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# User Manual

**SC50HV-20/SC60HV-20**  
**Power Conversion System**  
**(PCS)**









# About This Manual

## Applicability

This Installation Manual is valid for the following device types:

- SC50HV-20
- SC60HV-20

The SC50HV-20/SC60HV-20 device is referred to as “PCS” hereinafter unless otherwise specified.

## Target Group

This manual is intended for:

- Qualified personnel who are responsible for the installation and commissioning of the PCS
- PCS owners who will have the ability to interact with the PCS.

## How to Use the Manual

Read the manual and other related documents before any work on the PCS is carried out. Documents must be stored carefully and be available at all times.

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Content may be periodically updated or revised due to product development. The information in this manual is subject to change without notice. The latest manual can be acquired at [support.sungrowpower.com/](http://support.sungrowpower.com/).

## Symbols Explanation

Important instructions contained in this manual should be followed during installation, operation and maintenance of the PCS. And they will be highlighted by the following symbols.



## **DANGER**

**DANGER** indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

## **WARNING**

**WARNING** indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.

## **CAUTION**

**CAUTION** indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

## **NOTICE**

**NOTICE** indicates a situation which, if not avoided, could result in equipment or property damage.



**NOTE** indicates additional information, emphasized contents or tips to help you solve problems or save time.

## **Symbols on the PCS Body**

The symbols below are pasted on the PCS. Make sure to read the following symbols and fully understand them before installing the equipment.




**WARNING**


For continued protection against risk of fire, replace only with same type and ratings of fuse.

**DANGER**

Pour une protection continue contre les risques d'incendie.  
Remplacer seulement par les fusibles avec le même type et les mêmes caractéristiques.

**CAUTION**

- Risk of electric shock from energy stored in capacitor.
- Both AC and DC voltage sources are terminated inside this equipment.
- Each circuit must be disconnected individually and the service person must wait 5 minutes before servicing.
- Do not remove cover until 5 minutes after disconnecting all sources of supply.

**DANGER**

- Risque d'électrocution provoqué par les énergies conservées dans le condensateur.
- Les sources de tension CA et CC se terminent à l'intérieur du présent équipement.
- Chaque circuit doit être déconnecté individuellement. Et le technicien doit attendre 5 minutes avant de procéder à la maintenance.
- Ne retirer le couvercle que 5 minutes après le débranchement de toutes les sources électriques.



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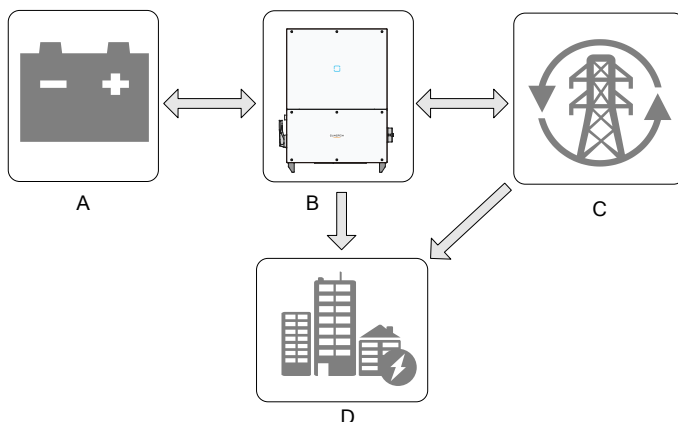


# 1 Safety Instructions

## 1.1 Intended Usage

SC50HV-20/SC60HV-20 is a three-phase grid-connected PCS applicable to energy storage systems.

The charging and discharging system with SC50HV-20/SC60HV-20 is shown below:



**Fig. 1-1** Energy storage system

No.	Name
A	Energy storage batteries (lead-acid battery, lithium battery and etc.)
B	PCS for energy storage system
C	Utility grid (Applicable grid: TN, TT, IT)
D	Loads



### **WARNING**

- **Installation described in this section must be strictly observed. Any other or additional installation other than the described installation is not permitted.**
- **Installation and connections other than the contents described in this section may lead to device damages and void warranty claims.**

## **1.2 Important Safety Instructions**

This section introduces the safety instructions during operation of the PCS. Read the safety instructions in this section before PCS operation. Please also respect all warnings, instructions, and cautions and respective chapter before operation.

### **DANGER**

#### **Shock Hazard!**

**Death resulting from burns and electric shock upon touching the PCS live components.**

- **Do not touch the live components of the PCS or the utility grid.**
- **Observe all safety regulations.**

### **DANGER**

#### **Shock hazards inside the PCS!**

- **Note and respect the warning labels in the product.**
- **Respect all safety instructions in this manual and other related document.**

### **DANGER**

#### **Electric shock or fire due to device damage or system fault!**

- **Visual check if there is device damage or other potential dangers before operation.**
- **Check if other external devices or circuit connections are safe.**
- **Operate the device only when it is safe to do so.**





## **WARNING**

**Follow the steps in this manual strictly to power the device after maintenance and troubleshooting.**

## **1.3 During Operation**

### **1.3.1 Manuals**

Very important information about the PCS operation is contained in this manual. All the descriptions in this manual, especially those safety-related items, must be complied with.

- Operate the PCS by strictly following the description in this manual. Device damage, personal injury or property loss may follow if otherwise.
- These manual and other related documents should be available for relevant persons at all times.

### **1.3.2 Personnel**

- Only professional electrician or personnel with professional training can operate the PCS;
- Operator should be familiar with the construction and working principle of the whole energy storage system;
- Operator should be familiar with the PCS Operation Manual and Installation Manual;
- Operator should be familiar with the country/local specific standards.

### **1.3.3 Markings on the PCS**

- PCS enclosure and interior contains important warning and safety information. Do not tear or damage it.
- Nameplates located in the side of the cabinet contain very important parameter information. Do not tear or damage them.

## **NOTICE**

- **All safety instructions, warning labels and nameplate on the PCS body must be clearly visible;**
- **Replace the markings once they damaged or unclear.**



### 1.3.4 Safety Warning Signs

Please respect the followings during installation, daily maintenance or troubleshooting of the PCS:

- An obvious marking should be placed in the PCS upstream and downstream to keep the switch from accidental reconnection;
- A temporary warning sign or barrier must be posted around the operation area;
- Remove the door keys and keep them appropriately after maintenance or troubleshooting work is finished.

### 1.3.5 Storage Battery Protection

High Voltages exist between positive and negative polarities of the storage batteries. Electrical shock or life risk may occur by accidental touch.

#### DANGER

**High voltages exist between the positive and negative polarity of the storage batteries!**

- **Ensure the PCS and storage batteries are completely disconnected during device maintenance.**
- **Place warning labels in the disconnection place to avoid accidental reconnection.**

### 1.3.6 Live Line Measurement

#### DANGER

**High voltages are present in the device. Death resulting from burning and electric shock upon touching the live components of the PCS. During live line measurement,**

- **use suitable protective equipment , for example dielectric gloves, and**
- **accompany by other persons.**

### 1.3.7 Measuring Instrument

Appropriate measurement instruments are recommended during the electrical connection, commissioning and operation of the PCS.



### WARNING

- Use high quality instruments that can meet the field requirements.
- Ensure the safety and correctness of instruments connection and use to avoid electric arc.

## 1.3.8 Parameter Setting

Some settable parameters in the software are closely related to the operation of the PCS. Reliably analyse and evaluate the operation status of the PCS before modifying or setting those parameters.

### WARNING

- Inappropriate parameter setting may impair the functionality of the PCS!
- Only qualified authorized personnel can set the parameters of the PCS.

## 1.3.9 ESD Protection

### NOTICE

PCS may be damaged irreversibly by electrostatic discharge (ESD) at its components.

- During the operation of the PCS, please observe all the ESD-related safety regulations, for example, wear antistatic wrist strap.
- Avoid unnecessary touch of the printed circuit board or other sensitive components!

## 1.3.10 Moisture Protection

### NOTICE

Moisture can damage the PCS. For normal operation of the PCS, please respect the followings:

- Do not open the PCS doors when relative humidity is higher than 95%.
- Do not maintain or service the PCS in rainy or other bad days.



### 1.3.11 Maintenance and Service

#### WARNING

**Wait at least 5 minutes after the PCS stops and then open the PCS front door to maintain or service.**

Before any service work, observe the followings.

- Ensure that the PCS will not be started accidentally.
- Verify that the PCS interior is discharged completely with a multimeter.
- Necessary ground and short circuit connect.
- Cover the adjacent electrical components with insulation cloth during operation.
- Ensure the clearness of the safety route during maintenance and service work.

### 1.3.12 Disposal of Waste

When the PCS is end of life, it cannot be disposed of together with household wastes. Please contact the local authorized collection point.

### 1.3.13 Others

#### WARNING

**Please observe country/local-specific standards and regulations.**

#### WARNING

- **Only service the device when it is voltage-free.**
- **Never work alone when servicing this device. Two persons are required until the PCS is properly shut down and de-energized.**

Other protection measures:

- Use suitable protective equipment (for example safety goggles, earplugs, dielectric gloves, insulating shoes) when maintaining or servicing the device.
- Emergency aid should be prepared beforehand since the PCS is always installed far away from the downtown area.
- Every possible auxiliary method should be taken to ensure the safety of personnel and device.





- All the pictures and descriptions in this manual apply to the standard configuration of the PCS. The actual product you receive may differ. Should you have any specific requirements, please inform us.
- This manual may not cover all possible situations. Should a specific problem occur that is not explained in this manual, please contact Sungrow.



## 2 Product Introduction

### 2.1 System Introduction

Electric power system consists of the following six parts: development, generation, transmission, distribution, consumption and storage. Among which, the energy storage system is important to realize the following functions: demand side energy management, substation grid support, load balance, renewable energy application etc.

SC-series PCS are dedicated to charging/discharging the storage battery and providing intermediate link between the grid and the storage battery in different occasions (grid-connected system, islanded system or hybrid system).

Smart grid system with PCS for energy storage system is shown in following figure.

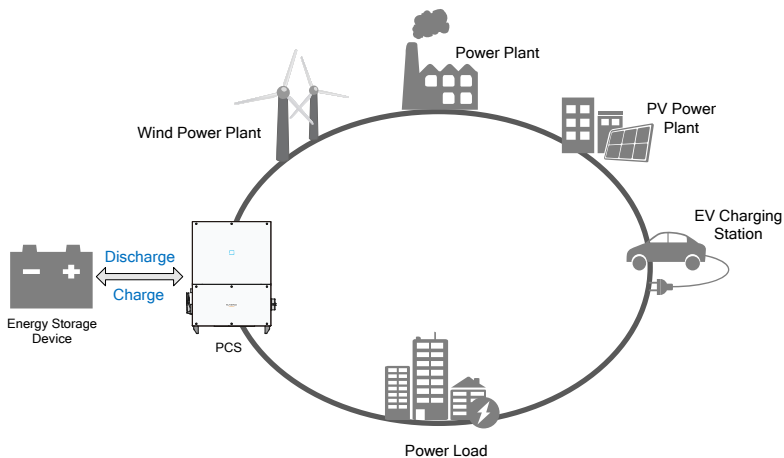


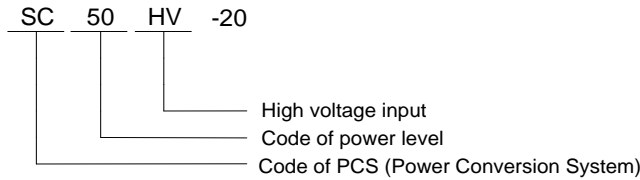
Fig. 2-1 Smart grid and energy storage system

### 2.2 Product Description

#### 2.2.1 Model Description

The model description is as follows (take SC50HV-20 as example):





Tab. 2-1 Power description

Model	AC output power	Nominal voltage	AC	Rated off-grid voltage
SC50HV-20	55 kVA @ 45 °C / 50 kVA @ 50 °C	3 / PE, 400 V		3/N/PE, 230V
SC60HV-20	66 kVA @ 45 °C / 60 kVA @ 50 °C	3 / PE, 480 V		3/N/PE, 277V

### 2.2.2 Product Appearance

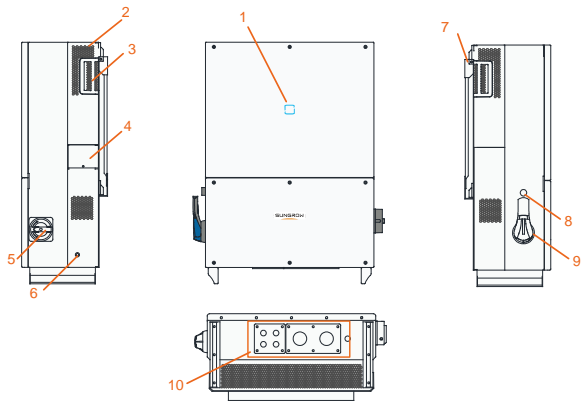


Fig. 2-2 Product Components Description

\*Image shown here is for reference only. Actual product you receive may differ.

Item	Name	Description
1	LED indicator panel	HMI interface to indicate the present working state of the PCS.
2	Air outlet	Controlled forced-air cooling method. Ensures proper ventilation.
3	Handles	Handles are designed for transporting, installing and disassembling the PCS



Item	Name	Description
4	Cover plate of the fan	The fan is located on the back of the cover plate and used for the forced cooling of the PCS
5	AC switch	To disconnect the PCS from the AC output safely
6	Second PE Terminals	Second protective earth terminals as specified in EN 50178.
7	Hanger	Hang the PCS on the bracket.
8	Emergency stop button	Stop the PCS in emergency by pressing this button down
9	BAT. Switch	To disconnect the PCS from the battery safely
10	Electrical connection area	Includes DC terminal, AC terminal and communication terminal.

### 2.2.3 Dimensions of PCS

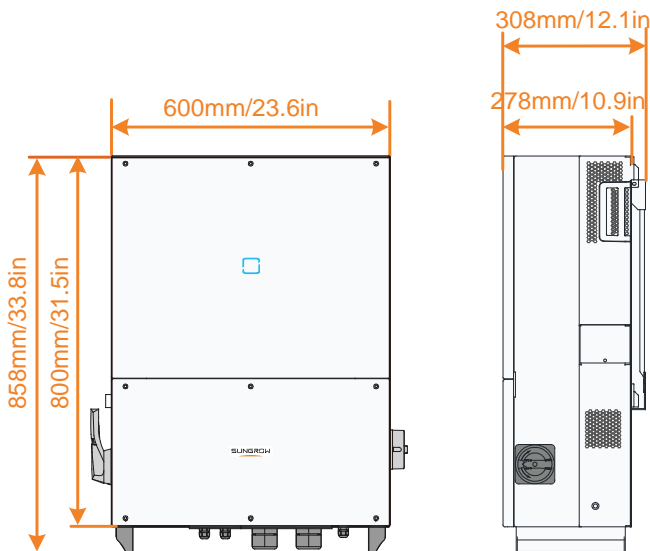







Fig. 2-3 Outline Dimensions of PCS

### 2.2.4 LED Indicator Panel

As an HMI, the LED indicator panel on the PCS front panel indicates the present working state of the PCS.



**Tab. 2-2** LED indicator description

LED indicator	LED state	Definition
	ON	The device is connected to the grid and operating normally.
	Fast blink (Period: 0.2s) 	The Bluetooth communication is connected and there is data communication. No system fault occurs.
	Slow flash (Period: 2s) 	The device is in standby or startup state (not feeding power into the grid).
	ON	A fault occurs and the device cannot connect to the grid.
	Twinkling	The Bluetooth communication is connected and there is data communication. System fault occurs.
	OFF	Both the AC and DC sides are powered down.

## 2.2.5 Battery Switch

Battery switch is designed for safely disconnecting the DC input current if required.

The PCS works automatically when input and output meet the requirements. Rotating battery switch to the “OFF” position will immediately cut off the flow of DC current.

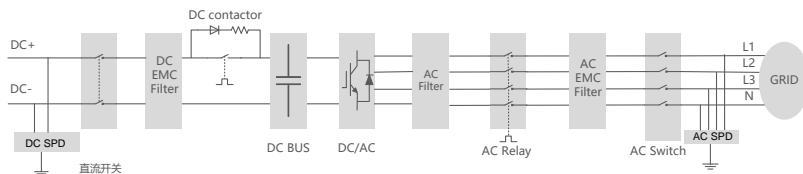
## 2.3 Technical Description

### 2.3.1 Principle Description

Inversion circuit converts DC power into AC power, which will be fed into the utility grid via four core terminals. Protective circuits are designed to guarantee PCS safe operation and human safety.

DC switch is integrated for safe disconnection of DC current. The PCS provides standard interface RS485 for communication. PCS are also provided running records display and parameters configuration via iSolarCloud App.





**Fig. 2-4 Main Circuit Diagram**

### 2.3.2 Functions Description

PCS functions can be grouped as the following:

- Conversion function
 

PCS converts the direct current power into alternating current power, which conforms to the grid requirement of its installation country.
- Data storage and display
 

PCS stores essential data including running information and fault records, and displays them on App.
- Parameters configuration
 

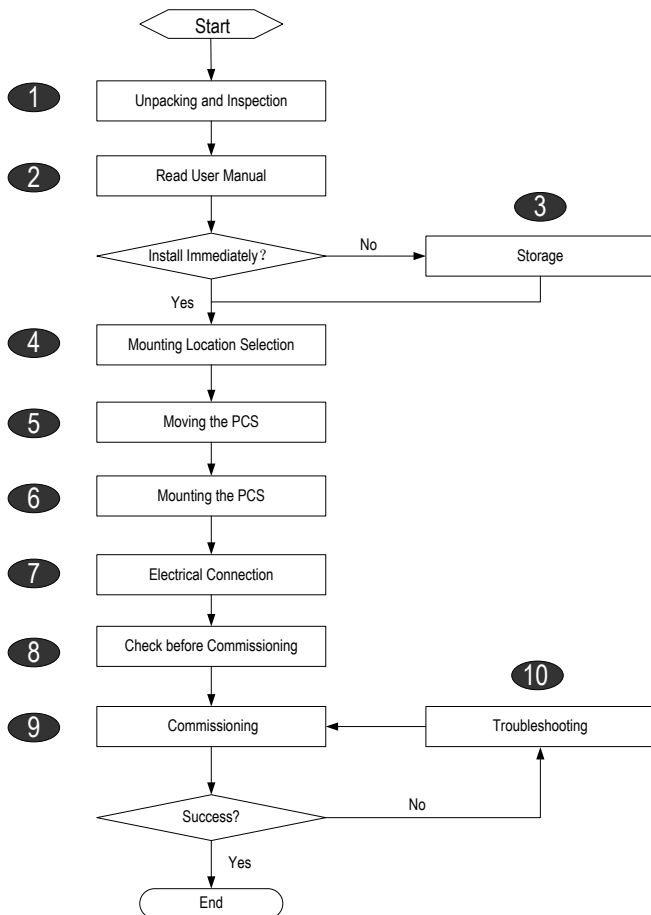
PCS provides various parameters configuration for optimal operation.
- Communication interface
 

Standard RS485 interface for connecting other monitoring devices into the Energy storage is included.
- Protection functions
  - Reverse polarity protection
  - Overvoltage protection
  - Grid monitoring / Ground fault monitoring
  - Insulation monitoring
  - Overheat protection



### 3 Installation Flow

Fig. 3-1 shows the installation flow of PCS. Please follow these procedures when installing the PCS.



**Fig. 3-1** Installation Flow Chart



**Tab. 3-1** Description of Installation Flow

Order	Description	Reference Chapter
1	Unpacking and inspection	Section 4.1
2	Read this manual, especially the section on "safety instruction"	Chapter 1
3	Store the PCS unit if not install immediately	Section 4.3
4	Choose the best installation site	Section 5.1
5	Moving the PCS to installation site	Section 5.2
6	Install the PCS against the chosen wall	Section 5.4/5.5
7	Electrical connections include DC, AC, ground and communication(optional)connection	Section 6.3~6.6
8	Examine before commissioning	Section 7.1
9	Startup PCS and configure corresponding parameters	Section 7.2
10	Troubleshooting	Section 9.1



## 4 Unpacking and Storage

### 4.1 Unpacking and Inspection

The unit is thoroughly tested and strictly inspected before delivery. Damage may still occur during shipping.

- Check the packing for any visible damage upon receiving.
- Check the inner contents for damage after unpacking.
- Check the completeness of delivery contents according to the inner packing list.

If there is visible damage to the packaging or the inner contents, or if there is something missing, contact the unit dealer.

Do not dispose of the original packaging. It will be the best choice to store the PCS by re-using the original packaging.

### 4.2 Identifying PCS

A nameplate is attached to one side of the PCS. It provides information on type of PCS, along with the most important specifications, marks of certification institutions, website and serial number which is available and identified by Sungrow. (Take SC50HV as an example)



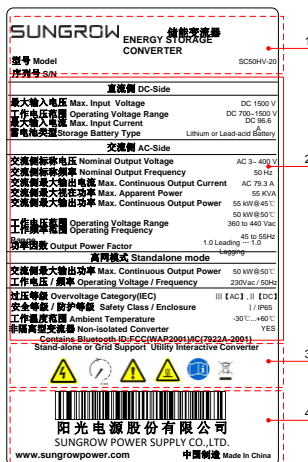


Fig. 4-1 Nameplate of PCS

\*Image shown here is for reference only. Actual product you receive may differ.

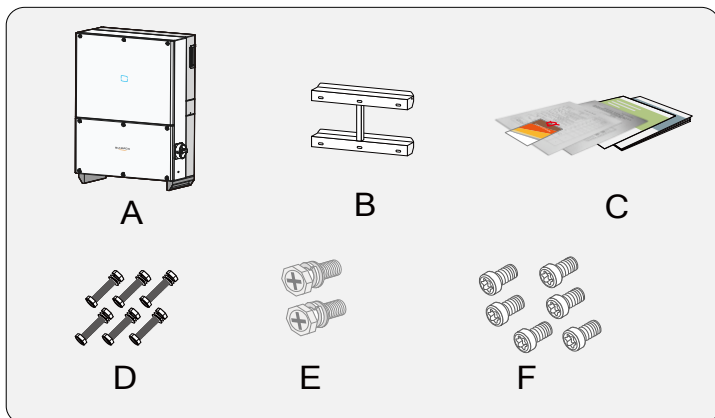
Item	Description
1	SUNGROW logo and product type
2	Technical data of PCS
3	Warning signs of PCS.
4	Company name, website and origin

Tab. 4-1 Description of Icons on the Nameplate

Icon	Description
	This symbol indicates that you should wait at least 5 minutes after disconnecting the PCS from the utility grid and from the DC input before touching any inner live parts.
	The installation and service of the PCS unit can only be performed by qualified personnel.
	Hot surface! In order to reduce the risk of burns, do not touch the hot surface when the device is running.
	Refer to the corresponding instructions.
	Don't dispose of the PCS with the household waste.



### 4.3 Delivery Contents



**Fig. 4-2** Delivery Contents

\*Images shown here is for reference only! Actual product you receive may differ.

Item	Name	Description
A	PCS unit	---
B	Backplate	It is used for mounting PCS onto the wall.
C	Documents	Documents include quality certificate, packing list, product test report, and quick user manual.
D	Fastener set	Six units. It is used for fastening backplate onto metal frame.
E	Fix screws	2, M4×16 screws for fix the PCS to the backplate.
F	Spare screw	6, M6×12 screws for lower connection cabinet

### 4.4 Storage of PCS

Store the PCS properly when the PCS is not to be installed immediately. Sungrow shall hold no liability for the corrosion of the device or the failure of device internal components caused by storage of the device not following the requirements specified in this manual. PCS must be packed into its original carton with the desiccant bags inside.

- PCS must be packed into its original carton with the desiccant bags inside.
- Seal the packing carton with adhesive tape.



- Store the PCS in a dry and clean place to protect it against dust and moisture.
- Relative temperature:  $-40^{\circ}\text{C}\sim 70^{\circ}\text{C}$ ; Relative humidity: 0~95%.
- If one PCS is stacked on top of the other PCS, the max. stack layer should be two.
- Keep distance from the chemical corrosive materials to avoid possible corrosion.
- Periodically (recommended: six months) check for any visible damages during the storage period. Replace the packing in time if necessary.
- The packing should be upright.
- If the PCS is stored for half a year or longer time, local installer or service dept. of Sungrow should perform a comprehensive test before connecting the PCS into energy storage system.



# 5 Installation

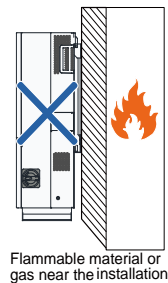
## 5.1 Installation Site Selection

Select an optimal installation site for safe operation, long service life and outstanding performance.

- Take the load capacity of the wall into account. The wall (concrete wall or metal frame) should be strong enough for the weight of the PCS over a long period.
- Install the PCS in a convenient location for electrical connection, operation and maintenance.
- Do not install the PCS on the wall made up of flammable materials.

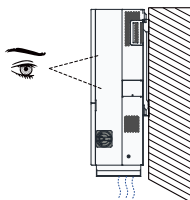


- Do not install the PCS near flammable materials or gas.



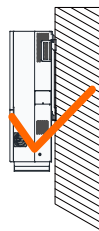


- Place the PCS at eye level for easy viewing and operation.

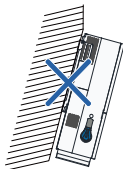


Ground

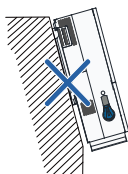
- Install vertically for sufficient heat dissipation.



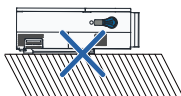
Forward tilt



Backward tilt



Horizontally



Upside down



- With an IP65 protection rating, the PCS can be installed both outdoors and indoors.
- To achieve better running effect. The ambient temperature should be within  $-30^{\circ}\text{C}$ ~ $60^{\circ}\text{C}$  ( $-22^{\circ}\text{F}$  ~  $140^{\circ}\text{F}$ ). The PCS will operate with power derating if the temperature is too high.
- The relative humidity range of the installation site is 0~100%.



Max. ambient temperature:  
 $60^{\circ}\text{C}$  ( $+140^{\circ}\text{F}$ )



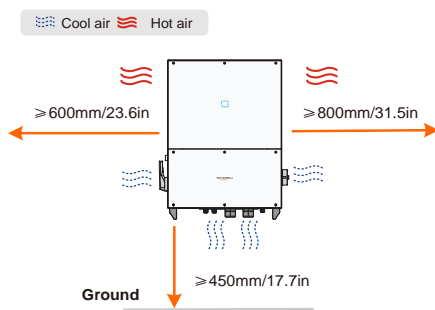
Min. ambient temperature:  
 $-30^{\circ}\text{C}$  ( $-22^{\circ}\text{F}$ )



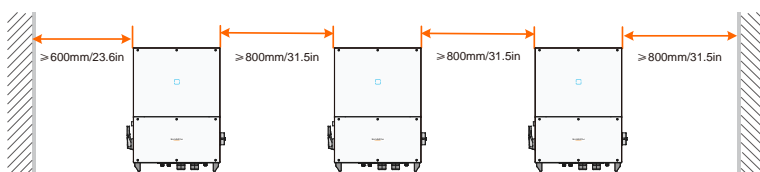
Relative humidity:  
0~100%



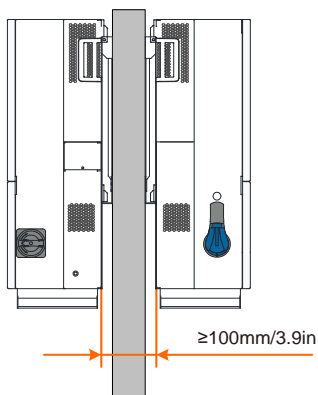
- Ensure there is enough space for convection (The fans are maintained on the left side of the PCS, and a larger clearance is required.)



- When installing multiple PCS, it is recommended to install multiple devices side by side.

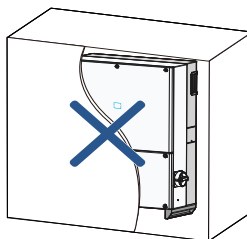


- When the devices are installed back to back, make sure the clearance in between is greater than or equal to 100mm.





- Do not install the PCS in a confined space.  
The PCS will not work normally if otherwise.
- Install the PCS where children cannot reach.
- Do not install the PCS near residential areas.  
Noise can be produced during PCS operation which may affect the daily life.





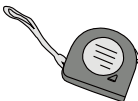
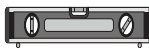
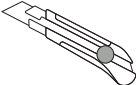
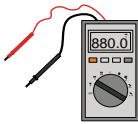


## 5.2 Moving PCS to Installation Site

To install the PCS, remove the PCS from the packaging and move it to the installation site. Follow the instructions below as you move the PCS:







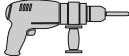


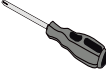


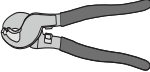
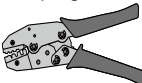
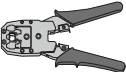
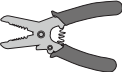
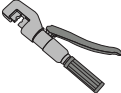
- Always be aware of the weight of the PCS.
- Lift the PCS by grasping the handles on both sides of the PCS.
- A minimum of two people or proper moving devices should be used to move the PCS.
- Do not release the equipment unless it has been secured firmly.

## 5.3 Installation Tools

Gather the following tools before installation:

Type	Tool			
General tools	Packaging tape 	Marker 	Measuring tape 	Level 
	Utility knife 	Multimeter Measurement 	Protective clothing 	Wrist strap 



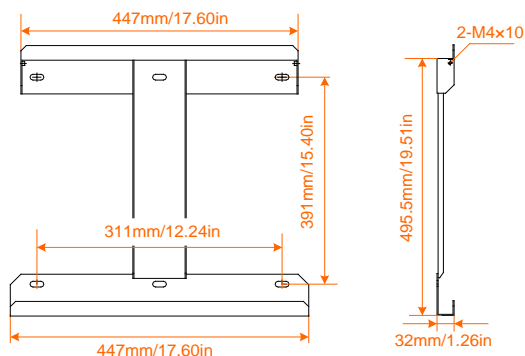
Type	Tool			
	Protective gloves 	Dust mask 	Earplugs 	Goggles 
	Insulated shoes 	Vacuum cleaner 	-	-
Install ation tool	Hammer drill 	Rubber mallet 	Slotted screwdriver 	Phillips screwdriver 
	Wrench Opening:16m m 	Socket wrench 	Wire cutter 	
	crimping tool 	RJ45 crimping tool 	Wire stripper 	Hydraulic pliers 

- Other auxiliary tools or spare parts

## 5.4 Installing the PCS

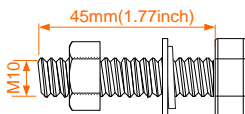
PCS is installed to the wall by the bracket enclosed in the packing. If you do not use the supplied bracket, you can drill holes as per specifications below:





**Fig. 5-1** Dimensions of the bracket (figures in inch)

The stainless fasteners are supplied for attaching the bracket to metal frame.



**Fig. 5-2** Dimensions of fastener for metal frame (figures in mm)



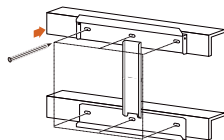
To install the PCS to concrete walls, the user needs to purchase expansion bolts with proper size (recommended: M10\*65) to attach the bracket to concrete walls.

### 5.4.1 Installing to Metal Frame

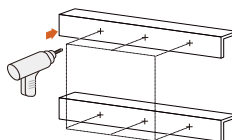
- Step 1** Remove the bracket and fasteners from the packaging.
- Step 2** Place the bracket to the chosen metal frame and adjust it to proper position and height.
- Step 3** Mark the position for holes, drilling according to the hole positions of the bracket.
- Step 4** Drill holes according to the marks made before. If the shape of the metal frame does not match the bracket, re-drill holes on the bracket according to the metal frame.



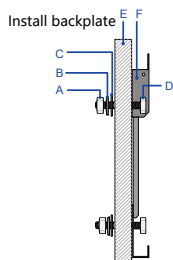
Mark positions



Drill holes



**Step 5** Secure the bracket to the metal frame firmly with the supplied fastener. The torque of the fastener nut is 35 N·m.

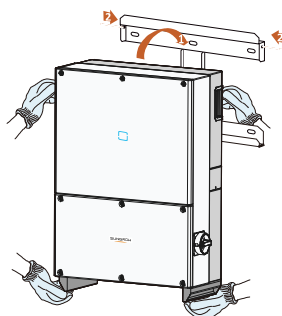


No.	Name	Description
A	Hexagon nut	M10
B	Spring washer	-
C	Flat washer	-
D	Screw bolt	M10*45
E	Metal frame	-
F	Bracket	-

**Step 6** Lift the PCS above the bracket and then slide down to make sure they match perfectly.

**Step 7** After putting the PCS on the bracket, secure the PCS to the bracket with two M4×16 screws (tighten the screw with its own nut).

Mount the PCS



## 5.4.2 Installing the PCS to the wall

**Step 1** Remove backplate and fasteners from the packaging.

**Step 2** Place the backplate onto the chosen concrete wall and adjust it until it is in a horizontal position.

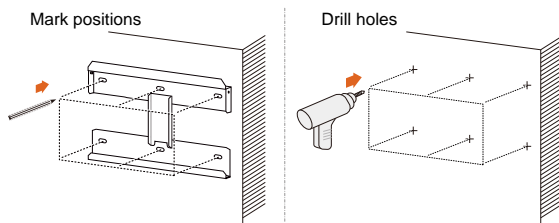
**Step 3** Mark the positions to drill holes using the backplate as the template.



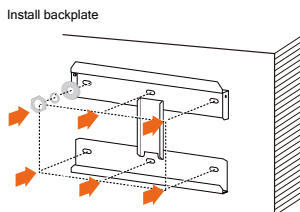
**Step 4** Drill holes according to the marks made before.

**⚠ DANGER**

**In order to avoid electrical shock or other injury, inspect existing electronic or plumbing installations before drilling holes.**



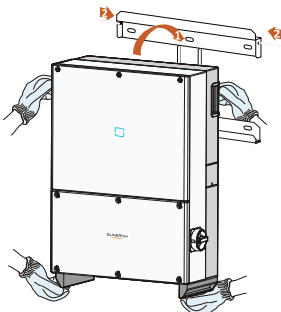
**Step 5** Attach the backplate to the wall firmly with the supplied expansion bolt set. The torque for fastening the nut is 35 Nm.



**Step 6** Lift up PCS above the backplate and then slide down to make sure that the recesses on the back of the PCS fit perfectly together with the backplate.

**Step 7** After you fit the PCS to the bracket, fasten the PCS to the bracket with two M4x10 screws.

Mount the PCS





## 6 Electrical Connection

Once the PCS is secured to the installation site, it can be connected to the energy storage system.

All electrical connections must comply with local regulations and related electrical rules.

### WARNING

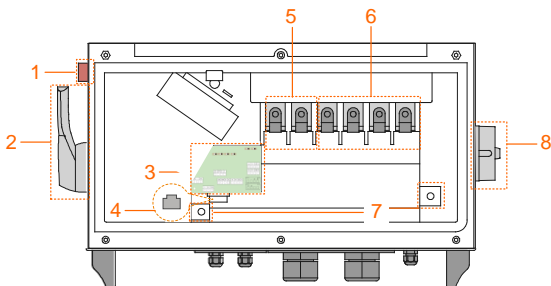
**Improper cable connection may lead to a fatal injury or permanent damage to the device.**

**Cable connections should only be done by qualified professional personnel.**

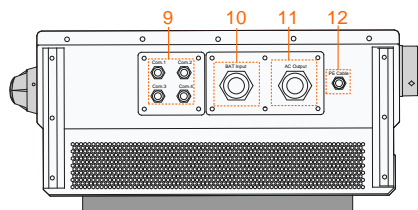
**Always keep in mind that the PCS is AC and DC redundancy power supplied. Electrical operators must wear proper personal protective equipment: helmet, insulated footwear and glove, etc.**

### 6.1 Terminals Description

All electrical terminals and cable openings of the PCS are located at the connection cabinet as following figure.







**Fig. 6-1** Connection Cabinet Description

\*Image shown here is for reference only. Actual product you receive may differ.

No.	Name	Description
1	Start / Stop button	Start / Stop the PCS.
2	Battery switch	Protective components to safely disconnect DC side current.
3	Configuration circuit board	Communication cable connection and configuration
4	Network Port	Used for EMS communication
5	Battery crimping terminal	Battery input cable access
6	AC crimping terminal	AC output cable access
7	PE terminals	PE cable access
8	AC switch	Protective components to safely disconnect from AC side.
9	Communication cable glands	For Communication cable connection
10	Battery cable gland	For battery cables connection
11	AC cable gland	For AC cables connection
12	PE cable gland	For PE cable connection

## 6.2 DC fuse and AC circuit breaker requirements

At altitudes <4000m, the specifications for DC fuses and AC circuit breakers are as follows:

Item	Rated voltage	Rated current
DC fuses	$\geq 1500\text{Vdc}$	$\geq 150\text{A}$
AC circuit breakers (SC50HV-20)	$\geq 400\text{Vac}$	$\geq 100\text{A}$
AC circuit breakers (SC60HV-20)	$\geq 480\text{Vac}$	

If the altitude exceeds 4000 meters, the actual withstand current and voltage of the DC fuse and AC circuit breaker need to meet other parameters besides the rated current and voltage.

The selection of other parameters needs to be determined according to the

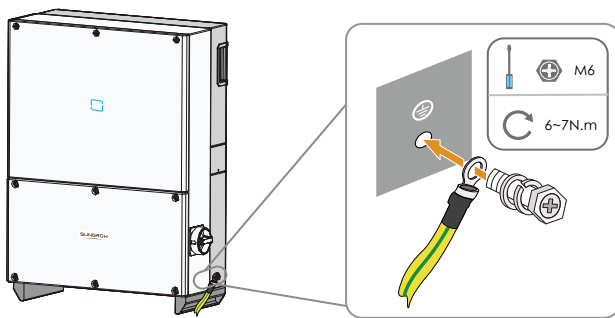


actual application.

## 6.3 Grounding the PCS

A second protective earth (PE) terminal is equipped at the side of the PCS. Be sure to connect this PE terminal to the PE bar for reliable grounding and ensure that the grounding resistance should be less than 10 Ohm.

### Second PE Connection



### WARNING

In European and Asia-Pacific regions, this secondary protective grounding connection cannot replace the connection of the terminals in the AC wiring. Both shall be reliably grounded. Otherwise, Sungrow will not take any responsibility for the possible consequences.

### NOTICE

In other regions (such as North America), the secondary protective grounding can be implemented in accordance with the relevant standards of the country/region.



## 6.4 AC Connection

### 6.4.1 Requirements for multi-PCS parallel connection

#### Off-grid scene

If multiple PCSs are connected in parallel to the load, ensure that the total number of parallel PCSs does not exceed 6. Otherwise, please contact SUNGROW for technical scheme.

#### Grid-connected scene

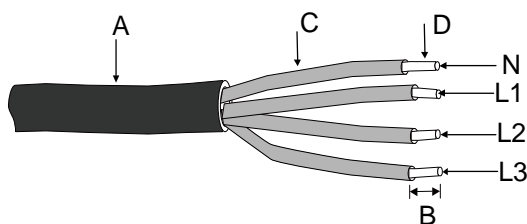
If multiple PCSs are connected in parallel to the grid, ensure that the total number of parallel PCSs does not exceed 25. Otherwise, please contact SUNGROW for technical scheme.

#### NOTICE

The above requirements apply only to the case where other devices (such as photovoltaic converters) are not connected in parallel. If other devices are connected in parallel, they need to be re-evaluated based on system capacity.

### 6.4.2 AC Cable Requirements

The cross-section of the AC cable conductor must be sized in order to prevent accidental disconnections of the PCS from the grid due to high impedance of the cable that connects the PCS to the power supply point.

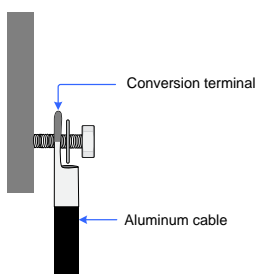


No.	Description	Remark
A	Protective layer /Conduit	Outer diameter: 25mm~32mm / 0.98in~1.26in
B	Length of insulation to be stripped off	Refer to Fig. 6-2Crimping the lugs
C	Insulation layer	-



No.	Description	Remark
D	Cross section of AC cables	Range: 35mm <sup>2</sup> ~70 mm <sup>2</sup> / 4AWG~4/0AWG

- If the aluminum cable is selected, in order to ensure a reliable electrical connection, use the the copper and aluminum conversion terminal to avoid direct contact between the AC copper bar and the aluminum cable.



#### NOTICE

**Directly connecting the aluminum cable to the copper bar will cause abnormal operation or even device damage.**

### 6.4.3 Connection Procedure

#### DANGER

**High voltage inside the PCS!**

**Ensure all cables are voltage-free before electrical connection.**

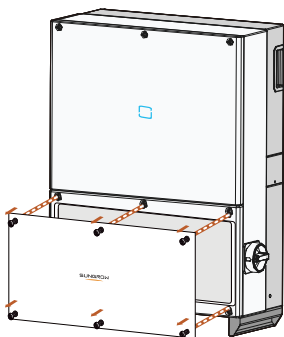
**Do not connect the AC circuit breaker until all PCS electrical connections are completed.**

Install an AC circuit breaker (recommended specification 125A/690V) between the PCS and the AC side.

**Step 1** Disconnect AC circuit breaker to prevent it from inadvertently reconnecting.

**Step 2** Loosen the six hexagon socket crews (M6×16) on the lower connection cabinet.



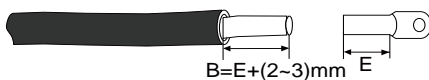


**Step 3** Strip off AC cables as shown below.



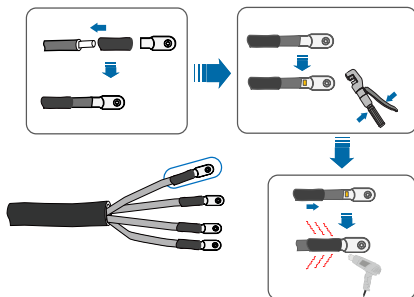
For flexible cables (stranded wires), use crimping lugs.

**Step 4** Strip the protection layer and insulation layer by specific length, as described in the figure below.



**Fig. 6-2** Crimping the lugs

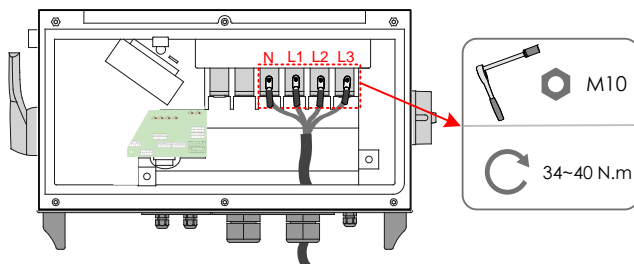
**Step 5** Crimp the cord end terminals.



**Step 6** Loosen the swivel nut of the gland terminal (Marked as "AC Output") and select an appropriate seal according to cable outer diameter. Lead the cable through the swivel nut and seal successively.

**Step 7** Connect the AC cable to the corresponding terminals.





\* Pictures here are indicatively only. Product in kind prevail.

#### NOTICE

- Please avoid squeezing the cable insulation layer into the AC terminal. Improper connection may affect the normal operation of the PCS.
- During AC cable connection, the cables inside the lower part of the device should be bent to be surplus in length. In this way, cable dropping or loosening, which can cause arc or other problems impairing functionality of the device, due to self-weight of the cables in case of land subsidence is avoided.

**Step 8** Screw cap-nut tightly onto the cable.

**Step 9** Seal the gaps between the AC cable and the gland inside the lower part of the cabinet with duct seal.

#### NOTICE

Seal the gap between the cable and the gland/conduit with duct seal or other suitable materials to prevent the entry of foreign bodies or moisture and ensure long-term and normal operation of the PCS.

## 6.5 Internal PE Cable Connection

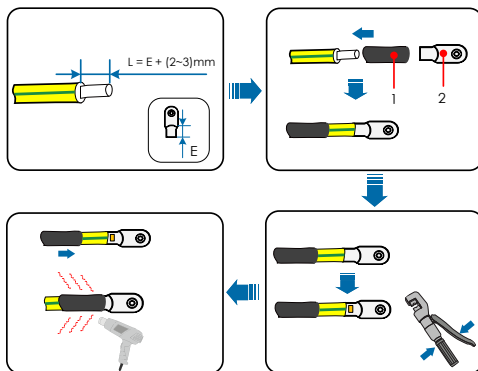
### 6.5.1 Internal PE Cable Requirements

Outer diameter	Cross section
5mm~10mm / 0.20in~0.40in	6 mm <sup>2</sup> ~16 mm <sup>2</sup> / 10AWG~6AWG
Recommended cable specifications in Australia	
Outer diameter	Cross section
6mm~18mm / 0.30in~0.70in*	6 mm <sup>2</sup> ~16 mm <sup>2</sup> / 10AWG~6AWG



## 6.5.2 Connection Procedure

**Step 1** Prepare the cable and crimp cord end terminal.

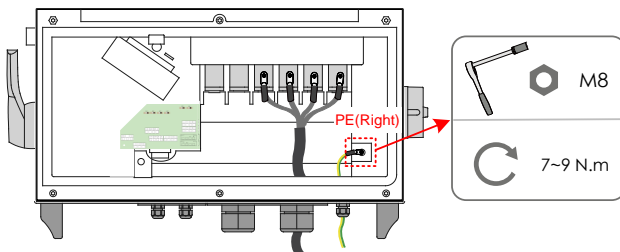


1: Heat shrink tubing

2: Cord end terminal

**Step 2** Loosen the swivel nut of the gland terminal (Marked as “PE cable”) and select an appropriate seal according to cable outer diameter. Lead the cable through the swivel nut and seal successively.

**Step 3** Connect the PE cable to the corresponding terminal. (The cabinet includes two PE terminals inside. Wire either or both of them in an appropriate manner according to local regulations.)



## 6.6 Battery Connection

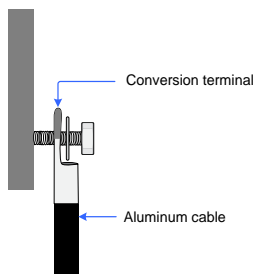
### 6.6.1 DC Cable Requirements

Select DC cables according to the following factors:

- The voltage rating of the cable should no less than 1500V.
- The Conductor type can be copper wire or aluminum wire.



\*If the aluminum cable is selected, in order to ensure a reliable electrical connection, use the copper and aluminum conversion terminal to avoid direct contact between the DC copper bar and the aluminum cable.



### NOTICE

**The device may be damaged or operate abnormally if the aluminum cable is directly connected to the copper bar.**

- The DC cable must be selected in accordance with the local installation requirements.
- The specification range of DC cables is:

Outer diameter	Cross section
13mm~19mm / 0.51in~0.75in	35mm <sup>2</sup> ~95 mm <sup>2</sup> / 4AWG~4/0AWG

### NOTICE

**No DC parallel connection**

## 6.6.2 Connection Procedure

### DANGER

**High voltage inside the PCS!**

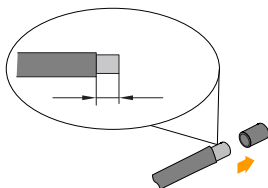
**Make sure all DC and AC cables connected to the PCS are voltage-free before electrical connection.**

**Do not connect the AC circuit breaker before electrical connection is completed.**

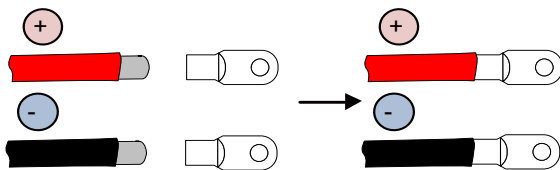


**Step 1** Rotate the BAT switch to the “OFF” position.

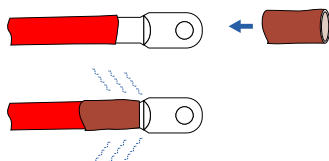
**Step 2** Strip the insulation layer of the DC cable to proper length according to the DC cable specification.



**Step 3** Insert the end of the DC cable to the cable socket that matches with the M10 bolt and tighten it with the proper tool.

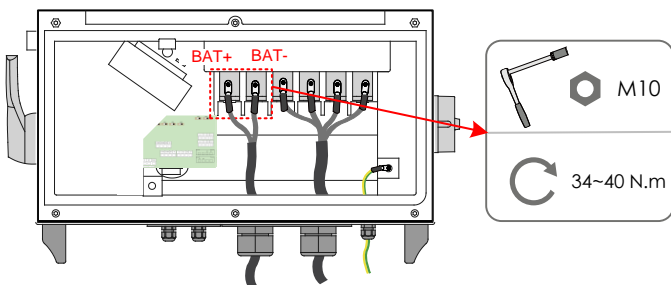


**Step 4** Install the heat-shrinkable tubing, shrink the tubing with hot air blower.



**Step 5** Loosen the swivel nut of the gland terminal (Marked as “BAT. Input”) and select an appropriate seal according to cable outer diameter. Lead the cable through the swivel nut and seal successively.

**Step 6** Connect the positive and negative polarity of the DC cable to the corresponding positive and negative cable connection terminals.



**⚠ WARNING**



- When accessing the positive and negative cable, it is necessary to ensure the insulation requirements between the positive access and the negative access. Once positive and negative inputs are short-circuited, it can cause unrecoverable damage to the PCS. Sungrow shall hold no liability for any possible consequences caused by ignorance of this warning.

**Step 7** Pull the cable gently to make sure it is secured.

**Step 8** Seal the gaps between the DC cable and the gland inside the lower part of the cabinet with duct seal.

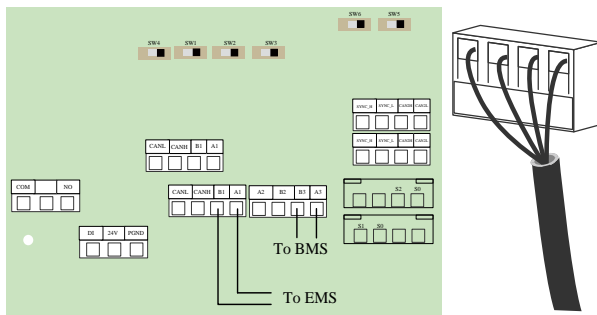
## NOTICE

Seal the gap between the cable and the gland/conduit with duct seal or other suitable materials to prevent the entry of foreign bodies or moisture and ensure long-term and normal operation of the PCS.

## 6.7 Communication Connection

**Step 1** Thread the Network cable through communication cable gland to the configuration circuit board.

**Step 2** Strip off the insulation layer of the communication cable. Connect the communication cable to corresponding terminals according to the marks on the configuration circuit board.



**Step 3** Lightly pull on cables to confirm whether they are fastened firmly.

**Step 4** Tighten the thread-lock sealing lock. Block off the vacant terminals to protect from dust and moisture penetrating inside the PCS.

**Step 5** Seal the gaps between the cable and the gland inside the lower part of the cabinet with duct seal. If there is no other connection procedure, reassemble and connect the front cover of the connection cabinet.



**NOTICE**

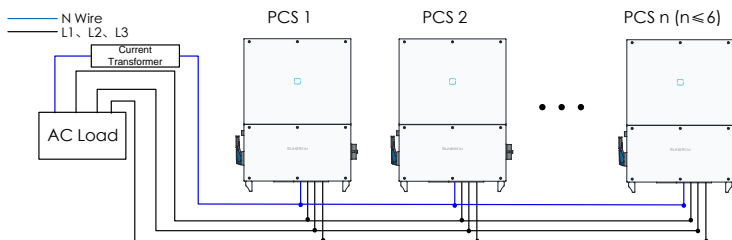
**Seal the gap between the cable and the gland with duct seal or other suitable materials to prevent the entry of foreign bodies or moisture and ensure long-term and normal operation of the PCS.**

**Step 6** Connect the communication devices. Refer to other manuals and documents if there are other devices.

**Step 7** Confirm the communication connection and set the communication parameters through App.

## 6.8 AC Parallel Connection

The PCS supports AC parallel connection, and the maximum number of parallel units is 6. The connection diagram is shown in the figure below.

**NOTICE**

**The instrument transformer is connected on the N wire between the load and the combiner box of the AC parallel connection system, and it is connected from the AC parallel connection system to the load, that is, from the P2 side to the P1 side. Two wires, S1 and S2, are led from the transformer.**

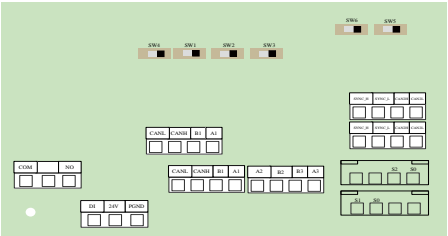
Single PCS:

Turn the switch SW5 to the "ON" position.

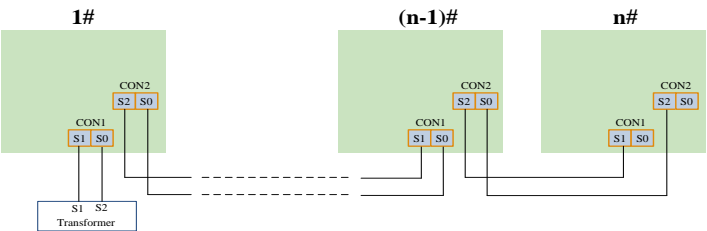
Multiple PCSs:

1. When  $1 < n \leq 4$ , turn SW5 of PCS1 and PCSn to the "ON" position, and SW5 of other PCSs to the "OFF" position.
2. When  $n > 4$ , turn SW5 of PCS1, PCS(n-1) and PCSn to the "ON" position, and SW5 of other PCSs to the "OFF" position.





The terminal CON1 of PCS1 is connected to the secondary side of the transformer, and the PCSs are connected side by side (pay attention to the wiring of PCSn). The specific wiring diagram is as follows:





## 7 Commissioning

Commissioning is a critical procedure for an energy storage system, which can protect the system from fires, and personnel from injury and electrical shock.

### 7.1 Inspection before Commissioning

Before starting the PCS, you should check the following items.

1. The PCS should be accessible for operation, maintenance and service.
2. Check again to confirm that the PCS is firmly installed.
3. Proper ventilation.
4. The PCS is clean and free of debris.
5. The PCS and accessories are correctly connected.
6. Cables are routed safely place and protected against mechanical damage.
7. The specification of the AC circuit breaker is appropriate for its intended use.
8. The terminals not used underneath the PCS should be sealed.
9. Warning signs & labels are suitably affixed and durable.

### 7.2 Commissioning Procedure

If all of the items mentioned above meet the requirements, proceed as follows to start up the PCS for the first time.

**Step 1** Make sure all the above-mentioned items meet the requirements.

**Step 2** Close the external AC circuit breaker.

**Step 3** Rotate the BAT. switch to the “ON” position.

**Step 4** Use iSolarcloud App to restore the factory settings to the machine.

**Step 5** If the PCS needs to communicate with the BMS, use the App to configure the BMS data source to be a battery. Otherwise, configure the BMS data source to be EMS. See 10.9 Configuring BMS Data Sources for detailed steps.

**Step 6** Use the iSolarcloud App to establish the communication connection with the PCS through Bluetooth to set the initial parameters. When the device



is initialized, send start instructions via the App For details, please refer to “10.4.2 Login Steps”.

**Step 7** The PCS feeds AC power to the grid and enters into the running state.

**Step 8** Observe the status of LED indicator panel. (See Tab. 2-2LED indicator description for details.)



## 8 Disconnecting, Dismantling and Disposing the PCS

### 8.1 Disconnecting the PCS

For maintenance work or any service work, PCS must be switched off. In normal operation, switching off is not necessary.

In order to disconnect the PCS from the AC and DC power sources, you should proceed as follows. Otherwise you will be exposed to lethal voltages or the PCS will be damaged.

**Step 1** Disconnect the external AC circuit breaker and prevent it from reconnecting.

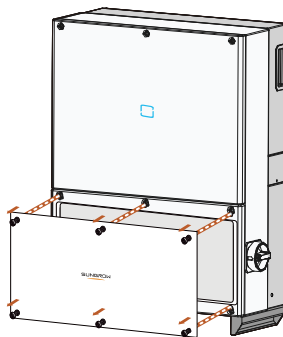
**Step 2** Turn off the upstream DC circuit break. Rotate BAT switch at the side of PCS to the "OFF" position.

#### NOTICE

**Please strictly follow the sequence of the above procedures. PCS will not work normally if otherwise.**

**Step 3** Wait about 10 minutes until the capacitors inside the PCS have discharged.

**Step 4** Loose the six screws on the lower connection cabinet and then remove the lid.



**Step 5** Measure AC voltage to ground at the AC terminal to confirm AC output of PCS at the AC circuit breaker is voltage free.



**Step 6** Loose screws to remove AC cables.

**Step 7** Disconnect DC cables from the PCS.

## 8.2 Dismantling the PCS

Refer to Chapter 5 and Chapter 6 to dismantle the PCS in reverse steps.

### NOTICE

**If the PCS will be reinstalled in the future, please refer to 4.4 Storage of PCS for a proper conservation.**

## 8.3 Disposing the PCS

Users should take the responsibility for the disposal of the PCS.

### NOTICE

**Some parts and devices in the PCS, such as the LCD display, batteries, capacitors, may cause environment pollution. Users must comply with the related local regulations to avoid pollution.**



# 9 Troubleshooting and Maintenance

## 9.1 Troubleshooting

Once a fault occurs in the PCS, the fault information can be displayed on the App.

Fault codes and check methods are as follows:

### For PCS Side

Specification	Troubleshooting
DC under voltage	<ol style="list-style-type: none"><li>1. Check whether the external grid is abnormal during on-grid operation</li><li>2. Check whether the load is excessively heavy during off-grid operation</li><li>3. Check whether the battery runs normally</li><li>4. If the fault still exists, please contact Sungrow Service.</li></ol>
DC over voltage	<ol style="list-style-type: none"><li>1. Check whether the external grid is abnormal during on-grid operation</li><li>2. Whether the battery is connected normally</li><li>3. Contact the service department</li></ol>
AC under voltage	<ol style="list-style-type: none"><li>1. Check whether the grid is abnormal</li><li>2. If the fault still exists, please contact Sungrow Service.</li></ol>
AC over voltage	<ol style="list-style-type: none"><li>1. Check whether the grid is abnormal</li><li>2. If the fault still exists, please contact Sungrow Service.</li></ol>
AC over frequency	<ol style="list-style-type: none"><li>1. Check whether the grid is abnormal</li><li>2. If the fault still exists, please contact Sungrow Service.</li></ol>
AC under frequency	<ol style="list-style-type: none"><li>1. Check whether the grid is abnormal</li><li>2. If the fault still exists, please contact Sungrow Service.</li></ol>
AC contactor fault	<ol style="list-style-type: none"><li>1. Check whether the AC relay is abnormal</li><li>2. If the fault still exists, please contact Sungrow Service.</li></ol>
Islanding protection	<ol style="list-style-type: none"><li>1. Whether tripping occurs in the grid during on-grid operation. If yes, it is normal</li><li>2. If the fault still exists, please contact Sungrow</li></ol>



Specification		Troubleshooting
Module temperature	over	Service. 1. Check whether the ambient temperature is normal 2. Check whether air ducts of the device have been blocked 3. Check whether the fans run normally 4. If the fault still exists, please contact Sungrow Service.
		1. The fault can be caused by poor sunlight or damp environment, and the PCS will be reconnected to the grid after the environment is improved. 2. Check if the battery pack is in poor contact. 3. Check the protection value setting in the App. 4. If the fault is not caused by the foregoing reasons and still exists, contact Sungrow Service.
Leakage protection	current	
Overload protection		Wait for the PCS to return to normal. If the fault occurs repeatedly, contact Sungrow Service.
DC overcurrent		Wait for the PCS to return to normal. If the fault occurs repeatedly, contact Sungrow Service.
AC over current		1. Check whether the external grid is abnormal during on-grid operation 2. Check whether the load is excessively heavy during off-grid operation 3. If the fault still exists, please contact Sungrow Service.
Temperature anomaly		When the internal temperature returns to normal, the machine will reconnect to the grid. If the fault occurs repeatedly: 1. Check if the ambient temperature of the PCS is too high 2. Check if the machine is in a place that is easy to ventilate 3. Check if the machine is in direct sunlight, if it is, please properly shade it. 4. Check if the fan is running normally. If it is not normal, please replace the fan. 5. If the fault is not caused by the foregoing reasons and still exists, contact Sungrow Service.
Hardware fault		Wait for the PCS to return to normal. If the fault occurs repeatedly, contact Sungrow Service.

### For Battery Side

Specification	Troubleshooting
Low insulation	Wait for the PCS to return to normal. If the fault occurs



Specification		Troubleshooting
resistance		repeatedly: 1. Check if the ISO impedance protection value of the PCS is too high, and confirm that it meets the requirements. 2. Check if the battery box environment is rainy or not, and measure whether the insulation resistance value of the positive and negative poles of the battery box is too low. 3. If the fault is not caused by the foregoing reasons and still exists, contact Sungrow Service.
AC SPD fault		1. Check if the SPD is loose or damaged. If it is damaged, replace the lightning arrester. 2. If the fault is not caused by the foregoing reasons and still exists, contact Sungrow Service.
Analog anomaly	offset	1. Restart the PCS 2. Check if the internal connection is loose. 3. If the fault is not caused by the foregoing reasons and still exists, contact Sungrow Service.
BAT reversed	polarity	1. Check whether polarities of the connected battery are reversed 2. If the fault still exists, please contact Sungrow Service.
AC imbalance	current	If the fault occurs repeatedly, please contact Sungrow Service.
DC SPD fault		Check if the SPD is loose or damaged. If it is damaged, replace the lightning arrester.
DC soft start fault		Restart the PCS. If the fault persists, please contact Sungrow Service.
DC component fault		When the fault is stopped, the PCS will restart automatically. If the fault occurs frequently, please contact customer service.
Parallel communication fault		1. Try to power down and restart the PCS; 2. Check if the parallel communication line is loose; 3. If the fault is not caused by the foregoing reasons and still exists, contact Sungrow Service.
AC imbalance	voltage	When the grid returns to normal, the machine will reconnect to the grid. If the fault occurs repeatedly: 1. Measure the actual grid voltage. If the grid voltage imbalance is indeed higher than the set value, please contact the power company. 2. Check if setting grid voltage imbalance parameter is reasonable in the App. 3. If the fault is not caused by the foregoing reasons and still exists, contact Sungrow Service.
Battery communication failure		Restart the PCS. If the fault persists, please contact Sungrow Service.
BMS battery failure		
Soft start failure		
Midpoint shift	potential	



Specification	Troubleshooting
Carrier synchronization failure	<ol style="list-style-type: none"> <li>1. Try to power down and restart the PCS;</li> <li>2. Check if the carrier sync line is loose;</li> <li>3. If the fault is not caused by the foregoing reasons and still exists, contact Sungrow Service.</li> </ol>

## 9.2 Maintenance

### 9.2.1 Routine Maintenance

Items	Methods	Period
System clean	Check the temperature and dust of the PCS. Clean the PCS enclosure. Check the humidity and dust of the environment. Meanwhile check whether the filter function of the air inlet is ok. Clean the air inlet and outlet, when necessary.	Six months to a year (it depends on the dust contents in air.)
Fans	Check whether there is crack of the fan blade Check whether there is any abnormal noise of the fan. Clean or replace the fans.	Once a year
Devices check	Check the fuses and the DC SPD. Replace the fuse. Contact Sungrow to order new DC SPDs.	Every 6 months

### 9.2.2 Maintenance Instruction

#### Fans' Maintenance

There are three fans at the side of the PCS for active cooling during running operation. If the fans are dirty or out of work, the PCS may not be well cooled down and its efficiency may accordingly decrease. Therefore it is necessary to clean the dirty fans or replace the broken fans.

#### DANGER

- **Disconnect the PCS from the grid first and then batteries before any maintenance work.**
- **Lethal voltage still exists in the PCS. Please wait for at least 5 minutes and then perform maintenance work.**
- **Fans' maintenance work may only be performed by qualified electricians.**

**Step 1** Disconnect the AC circuit breaker.

**Step 2** Turn off the upstream DC circuit breaker. Rotate BAT switch at the side of PCS to the "OFF" position.

**Step 3** Wait for at least 5 minutes.

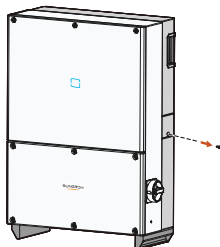


**Step 4** Disconnect all electrical connection in the reverse procedures in the chapter 6 Electrical Connection

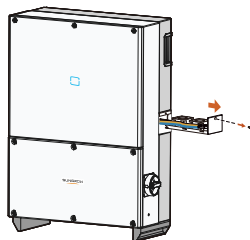
**Step 5** Lift up the PCS over the backplate with the help of others and then remove it from the wall.

**Step 6** Place the PCS onto the platform.

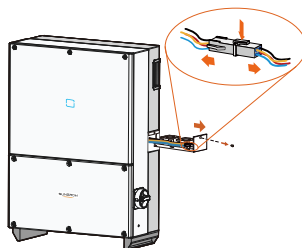
**Step 7** Unscrew the cover plate of the fan.



**Step 8** Clasp the groove (near the cover plate of the fan) on the back of the PCS by your fingers and pull out the slot of the fan.



**Step 9** Press the hump of the latch hook and unplug the cable connection joint outwards.



**Step 10** Remove fans from the PCS.

**Step 11** You can clean the dirty fans with soft brush or vacuum cleaner. Or replace the broken fans.

**Step 12** Re-assemble the fans onto the PCS.

**Step 13** Connect the four connectors and fasten them with cable ties.

**Step 14** Assemble the plate by fastening the two screws of both sides.

**Step 15** Perform the electrical and mechanical connection and then restart the PCS.



### **Clean Air Inlet and Outlet**

A huge amount of heat is generated in the process of running the PCS. The PCS adopts a controlled forced-air cooling method.

In order to maintain good ventilation, please check whether there is anything blocking the air inlet and outlet.

Clean the air inlet and outlet with soft brush or vacuum cleaner if necessary.



# 10 iSolarCloud App

## 10.1 Brief Introduction

The iSolarCloud App can establish communication connection to the PCS via the Bluetooth, thereby achieving near-end maintenance on the PCS. Users can use the App to view basic information, alarms, and events, set parameters, or download logs, etc.

\*In case the communication module Eye or WiFi is available, the iSolarcloud App can also establish communication connection to the PCS via the mobile data or WiFi, thereby achieving remote maintenance on the PCS.



- This manual describes only how to achieve near-end maintenance via the Bluetooth connection. For remote maintenance through the Eye or WiFi, refer to the related manuals in the delivery scope.
- Screenshots in this manual are based on the Android system V2.1.4, and the actual interfaces may differ.

## 10.2 Download and Install

### Method 1

Download and install the App through the following Application stores:

- MyApp (Android, mainland China users)
- Google Play (Android, users other than mainland China ones)
- App store (iOS)

### Method 2

Scan the following QR code to download and install the App according to the prompt information.





The App icon appears on the home screen after installation.



10.3 Menu

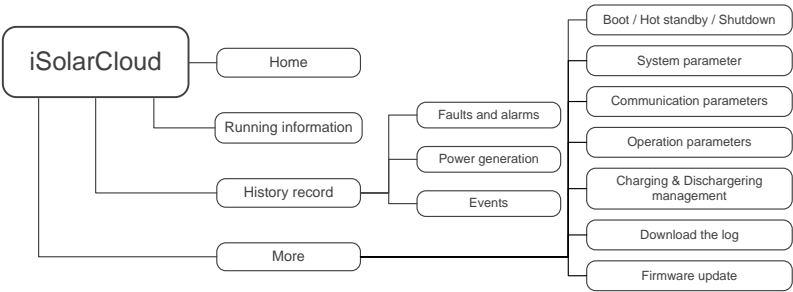


Fig. 10-1 Menu tree

10.4 Login

10.4.1 Requirements

The following items should meet requirements:

- The AC and DC sides or the AC side of the PCS is powered-on.

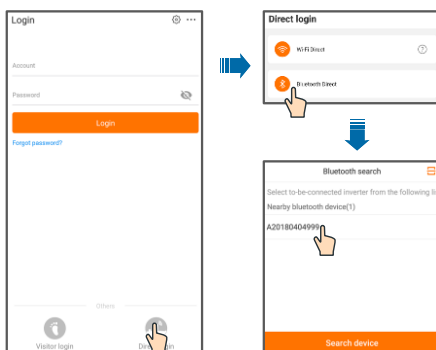


- The mobile phone is within 5m away from the PCS and there are no obstructions in between.
- The Bluetooth function of the mobile phone is enabled.

### 10.4.2 Login Steps

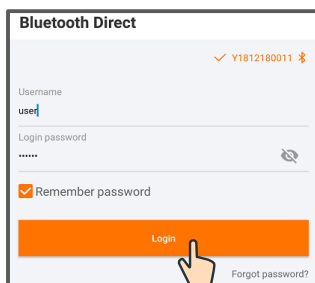
**Step 1** Open the App to enter the login interface, and click "Direct Login" to enter the next screen.

**Step 2** Open the App, after which the Bluetooth search screen pops up automatically, and select the to-be-connected PCS according the SN on the nameplate of the PCS. The Bluetooth indicator is on once the connection is established. Alternatively, tap "📄" to scan the QR code on the side of the PCS to establish Bluetooth connection.



**Fig. 10-2 Bluetooth connection**

**Step 3** Enter the login screen after the Bluetooth connection is established.



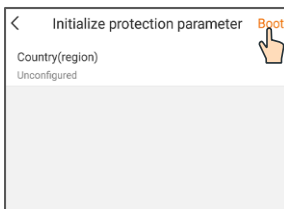
**Fig. 10-3 Login**





- Enter "user" in the username bar according to the current user permission. For details, refer to 1.3 User Permission.
- The initial password is "pw1111" which should be changed for the consideration of account security.

**Step 4** If the PCS is not initialized, you will enter the initialization protection parameter quick setting interface. After setting the quick setting interface, click "Boot" and the device will be initialized. The App will send start instructions and the device will start and operate.



**Fig. 10-4** Initialization protection parameter

#### NOTICE

**If the country code is not set correctly during commissioning, reset the protection parameters. There may be faults unless this is done.**

**Step 5** If the PCS is initialized, the App automatically turns to its homepage.

## 10.5 Home page

After login, the home page is as follows:



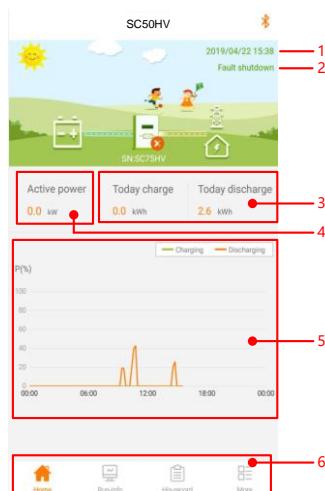


Fig. 10-5 Home page

Tab. 10-1 Home page description

No.	Designation	Description
1	Date and time	System date and time of the PCS
2	PCS state	Present operation state of the PCS For details, refer to Tab. 10-2Description of PCS state
3	Charge and discharge volume	Today power yield and accumulative power yield of the PCS
4	Real-time power	Output power of the PCS
5	Power curve	Curve showing change of power during the whole day. (Each point on the curve represents the percentage of present PCS power to rated power)
6	Navigation bar	Including "Home", "Run-info", "His-record", and "More"

Tab. 10-2 Description of PCS state

State	Description
Initial standby	The PCS is in the initial power-on standby state
ISO detection	The PCS is in the insulation state.
Starting	The PCS is initializing.
Run	After being energized, PCS converts the DC power into AC power. This is the normal operation mode.
Alarm running	The PCS is in running state with alarms (the device is abnormal, but can still start and run)
Derating running	The PCS derate actively due to environmental factors such as temperature or altitude



State	Description
Hot standby	The PCS is in hot standby state. After setting the start instruction, it can respond quickly and output power
Instruction shutdown	The stop state triggered by stop instruction sent by the App or PC
Fault shutdown	If a fault occurs, PCS will automatically stop operation, disconnect the AC relay. The fault information will be displayed in the App. Once the fault is removed in recovery time, PCS will automatically resume running.
Emergency stop	Stop triggered through external stop button

If the PCS is running abnormally, the alarm or fault icon will be displayed in the lower right corner of the PCS icon in the middle of the screen. The user can tap this icon to enter the alarm or fault screen to view detailed information and corrective measures.




Fault

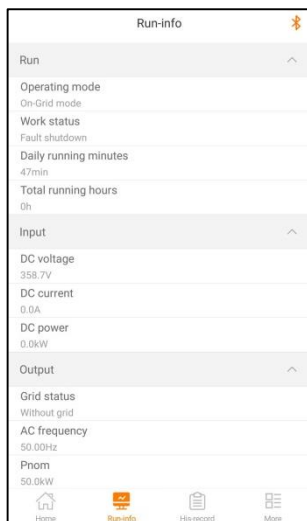


Alarm

## 10.6 Running Information

Tap  "on the navigation bar to enter the running information screen, as shown in the following figure.



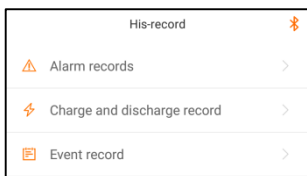


**Fig. 10-6** Running Information

The run info includes the run, input, output and other info.

## 10.7 History Record

Tap "His-record" on the navigation bar to enter the history record screen, as shown in the following figure.



**Fig. 10-7** History record

On "history record" screen, you can check the alarm records, charge and discharge record and event record.

### 10.7.1 Alarm Records

Tap "Alarm records" to view fault and alarm records, as shown in the following figure.



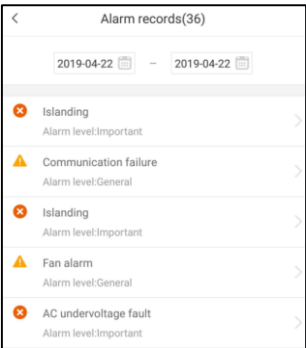


Fig. 10-8 Alarm records



- Click "📅" to select a time segment and view corresponding records.
- The PCS can record up to 100 latest entries.

Select one of the records in the list and click the record, to view the detailed fault info as shown in following figure.

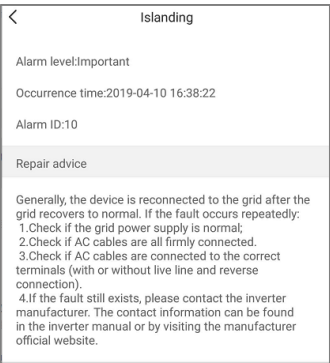


Fig. 10-9 Detailed fault alarm info

### 10.7.2 Charge and Discharge Records

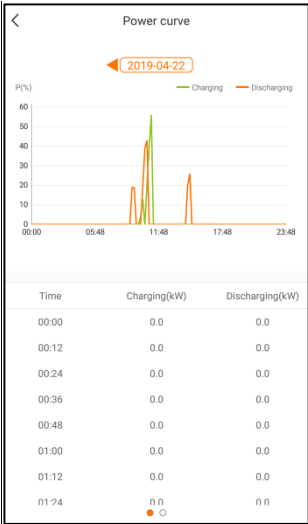
User can view various energy records: power curve, daily / monthly / annual charge and discharge curve.



**Tab. 10-3** Explanation of power yields records

Parameter	Description
Power curve	Display the power output in a single day. Each point in the curve is the percentage of present power and nominal power.
Daily charge and discharge curve	Display daily discharge and charge volumes.
Monthly charge and discharge curve	Display monthly discharge and charge volumes.
Annual charge and discharge curve	Display annual discharge and charge volumes.

Click the “⚡ Charge and discharge record ” to view the power curve page as shown in following figure.



**Fig. 10-10** Power curve

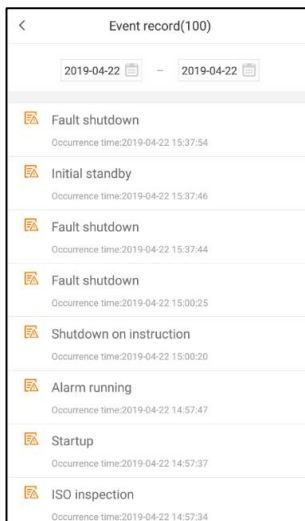
Tap the time bar “2019-04-22” on the top of the screen to select a time segment and view the corresponding power curve.

**Step 2** Swipe left to check the charge and discharge curve.

**10.7.3 Event Records**

Click “📅 Event record ” to view event record list.





- Click "📅" to select a time segment and view corresponding event records.
- The PCS can at most record the latest 100 events

## 10.8 More



Tap "More" on the navigation bar to enter the "More" screen, as shown in the following figure.



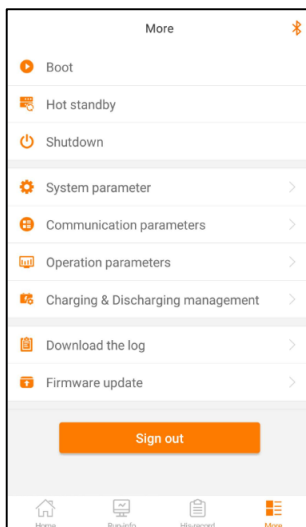


Fig. 10-11 More

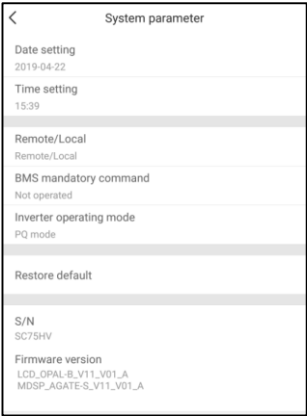
### 10.8.1 Boot / Hot standby / Shutdown

Tap " Boot " / " Hot standby " / " Shutdown " to issue the corresponding command to the PCS.

### 10.8.2 System parameter

Tap " System parameter " to enter the system parameter screen.






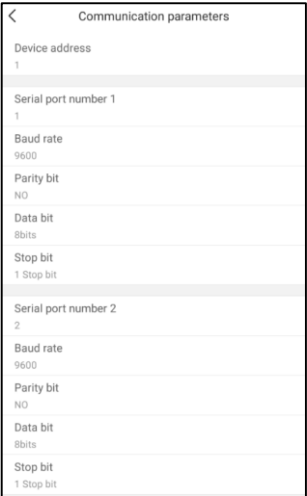
Tab. 10-4 Explanation of system parameters

Parameter	Description
Date Setting	Time deviation between the time on the device and the local time of the installation site may cause data logging failure. Please adjust device time according to the local time.
Time Setting	
Remote / Local	Remote/Local control
BMS mandatory command	Reserved
PCS operating mode	Inversion operating mode
Restore default	All history information will be unrecoverable cleared and all parameters will return to the default value except the protective parameters and time once the “Reset to Factory Defaults” operation is performed.
S/N	Serial number of this device.
Firmware version	Including LCD and DSP software version.


10.8.3 Communication parameters

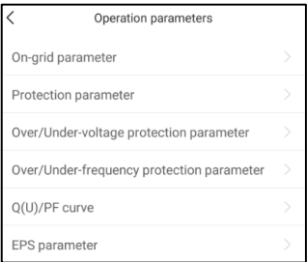
Tap "  Communication parameters" to enter the communication parameter screen.





10.8.4 Operation parameters

Tap "  Operation parameters " to enter the operation parameter screen.



For convenient protection parameter setting, the protection parameters are preset for certain countries. After country setting, select the protection stage as single or multiple and then set the corresponding protection parameter.

Tab. 10-5 Single-stage Protection Parameters Explanation

Parameter	Range
AC under-voltage single-stage protection value	10.0%~95.0%
AC over-voltage single-stage protection value	105.0%~150.0%
AC under-frequency single-stage protection value	45.00Hz~59.80Hz
AC over-frequency single-stage protection value	50.20Hz~66.00Hz



**Tab. 10-6** Multi-stage Protection Parameters Explanation


Parameter	Range
AC over-voltage level 1 protection value	105.0%~150.0%
AC over-voltage level 2 protection value	105.0%~150.0%
AC over-voltage level 3 protection value	105.0%~150.0%
AC over-voltage level 4 protection value	105.0%~150.0%
AC over-voltage level 5 protection value	105.0%~150.0%
AC over-voltage level 1 protection time	SA: 12.00s~13.00s HE: 9.20s~10.00s CN: 0.02s~300.00s
AC over-voltage level 2 protection time	SA: 12.00s~13.00s HE: 9.20s~10.00s CN: 0.02s~300.00s
AC over-voltage level 3 protection time	SA: 12.00s~13.00s HE: 9.20s~10.00s CN: 0.02s~300.00s
AC over-voltage level 4 protection time	SA: 12.00s~13.00s HE: 9.20s~10.00s CN: 0.02s~300.00s
AC over-voltage level 5 protection time	SA: 12.00s~13.00s HE: 9.20s~10.00s CN: 0.02s~300.00s
AC under-voltage level 1 protection value	10.0%~95.0%
AC under-voltage level 2 protection value	10.0%~95.0%
AC under-voltage level 3 protection value	10.0%~95.0%
AC under-voltage level 4 protection value	10.0%~95.0%
AC under-voltage level 5 protection value	10.0%~95.0%
AC under-voltage level 1 protection time	SA: 20.00s~21.00s HE: 20.00s~21.00s CN: 0.02s~300.00s
AC under-voltage level 2 protection time	SA: 20.00s~21.00s HE: 20.00s~21.00s CN: 0.02s~300.00s
AC under-voltage level 3 protection time	SA: 20.00s~21.00s HE: 20.00s~21.00s CN: 0.02s~300.00s
AC under-voltage level 4 protection time	SA: 20.00s~21.00s HE: 20.00s~21.00s CN: 0.02s~300.00s
AC under-voltage level 5 protection time	SA: 20.00s~21.00s HE: 20.00s~21.00s CN: 0.02s~300.00s
AC over-frequency level 1 protection value	50.20Hz~66.00Hz
AC over-frequency level 2 protection value	50.20Hz~66.00Hz
AC over-frequency level 3 protection value	50.20Hz~66.00Hz
AC over-frequency level 4 protection value	50.20Hz~66.00Hz
AC over-frequency level 5 protection value	50.20Hz~66.00Hz
AC over-frequency level 1 protection time	0.02s~1000.00s

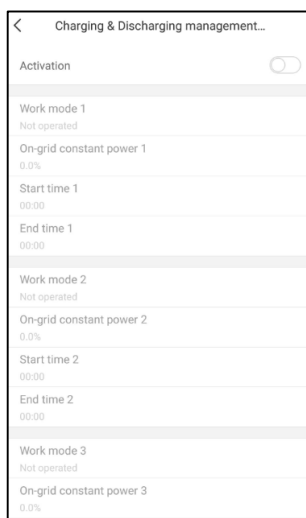


Parameter	Range
AC over-frequency level 2 protection time	0.02s~1000.00s
AC over-frequency level 3 protection time	0.02s~1000.00s
AC over-frequency level 4 protection time	0.02s~1000.00s
AC over-frequency level 5 protection time	0.02s~1000.00s
AC under-frequency level 1 protection value	45.00Hz~59.80Hz
AC under-frequency level 2 protection value	45.00Hz~59.80Hz
AC under-frequency level 3 protection value	45.00Hz~59.80Hz
AC under-frequency level 4 protection value	45.00Hz~59.80Hz
AC under-frequency level 5 protection value	45.00Hz~59.80Hz
AC under-frequency level 1 protection time	0.02s~1000.00s
AC under-frequency level 2 protection time	0.02s~1000.00s
AC under-frequency level 3 protection time	0.02s~1000.00s
AC under-frequency level 4 protection time	0.02s~1000.00s
AC under-frequency level 5 protection time	0.02s~1000.00s


Proceed to set the protection recovery value after setting the single-stage/multi-stage protection stage.

### 10.8.5 Charging & Discharging management

Tap "  Charging & Discharging management " to enter the charging & discharging management screen.




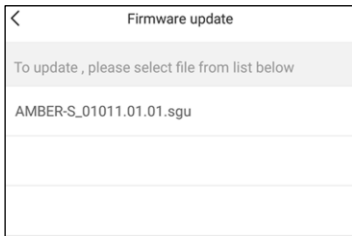
### 10.8.6 Download the log

Tap "  Download the log " to enter the download the log screen.



### 10.8.7 Firmware update

Tap " Firmware update" to enter the firmware upgrade screen, as shown in the following figure.

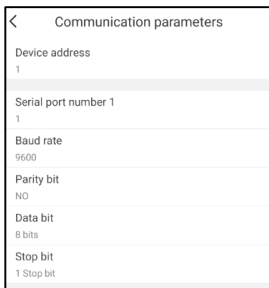


**Fig. 10-12** Firmware upgrade

Select the desired upgrade package to upgrade the firmware.

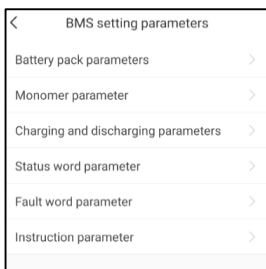
## 10.9 Configuring BMS Data Sources

**Step 1** Enter the “Communication Parameters” interface and modify the baud rate, parity and data bits according to the communication protocol.

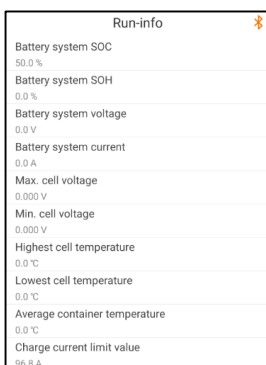


**Step 2** Enter the “BMS Setting Parameters” interface and configure BMS related parameters according to the battery protocol, including battery SOC, battery SOH, total battery voltage, total battery current, maximum cell voltage, minimum cell voltage, maximum cell temperature, Minimum monomer temperature and other parameters.





**Step 3** Check the set parameters in “Operation Information”, check and confirm the correct and proceed to the next step.



Configure the unit, offset, address, and finally configure the valid flag.

Unit refers to resolution or accuracy, respectively 0.1, 1, 0.001

- If the accuracy of the protocol is 0.1, configure 1 in the unit of the App.
- If the precision in the protocol is 1, configure 0 in the unit in the App.
- If the accuracy of the protocol is 0.001, configure 100 in the unit of the App.

If it is like an alarm or a fault, directly follow the default value

The offset represents the offset, configured according to the protocol, and if not specified in the protocol, it is processed according to the default value.

Address represents register address

The valid flag refers to whether to obtain this BMS information, input 1 for acquisition, and 0 for no acquisition.



**Step 4** After the PCS is powered on, enter "Forbidden" on the [Wake-up Command] page, enter 0 for "Address" in the [Command 1] page, and enter "1" for "Valid Flag".

<

Instruction parameter

Wake-up instruction

Valid mark

0

Address

0

Enable

0

Disable

0

Switch instruction

Valid mark

0

Address

0

Enable

0

Disable

0

<

Instruction parameter

Instruction 1

Valid mark

1

Address

0

Wake-up mask

Unconfigured

Switch mask

Unconfigured

Reset mask

Unconfigured

Instruction 2

Valid mark

0

Address

0

Wake-up mask

Unconfigured

Switch mask

Unconfigured

**Step 5** Close the switch, the "valid flag" on the page of [Instruction 1] is 0.



# 11 Appendix

## 11.1 Technical Data

Parameters	SC50HV-20	SC60HV-20
<b>DC side</b>		
DC Voltage range	700 - 1500V	840 - 1500V
Min. DC voltage	580 V	700V
DC voltage range for nominal power (On Grid)	580 - 1300V(@50°C) 580 - 1500V(@35°C)	700 - 1300V(@50°C) 700 - 1500V(@35°C)
DC voltage range for nominal power ( On Backup)	700 - 1300V(@50°C) 700 - 1500V(@35°C)	840 - 1300V(@50°C) 840 - 1500V(@35°C)
Max. DC current	96.6 A	96.6 A
Max. DC power	56 kW	67kW
<b>AC side (Grid)</b>		
AC output power	55 kVA @ 45 °C / 50 kVA @ 50 °C	66 kVA @ 45 °C / 60 kVA @ 50 °C
Max. AC output current	79.3 A	79.3 A
Nominal AC voltage	400 V	480V
AC voltage range	360~440 V	422.4 ~ 528 V
Nominal grid frequency / Grid frequency range	50 Hz / 45 - 55 Hz, 60 Hz / 55 - 65 Hz	60 Hz / 55 - 65 Hz
AC current harmonic(THD)	< 3 % (at nominal power)	< 3 % (at nominal power)
Power factor at nominal power	> 0.99	> 0.99
Adjustable reactive power	-100% – 100%	-100% – 100%
<b>AC side (Off-Grid)</b>		
AC output power	55 kVA @ 45 °C / 50 kVA @ 50 °C	66 kVA @ 45 °C / 60 kVA @ 50 °C
Nominal AC voltage	230 V ± 3 % , 3/N/PE	277V ± 3 %, 3/N/PE
AC voltage harmonic(THD)	< 3 % (Linear load)	< 3 % (Linear load)
Unbalance load capacity	100%	100%
Nominal voltage frequency / Voltage frequency range	50 Hz / 45 - 55 Hz, 60 Hz / 55 - 65 Hz	60 Hz / 55 - 65 Hz



<b>Efficiency</b>		
Max. efficiency	98.4%	98.6%
<b>Protection</b>		
Reverse polarity protection	Yes	Yes
DC switch	Yes	Yes
AC switch	Yes	Yes
Overvoltage protection	DC Type II / AC Type II	DC Type II / AC Type II
Grid monitoring / Ground fault monitoring	Yes / Yes	Yes / Yes
Insulation monitoring	Yes	Yes
Overheat protection	Yes	Yes
<b>General Data</b>		
Dimensions (W*H*D)	600*800*278 mm	600*800*278 mm / 23.6in*31.5in*10.9in
Weight	80 kg / 176.4lbs	80 kg / 176.4lbs
Topology	Transformerless	Transformerless
Degree of protection	IP65	NEMA 4X
Operating ambient temperature range	-30 to 60 °C (> 50 °C derating)	-30 to 60 °C (> 50 °C derating) -22 to 140 °F (> 122 °F derating)
Allowable relative humidity range	0 – 100 %	0 – 100 %
Cooling method	Temperature-controlled forced air cooling	Temperature-controlled forced air cooling
Display	LED, Bluetooth + APP	LED, Bluetooth + APP
Max. operating altitude	4000 m (> 3000 m derating)	4000 m (> 3000 m derating)/13123 ft (> 9843 ft derating)
Self-consumption at stop	< 20 W	< 20 W
Communication	RS485 / Ethernet	RS485 / Ethernet
Communication protocol	Modbus-RTU / Modbus-TCP	Modbus-RTU / Modbus-TCP
Compliance	CE, IEC 62477, IEC 61000	UL 1741, UL 1741 SA, Rule 21
Grid support	L/HVRT, active & reactive power control and power ramp rate control	L/HVRT, active & reactive power control and power ramp rate control

## 11.2 Exclusion of Liability

The content of these documents is periodically checked and revised, please



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- Installing or operating the product under incorrect safety or protection conditions
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## 11.3 Contact Information

Should you have any question about this product, please contact us.

We need the following information to provide you the best assistance:

- Type of the device
- Serial number of the device
- Fault code/name
- Brief description of the problem

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