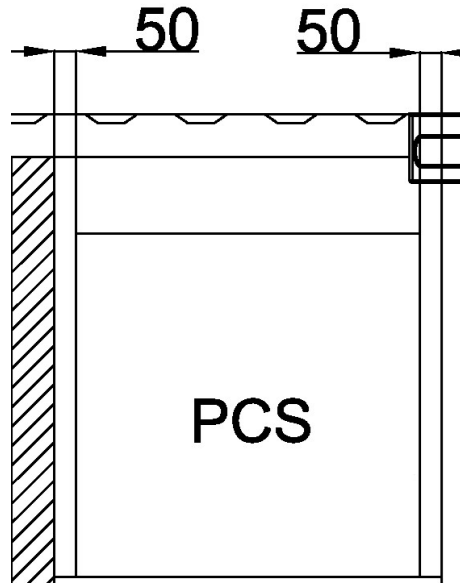


Fig. 5-2 Side installation space of storage inverter

5.2.5 Other requirements

1) Waterproofing

The ingress protection grade of the rack of the Bi-directional 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.

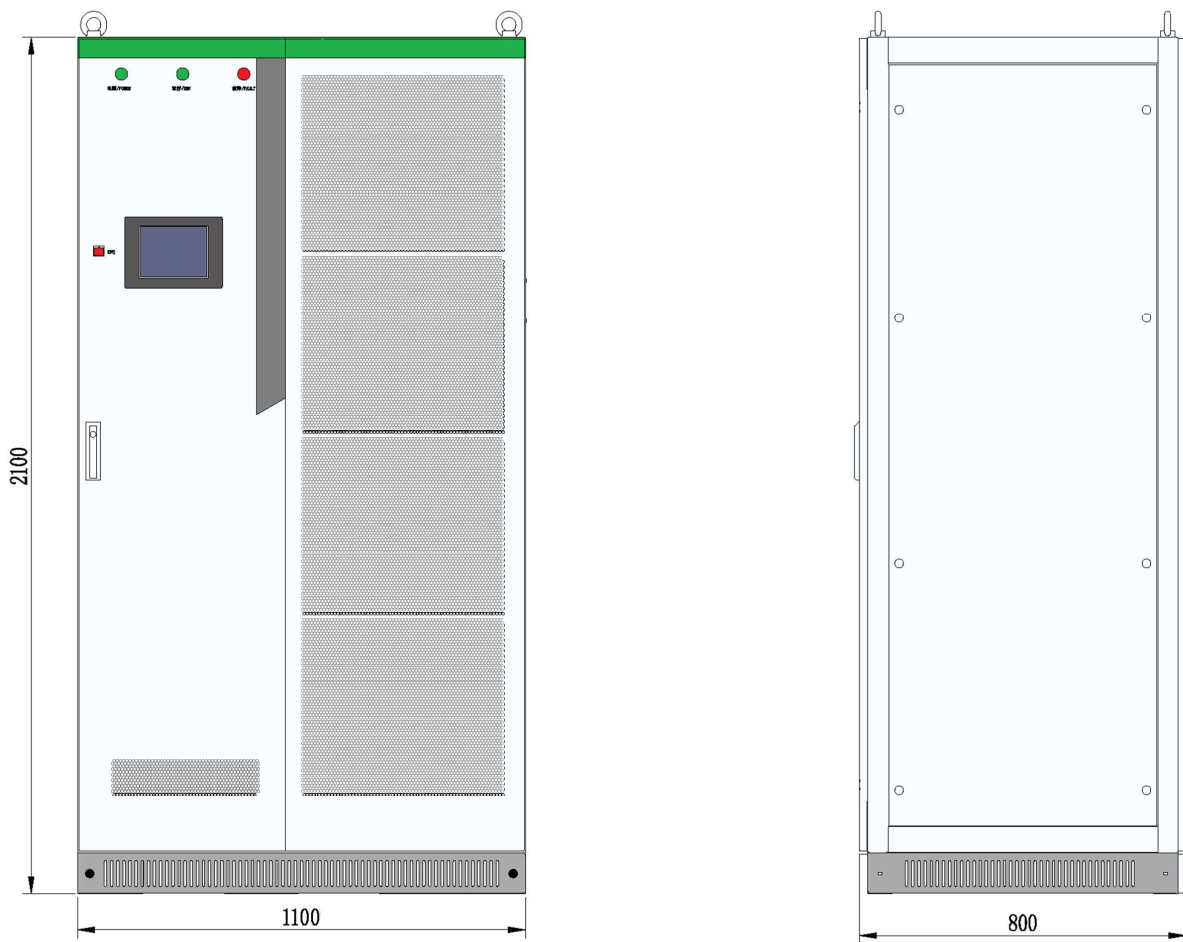


Fig. 5-3 Overall dimensions of PCS

The PWS1-500KTL cabinet, width: 1100mm, height: 2,160mm (without lifting rings); depth: 800mm.

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

The PWS1-500KTL series Bi-directional Storage Inverter is without lifting rings and can't be lifted.

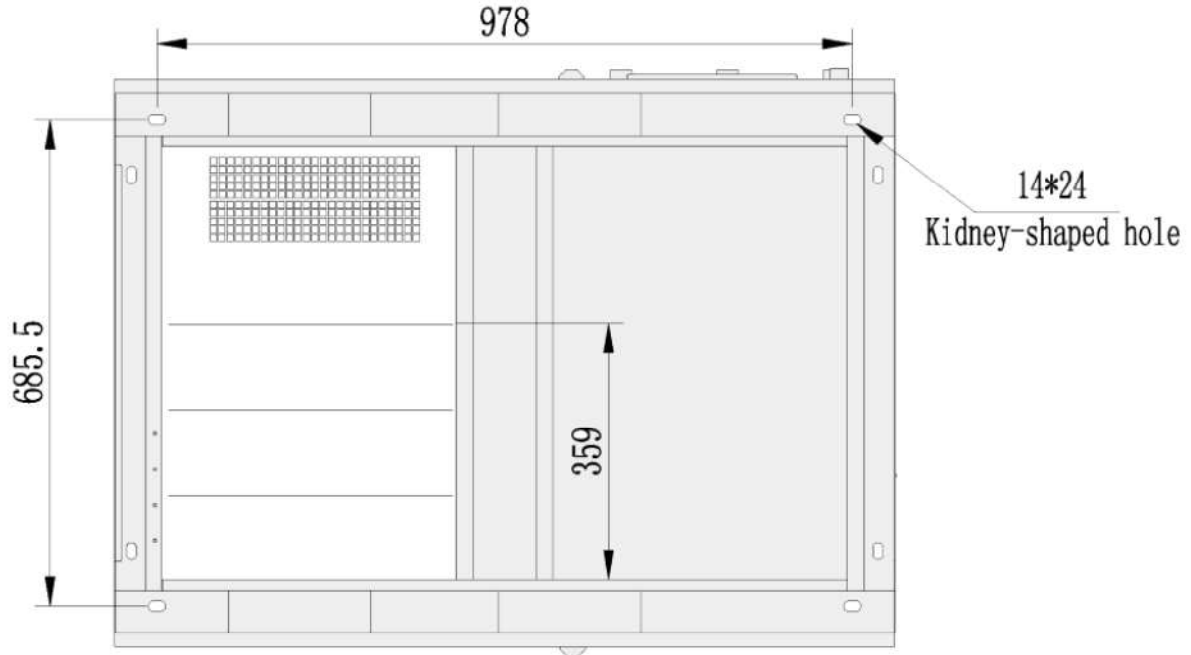


Fig. 5-4 PWS1-500K rack wiring hole in bottom view

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

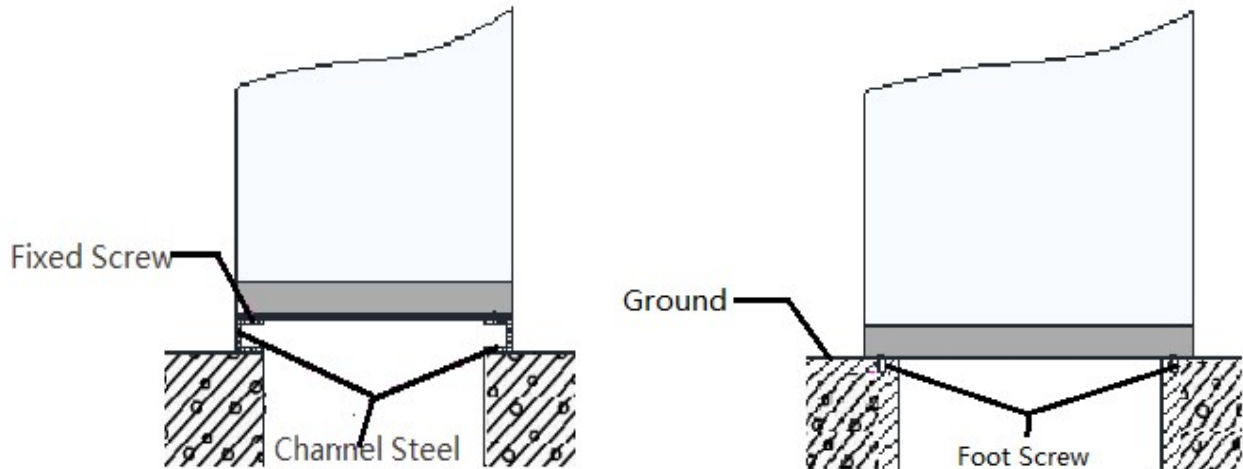
5.4 Rack installation

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, $\Phi 14$ 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.

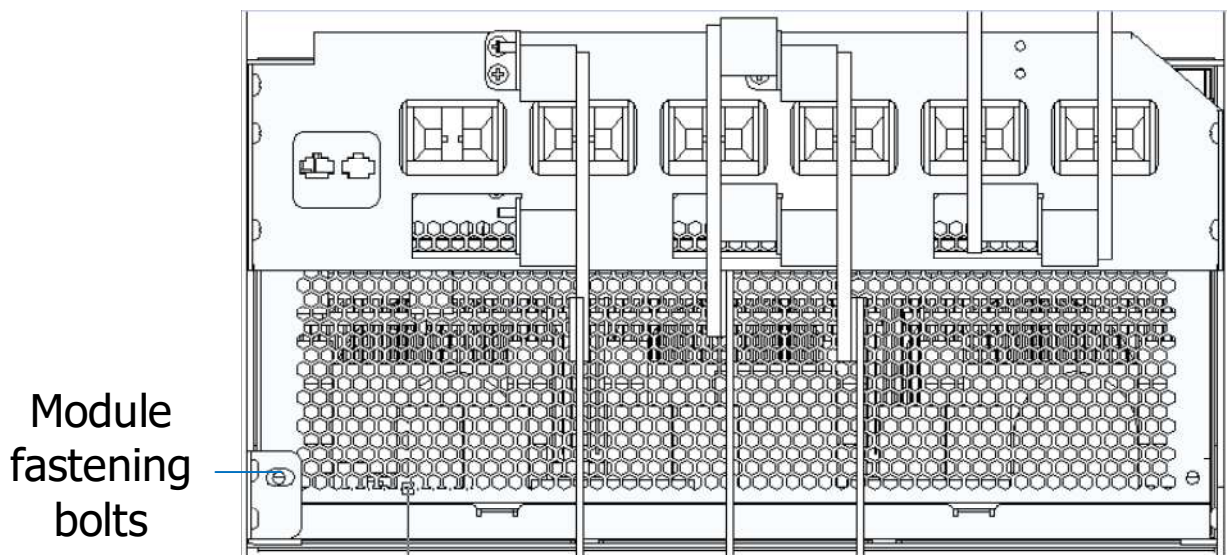


Fig. 5-7 Module fastening bolt position in the back side of each module

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 manufacturer 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.

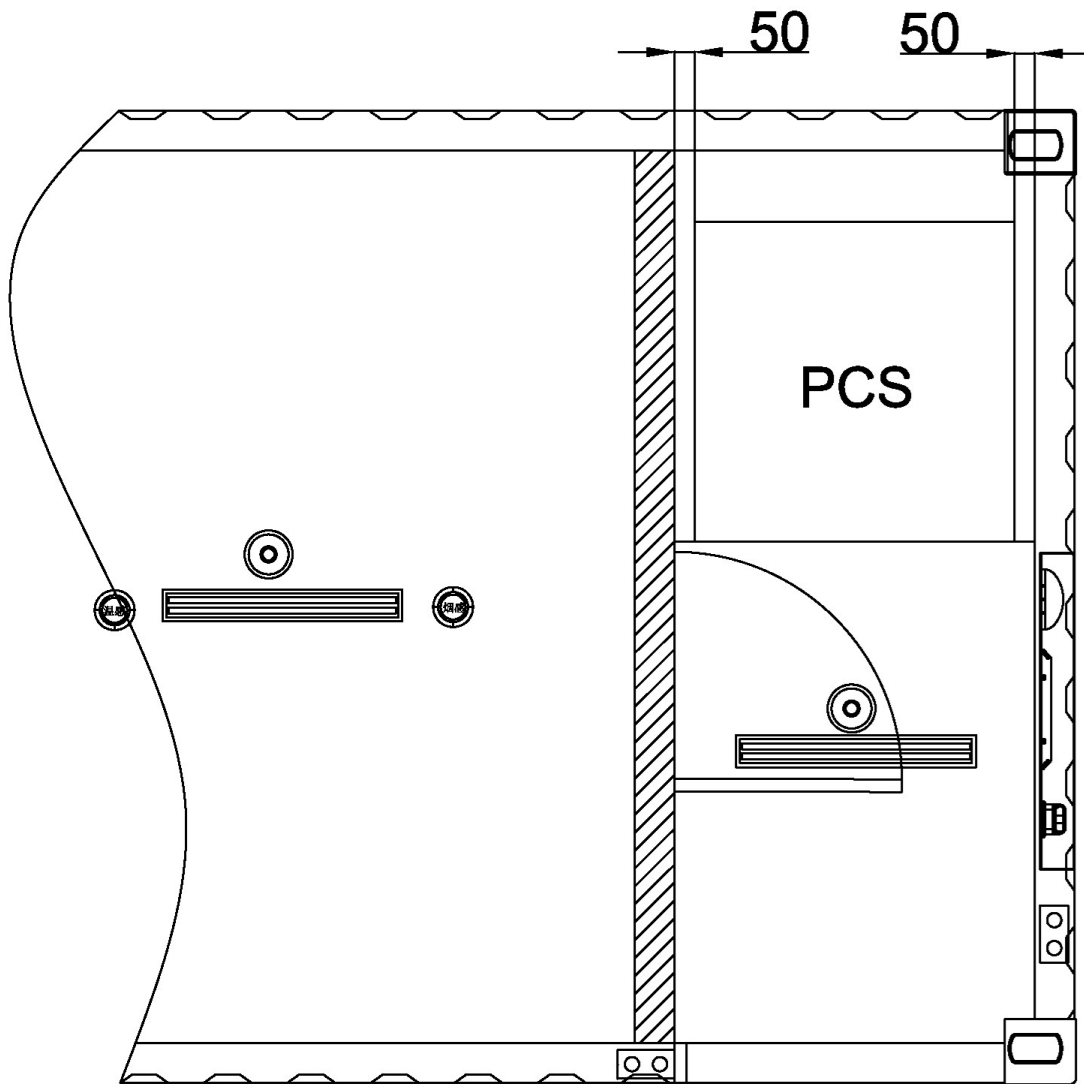


Fig. 5-8 The distance between PCS and container wall

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 manufacturer to confirm the Fan position for particular project.

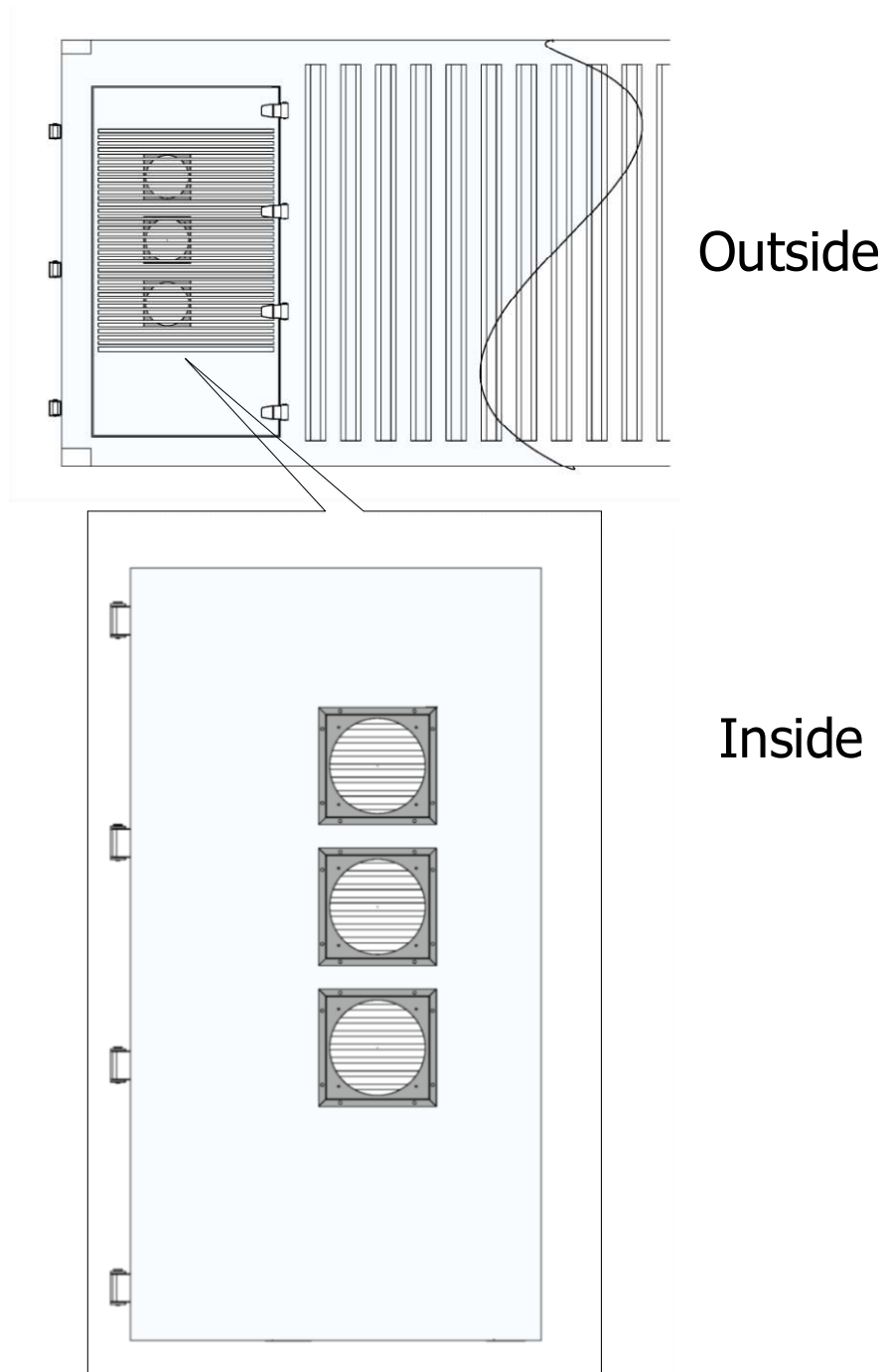


Fig. 5-9 The Fan on the inner side of container wall

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.

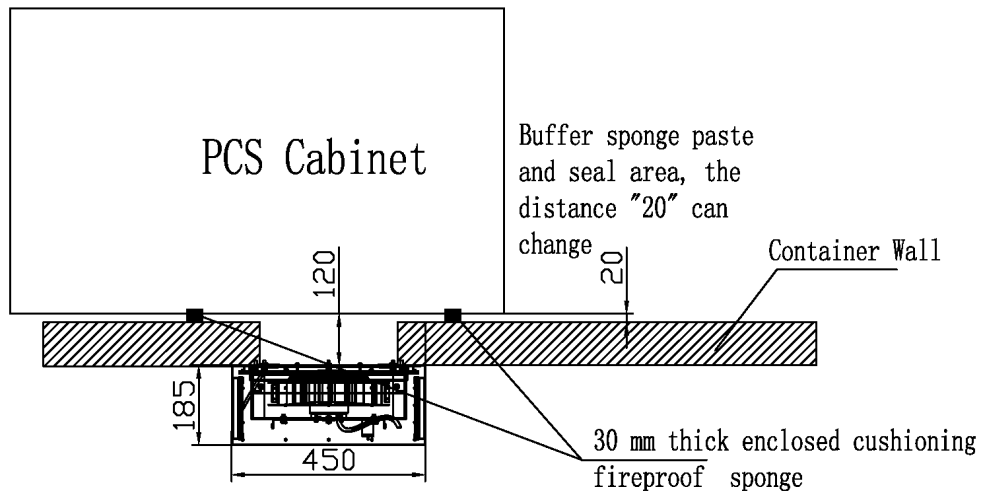


Fig. 5-10 Container external fan drawing

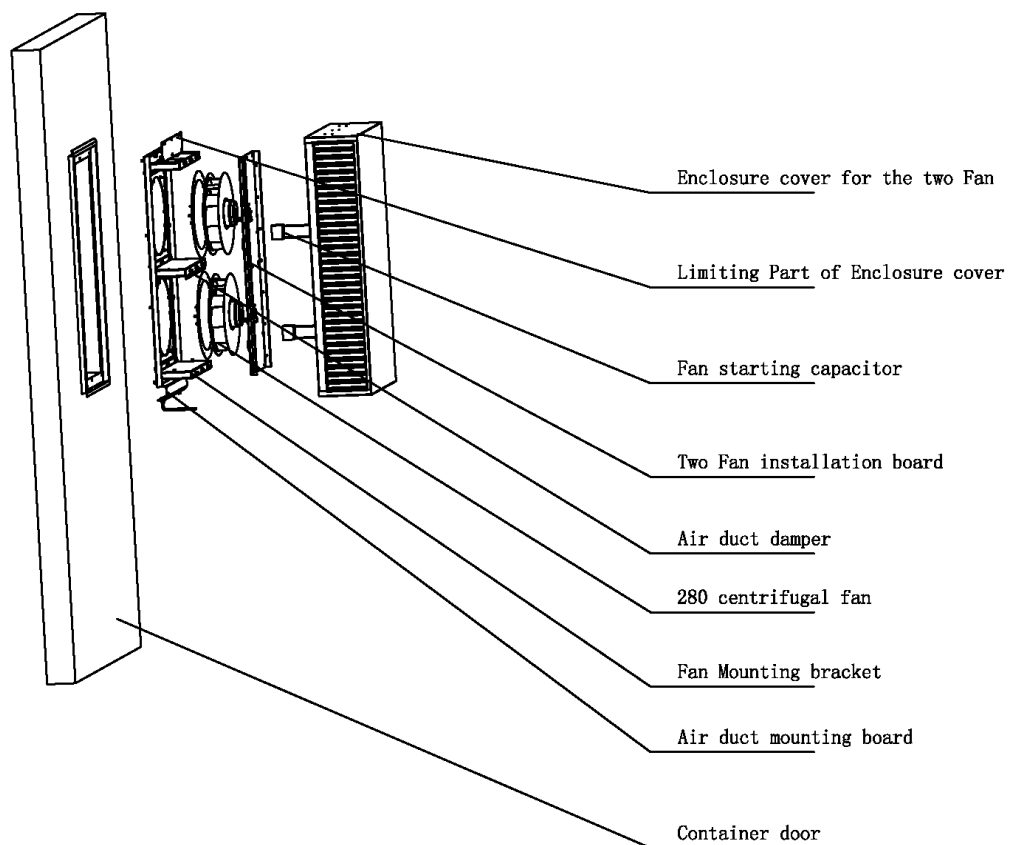


Fig. 5-11 Components of Container external fan

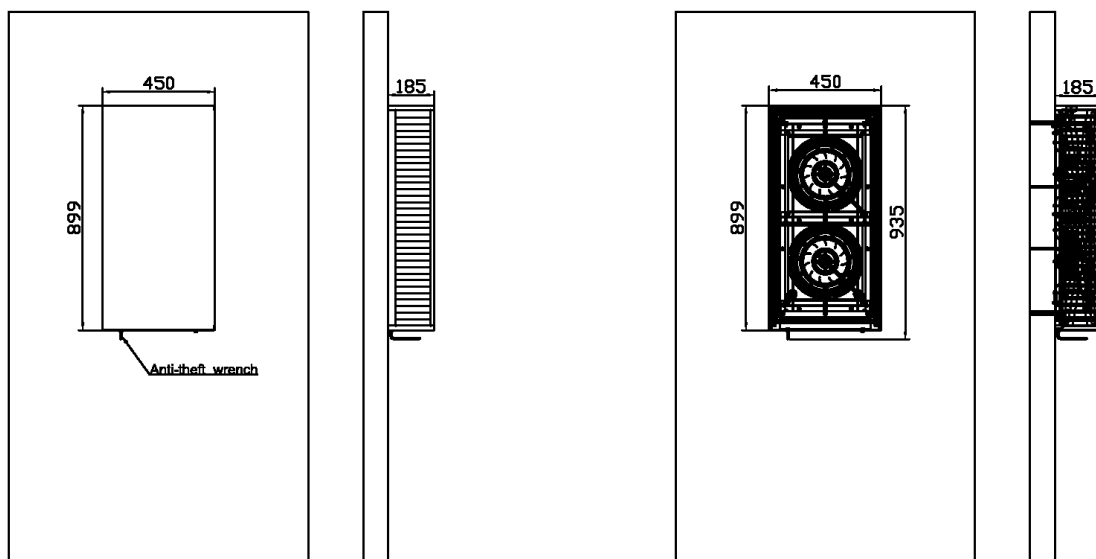


Fig. 5-12 Three external fan on the outward side of the door

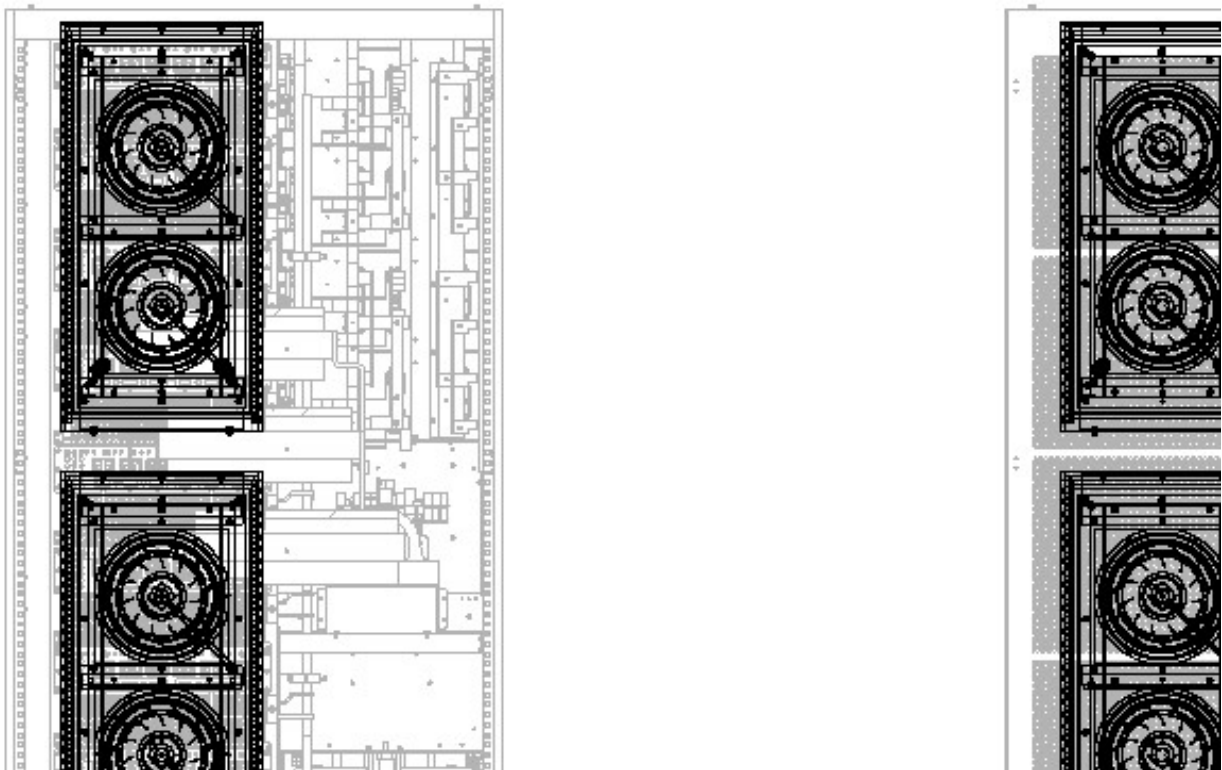


Fig. 5-13 PWS1-500K series Fan and its corresponding Module; Relative position of Fan and back door

5.5.4 Air duct design

Air duct can be customized design according to customer's requirements. Please contact the manufacturer for information on air duct design for specific projects.

Model	System air demand	Ventilation air volume	Fan	Module	Inlet air area	Outlet air area
PWS1-500K series	5000 M ³ H	6400 M ³ H	4	2	0.6 m ²	0.8 m ²

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 before 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 external battery pack, please make sure DC and AC switches are disconnected.



NOTICE

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-MX), 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. When designing energy storage system, the PCS of 500KTL series is without isolation transformer, its AC output side can directly be connected to the 3-Wire without Neutral line low-voltage utility grid.

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 1mm² wire should be $\leq 3A$.

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.

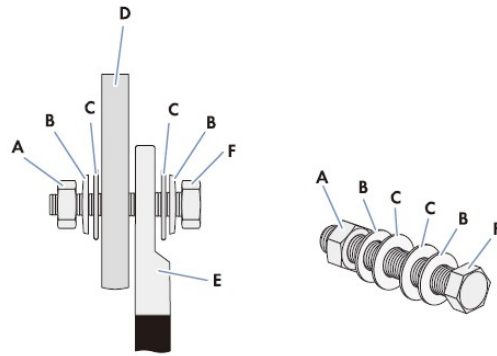


Fig. 6-1 Design of the connection with one one-hole terminal lug

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

Open the dam-board of back door and then can see the wiring copper bar as shown below.

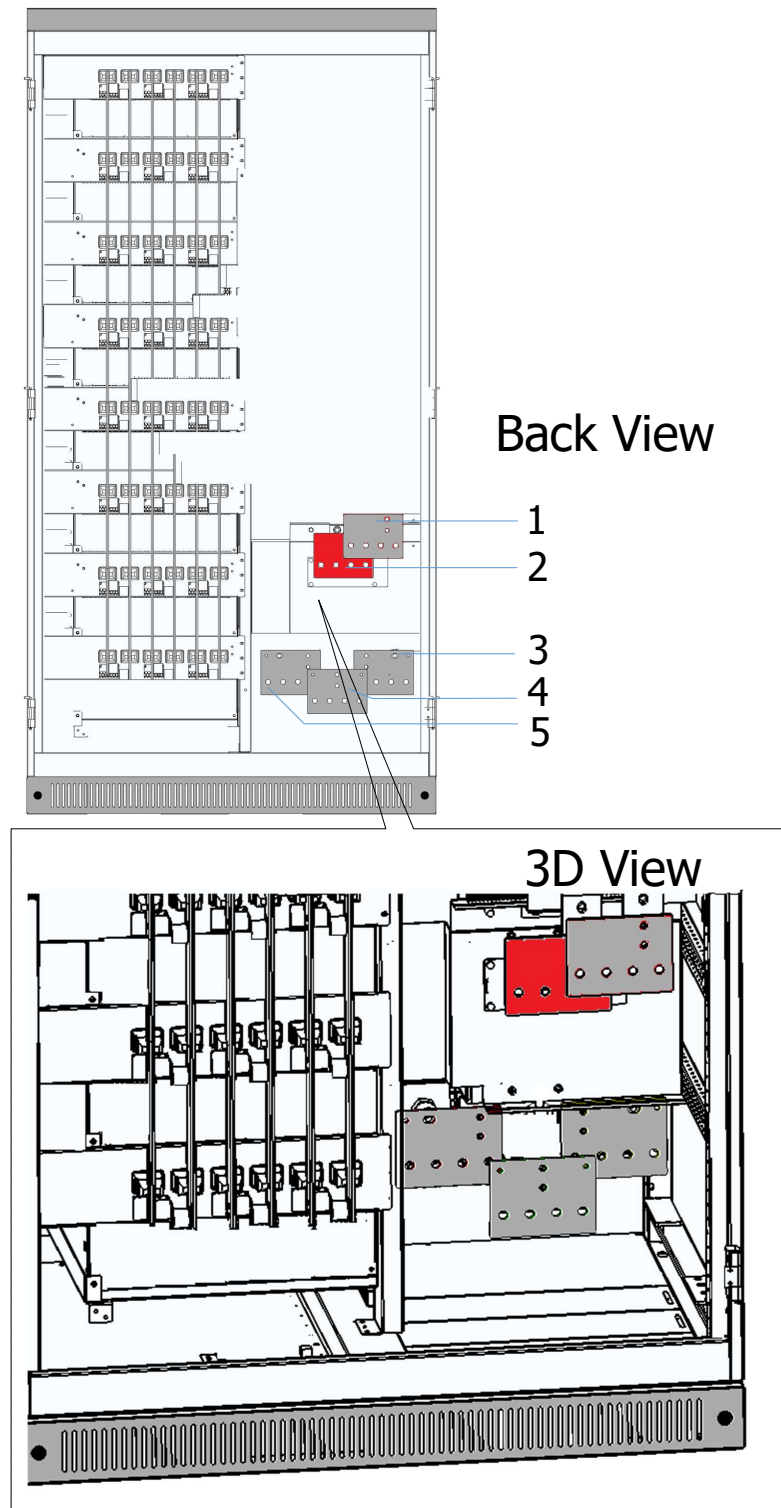


Fig. 6-3 PWS1-500K-XM series with 1 branch DC input cabinet wiring copper bars designation

Table 6-3 PWS1-500K-XM series with 1 branch DC input cabinet wiring copper bars description

Position	Designation	Description
1	Battery +	Battery input positive pole
2	Battery -	Battery input negative pole
3	A	Phase A, dimension is shown as below.
4	B	Phase B
5	C	Phase C

Fig. 6-4 PWS1-500K series with 1 branch DC input DC wiring copper bar dimension

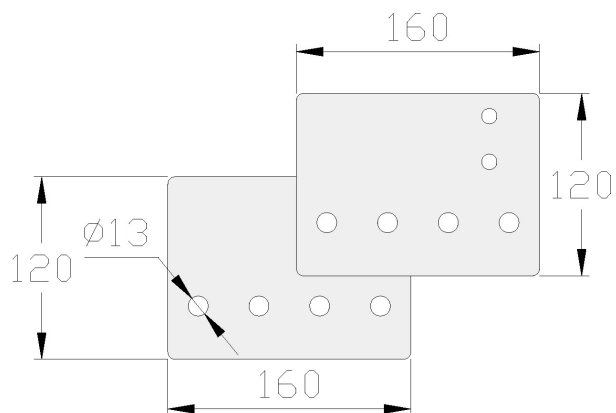
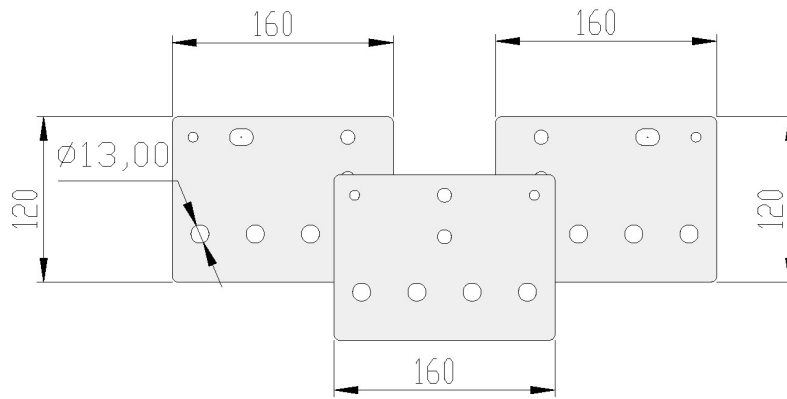


Fig. 6-5 PWS1-500K series AC wiring copper bars dimension



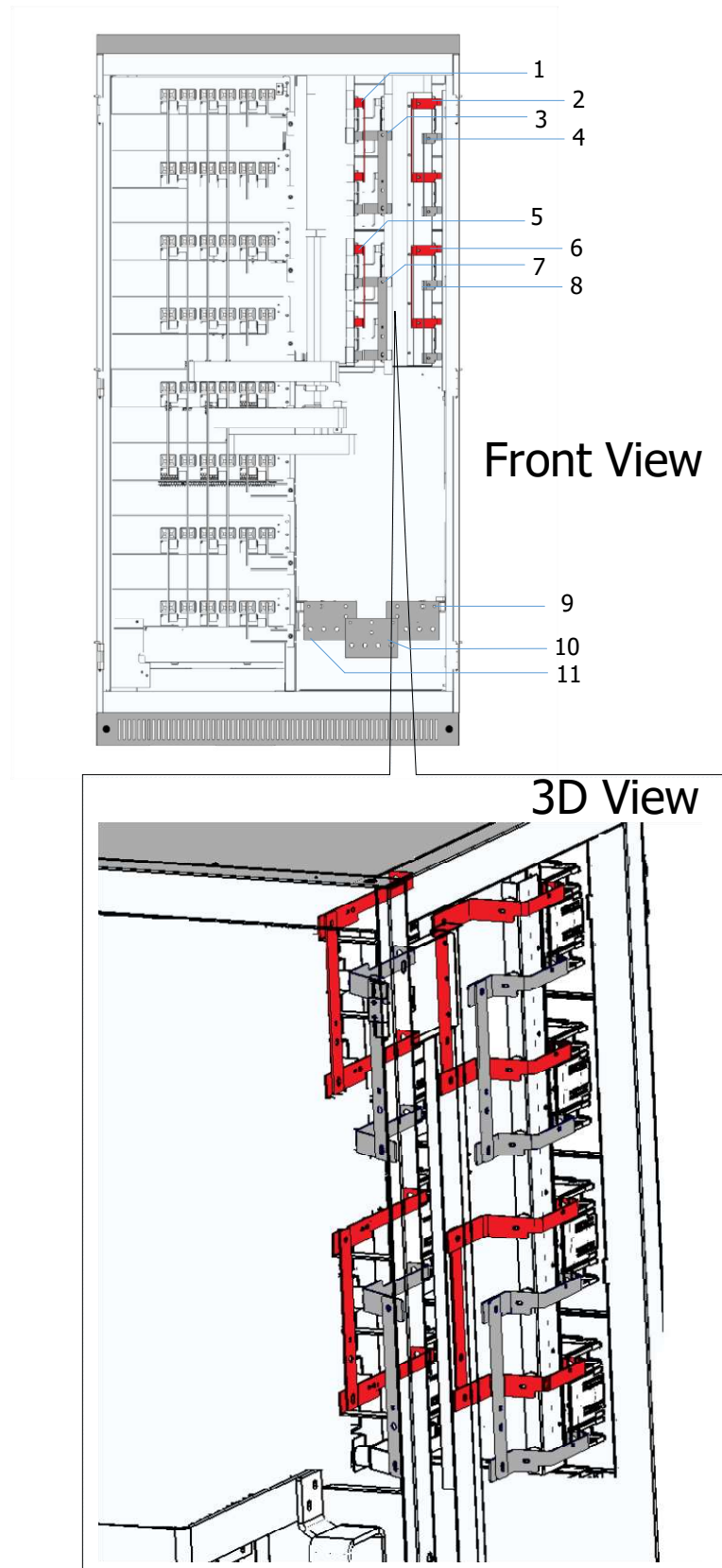


Fig. 6-6 PWS1-500K series with 4 branch DC input cabinet wiring copper bars designation

Table 6-4 PWS1-500K-M4 series with 4 branch DC input cabinet wiring copper bars description

Position	Designation	Description
1	Battery +	Battery positive port
2	Battery +	Battery positive port
3	Battery -	Battery negative port
4	Battery -	Battery negative port
5	Battery +	Battery positive port
6	Battery +	Battery positive port
7	Battery -	Battery negative port
8	Battery -	Battery negative port
9	A (Grid)	Phase A
10	B (Grid)	Phase B
11	C (Grid)	Phase C

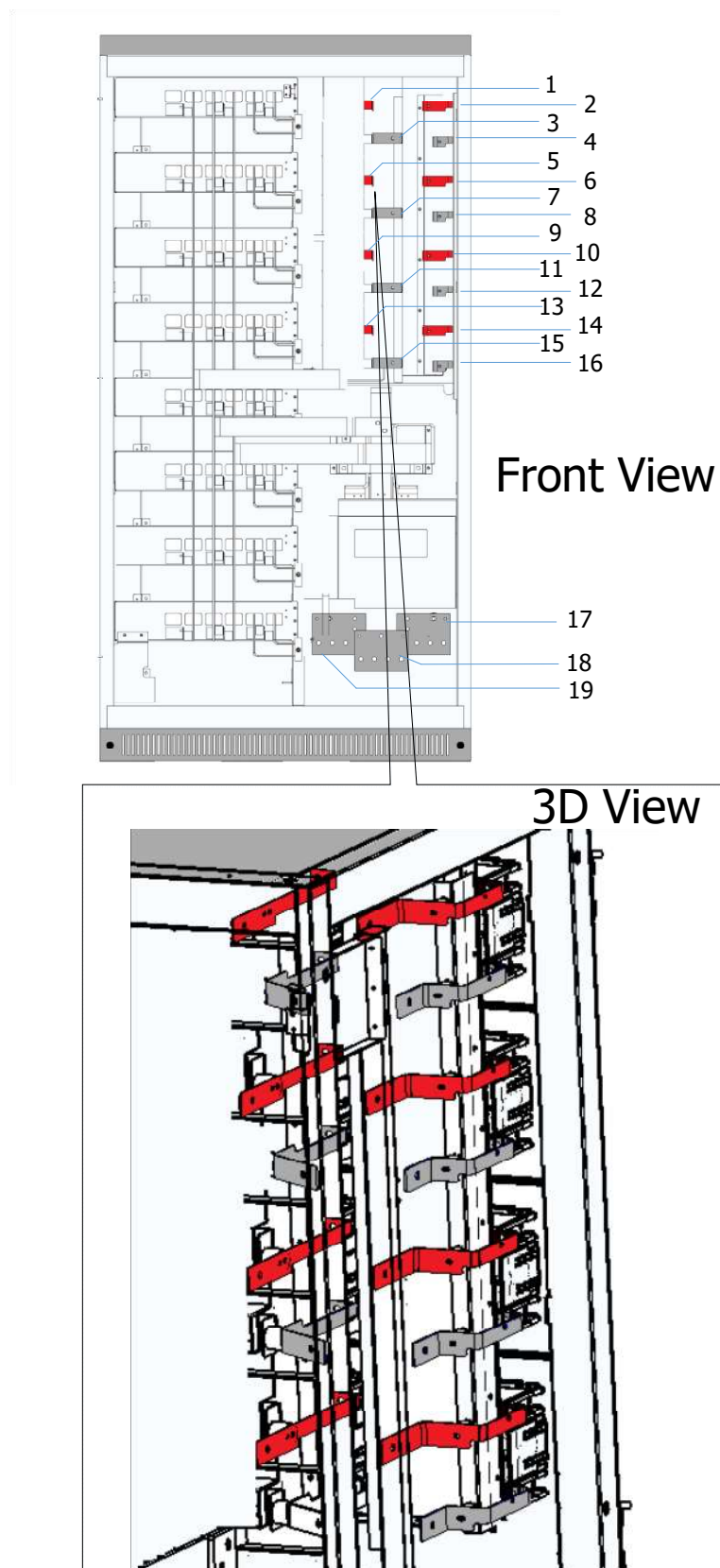


Fig. 6-7 PWS1-500K series with 8 branch DC input cabinet wiring copper bars design

Table 6-5 PWS1-500K-M8 series with 8 branch DC input cabinet wiring copper bars description

Position	Designation	Description
1	Battery +	Battery positive port
2	Battery +	Battery positive port
3	Battery -	Battery negative port
4	Battery -	Battery negative port
5	Battery +	Battery positive port
6	Battery +	Battery positive port
7	Battery -	Battery negative port
8	Battery -	Battery negative port
9	Battery +	Battery positive port
10	Battery +	Battery positive port
11	Battery -	Battery negative port
12	Battery -	Battery negative port
13	Battery +	Battery positive port
14	Battery +	Battery positive port
15	Battery -	Battery negative port
16	Battery -	Battery negative port
17	A (Grid)	Phase A
18	B (Grid)	Phase B
19	C (Grid)	Phase C

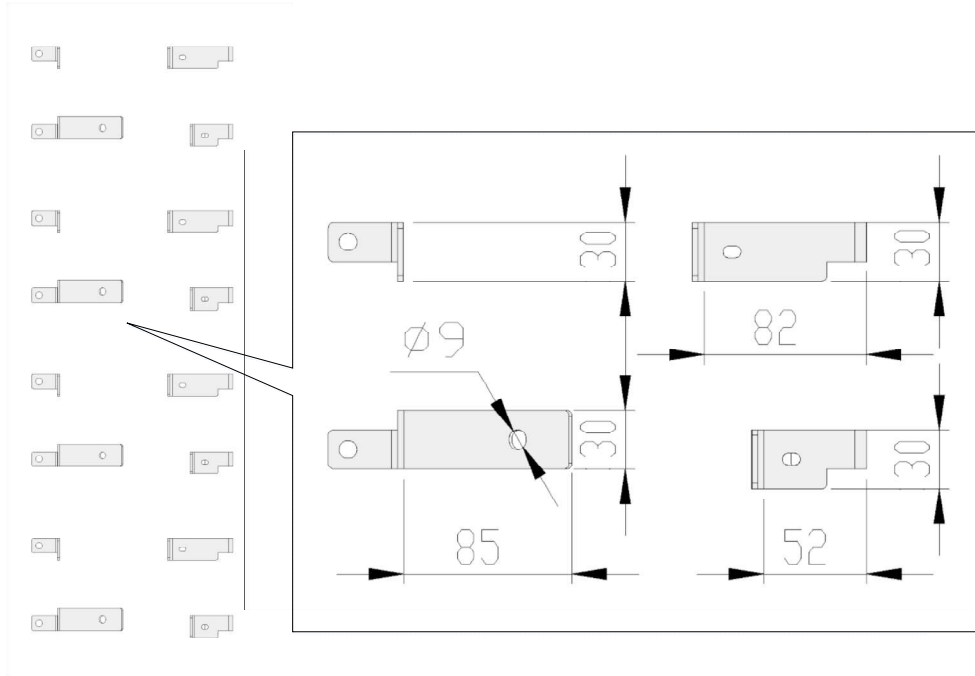


Fig. 6-8 PWS1-500K series with 8 branch DC input DC wiring copper bar dimension

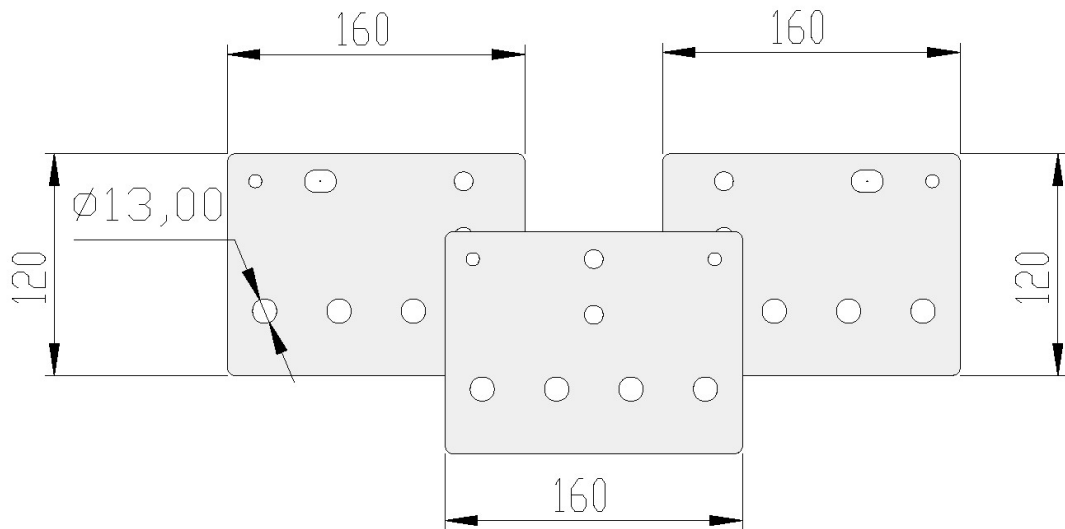


Fig. 6-9 PWS1-500K series AC wiring copper bars dimension

6.1.4 System grounding

The modules in the PCS realize grounding connection with the rack through hangers.

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 bonded to ground.

Table 6-5 Grounding PE cable description

Rated power	Copper PE line section recommendation (mm ²)
500kW	≥75



WARNING

Rack and modules need to be grounded reliably! The grounding resistance should be less than 4Ω. DO NOT connect the DC Positive or Negative terminals to Ground.

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 (mm ²)
500kW	≥75



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 to ensure that the phase sequence is positive (R-W-B).
- 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 (mm ²)
500kW	≥75



WARNING

Ensure that there is no dangerous voltage at the connection points before touching.



NOTICE

All wires are connected to the wiring terminals externally from the wiring holes at the bottom of PCS. After wiring, fireproofing compound 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.

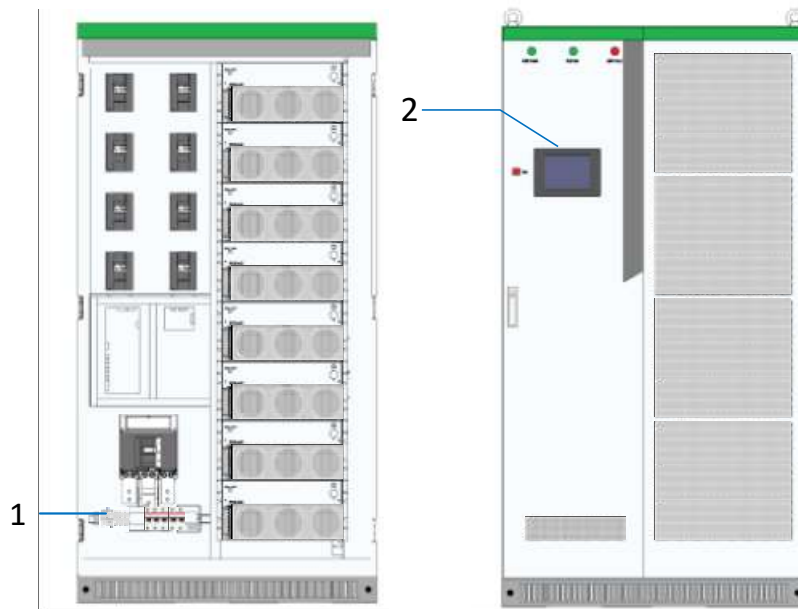


Fig. 6-8 Wiring and communication interface position

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 6.4 Communication interface

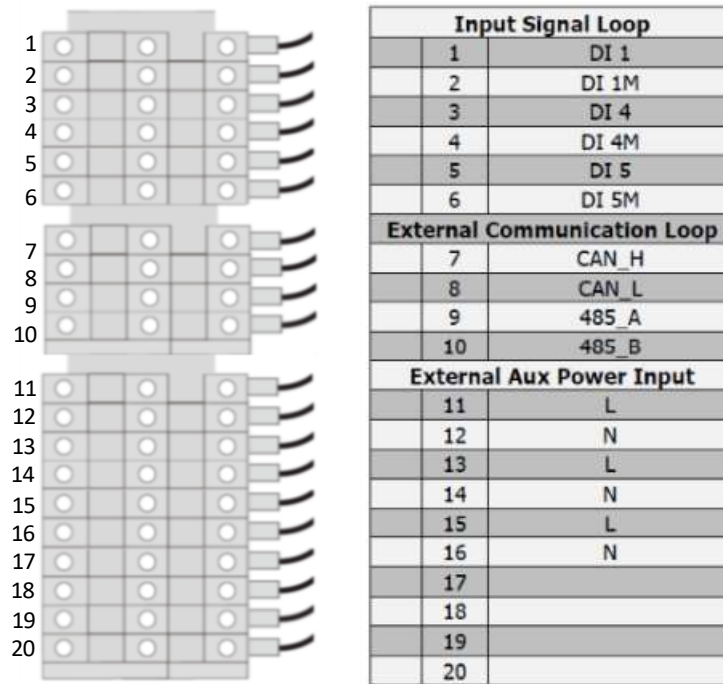


Fig. 6-9 Definition of terminal strip ports

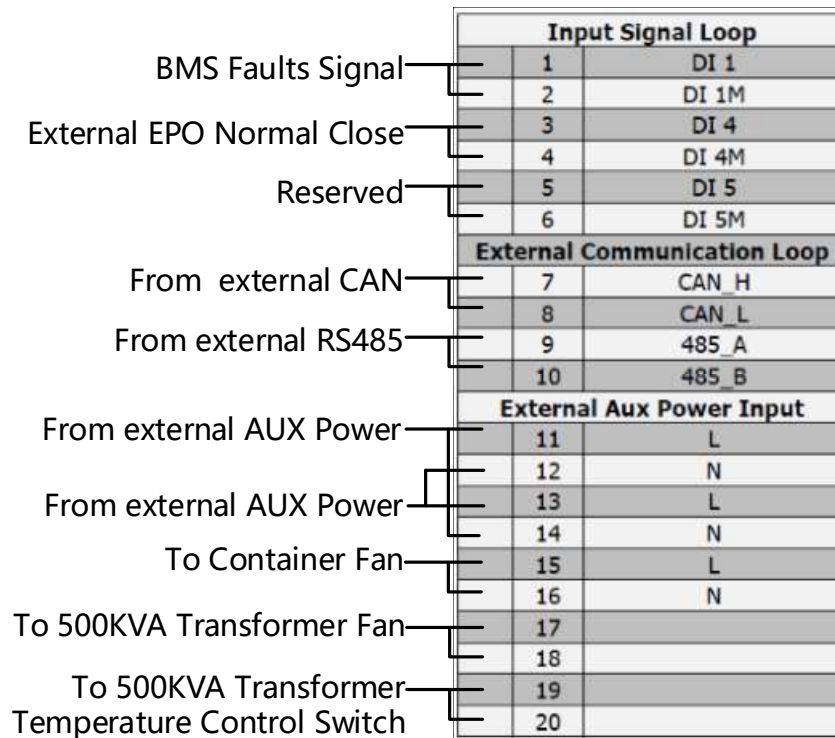


Fig. 6-10 Definition of terminal strip ports

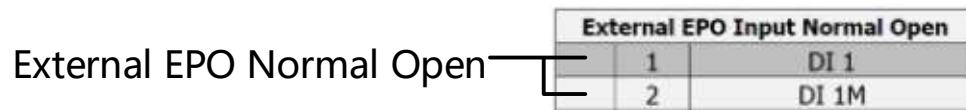


Fig. 6-11 Definition of additional terminal strip ports for 1 branch DC Input Switch

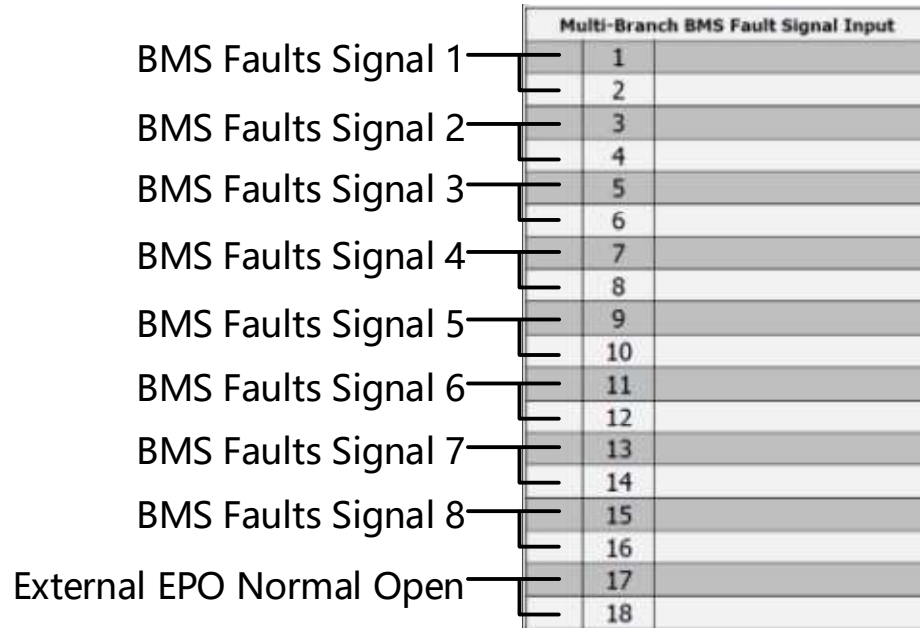


Fig. 6-12 Definition of additional terminal strip ports for 8 branch DC Input Switch

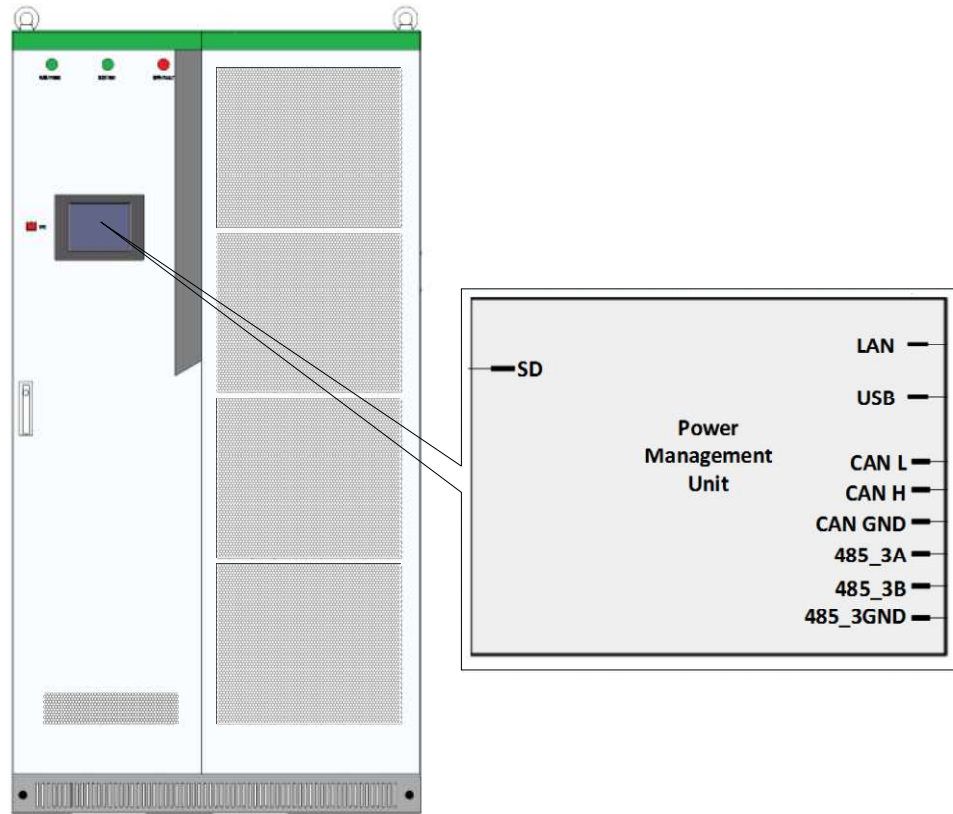


Fig. 6-13 Definition of touch screen communication ports

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 have 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	<p>RS485 or Ethernet (Protocol is based on MODBUS TCP/IP or MODBUS RTU compatible with SUNSPEC/MESA)</p> <p>Defaulted as RS485 MODBUS RTU. Use Ethernet when the system requires fast control.</p> <p>When the EMS needs to communicate in CAN method, a CAN to Ethernet communication protocol converter is required.</p>

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
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.

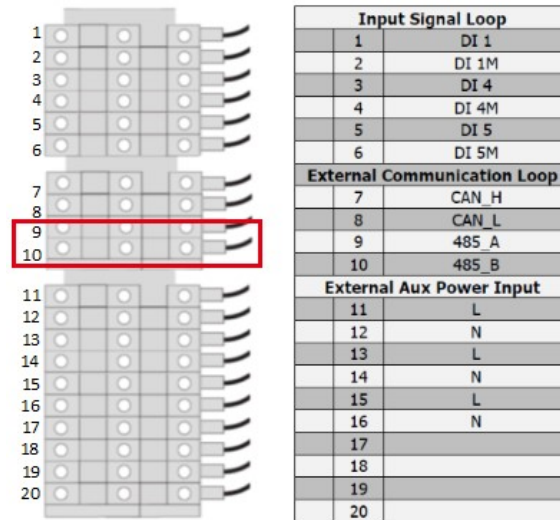


Fig. 6-14 PCS RS485 communication terminal

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.

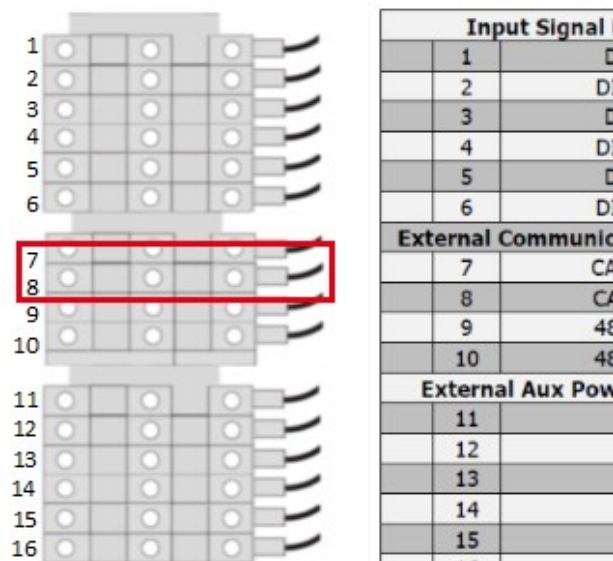


Fig. 6-15 PCS CAN communication terminal

6.3 RCDs

The following values of RCDs should be used with the AC connection:

PCS	Minimum RCD Value
10kW to 30kW	Type B 100mA
>30kW to 70kW	Type B 200mA
>70kW to 125kW	Type B 300mA
>125kW to 250kW	Type B 500mA
>250kW to 500kW	Type B 900mA

6.4 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.

6.5 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.	<input type="checkbox"/>
The module fastening bolts are removed	<input type="checkbox"/>
The ambient operating conditions are within the range in specification.	<input type="checkbox"/>
The unit is properly fastened to the floor.	<input type="checkbox"/>
No blockage in the air ventilation path of the PCS and the air tunnel is through.	<input type="checkbox"/>
Electrical installation	✓
The PCS (including cables) is grounded properly and the earthing electrodes are constructed properly.	<input type="checkbox"/>
The AC line voltage matches the nominal output voltage of the PCS	<input type="checkbox"/>
The external MV or LV AC transformer is suitable for use with the PCS	<input type="checkbox"/>
The insulation of the assembly is good and meet the code	<input type="checkbox"/>
The AC power connections at A, B and C and their tightening torques are correct.	<input type="checkbox"/>
The DC power cable connections at DC+ and DC– and their tightening torques are correct.	<input type="checkbox"/>
The AC and DC power cable wiring holes are sealed properly.	<input type="checkbox"/>
The auxiliary and control cables are routed away from the power cables	<input type="checkbox"/>
The external control connections to the PCS are correct	<input type="checkbox"/>
The cable connections at the junction box and their tightening torques are correct.	<input type="checkbox"/>
There are no tools, foreign objects or dust inside the cabinet.	<input type="checkbox"/>
All of the dam-boards and covers are in place. Ensure that the dam-board below the front door is installed.	<input type="checkbox"/>

All of the doors and door locks are in place. ☐

Insulation withstand test ☐

The grounding resistance should be less than 4Ω. ☐

6.6 Batteries

The PCS is designed to operate with a DC voltage of 600V to 900V. If the DC voltage is less than 600V then the output voltage may be low and the PCS may not operate within specifications. If the voltage is more than 900V serious damage can be caused.

Lithium Ferrous batteries are recommended. The PCS/EMS combination is designed for operation with the Battery Management System (BMS) . Please check the compatibility before using.

Lead Acid (VRLA or flooded) can be used. Please note that because of the high voltage configuration, special precautions may be necessary to ensure adequate safety. Please refer to battery manufacturers' documentation regarding safety precautions.

Battery installation details depend on the type and model depend on the type and model of the battery. Please follow the installation procedure provided by the battery manufacturer.

Lead Acid batteries need temperature compensation to ensure that the charging conditions are met. A semiconductor type temperature sensor is supplied separately if the Inverter is required to be operated with Lead Acid Batteries. This sensor is plugged into the EMS front panel jack provided for this purpose.

The temperature sensor is connected to the negative terminal of the lower most battery.

Lithium batteries do not this temperature sensor. The internal temperature of the battery modules is available from the BMS and is displayed in the EMS.

7 Functional Description

7.1 Operating Status

7.1.1 Overview of the Operating Status

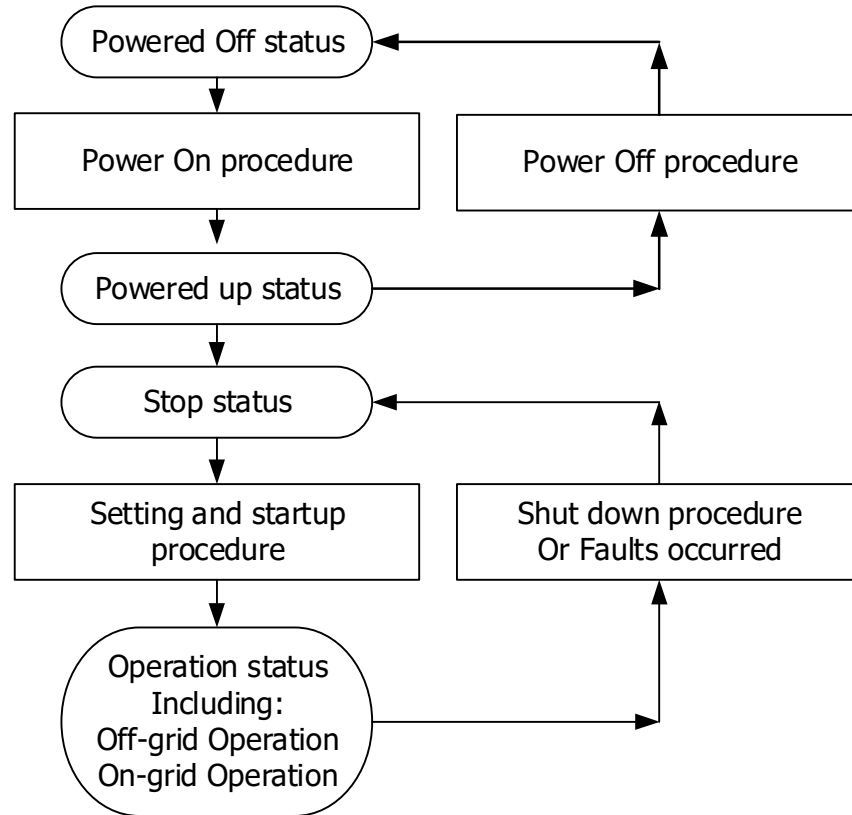


Fig. 7-1 Overall Status

Refer to the following table for status of storage inverter.

Table 7-1 Status of storage inverter

Status	Conditions	State indication
Powered off		DC and AC breaker all disconnected
Powered up		DC and AC breaker all connected
Stop	DC switch is closed, AC switch is closed, and the device might have faults occurred.	RUN green light in front door flickers quickly, and the module green light flickers quickly.
Operation	Including Off-grid and On-grid operation	

On-grid	The device does not alarm, on-grid mode is set, and the device receives startup command.	RUN green light in front door is always on, and the module green light is always on.
Off-grid	The device does not alarm, off-grid mode is set, and the device receives startup command.	RUN green light in front door is always on, and the module green light is always on.
Faults	Any fault information	Red light is always on, the module red light is always on or flickers, and the buzzer makes an alarm.
Shutdown	The device receives shutdown command.	RUN green light flickers slowly, and the module green light flickers slowly.

7.1.2 Operating States without STS

After external wiring of the storage inverter is completed, and wiring is fully checked, close the breaker in AC port. The storage inverter can be switched in different modes under the conditions below.

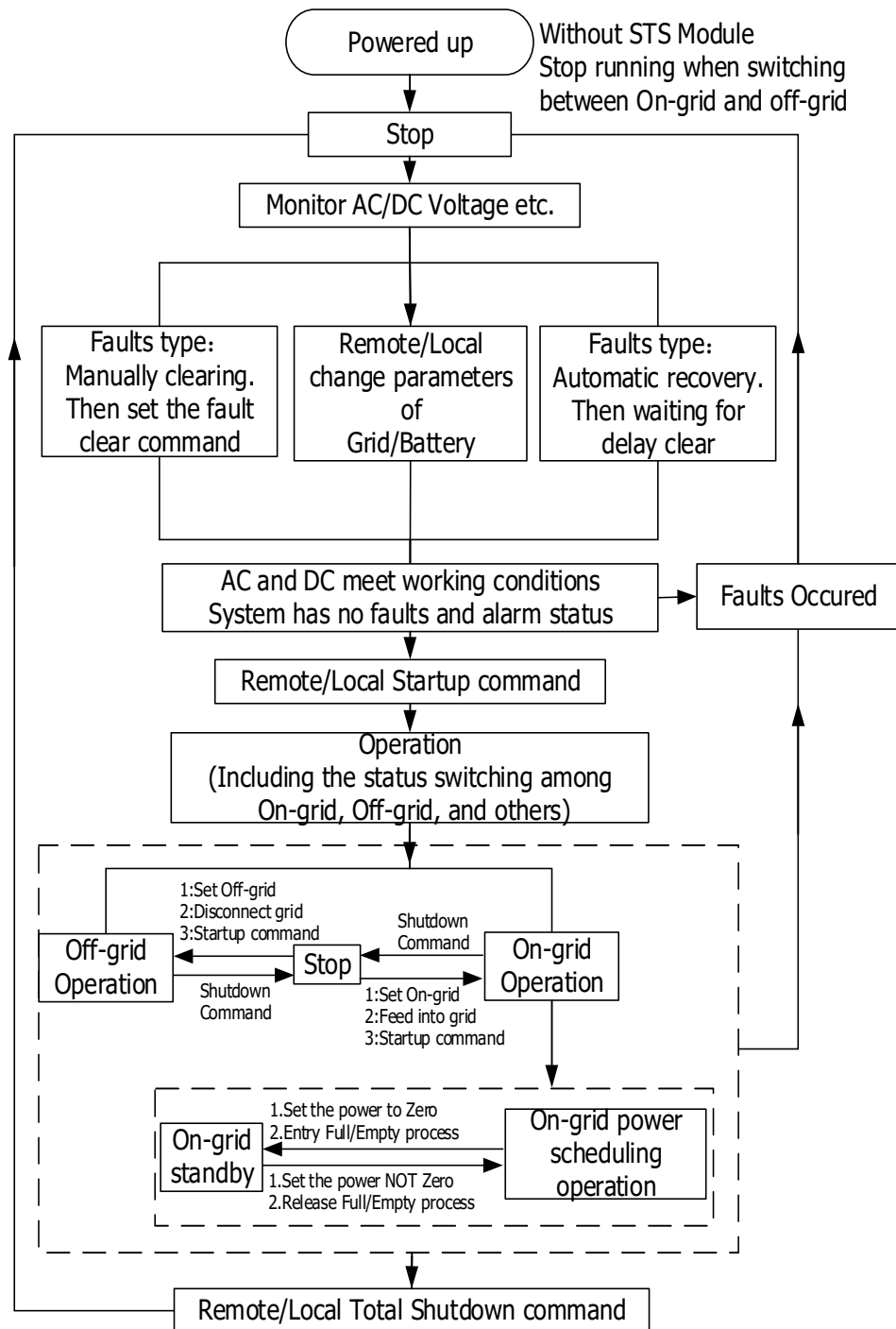


Fig. 7-2 Status diagram for storage inverter without STS module

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 parameters are consistent with the grid requirements.

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;
- 4): If the grid AC voltage; Battery 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 below:

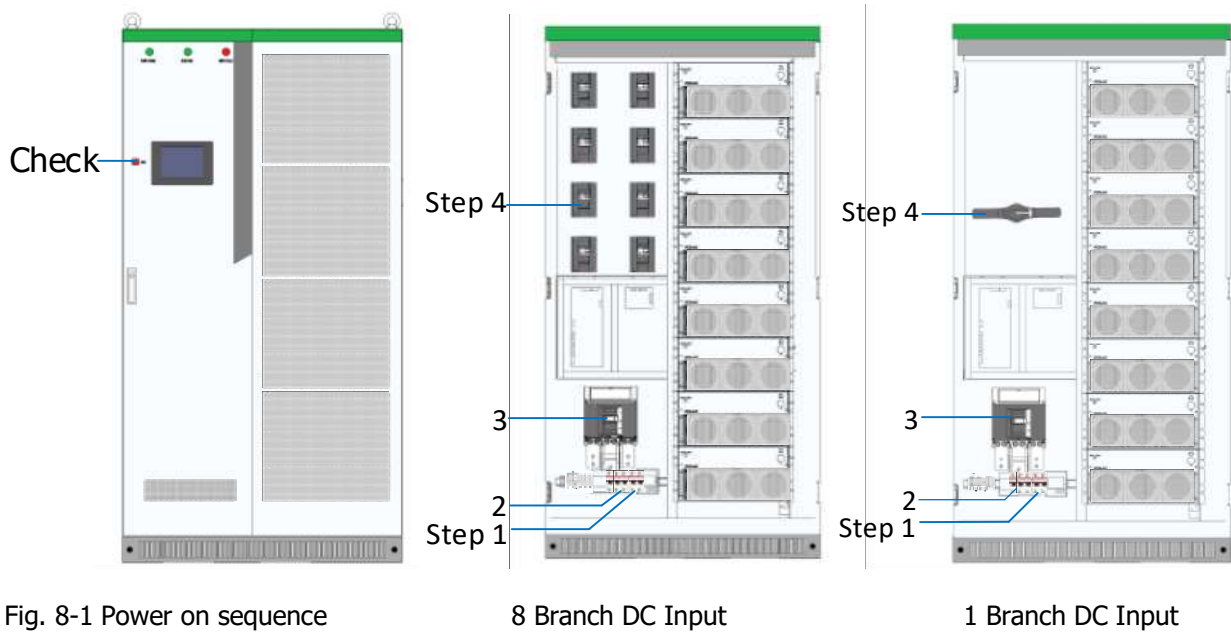


Fig. 8-1 Power on sequence

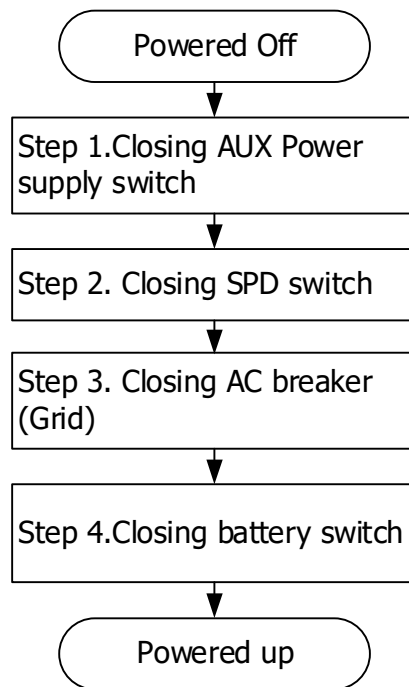


Fig. 8-2 Power on sequence for the PWS1-500KTL series PCS without transformer.

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.

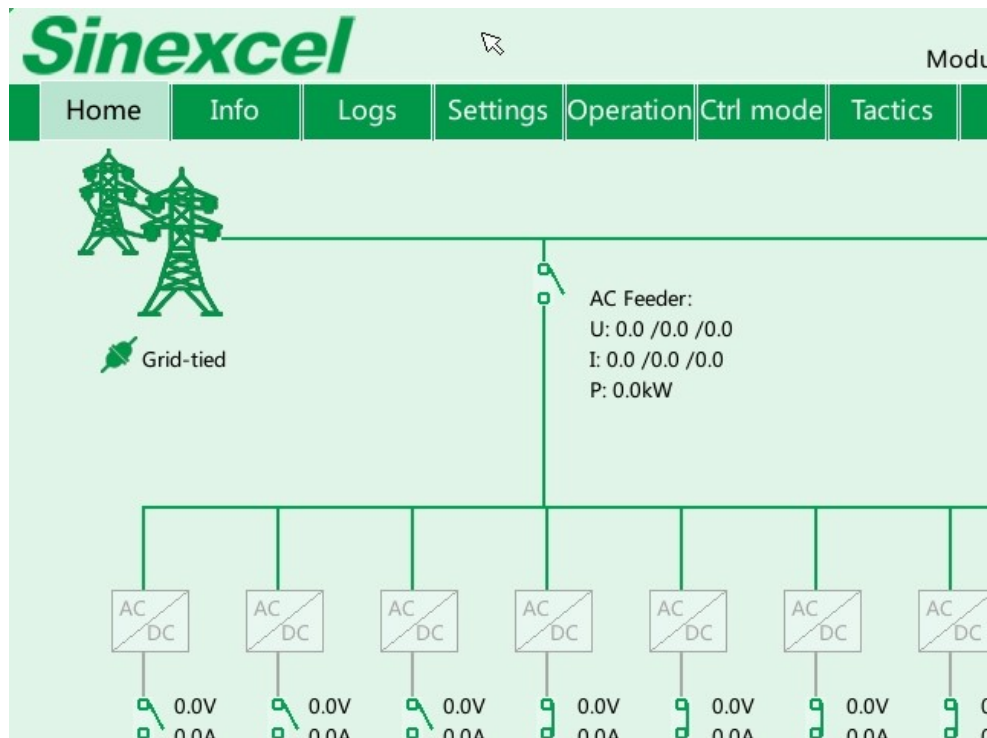


Fig. 8-4 Main Interface Sample

Detailed Menu information can be seen in Appendix. "11.1 Touch Screen Startup"

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 Select Control Mode

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

Configuring the control mode

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

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

8.3.4 General Settings

The screenshot shows the Sinexcel web interface. At the top, there is a navigation bar with tabs: Home, Info, Logs, Settings, Operation, Ctrl mode, and Tactics. The 'Settings' tab is selected. Below the navigation bar, there is a sidebar with 'General' and 'Advanced' options. The 'General' option is selected. The main content area is divided into two sections: 'Power Dispatch' and 'DC Configuration'. The 'Power Dispatch' section has two input fields: 'Active power setting' and 'Reactive power setting', both with a value of 0.0. The 'DC Configuration' section has six input fields: 'DC lower voltage' (250.0), 'End of Discharge Threshold Voltage' (200.0), 'Topping charge voltage' (550.0), 'Float charge voltage' (550.0), 'Topping charge turn to float charge judgement current' (0.0), and 'End-of-charge current' (0.0).

Power Dispatch	
Active power setting	0.0
Reactive power setting	0.0

DC Configuration	
DC lower voltage	250.0
End of Discharge Threshold Voltage	200.0
Topping charge voltage	550.0
Float charge voltage	550.0
Topping charge turn to float charge judgement current	0.0
End-of-charge current	0.0

Fig. 8-5 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. The detailed advanced setting can be seen in **Appendix1 12.4 Parameter Setting**.

8.3.5 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"**

The detailed menu explanation can be seen in **Appendix1 12.7 Manual 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"**

The detailed menu explanation can be seen in **Appendix1 12.8 Automatic startup.**

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.

The detailed menu explanation can be seen in **Appendix1 12.9 Remote startup.**

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.

The detailed menu explanation can be seen in **Appendix1 12.10 Shutdown procedure.**

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 switch.

8.9 Emergency shutdown

For any abnormal or dangerous situation, press the emergency shutdown button "EPO" on the rack door and the PCS will instantly stop running.



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 discharged (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 are caused by improper parameter settings.

User could reset the parameters following the instructions in Appendix and then the faults will be automatically cleared.



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	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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 Earth Fault Detection

The Fault code for DC side Earth Fault Detection is 0x3A and is shown on the LCD panel. That fault can also be read via register 44 bit2. The EMS continuously reads the register to detect DC side Earth Fault and provides indication. It also automatically sends an e-mail alert to the registered address. The EMS can also provide an external relay connection for the alarm, if required.

9.5 Detailed Troubleshooting

The detailed troubleshooting can be obtained from the manufacturer or authorised representative.

10 Maintenance

10.1 Safety during Maintenance



DANGER

There is high voltage in the live components of the product. Touching field components can result in death or seriousness electric shock injury.

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 accidentally.

After turning off the inverter, wait at least 15 minutes before any maintenance work to ensure that the capacitors are completely discharged.

Before touching 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 only after finishing 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°C (power de-rating for 45 °C 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 copper busbars, 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 are affected by adverse environmental conditions, it is recommended to shorten maintenance interval.

Sinexcel recommends a visual inspection in regular intervals periods to determine maintenance requirements.

Consumables and maintenance materials

Consumables, tools and maintenance equipment are usually not included in the standard equipment list.

Only Professionally qualified and competent persons should be involved in the maintenance. The maintenance personnel must have access to professional tools and equipment suitable for electrical work..

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 Common Settings

11.1 Language Selection

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"** > **"Language"** >**"English"** or **"简体中文"**.
4. Then a window will pop up to remind you that system will restart, click **"Yes"** or **"OK"**.

11.2 Date and Time Selecting

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"**>**"System real time"**>**"Yyyy-mm-dd-hh-mm-ss"**
4. Then click **"OK"** to save or click **"ESC"** to discard changes.

11.3 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"**.

11.4 AC settings

Procedure:

1. Select **"User"**> Input password> **"OK"**>**"Login"**. (Log into the PCS user interface)
2. Select **"Ctrl mode"**> **"Manual Operate"**.
3. Select **"Setting"**> **"Advanced"**>**"AC Info"**

"PF setting" : set to regulate the PF of the entire storage system

"Active power setting": Set to regulate the power of the storage system

"Reactive power setting": Set to regulate the reactive power of the storage system

"Grid recovery delay": please keep the default configuration.

"Power ramp rate": please keep the default configuration. This function will apply when set power changes. The default value is 2 rated power per second, which means within 0.5 seconds the system can runs to full output.

"Grid reconnection power ramp rate": please keep the default configuration. This function will apply when system suspend happens caused by utility grid voltage abnormal, and reconnect after utility grid restore normal. The default value is 2, twice of rated power per second, which means within 0.5 seconds the system restores to full output.

"Off-grid AC Volt regulation": to regulate the off-grid output voltage.

"Reactive power control mode": to set the operation mode, constant power or constant reactive power.

"Active power control mode": enable or disable active power regulation.

"Island detection enable": enable or disable anti-islanding function. For more information, please refer to UL1741 Supplement A or other similar rules about Utility Grid-Interactive Distribute Generators.

"Power change mode": to set the power change pattern, step-to-top, or ramp-rise.

"Off-grid Volt startup mode": Can be set as step-to-top, or ramp-rise.

11.4.1

The following settings are built into the EMS to comply with AS4777 and local grid codes. These settings are automatically programmed when the Country code is chosen. Setting from the Inverter LCD panel is disabled.

- FVRT: frequency/voltage ride-through
- Volt/Var
- Volt/Watt
- Freq/Watt

11.5 DC settings

Procedure:

1. Select **"User"**> Input password> **"OK"**>**"Login"**. (Log into the PCS user interface)
2. Select **"Ctrl mode"**> **"Manual Operate"**.
3. Select **"Setting"**> **"Advanced"**>**"DC Info"**

"Battery Under Voltage Threshold": Prioritize the setting according to the manufacturer's recommendation. Conduct setting according to the following data in case of manufacturer's data cannot be obtained:

Set 2V lead acid battery according to $1.67 \sim 1.80V \times \text{number of batteries in series}$;

Set 3.2V lithium batteries according to $2.70 \sim 2.75V \times \text{number of batteries in series}$.

"End-of-discharge voltage": Conduct setting according to EOD voltage when there are no special requirements.

"Battery Equal Charge Voltage": Prioritize the setting according to the manufacturer's recommendation. Conduct setting according to the following data when manufacturer's data cannot be obtained: Set 2V lead battery according to $2.20 \sim 2.27V \times \text{number of batteries in series}$; set 3.2V lithium batteries according to $3.60 \sim 3.70V \times \text{number of batteries in series}$.

"Battery Float Charge Voltage": Prioritize the setting according to the manufacturer's recommendation. Conduct setting according to the following data when manufacturer's data cannot be obtained: Set 2V lead batteries according to $2.20 \sim 2.27V \times \text{number of batteries in series}$; set 3.2V lithium batteries according to $3.60 \sim 3.70V \times \text{number of batteries in series}$. Keep consistent with the equalizing voltage of battery.

"Topping charge turn to float charge judgment current": Prioritize the setting according to the

manufacturer's recommendation. Set 2V lead batteries according to 0.02C~0.05C in case of manufacturer's data cannot be obtained. Other connection types can be set as 1A.

"End-of-charge current": keep the default value.

"Maximum charge current": Set 500K as 500A.

"Maximum discharge current": Set 500K as 500A.

"DC control mode": please set it as factory setting between "Const I and Const P".

"DC current setting": Set charging or discharging current within the rated power according to the actual demand. (Available only after "energy dispatching mode" in "system parameter" is set as "DC dispatching", and DC operation mode is set as "constant I mode".)

"DC power setting": Set charging and discharging power within the rated power range according to the actual demand. (It is valid only after "energy dispatching mode" in "system parameter" is set as "DC dispatching", and DC operation mode is set as "constant P mode".)

"Start of Discharge Threshold Voltage": Conduct setting according to EOD voltage when there are no special requirements.

"Maximum precharge current": Set 500K as 500A.

Conduct setting according to client's requirement. When the client does not require precharge function, set it as 10A.

"Precharge voltage": Conduct setting according to EOD voltage when there are no special requirements.

"Precharge turn to fast charge judgment voltage": Conduct setting according to EOD voltage when there are no special requirements.

"Precharge time": Conduct setting according to client's requirement. When the client does not require precharge function, set it as 1min.

11.5.1 Battery Temperature Compensation

Lead Acid batteries need temperature compensation to ensure that the charging conditions are met. A semiconductor type temperature sensor is supplied separately if the Inverter is required to be operated with Lead Acid Batteries. This sensor is plugged into the EMS front panel jack provided for this purpose.

The temperature sensor is connected to the negative terminal of the lower most battery.

Lithium batteries do not use this temperature sensor. The internal temperature of the battery modules is available from the BMS and is displayed in the EMS.

11.6 System Setting

Procedure:

1. Select **"User"**> Input password> **"OK"**>**"Login"**. (Log into the PCS user interface)
2. Select **"Ctrl mode"**> **"Manual Operate"**.
3. Select **"Settings"** > **"System"**

"Start up mode": default set **"Manual"**.

"Energy dispatching mode": please set it as **"AC dispatching"**. If **"DC dispatching"** is set according to the actual demand, set **"charging and discharging current"** and **"charging and discharging power"** in **"Settings"**>**"DC Info"** page 2.

"DC string setting pattern": reserved function for special models.

11.6.1 General Setting

Procedure:

1. Select **"User"**> Input password> **"OK"**>**"Login"**. (Log into the PCS user interface)
2. Select **"Ctrl mode"**> **"Manual Operate"**.
3. Select **"Settings"** > **"General"**

Power dispatch including the **"Active power setting"** **"Reactive power setting"**

DC Configuration including the

"DC lower voltage"

"End of Discharge Threshold Voltage"

"Topping charge voltage"

"Float charge voltage"

"Topping charge turn to float charge judgment current"

"End-of-charge current"

"Maximum charge current"

"Maximum discharge current"

11.6.2 Power Quality Mode Settings

The Power Quality Mode is set by the EMS (EX-SBC-01). The default values are automatically loaded when the Country Code is selected. The values can be adjusted only after an authorisation code is obtained by contacting Support.

11.6.3 Country Code Settings

The Country Code is set by the EMS. The procedure is described in EMS manual. The EMS manual is available for download from the Oztron website.

11.6.4 DRM Settings and DRED

The DRM settings can be enabled by the EMS. The Country Code is set by the EMS. The procedure is described in EMS manual. The EMS manual is available for download from the Oztron website.

12 Web Monitoring Portal

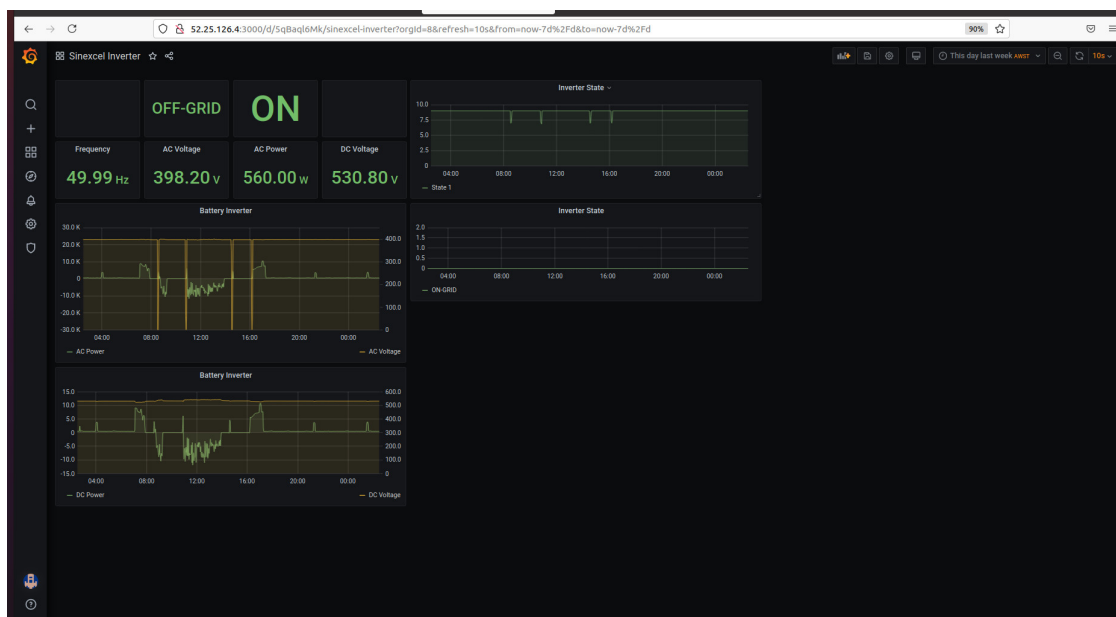
The Inverter can be remotely monitored by logging on to the Monitoring Portal. This is done by the EMS and is set up when the EMS is set up. The default log in is given below:

<http://52.25.126.4:3000/>

Username : sinexcel

password : Sinexcel1234

A sample output is shown below:



13 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

Local Representative:

Oztron Energy

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